City of Grand Junction
Public Works Department
250 North 5th Street
Grand Junction, CO 81501-2668
Phone: (970) 244-1555
FAX: (970) 256-4022

December 11, 2003

Mr. Robert Jenkins
1000n. 9th Street Suite 35
Grand Junction, Co 81501

RE: TEDS Exception from Minimum Access Spacing – St. Mary's Hospital

Dear Robert:

Please find attached the committee's decision on the above request. You may use this decision to proceed through the development review process.

If you have any question concerning this decision, please feel free to contact the Development Engineer in charge of your project or me at (970) 244-1557.

Sincerely,

Tim Moore
Public Works Manager

C: Rick Dorris, Development Engineer (256-4034)
Pat Cecil, Development Services Supervisor

\DE#46-03 St. Mary's

City of Grand Junction
Department of Public Works and Utilities
Engineering Division
250 North Fifth Street
Grand Junction, CO 81501-2668
FAX: (970) 256-4011

DESIGN EXCEPTION #DE46-03

To: Mark Relph, Director of Public Works & Utilities

Copy to: Rick Dorris, Development Engineer
Pat Cecil, Development services Supervisor

From: Tim Moore, Public Works Manager

Date: November 24, 2003

RE: Request to Reduce Minimum Access Spacing on a Principal Arterial Street - St. Mary's Hospital

DESCRIPTION OF THE SITUATION

As part of the implementation of the Master Site Plan for St. Mary's Hospital, the proposed plan for access onto Patterson Road is to consolidate four existing driveways spaced along the Hospital's Patterson Road frontage into a single access point at Mira Vista. Meetings conducted by St. Mary's staff with local residents along Mira Vista indicated a strong opposition to the alternative of combining local access with the Hospital traffic. As an alternative to combining access with Mira Vista, St. Mary's proposed to construct an access point on Patterson Road adjacent to Hospital frontage as shown on the attached site plan.

Section 6.2.8, *Spacing and Offsets* says, "Unsignalized intersections must be T-intersections and spaced at least 600 feet apart, measured centerline to centerline. Unsignalized four legged intersections may be allowed on arterial streets provided that the design for the intersection precludes left turns onto and through movements across the arterial".

The applicant's request is for a full movement access point located approximately 687 feet west of 7th Street and approximately 385 feet east of Mira Vista.

2. The full movement access shall be periodically re-evaluated by SMH and the City. Re-evaluation analyses to be performed by SMH shall include traffic studies, analysis of accident data, Level of Service (LOS) considerations and other relevant factors in accordance with then adopted standards. All analyses shall be submitted to and approved by the City. Re-evaluation(s) shall occur with each successive Master Site Plan update or other application for development (as required by the City's Zoning and Development Code) on the west campus of SMH.

3. If subsequent traffic analyses indicate significant safety concerns as evidenced by increased numbers and severity of accidents, delays or impedance to the through movement function of Patterson Road, the access may be required to be modified to limit some of the access movements. THAT COST WOULD BE THE RESPONSIBILITY OF SMH.

4. The location of the access authorized by this Exception shall be coordinated/constructed with existing driveways on the north side of Patterson Road.

Recommended by: _____

Approved as ~~Requested~~ Recommended: ✓

Denied: _____

DATE: 12/11/03

_____

_____ 12-11-03

_____ 12/12/03

MEMORANDUM

CITY OF GRAND JUNCTION
ENGINEERING DEPARTMENT

TO: Mike McDill
George Miller
Jody Kliska
Lisa Cox

FROM: Rick Dorris

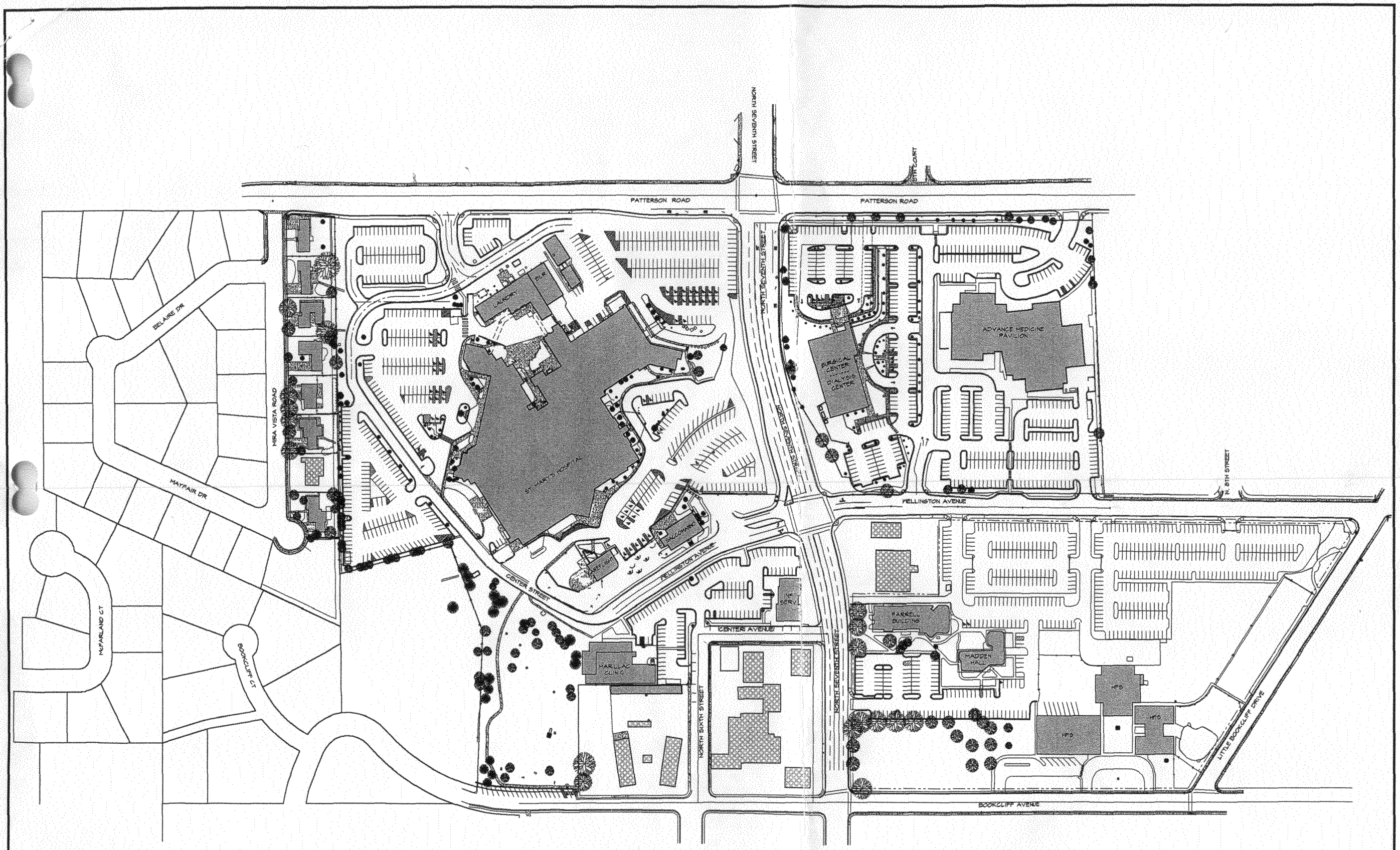
DATE: August 1, 2003

SUBJECT: St. Mary's Access Drawing, Information Only

Rob Jenkins dropped off this drawing today. It is their sketch plan for access to conduct their next neighborhood meeting. It has not been Engineered, simply drawn up. Rob knows they need a TEDS exception for intersection spacing on Patterson.

