

To: Steve Gramm, Study Advisory Team	
From: Rick Laughlin	Project: I-190/Silver St.
CC:	
Date: 4/4/2011	Job No:

**RE:** Special event observation

HDR conducted an observation of special event traffic on 3/18 and 3/19, 2011 to determine special traffic demands posed by special events and the potential impacts within the study area for the Silver Street interchange. On those evenings, the following special events were occurring at the Rushmore Plaza Civic Center:

- State "A" boys basketball tournament
- Rapid City Rush hockey game
- South Dakota State Valley 8-ball tournament
- Musical performance

Observations were conducted at various locations around the Civic Center beginning at about 4:30 PM and continuing until after 10 PM. The locations included 1) the I-190/Silver Street interchange, 2) the North Street/Mt. Rushmore Road intersection, 3) the 5<sup>th</sup> Street/North Street intersection, 4) the 5<sup>th</sup> Street/New York Street intersection and 5) the Omaha Street/Mt. Rushmore Road intersection. The locations are also shown in Figure 1. Observation notes are attached to this memorandum for reference.

A number of inferences have been drawn from the observations, each of which is discussed below.

1. Vehicles circulating to find parking may have multiple impacts within the study area. All the locations studied showed evidence of drivers looking for parking at the primary Civic Center parking lots and, finding the primary lots full, traveling to other locations looking for parking. Parking circulation caused some drivers to pass through several of the studied intersections instead of driving directly to a parking stall, increasing the congestion for everyone.
2. Parking overflowed into the residential neighborhoods north of the Civic Center, resulting in illegal parking and congestion. The temporary loss of parking to construction increased the parking shortage and associated overflow issues.
3. The Silver Street interchange could have carried more traffic, especially with a more efficient interchange configuration.
4. The configuration of the closed turning lane and multiple stop signs at the existing Silver Street interchange resulted in confusion and potential safety problems for visitors.
5. Significant pedestrian traffic resulted from patrons parking in neighborhoods, in Downtown, or in remote parking lots. Pedestrian traffic added further to intersection congestion.



**Figure 1 – Special Event Observation Locations**

6. Event traffic resulted in the Omaha St./Mt. Rushmore Rd. intersection running over capacity for periods of time between 15 and 30 minutes in length, particularly the eastbound left turn lane.

These findings point toward the following suggested actions:

1. Reconfigure the I-190/Silver St. interchange to operate more efficiently and facilitate use of the interchange to handle event traffic. A more efficient and typical interchange would encourage more use and ease issues at other locations, especially considering the amount of out-of-town traffic.
2. Provide a parking management system to handle heavy event traffic. Such a system could be as complex as a computer-controlled system that monitors parking supply and demand and directs traffic to the closest available parking, or as simple as using portable message boards to give drivers advanced warning when the main lots are full. Note that flaggers and crossing guards are currently used at some locations on the Civic Center property.
3. Provide more extensive circulating transit to pick up/drop off people at satellite parking and at Downtown venues.

To: Rick Laughlin	
From: Jody Page	Project: I-190 Interchange Options Study
CC:	
Date: 3/21/11	Job No:

**RE: Civic Center Event Intersection Traffic Observations (3/18/11)**

- LOCATION #1 – Interstate 190 and Silver Street Interchange.
- 5:00 – Very light traffic. Note that the Rapid City Central High School parking lot is mostly closed for construction project. The normal Westbound to Southbound left lane under the bridge has also been closed by the SDDOT due to the bridge clearance issues.
- 5:12 – Traffic picking up slightly. Majority of movement in the Northbound off ramp and Eastbound on North Street. The only minor traffic issues are with vehicles not probably executing the 4 way stop sign movement which causes slight delays. The Northbound off ramp traffic had additional width which allows for forming two lines for thru/right turns and a left turn lane.
- 5:20 – Steady traffic. A total of 6 pedestrians pass through intersection from the East and West heading North. The only pedestrians observed but the lack of sidewalks had them crossing at non-crosswalk locations.
- 5:35 – Traffic seemed to lighten back up. Overall, the stop sign controlled intersections appear to be functioning well.
- 5:42 – Starting to see an increase in traffic on Northbound off ramp, proceeding mostly East towards the event and north. Southbound turning right to Westbound is also steady.
- 5:45 – Some stacking is occurring for Westbound under the bridge at the West stop sign, but hasn't backed into the West Blvd/North Street intersection yet.
- 5:50 – Continued steady traffic on Northbound off ramp & Eastbound North St. traffic towards the event, but usually only for short instances and then it slows. Noticed that event parking is starting to overflowing into the Easter portion of the Central High School parking lot that remained open.
- 6:09 – Steady traffic from all directions. 4 way stop still appears to be functioning properly.
- 6:14 – Westbound vehicle attempting to turn left almost turns onto the Northbound off ramp one-way. (Near miss) Vehicle stops during turn, and then proceeds under the bridge to turn left at the proper stop sign.
- 6:22 – Noticed that event vehicles have started parking in the residential areas on the North side of North St and walking across street.
- 6:30 – Heavy Northbound off ramp traffic & Eastbound coming under the bridge is developing a queue, likely from the I-190 Southbound exit ramp.
- 6:35 – Vehicle makes illegal left hand turn from North Street onto Northbound off ramp. Vehicle proceeds two blocks in the wrong direction down the one-way and turns into RCC high school parking lot entrance. (Near miss). Fortunately, no vehicles were traveling Northbound at the time.

- 6:42 – Traffic levels slowing down.
- 9:39 – Hockey Game Ends. Rapid City Rush win 2-1.
- 9:46 – Westbound traffic becoming heavy. Little to no cross traffic allows for a good progression of Westbound traffic through stop controlled intersection. Westbound queue under the bridge from the West stop sign backs up thru to the West Blvd intersection periodically. The Westbound queue at the East stop sign is staking 6-10 cars deep for the 2 lanes, 75% of the Westbound appears to be going Southbound onto I-190.
- 9:52 – Traffic starting to let up slightly, the Westbound queue at the East stop sign is down to a 1-5 car queue.
- 10:09 – Basketball Game Ends. Viborg/Hurley defeats Dell Rapids.
- 10:22 – Traffic continues at moderate letting up to light. Stop sign intersections continue to function adequately primarily due to the light cross traffic.

To: Rick Laughlin	
From: Rich Liggett	Project: I-190/Silver Street
CC:	
Date: 03/21/2011	Job No:

**RE:** Intersection observations (North St. / Mount Rushmore, Location 2) (3/18/11)

- 5:00 P.M. – Normal traffic flow, traffic cycle through intersection seems normal
- 5:05 – Looks like local residential pedestrian traffic crossing at intersection
- 5:09 – Exhibition driving from Mt. Rushmore to North St. westbound
- 5:15 – Pedestrian traffic crossing in crosswalk
- 5:16 – Pedestrian traffic crossing in crosswalk
- 5:17 – Civic Center Bus starting to transport people from Central Parking lot
- 5:20 – Pedestrian traffic crossing in crosswalk
- 5:25 – Pedestrian traffic crossing in crosswalk
- 5:29 – Pedestrian traffic crossing in crosswalk
- 5:36 – Pedestrian traffic crossing in crosswalk
- 5:40 – Noticeable increase in traffic on Mt Rushmore NB and North St. E/W bound
- 5:42 – Pedestrian traffic crossing in crosswalk
- 5:43 – Parking North of North St for events and Pedestrian traffic crossing in crosswalk
- 5:48 – Pedestrian traffic crossing in crosswalk
- 5:49 – Pedestrian traffic crossing in crosswalk
- 5:57 – Pedestrian traffic crossing in crosswalk
- 5:58 – Pedestrian traffic crossing in crosswalk
- 5:59 – NB East turn lane on Mt Rushmore queue is 7 deep
- 5:59 – Pedestrian traffic crossing in crosswalk
- 6:00 – Increased traffic NB on Mt Rushmore turning East to North St.
- 6:00 – Appears that Parking in Civic Center is full traffic is looking for additional parking
- 6:03 – Increased Parking on Allen and Fillmore North of North Street
- 6:06 – Increased Traffic from Mt Rushmore to E/W Bound on North st.
- 6:07 – Pedestrian traffic crossing in crosswalk
- 6:10 – Pedestrian traffic crossing in crosswalk – Traffic is less Courteous than has been traffic is rushed through intersection.
- 6:11 – Additional Parking North of North St.
- 6:12 – Pedestrian traffic crossing in crosswalk