I asked him if their traffic consultant evaluated the stacking for their road and he said no. They want to see if we are somewhat agreeable prior to Engineering it. They are also hoping this will be full motion. I am concerned that the 7th street que may back up over it.

Please review this drawing for both positive items and challenges and email me your feedback.



1 / C0.0 / A SITE PLAN

NOT TO SCALE

ROBERT D. JENKINS/AIA
ARCHITECT

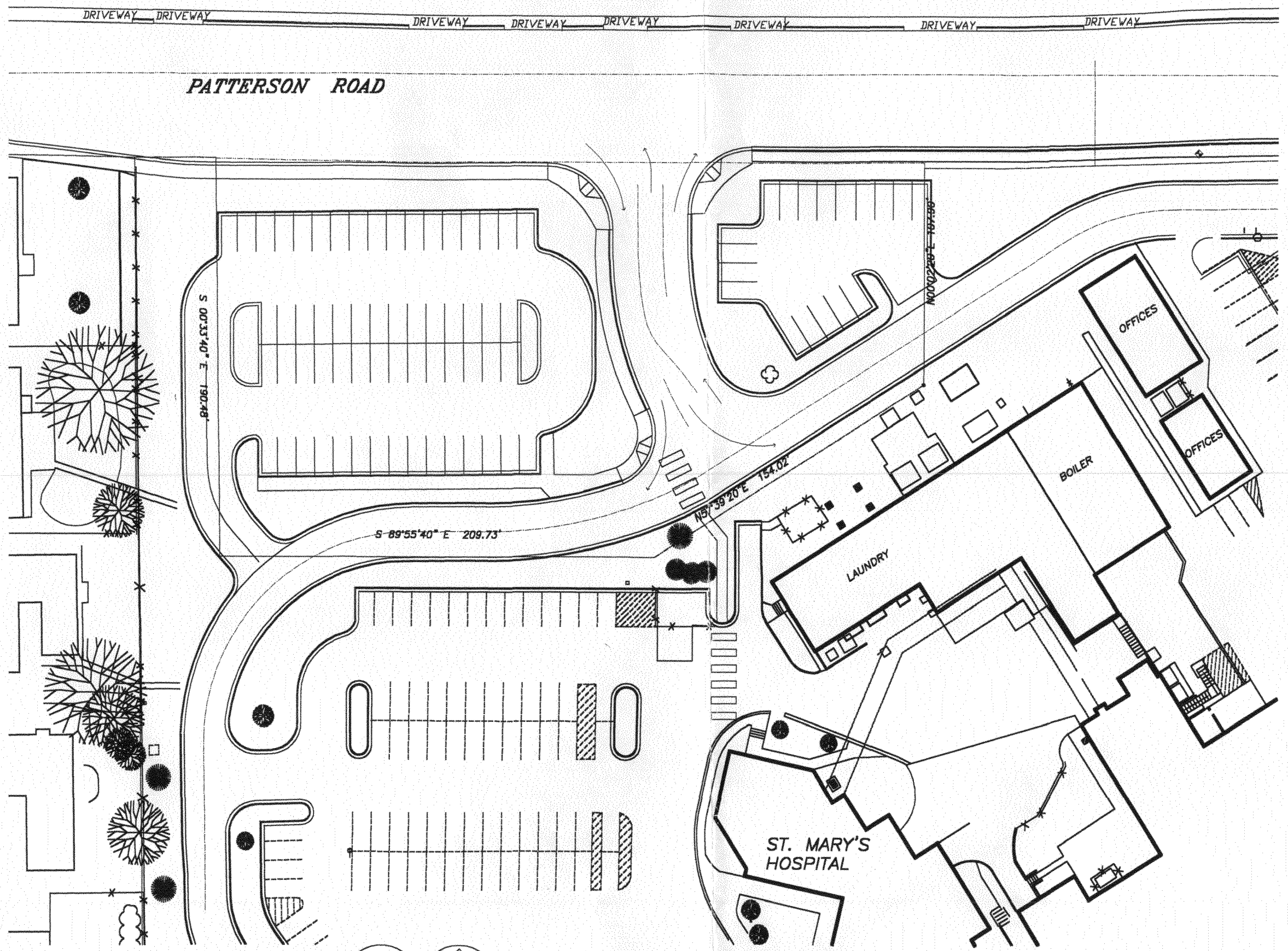
1000 North 9th Suite 35
Grand Junction, Co 81501 (970) 256-1980

PROJECT NUMBER:
0301

DATE:
07/31/03

DRAWN BY:
JMR

C0.0A



1 / C1.1 A NORTHWEST PARKING LOT

1" = 50'-0"

ROBERT D. JENKINS/AIA
ARCHITECT

1000 North 9th Suite 35
Grand Junction, Co 81501 (970) 256-1980

PROJECT NUMBER:
0301

DATE:
07/31/03

DRAWN BY:
JMR

C1.1A

ROLLAND ENGINEERING

405 RIDGES BOULEVARD, SUITE A
GRAND JUNCTION, COLORADO 81503
Phone: (970) 243-8300 • Fax (970) 241-1273
E-Mail: rolleng@bresnan.net

October 29, 2003

City of Grand Junction
City Engineer
Mr. Michael G. McDill, P.E.
250 N. 5th Street
Grand Junction, CO 81501

RE: St. Mary's Hospital West Campus Patterson Access
TEDS Design Exception

Dear Mike,

This letter is presented as a formal request for a design exception to the City of Grand Junction **TEDS manual, section 6.2.8** for the above referenced project and as partial response to the August 12, 2003 letter from Rick Dorris, City Development Engineer.

As part of the implementation of the Master Site Plan for St. Mary's Hospital, the proposed plan for access onto Patterson Avenue is to consolidate 4 existing driveways spaced along the Hospital's Patterson frontage into a single access point. There is insufficient distance between existing Mira Vista Road on the west and 7th Street on the east to place an access point that meets the TEDS requirement of 600 foot spacing for a principal arterial street.

The original alternative that was considered was to combine Mira Vista Road and the Hospital's Patterson Road entrance at one location:

A proposed access point approximately 200 feet east of existing Mira Vista, in which the existing Mira Vista would be closed off at Patterson (as shown on the current St. Mary's Master Site Plan). Traffic to and from Mira Vista would be routed through the north west corner of the Hospital's property onto Patterson Road.

Meetings were held with local residents who use Mira Vista to evaluate the functionality and safety aspects of this alternative. The response from the local residents was predominantly in opposition to this alternative so it is not being pursued.

The newly proposed access onto Patterson Road is located 385 feet east of Mira Vista Road and 687 feet west of 7th street. This location fits the design of St. Mary's Master Plan Development and the current access needs of the Hospital. The proposed access will be designed as "full movement" and will include a dedicated right turn lane into the Hospital for eastbound Patterson Road traffic.

We feel that there is an inherent safety benefit in reducing the number of access points from four to one. Also, some of the traffic issues exist and will continue to exist regardless of any changes (or no change) to the Hospital's Patterson access.

An in-depth traffic analysis has been prepared (submitted separately) to further address the impacts of this proposed access including the remaining 7 items of concern in the August 12, 2003 letter from Rick Dorris.

The consolidation of the 4 existing accesses on the Hospital's frontage of Patterson Road to this single access at this location appears to be the best solution to this issue. We would like this design exception be approved for the reasons stated above.

Sincerely,
ROLLAND Engineering

Kent Shaffer

Cc: Robert D. Jenkins Architect

TEDS EXCEPTION REVIEW
St. Mary's Hospital Patterson Access
October 22, 2003
Jody Kliska
Transportation Engineer

1. The response to Question 1 just says "no second full access is not a reasonable or sensible alternative for St. Mary's or for the City of Grand Junction" without providing a list of needs or evaluation criteria that should be considered and is not responsive. Examples of needs that should be considered could include emergency access to the site from outside providers; shorter ambulance travel time to and from the northern part of the city; allowing the campus ring a higher functionality; more convenient access to the north section of the campus; congestion relief to the single access point at 7th & Wellington; combines four existing access points into a single Patterson Road access.
2. The response to question 2 does not give adequate justification to increasing the existing traffic by 10% for projected future. Is 10% a reasonable and adequate increase for an additional 338 parking spaces on site?
3. No measurement of existing Patterson Road gaps was provided. A study conducted by the City in 1997 for a site ½ mile east found that inadequate gaps existed for left-turn exiting traffic onto Patterson Road during the p.m. peak hour. It is assumed that this has not improved in the past six years and that adequate gaps do not currently exist for left-turn exiting traffic from this site.
4. The analysis of future eastbound right-turn demand at 7th & Patterson suggests additional storage is necessary and may require dedication of additional right-of-way to provide adequate storage. The eastbound through queues will block the proposed access during p.m. peak now and in the future, according to the analysis. Looking at hourly volume data collected by the City last month suggests that volumes throughout the day are fairly constant and that queuing is not just a peak hour phenomenon. This section of Patterson Road is the most heavily traveled segment of the road. A copy of the data is attached.
5. Eastbound left-turn queues at the signal suggest that a ¾ movement may work for entering westbound left-turn traffic for the proposed access. However, there is nothing provided in the report that shows the location of opposing accesses in the vicinity of the proposed access. Table 1 assumes a single access exists opposing the proposed access; however, there are multiple accesses opposite the vicinity of the proposed access that could be affected by the proposed access.
6. Figure 2 would be the preferable design to ensure adequate on-site storage without affecting the operations of the campus ring road.
7. The Summary points out the need for a second access, but a more compelling argument is made for limiting the access to ¾ movement, based upon the first two sentences in the summary. The document is silent on the effects, if any, to the existing Mira Vista Drive.

Patterson Road Volumes west of 7th Street September 25, 2003			
Hour	WB	EB	Total
7 a.m.	569	333	902
8 a.m.	1035	751	1786
9 a.m.	937	770	1707
10 a.m.	948	758	1706
11 a.m.	976	816	1792
12 p.m.	1085	993	2078
1 p.m.	1095	1137	2232
2 p.m.	1085	1111	2196
3 p.m.	1028	1108	2136
4 p.m.	1169	1188	2357
5 p.m.	1214	1301	2515
6 p.m.	1094	1304	2398
7 p.m.	857	964	1821

ROLLAND ENGINEERING

405 RIDGES BOULEVARD, SUITE A
GRAND JUNCTION, COLORADO 81503
Phone: (970) 243-8300 • Fax (970) 243-1273
email: rolleng@bresnan.net

November 18, 2003

City of Grand Junction
Mr. Rick Dorris, P.E.
City Development Engineer
250 N. 5th Street
Grand Junction, CO 81501

RE: St. Mary's Hospital West Campus Patterson Access
TEDS Design Exception

Dear Rick,

Attached is the gap analysis, as requested by City Traffic Engineering, for Patterson Road prepared by traffic consultant Michael Baker Jr. Inc. This data is being provided as an addendum to the TEDs exception request letter sent to Michael G. McDill, City Engineer dated October 29, 2003 for the proposed St. Mary's Hospital main entrance onto Patterson Road.

Please let us know if you require any additional information in the evaluation of the TEDs exception request.

Sincerely,
ROLLAND Engineering

Kent Shaffer

RECEIVED
NOV 18 2003
COMMUNITY DEVELOPMENT DEPT.

Cc: Robert D. Jenkins Architect

2.48'

1053TEDSXadd.doc

Patterson Road Gap Analysis

Introduction

This document is an addendum to the traffic analysis for the TEDS exception for the St. Mary's Hospital Patterson Road access. The gap analysis presented here addresses:

Q3: Availability of gaps in Patterson Road traffic at peak hour that would allow exiting left turning traffic.

Data Collection

The gaps in Patterson Road traffic were observed on Thursday, November 7, 2003, between 7-9 am and 4-6 pm. The gaps were observed at the proposed access location. The time required to make left-turns was also observed at the current Hospital accesses.

Minimum Gap Length for Left-Turns

Vehicles making a left-turn from the current Hospital accesses onto Patterson Road were observed to determine the minimum gap length necessary to execute a left-turn. Table 1 lists the different types of left-turns and minimum gap lengths.

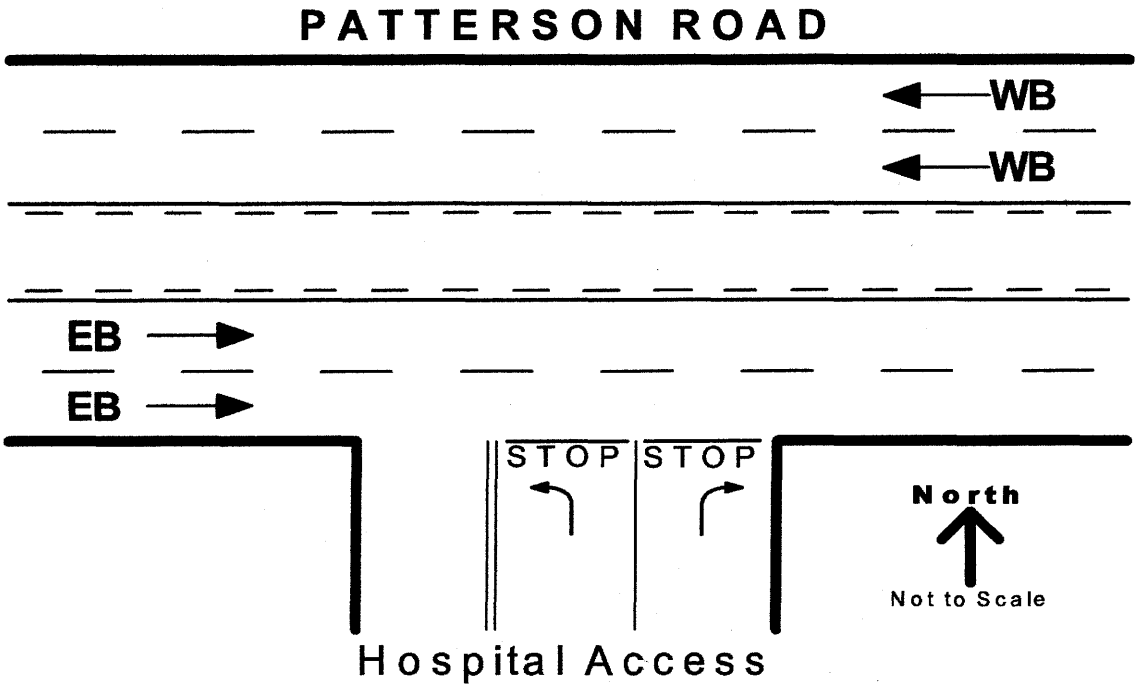


Figure 1 Hospital Access Diagram

Table 1 – Minimum Gap Length for Left-Turns

Type of Left-Turn	Description	Minimum Gap
Standard Left-Turn	Gap closes due to conflicting EB and WB (or just WB) traffic on Patterson Rd. Minimum gap includes time to cross EB traffic and merge with WB traffic.	6 sec
Additional Left-Turns During Same Gap	Two or more vehicles turn left during the same gap. The second left-turn vehicle still requires a six second gap, but two of those seconds occur at the end of the first vehicles' left-turn. Required Gap • 1 vehicle turns left = 6 sec • 2 vehicles turn left = 10 sec • 3 vehicles turn left = 14 sec	4 sec
Left-Turn (no WB Patterson Rd traffic)	Gap closes due to conflicting EB traffic on Patterson Rd, but there is no conflicting WB traffic. A smaller minimum gap is needed because the vehicle turning left does not have to merge with WB traffic; it only has to cross the EB traffic.	4 sec
Two-Stage Left-Turn	Left-turn vehicle crosses EB traffic and then waits in the median lane for an opportunity to merge with WB traffic. *(Even though this type of left-turn occurs, it was NOT considered in the gap analysis.)*	**NOT USED**