- 6:15 – Additional Parking North of North St., Pedestrian traffic crossing in crosswalk
- 6:15 – Traffic Volumes have slowed.
- 6:18 – Traffic has increased
- 6:20 – Additional Parking North of North St., Pedestrian traffic crossing in crosswalk
- 6:24 – Additional Parking North of North St., Pedestrian traffic crossing in crosswalk
- 6:25 – Pedestrian traffic diagonal across intersection
- 6:26 – Pedestrian traffic crossing in crosswalk
- 6:27 – Traffic is increasing Lane Queues are 1 to 2 cars
- 6:28 – Traffic NB on Mt Rushmore Queue 2 to 3 deep
- 6:29 – Pedestrian traffic crossing in crosswalk
- 6:30 – Pedestrian traffic crossing in crosswalk
- 6:31 – Pedestrian traffic crossing in crosswalk
- 6:34 – Additional Parking north of North St.
- 6:35 – Car paused in intersection (not sure why), Parking North of intersection has increased and additional Ped traffic has increased.
- 6:36 – Pedestrian traffic crossing in crosswalk, Queues on Mt Rushmore are 4 deep.
- 6:38 – Traffic queues on North E bound to turn S bound on Mt Rushmore shortly backed up to 4 but then went to 1 or 2 cars.
- 6:38 – Pedestrian traffic crossing in crosswalk, Queues are clearing.
- 6:39 – No cars near intersection, Pedestrian traffic crossing in crosswalk
- 6:40 – Queues are 1 to 2 deep NB on Mt Rushmore and E/W bound on North st.
- 6:42 – Pedestrian traffic crossing in crosswalk
- 6:42 – An SUV came to intersection quickly, slowed and then raced through intersection.
- 6:43 – Additional traffic on Mt Rushmore
- 6:44 – Additional parking north of North st
- 6:46 – Impatient traffic and pedestrian traffic is in a hurry. Sharp braking for Pedestrians crossing in crosswalk
- 6:47 – 11 pedestrians in crosswalk, car stops in middle of intersection to let peds pass.
- 6:48 – Increased Traffic thru intersection. Illegal parking north of intersection has caused congestion north of intersection.
- 6:48 – Pedestrian traffic crossing in crosswalk
- 6:49 – Traffic has increased in all directions
- 6:50 – Intersection of Fillmore and Allen – Near miss, No sight triangle due to parked cars in ROW.
- 6:51 – NB on Mt Rushmore to East Bound on North Queue is 9 deep
- 6:53 – Near miss north of Intersection, Car looking for parking stopped in street and cars both EB and WB turning north.