Notes:
EB – Eastbound, WB – Westbound

Observed Gaps

The minimum gap lengths listed in Table 1 were used to determine the total number of gaps available for left-turn vehicles. The observed gaps were measured using a stop watch. Only gaps that met the minimum gap lengths listed in Table 1 were recorded. Also, gaps used by vehicles turning left from Patterson Road into the current Hospital accesses were not recorded.

Table 2 lists a summary of the gap analysis. The columns in Table 2 are prior to the table. Table 3 (after the Conclusion) lists the same data as Table 2, but in five-minute increments and it also lists gap size.

- **# of Actual Left-Turns** – Based on traffic volumes counted on Wednesday, September 17. (Refer to the original traffic analysis.)

- **Total # of Gaps** – Based on gaps observed on Thursday, November 7.

- **Estimated # of Left-Turns Possible** – Based on "Total # of Gaps" and the size of the gaps. For example, a 10 second gap would count as *one* "Total Gap", but "Estimated # of Left-Turns Possible" would be *two*.

- **# of Queues that Block the Proposed Access** – Based on queuing from the Patterson Rd / 7th Street traffic signal observed on Thursday, November 7. There are no left-turn gaps when queuing from this signal backs up past the proposed access.

Table 2 – Gap Data (Summary)

Period	# of Actual Left-Turns	Total # of Gaps	Estimated # of Left-Turns Possible	# of Queues that Block the Proposed Access
AM Peak Hour (7:30-8:30 am)	**21**	**115**	**171**	0
PM Peak Hour (4:30-5:30 am)	**35**	**52**	**74**	9

Conclusion

Table 2 shows that adequate gaps exist in the AM and PM peak hour to accommodate the left-turn demand. The gaps on Patterson Road are directly related to the traffic signal operations at 7th Street and 1st Street. These signals are coordinated and currently operate on a 110 second cycle length. Due to signal coordination, adequate gaps exist on a fairly consistent pattern. This pattern corresponds to the 110 second cycle length of the signals.

Table 3 – Gap Data (Five-Minute Increments)

Time	# of Actual Left-Turns	Total # of Gaps	Estimated # of Left-Turns Possible	4-5 sec (1 LT)	6-9 sec (1 LT)	10-13 sec (2 LT)	14-17 sec (3 LT)	18-21 sec (4 LT)	> 21 sec (5+ LT)	# of Queues that Block the Access
AM Peak Hour										
7:15		10	14	2	4	4				
7:20	4	12	18	2	7	2			1	
7:25		12	17	4	6	1			1	
7:30		9	12	3	4	1	1			
7:35	8	14	22	4	6	1	2	1		
7:40		11	16	3	5	1	2			
7:45		9	12	5	2	1	1			
7:50	5	5	8		3	1	1			
7:55		5	5		5					
8:00		9	19	2	3	1	1	1	1	
8:05	4	10	13	4	4	1	1			
8:10		9	15		4	4	1			
AM Peak Hour Total	**21**	**115**	**171**	**29**	**53**	**18**	**10**	**2**	**3**	**0**
PM Peak Hour										
4:30		5	7		3	2				
4:35	9	6	11		3	1	2			
4:40		4	8		1	2	1			2
4:45		5	6		4	1				
4:50	10	8	12		4	4				
4:55		4	5	1	2	1				
5:00		6	7	1	4	1				
5:05	7	3	4		2	1				
5:10		2	4			2				2
5:15		2	2	1	1					3
5:20	9	3	3	1	2					2
5:25		4	5		3	1				
PM Peak Hour Total	**35**	**52**	**74**	**4**	**29**	**16**	**3**			**9**

Time	Total # of Gaps	Estimated # of Left-Turns Possible	**4-5 sec** *(1 LT)*	**6-9 sec** *(1 LT)*	**10-13 sec** *(2 LT)*	**14-17 sec** *(3 LT)*	**18-21 sec** *(4 LT)*	**> 21 sec** *(5+ LT)*	# of Queues that Block the Access
7:15	10	14	2	4	4				
7:20	12	18	2	7	2			1	
7:25	12	17	4	6	1			1	
7:30	9	12	3	4	1	1			
7:35	14	22	4	6	1	2	1		
7:40	11	16	3	5	1	2			
7:45	9	12	5	2	1	1			
7:50	5	8		3	1	1			
7:55	5	5		5					
8:00	9	19	2	3	1	1	1	1	
8:05	10	13	4	4	1	1			
8:10	9	15		4	4	1			
Peak Hour Total	115	171	29	53	18	10	2	3	
4:30	5	7		3	2				
4:35	6	11		3	1	2			
4:40	4	8		1	2	1			2
4:45	5	6		4	1				
4:50	8	12		4	4				
4:55	4	5	1	2	1				
5:00	6	7	1	4	1				
5:05	3	4		2	1				
5:10	2	4			2				2
5:15	2	2	1	1					3
5:20	3	3	1	2					2

5:25	4	5		3	1				
Peak Hour Total	52	74	4	29	16	3			9

MEMORANDUM

CITY OF GRAND JUNCTION
ENGINEERING DEPARTMENT

TO: Tim Moore
Jody Kliska
Lisa Cox

FROM: Rick Dorris

DATE: November 12, 2003

SUBJECT: St. Mary's Patterson Road Access TEDS Exception Review

Jody has certainly done a thorough review. I have a couple of extra points to add.

1. At the bottom of page two they have increase the hospital traffic by 10% stating the hospital doesn't plan on expanding its current facility. This information is not accurate. In fact, the hospital plans on expanding its current facility by 60,000 to 80,000 square feet. I would certainly expect that in the next 20 years.
2. According to the que lengths on page 6, the AM peak hour que backs up to within 100' of Mira Vista rendering this proposed access to be right in right out. Seems like combining with Mira Vista might at least remedy the queing problem in 2023 for the AM peak. The PM peak hour que backs up almost to First Street rendering the subject access point a right in right out, probably with major difficulty even making a right out.
3. I observed the queing from 7th Street about 3:00 PM one afternoon. Traffic was backing up to the proposed access at almost every red light. In my opinion, this access must be further from 7th Street.

City of Grand Junction
Department of Public Works and Utilities
Engineering Division
250 North Fifth Street
Grand Junction, CO 81501-2668
FAX: (970) 256-4031

August 12, 2003

Mr. Rob Jenkins
1000 North 9th, Unit 35
Grand Junction, CO 81501

Reference: St. Mary's Patterson Access

Dear Rob,

The proposed new access for the hospital, based on your July 31, 2003 drawing does not meet the minimum TEDS spacing requirement of 600' on a principal arterial street. A TEDS exception would be necessary. Please follow the criteria in chapter 14 of TEDS and analyze and answer the following items.

1. Describe the need for the access. What happens if no access is allowed?
2. The anticipated peak hour traffic volumes at the access.
3. Availability of gaps in Patterson Road traffic at peak hour that would allow exiting left turning traffic.
4. Analysis of queues from the signal at 7th & Patterson to determine if entering/exiting traffic from the proposed access will interfere with existing signal operations, now and in the future.
5. If limited access (3/4 movement or right-in, right-out), design the appropriate limiting device.
6. Effects on opposing driveways.
7. Analysis of access throat length and storage for queued vehicles.

The City can't determine if this access is acceptable, or not, without the Traffic Engineer's analysis of the above items. It would be prudent to have the approved, or denied, TEDS exception in hand prior to meeting with the neighbors. Otherwise, I suspect we would simply discuss this option not knowing if it will work.

Please call me if you have any questions.

Sincerely,

Rick Dorris, PE
City Development Engineer

Cc: Mike McDill
Jody Kliska
George Miller
Lisa Cox
Bob Blanchard

TEDS Exception

Prepared For:

St. Mary's Hospital

Patterson Access

Grand Junction, Colorado

October 2003

INTRODUCTION

This document was prepared to address Grand Junction City (City) comments related to the TEDS exception needed for the St. Mary's Hospital Access on Patterson Road. The City comments are contained in a letter to Mr. Rob Jenkins dated August 12, 2003. Appendix A contains the letter. The seven questions in the letter are addressed in this document.

Q1: Describe the need for the access. What happens if no access is allowed?

In conformance with Master Site Plan 2000, St. Mary's Hospital will reorganize vehicular circulation on the West Campus, will close a total of six (6) curb cuts (three on Patterson Road and three on North Seventh Street), and will construct two (2) new entrances to the campus, one on Patterson Road and one on North Seventh Street. The North Seventh Street entrance will begin at the intersection of Seventh and Wellington and will turn into the Hospital Site directly east of Saccomanno Education Center. The new Patterson Road entrance is proposed to be located approximately 250' east of the west property line. This proposal provides for approximately 380' separation between Mira Vista Drive and the proposed new entrance, and more than 680' between the new entrance and Seventh Street.

St. Mary's Hospital is a Regional Health Care Facility. It provides Western Colorado and Eastern Utah with a Level Two Trauma Center that depends upon adequate, easy, and absolutely dependable access to the Hospital Site. If the Seventh & Wellington intersection is closed for any reason, St. Mary's Hospital must rely on a second full access entrance. "No second full access entrance" is not a reasonable or sensible alternative for St. Mary's or for the City of Grand Junction.

Text provided by Rob D. Jenkins, Architect

Q2: The anticipated peak hour traffic volumes at the access.

Existing Traffic Volumes

The traffic volumes at the four St. Mary's Hospital (Hospital) accesses on Patterson Road were counted on Wednesday, September 17, between 7-9 am and 3-6 pm. The City provided current traffic counts for Patterson Road.

Table 1 shows the difference between the peak hour at the existing four Hospital accesses and the Patterson Road peak hour. Figure 1 shows the existing traffic

volumes. The middle portion of Figure 1 shows the four Hospital accesses combined into one access. The analysis focused on the Patterson Road peak because the traffic volumes are much higher on Patterson Road. Appendix B contains the peak hour traffic volumes for the four Hospital accesses.

Table 1 – Peak Hour Traffic Volumes

Period	Location	Peak Hour	*Traffic Volumes at Existing Four Hospital Accesses* [1]				
			Enter		Exit		Total
			Left	Right	Left	Right	
AM (7-9 am)	Hospital Access	7:30-8:30 am	125	86	21	91	**323**
	Patterson Rd	7:15-8:15 am	124	89	17	87	**317**
PM (3-6 pm)	Hospital Access	3:00-4:00 pm	69	58	21	135	**283**
	Patterson Rd	4:30-5:30 pm	52	42	35	116	**245**

Notes:
1 – This includes traffic to and from the County Health Building.

County Health Building

The County Health Building moved its operation off-site at the beginning of October 2003. The building will be demolished with the reconstruction of the accesses. The traffic volumes at the Hospital accesses include traffic to and from the County Health Building. The County Health traffic was included in the analysis to account for the changes in parking spaces discussed below.

Parking Changes

The reconstruction of the Hospital accesses, internal road, and relocation of the County Health Operations will result in a net decrease of 50 parking spaces; currently there are approximately 500 parking spaces. The planned parking structure near the 7th Street / Wellington Avenue will result in a net increase of 338 parking spaces.

Future (Year 2023) Traffic Volumes

The F½ Area Corridor Study projected a 2.1% annual growth rate (AGR) for traffic on Patterson Road. This was estimated using the Mesa County RTPO travel model. Year 2023 traffic volumes on Patterson Road were projected using the 2.1% AGR. The existing traffic volumes entering and exiting at the Hospital accesses were increased by 10%. The 10% increase is based on the parking changes and the Hospital not anticipating expanding its current facility. Figure 1 shows the projected year 2023 traffic volumes.