- 6:54 – Pedestrian traffic crossing in crosswalk
- 6:56 – Pedestrian traffic crossing in crosswalk Rushing to get across intersection
- 6:57 – Civic center bus North of intersection to pickup up Peds.
- 6:58 – Queue NB on Mt Rushmore 7 to 8 Deep
- 6:59 – Reduced traffic through intersection
- 7:00 – Pedestrian traffic Rushing thru intersection
- 7:00 – Additional parking in intersection sight triangle
- 7:07 – Traffic Queues are lighter
- 7:08 – Increased NB traffic on Mt Rushmore turning East on North st
- 7:10 – Car slows thru intersection looking for parking
- 7:12 – Increased Queue depth on NB on Mt Rushmore turning East on North 2-3 cars deep
- 7:21 – Appears to be normal traffic flows.
- 8:30 – Looks like some traffic leaving Basketball game but no delays through intersection.
- 8:45 – Looks like some traffic leaving Basketball game but no delays through intersection.
- 9:00 – Normal Traffic flows
- 9:15 – Slight increase of traffic through intersection
- 9:18 – Increased traffic through intersection – Fast Acceleration through intersection
- 9:20 – Civic Center Staff starting to direct traffic from Parking lot at civic center onto Mt Rushmore
- 9:25 – Increased Traffic leaving Civic center NB on Mt Rushmore Turning E/W bound on North St.
- 9:27 – Driver confusion or Impatience cased car to Halt in intersection to let the proper car through intersection.
- 9:28 – Some Pool players crossing through Crosswalks
- 9:31 – Queue depth on Mt Rushmore is starting to increase to 1 to 2 cars
- 9:32 – Pedestrian traffic through crosswalk
- 9:33 – Queue depth on Mt Rushmore 2 to 3 deep NB Turing E/W bound on north
- 9:35 – Increased pedestrian traffic the intersection
- 9:36 – Rush Game over
- 9:42 – Increased Traffic on Mt Rushmore NB to E/W bound on North St. Increased Ped Traffic Queue 8 to 9 deep
- 9:43 – Lull in traffic Car stops in middle of intersection for allow for Ped traffic
- 9:44 – Heavy Traffic from NB Mt Rushmore East bound traffic having trouble getting ROW to turn Queues are 8 to 9 deep
- 9:46 – Traffic is heavier East and West bound on North than on Mt Rushmore
- 9:47 Queue on Mt Rushmore is 3 to 4 deep
- 9:49 – Still consistent Ped traffic Increase in traffic NB on Mt Rushmore.
- 9:50 – Traffic flowing smoothly through intersection. Queues 0 to 1 cars.

- 9:54 – 2 to 3 Cars NB on Mt Rushmore Queues
- 9:55 – Increase in East/West bound traffic on North St. Queues are only 0 to 1 cars per lane
- 9:56 – Fast acceleration from corner NB to East on North.
- 9:59 – NB Queue on Mt Rushmore 4 cars deep
- 10:00 – Parking lots are still pretty full
- 10:05 – 1 Car per side of intersection – traffic flow has slowed.

To: Jody Page / Rick Laughlin	
From: Steve Hoff	Project: I-190/Silver Street
CC: file	
Date: March 23, 2011	Job No: 137390