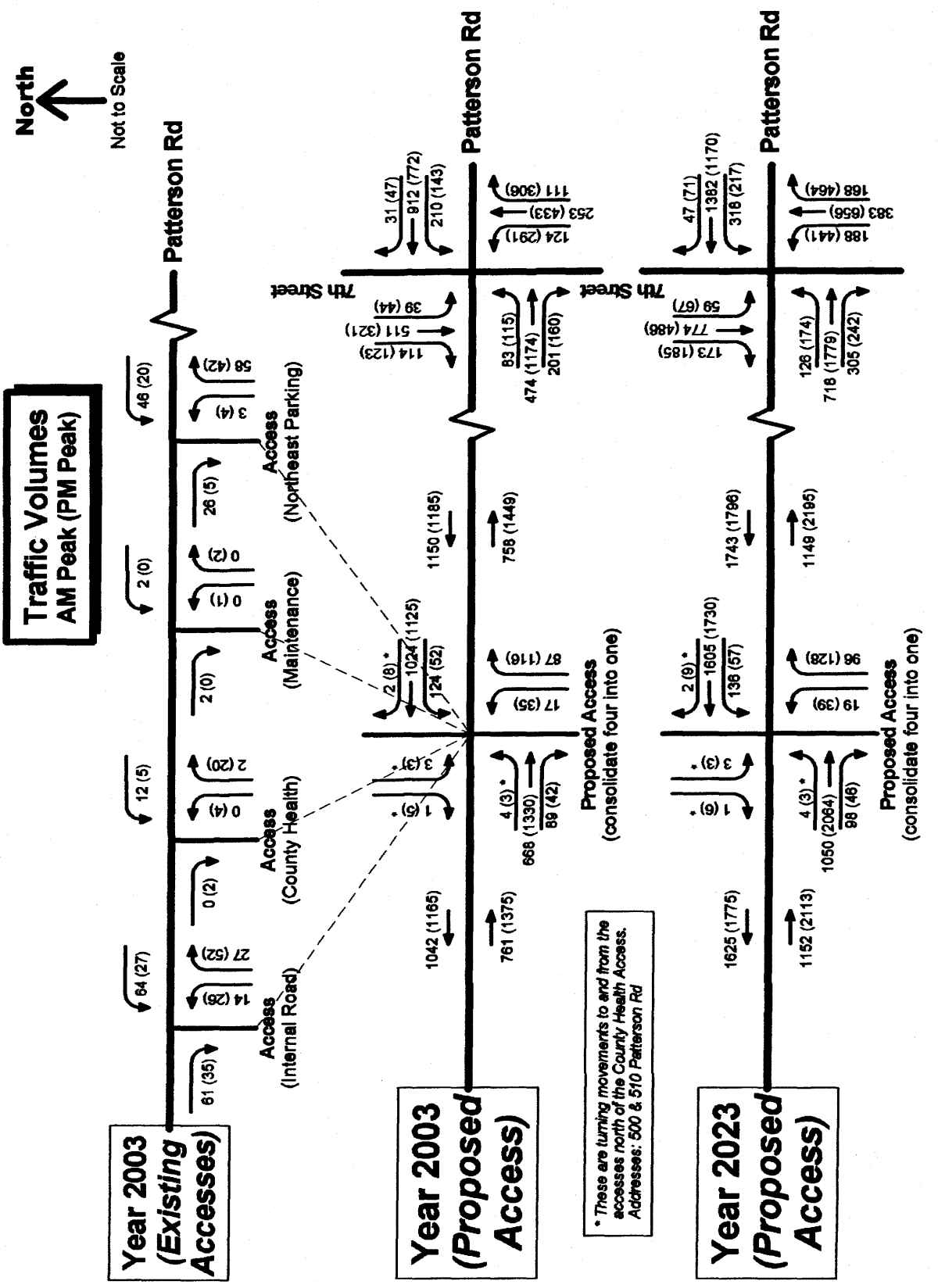


Figure 1 – Peak Hour Traffic Volumes

Q3: Availability of gaps in Patterson Road traffic at peak hour that would allow exiting left turning traffic.

The availability of gaps in Patterson Road traffic was estimated using the Highway Capacity Software (HCS 2000). The four Hospital accesses were combined into one access and analyzed as a stop-controlled intersection. Table 1 shows the results of the analysis. Appendix C contains the analysis output.

Future Improvements

The Hospital plans to construct an **eastbound right-turn deceleration** lane on Patterson Road at the Hospital access. This improvement is included in the year 2003 and 2023 analyses.

Table 1 – Hospital Access and Patterson Road
(Stop-Controlled Analysis)

Year	Period	Movement		V/C Ratio	Queue (veh)	Delay (sec)	LOS
2003	AM	EB	Left	0.1	1	11	B
		WB	Left	0.2	1	11	B
		NB	Left	0.1	1	20	C
			Right	0.2	1	12	B
		SB	Left/Right	0.1	1	29	D
	PM	EB	Left	0.1	1	11	B
		WB	Left	0.1	1	12	B
		NB	Left	0.2	1	24	C
			Right	0.2	1	10	A
		SB	Left/Right	0.1	1	19	C
2023	AM	EB	Left	0.1	1	14	B
		WB	Left	0.3	2	16	C
		NB	Left	0.2	1	28	D
			Right	0.3	1	15	B
		SB	Left/Right	0.1	1	70	F
	PM	EB	Left	0.1	1	14	B
		WB	Left	0.2	1	20	C
		NB	Left	0.4	2	66	F
			Right	0.2	1	12	B
		SB	Left/Right	0.1	1	26	D

The stop-controlled analysis showed that during the year 2023 PM peak vehicles making a left-turn exiting the Hospital will have to wait an average of over one minute (LOS F) for a sufficient gap in Patterson Road traffic. Drivers who frequent the hospital will become accustom to long delays at this access and may choose to exit the Hospital onto 7th Street and then make a left-turn onto Patterson Road.

Q4: Analysis of queues from the signal at 7th & Patterson to determine if entering/exiting traffic from the proposed access will interfere with existing signal operations, now and in the future.

The queuing from the Patterson Road and 7th Street signalized intersection was estimated using the Signal 2000 software. Table 2 shows the approach LOS and queues that will back up on the west side of the intersection. Appendix D contains the analysis output.

Future Improvements to Patterson Road and 7th Street

The Hospital dedicated right-of-way for the City to construct an **eastbound right-turn lane** at this intersection. The estimated construction year for this project is year 2005. This improvement was included in the year 2023 analysis, but it was not included in the year 2003 analysis. For comparison, the year 2023 analysis was run without the eastbound right-turn lane. The results are shown at the bottom of the Table 2.

Table 2 – Patterson Road and 7th Street
(Queuing Analysis)

Year	Period	Approach	Delay	LOS	WEST Approach QUEUES (ft)		
					Right	Thru	Left
2003	AM	Overall	30	C	Shared [1]	442	122
		North Approach	40	D+			
		South Approach	26	C+			
		East Approach	25	C+			
		West Approach	30	C			
	PM	Overall	32	C	Shared [1]	1008	164
		North Approach	47	D			
		South Approach	31	C			
		East Approach	22	C+			
		West Approach	34	C			
2023	AM	Overall	76	E	610 (200 [2])	620 (825 [2])	356
		North Approach	115	F			
		South Approach	39	D+			
		East Approach	85	F			
		West Approach	51	D			
	PM	Overall	102	F	217	2357	351
		North Approach	142	F			
		South Approach	112	F			
		East Approach	47	D			
		West Approach	118	F			
Year 2023 Analysis WITHOUT Eastbound Right-Turn Lane							
2023	AM	Overall	91	F	Shared [1]	1440	406
		North Approach	131	F			
		South Approach	40	D+			
		East Approach	68	E			
		West Approach	121	F			
	PM	Overall	139	F	Shared [1]	2952	384
		North Approach	204	F			
		South Approach	154	F			
		East Approach	48	D			
		West Approach	167	F			

Notes:

1 – The right-turn (RT) queue is accounted for in the thru queue because the outside lane is shared.

2 – Signal 2000 (Queue Model #1) calculates the RT lane queue at 610 ft, but the planned RT lane is only 200 ft long. This means that 410 ft of the RT queue will back into the thru lanes. The thru traffic will adjust to this, causing the thru lane queues to be approximately 825 ft.

The planned Hospital access is 600 feet west of the Patterson Road / 7th Street intersection. The queuing analysis shows that queues will back up past the Hospital access in all analysis periods except the year 2003 AM peak. The queuing analyses results for year 2003 AM and PM peak are consistent with queues observed during the traffic counts on September 17.

When queues back up farther than 600 feet and block the Hospital access, the average time to exit or enter at the access may be longer than shown in Table 1. The stop-controlled analysis does not account for queuing that blocks the access.

Year 2023 Analysis WITHOUT the Eastbound Right-Turn Lane

In the year 2023 PM peak, the construction of the eastbound right-turn lane will improve the overall intersection delay by over 30 seconds. It will also reduce the eastbound thru-lane queuing by 600 feet.

Q5: If limited access (3/4 movement or right-in, right-out), design the appropriate limiting device.

Limited access is not recommended at this time.

Q6: Effects on opposing driveways.

Table 1 shows that vehicles exiting the businesses on the north side of Patterson Road (across from the County Health Building) during the year 2023 AM peak will have to wait an average of over one minute (LOS F) for a sufficient gap in Patterson Road traffic.

Q7: Analysis of access throat length and storage for queued vehicles.

Table 1 shows that the maximum queue for vehicles exiting the Hospital access (northbound) is two vehicles. The current access configuration will accommodate two queued vehicles in the left-turn lane and two queued vehicles in the right-turn lane. Figure 2 shows how the access could be reconfigured to accommodate four vehicles in the left-turn lane and four vehicles in the right-turn lane.