**RE: Intersection Observation Notes**

**INTERSECTION OF 5<sup>th</sup> STREET AND NEW YORK AVENUE** (March 18<sup>th</sup>, 2011)

- 4:55 Traffic light – parking lot in NW quadrant is full.
- 5:00 North/South traffic picking up – minor issues. Westbound to southbound does not clear during the green light – mostly due to pedestrian traffic blocking the movement.
- 5:03 Pedestrians greatly affecting the functionality of the intersection – WB to SB is being affected. 2 transit busses transport pedestrians from southeast parking lot to the civic center – very lightly used.
- 5:08 Vehicle not paying attention and skidded to stop at the signal.
- 5:15 5<sup>th</sup> Street northbound left turners occur at the intersection and at the parking lot entrance north of the intersection. 3 to 4 vehicles queue at the intersection – remainder go to the parking lot entrance.
- 5:20 Southbound traffic right turners are all using the parking lot entrance – slowing traffic. No accidents, but a lot of near misses.
- 5:23 northwest parking lot is full
- 5:28 Ped traffic continues its major impact for the westbound to southbound movement. 1 vehicle per green light – continued light use of the busses.
- 5:32 The southbound to eastbound left turn lane is queuing back to the parking lot entrance. Vehicles exiting full parking lot at the lot access are blocking through traffic as they attempt to get into the left turn lane.
- 5:35 There is no advance signage notifying traffic that the parking lot is full. Vehicles enter the lot and then have to make a u-turn and enter 5<sup>th</sup> Street to access the lot in the southeast quadrant – affecting flow due to the blocking of the lanes.
- 5:40 The southbound to eastbound left turn queue is backing up past the lot entrance north of the intersection. Northbound vehicles wishing to turn into the parking lot are now blocking the southbound vehicles wishing to make the left turn at the intersection. SB vehicles blocking the through movement while waiting for the left turn lane to open up.
- 5:50 Continued heavy traffic – intersection flow is good. Parking entrance north of the intersection still creating issues.
- 6:00 Traffic same – pedestrian traffic remains high. (State “A” evening session games begin)
- 6:15 Continued long queues for SB to EB movement. Peds continue to affect the WB to SB – vehicles forced to turn on yellow/red to clear the intersection.
- 6:20 NB queues to south of the Rapid Creek bridge and SB queues north of the parking lot entrance. Parking lot exiting traffic continue to block the through traffic.
- 6:30 No changes.

- 6:45 Traffic volumes are beginning to reduce.
- 7:00 No issues (Rush Hockey beginning)
  
- 9:30 Pedestrian traffic is very heavy. Queuing for westbound to southbound – traffic guards are controlling pedestrian traffic to allow for the left turners. Busses are heavily used post-game.
- 9:50 No issues – Person is controlling the signals and clearing all directions before signal change. Very little delay. The clearing of the parking lots are controlling any overload of the intersection. Heavy eastbound movement out of the southeast parking lot.
- 10:10 No issues – State “A” game just complete.
- 10:20 No issues – exiting the parking lot continues to meter the traffic at the intersection.
- 10:30 No issues.

**INTERSECTION OF HAINES AVENUE AND NORTH STREET** (March 19<sup>th</sup>, 2011)

- 5:00 Traffic is light
- 5:20 Traffic is picking up – no issues as intersection is clearing. Heavy right turners (SB to WB). Very light WB and EB directions.
- 5:40 Moderate traffic – continued light WB and EB.
- 6:00 Moderate traffic – heavier for SB direction. SB right turners remain high. No issues with clearing the intersection.
- 6:30 Heavy SB traffic – easily clear the intersection though.
- 7:00 No Change – Hockey game beginning.
  
- 9:30 Traffic light
- 9:35 State “A” game ends.
- 9:40 EB to NB traffic is picking up – no issues with clearing the intersection since there is no WB traffic.
- 9:50 Same patterns – no issues. Exiting the parking lots continue to meter the traffic minimizing the effects at the intersections.
- 10:00 Continued heavier EB to NB – easily clear – 0 traffic in WB direction.
- 10:15 Traffic lighting up.
- 10:30 Traffic moderate to light.

To: Rick Laughlin	
From: Chris Bailey	Project: I-190 Interchange Options Study
CC:	
Date: 3/21/11	Job No:

**RE: Civic Center Event Intersection Traffic Observations (3/19/11)**

- 4:30 PM – Omaha St./ Mt. Rushmore Rd. – normal Saturday flows, signal operating OK
- 4:44 – Eastbound to Northbound left turn lanes backing up. Queue not clearing each cycle (passing ~8 cars/green).
- 4:45 – Traffic picking up on Mt. Rushmore Rd. South to North thru traffic (10-15 car queue), Eastbound to Northbound left turn (10-16 car queue), and Westbound to Northbound right turn (~10 cars/green).
- 5:02 – Traffic steady, all queues clearing each cycle except eastbound to northbound left turns.
- 5:10 – Eastbound to Northbound left turn lanes backed up 8 cars per lane after cycle.
- 5:13 – Northbound to Eastbound left turn not yielding to Eastbound U-turn (near miss).
- 5:22 – Eastbound to Northbound left turn still backed up (passing ~10 cars/green). Heavy Westbound to Northbound right turns (10-16 cars/green)
- 5:27 – Heavy Southbound to Eastbound left turn traffic (~10 cars/green)
- 5:28 Eastbound to Northbound left turns turning thru red light (~12 cars/green), horns honking, and hard braking in the left turn lanes.
- 5:32 – Eastbound to Northbound left turn traffic filling storage lanes, nearly blocking north thru lane.
- 5:35 – 26 pedestrians crossing south to north on west side of intersection.
- 5:37 – Heavy westbound to northbound right turns (10-15 cars/green)
- 5:39 – All lanes except Eastbound to Northbound left turns clearing queue each cycle.
- 5:51 – Eastbound to Northbound left turn queue lessening (2-4 cars remaining after each cycle).
- 5:53 – Eastbound to Northbound left turn queue cleared.
- 6:02 – Steady traffic, all queues clearing each cycle.
- 6:25 – Eastbound to Northbound left turn backing up (passing ~8 cars/green)
- 6:35 – Heavy Eastbound ( 20+ car queue), Westbound ( 20+ car queue), & Northbound (12-20 car queue) thru traffic.

- 6:44 – Eastbound to Northbound left turns still backed up, all other queues clearing each cycle.
- 6:48 – Heavy Southbound to Eastbound left turns (~8 cars/green)
- 6:55 – 12 pedestrians south to north on east side of intersection.
- 6:57 – Eastbound to Northbound left turn queue cleared.
- 7:00 - Traffic lightening, all queues clearing each cycle.
- 9:15 – Southbound traffic (left turns, thru, and right turns) backing up.
- 9:19 – 15 pedestrians north to south on west side of intersection.
- 9:24 – Heavy Westbound thru traffic (16-20 car queue).
- 9:27 – Heavy Southbound to Eastbound left turns (~10 cars/green), & Southbound to Westbound right turns (~14 cars/green). Southbound to Eastbound left turns three vehicles pass on left turn arrow, 7+ pass on free left turns after Northbound thru traffic clears.
- 9:31 – Hockey game ends.
- 9:32 – 20 pedestrians north to south on east side of intersection.
- 9:34 – Eastbound and Northbound traffic light.
- 9:35 – Southbound traffic clearing each cycle.
- 9:36 – Heavy Southbound to Eastbound left turns (~12 cars/green), Southbound to Westbound right turns (~15 cars/green), & Eastbound thru traffic (20+ car queue).
- 9:40 – Hard braking by both Northbound and Southbound left and right turning vehicles to avoid pedestrians.
- 9:44 – Heavy Southbound to Eastbound left turns (~12 cars/green) & Southbound to Westbound right turns (~20 cars/green).
- 9:50 – Heavy Southbound to Eastbound left turns (~15 cars/green) & Southbound to Westbound right turns (~25 cars/cycle).
- 9:51 – Southbound to Eastbound left turning vehicle turned in front of northbound thru vehicle, brakes locked up, black marks left on pavement (near miss).
- 9:54 – Steady pedestrian traffic north to south, most waiting for signals before crossing.
- 9:56 – All queues except southbound clearing each cycle.
- 9:58 – Heavy Southbound to Eastbound left turns (~11 cars/green) & Southbound to Westbound right turns (~22 cars/cycle).
- 10:06 – Southbound traffic lightening, Southbound to Eastbound left turns (~6 cars/green) & Southbound to Westbound right turns (~10 cars/cycle).
- 10:11 – Steady Eastbound and Westbound thru traffic.

- 10:15 – Parking lots nearly cleared out, Southbound traffic down to normal levels.