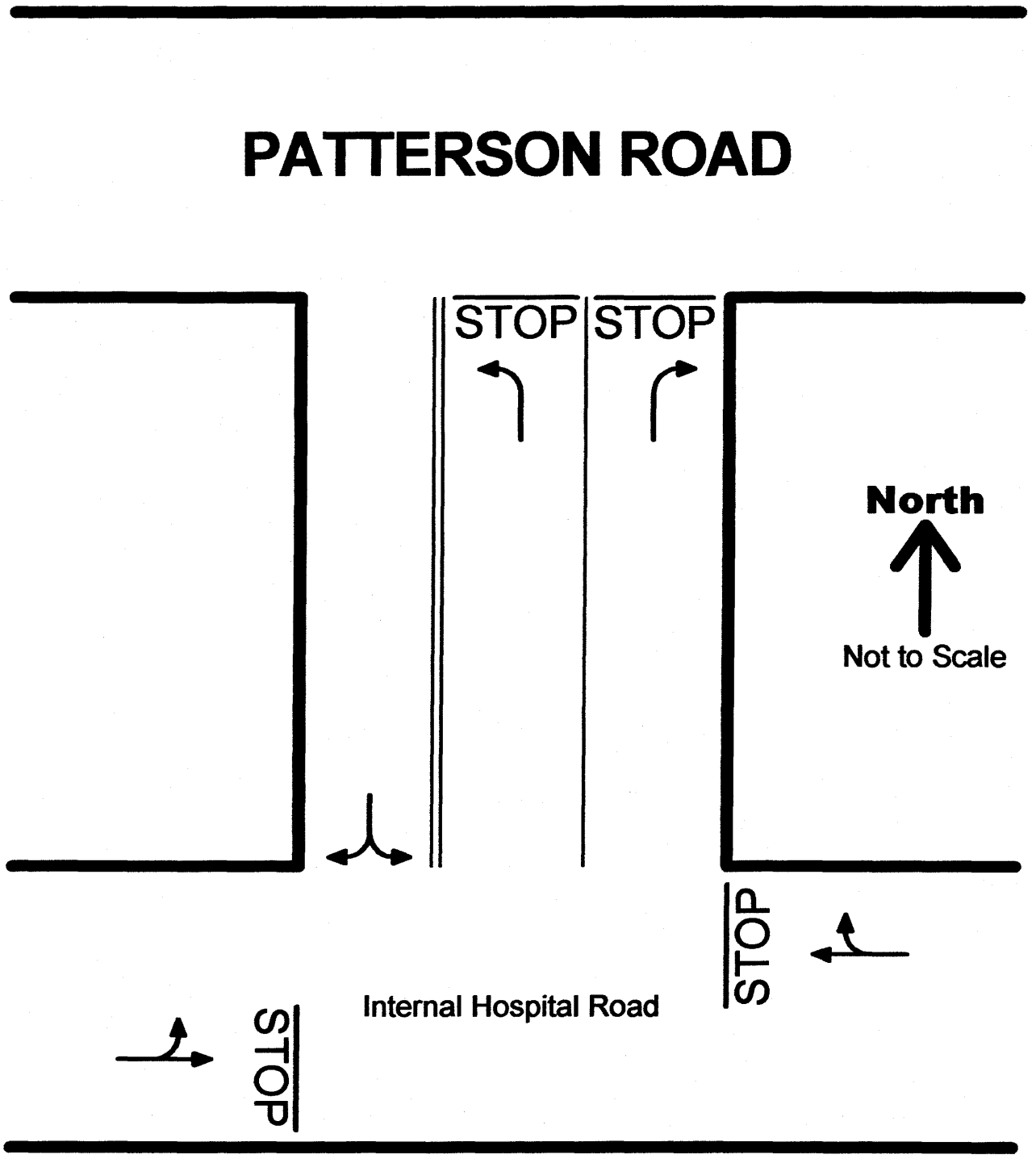


Figure 2 – Reconfigured Access to Accommodate More Queuing

CRASH HISTORY

Crash data for Patterson Road between 7th Street and Mira Vista Road was obtained from the City. The crash data covers January 1st 2000, to October 1st 2003. Crashes that occurred within 250 feet of 7th Street were not included because they are attributed to the 7th Street intersection, not the mid-block accesses. Figure 3 shows the number of crashes that occurred on this section of Patterson Road. Appendix E contains the crash data obtained from the City.

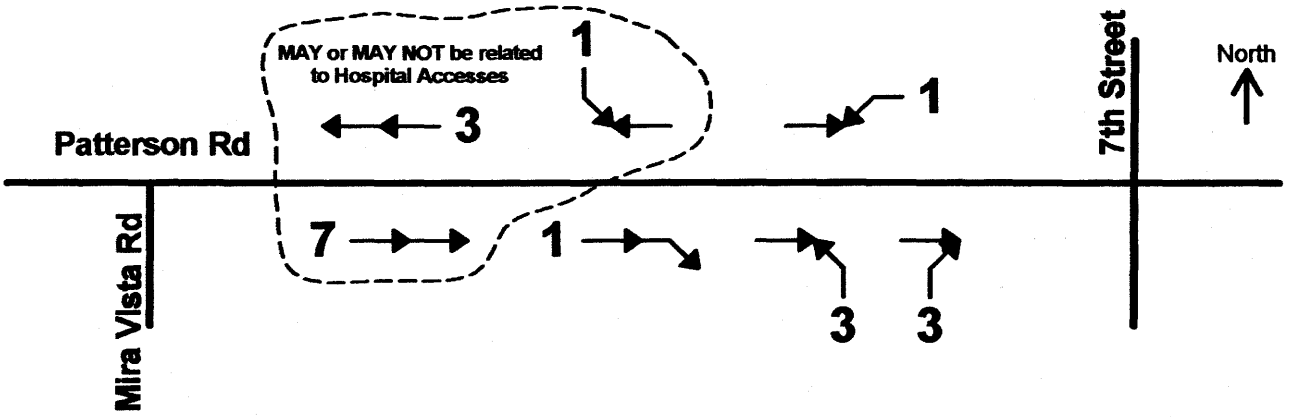


Figure 3 – Crash History

The following crashes *may or may not* be related to the Hospital accesses:

- Westbound rear-end crashes (3)
- Southbound left-turn crash (1)
- Eastbound rear-end crashes (7)

Note: Two of the seven eastbound rear-end crashes were same-direction side-swipe crashes. They were grouped with the rear-end crashes for simplicity.

None of these 11 crashes were fatal and only three involved injuries. Theses crashes could have been caused by:

- Queuing from 7th Street
- Turning movements to and from accesses on the north side of Patterson Road
- Vehicles entering or exiting the Hospital

The other eight crashes involve turning movements in and out of the Hospital. None of these eight crashes were fatal or involved injuries. They were "fender-benders".

SUMMARY

The capacity analysis shows that drivers will experience long delays (an average of over one minute) during the PM peak as they attempt to make left-turns onto Patterson Road from the Hospital access.

The queuing analysis of Patterson Road and 7th Street showed that queues will back up and block the Hospital access. The queues blocking the access may cause the delays to be much longer than one minute.

The construction of the eastbound right-turn lane at Patterson Road and 7th Street will decrease year 2023 PM Peak delay by over 30 seconds. This will also reduce the thru-lane queuing by 600 feet.

The crash history shows that over the past 3.75 years the current Hospital accesses averaged two "fender-bender" crashes per year. There were also another three crashes per year on Patterson Road that may or may not be attributed to the Hospital accesses.

Even though the capacity analysis shows that left-turns out of the Hospital will experience long delays, the City should allow a full access for the following reasons:

- **Access Consolidation** – the consolidation of four accesses (current) into one access (planned) will reduce the conflict points on Patterson Road between 7th Street and Mira Vista Road. This reduction of conflict points will contribute to "improved traffic operations and fewer collisions". Source: TRB Access Management Manual, page 8.

- **Right-turn Lane** – The addition of a right-turn deceleration lane at the Hospital access will improve safety by allowing right-turn vehicles into the Hospital to move out of thru traffic. This will also improve capacity because eastbound thru vehicles will not have to slow down as much for vehicles turning right ahead of them.

- **Crash History** – The number of crashes is low and the severity of the crashes (fatal, injuries, or fender-benders) is also low. In the last 3.75 years turning movements into or out of the Hospital averaged two crashes per year. None of these crashes were fatal or involved injuries. There were another three crashes per year that may or may not be related to the Hospital access.

  Note: If the number of crashes or the severity increases in the future, changing the access to ¾ (prohibit left-turns out of the access) or ½ (prohibit all left-turns at the access) should be investigated as an option to reduce the crashes or severity.

Appendices

Appendix A	Letter to Rob Jenkins Regarding City Comments
Appendix B	Table A1 – Peak Hour Traffic Volumes Table A2 – Patterson Road Hospital Access: Peak Hour Traffic Volumes
Appendix C	Hospital Access Analysis Output
Appendix D	Patterson Road / 7th Street Queuing Analysis Output
Appendix E	Patterson Road Crash Data

Appendix A

Letter to Rob Jenkins Regarding City Comments

City of Grand Junction
Department of Public Works and Utilities
Engineering Division
250 North Fifth Street
Grand Junction, CO 81501-2668
FAX: (970) 256-4031

August 12, 2003

Mr. Rob Jenkins
1000 North 9th, Unit 35
Grand Junction, CO 81501

Reference: St. Mary's Patterson Access

Dear Rob,

The proposed new access for the hospital, based on your July 31, 2003 drawing does not meet the minimum TEDS spacing requirement of 600' on a principal arterial street. A TEDS exception would be necessary. Please follow the criteria in chapter 14 of TEDS and analyze and answer the following items.

1. Describe the need for the access. What happens if no access is allowed?
2. The anticipated peak hour traffic volumes at the access.
3. Availability of gaps in Patterson Road traffic at peak hour that would allow exiting left turning traffic.
4. Analysis of queues from the signal at 7th & Patterson to determine if entering/exiting traffic from the proposed access will interfere with existing signal operations, now and in the future.
5. If limited access (3/4 movement or right-in, right-out), design the appropriate limiting device.
6. Effects on opposing driveways.
7. Analysis of access throat length and storage for queued vehicles.

The City can't determine if this access is acceptable, or not, without the Traffic Engineer's analysis of the above items. It would be prudent to have the approved, or denied, TEDS exception in hand prior to meeting with the neighbors. Otherwise, I suspect we would simply discuss this option not knowing if it will work.

Please call me if you have any questions.

Sincerely,

Rick Dorris, PE
City Development Engineer

Cc: Mike McDill
Jody Kliska
George Miller
Lisa Cox
Bob Blanchard

Appendix B

Table B1 – Peak Hour Traffic Volumes
Table B2 – Patterson Road Hospital Access: Peak Hour Traffic Volumes

Table B1 - Peak Hour Traffic Volumes

St. Mary's Hospital Access to Patterson Rd

Annual Growth Rate (AGR)[1] = 2.1%

			Southbound				Westbound				Northbound				Eastbound				Total
			R	T	L	*Ped*	R	T	L	*Ped*	R	T	L	*Ped*	R	T	L	*Ped*	
Patterson Rd / Hospital Access[2]	2002	AM Peak						1126		--						742			1868
		PM Peak						1161		--						1419			2580
	2003	AM Peak	1	--	3	--	2	1024	124	*2*	87	--	17	--	89	668	4	*2*	2023
		PM Peak	5	--	3	--	8	1125	52	*2*	116	--	35	--	42	1330	3	*2*	2723
	2023	AM Peak	1	--	3	--	2	1605	136	*2*	96	--	19	--	98	1050	4	*2*	3018
		PM Peak	6	--	3	--	9	1730	57	*2*	128	--	39	--	46	2064	3	*2*	4089
Patterson Rd / 7th Street	2002	AM Peak	112	500	38	*9*	30	893	206	*4*	109	248	121	*1*	197	464	81	*101*	2999
		PM Peak	120	314	43	*4*	46	756	140	*3*	300	424	285	*3*	156	1150	113	*77*	3847
	2003	AM Peak	114	511	39	*9*	31	912	210	*4*	111	253	124	*1*	201	474	83	*101*	3063
		PM Peak	122	321	44	*4*	47	772	143	*3*	306	433	291	*3*	160	1174	115	*77*	3928
	2023	AM Peak	173	774	59	*10*	47	1382	318	*4*	168	383	188	*1*	305	718	126	*111*	4641
		PM Peak	185	486	67	*4*	71	1170	217	*3*	464	656	441	*3*	242	1779	174	*85*	5952
Patterson Rd / 1st Street	2002	AM Peak	36	242	109		35	790	170		119	102	127		104	583	21		2438
		PM Peak	49	148	54		68	904	156		131	213	228		251	1170	67		3439
	2003	AM Peak	37	247	111		36	807	174		121	104	130		106	595	21		2489
		PM Peak	50	151	55		69	923	159		134	217	233		256	1195	68		3510
	2023	AM Peak	56	374	168		55	1223	264		183	158	197		161	902	32		3773
		PM Peak	76	229	83		105	1399	241		203	329	353		388	1811	103		5320

Table B2a - Intersection Turning Movement Count (AM Peak) Summary

Project: St. Mary's Hospital - Patterson Rd Access
Location: Grand Junction, Colorado
EB/WB Road: Patterson Rd
NB/SB Road: Hospital Accesses (4)

Counted by: Mark Bunnell
Count Date: 9/17/2003
Peak Season Adjust: 1

Time	Main Access (West)				County Health Bldg. Access				Hospital Maintenance Access				Main Access (East)				Total
AM	Left IN	Right IN	Left OUT	Right OUT	Left IN	Right IN	Left OUT	Right OUT	Left IN	Right IN	Left OUT	Right OUT	Left IN	Right IN	Left OUT	Right OUT	Volume
7:00-7:15	10	13	2	2	0	0	0	0	0	0	0	0	15	11	1	10	64
7:15-7:30	14	13	0	3	0	0	0	0	0	0	0	0	8	10	0	8	56
7:30-7:45	19	10	3	9	3	0	0	1	1	0	0	0	17	7	1	16	87
7:45-8:00	16	24	8	7	5	0	0	1	1	1	0	0	10	4	0	22	99
8:00-8:15	15	14	3	8	4	0	0	0	0	1	0	0	11	5	2	12	75
8:15-8:30	14	14	2	6	1	0	1	1	0	0	0	0	8	6	1	8	62
8:30-8:45	17	17	5	7	1	0	0	2	0	0	0	0	6	1	0	7	63
8:45-9:00	22	6	5	3	0	0	0	3	1	0	1	0	9	3	0	9	62
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Totals =	127	111	28	45	14	0	1	8	3	2	1	0	84	47	5	0	568

Intersection Peak Hour:	7:30-8:30 AM

Peak Hour Volumes		
	Intersection	323
	EB:	172
	WB:	17
	NB:	4
	SB:	130

Peak Hour Factors		
	Intersection:	0.84
	EB:	0.78
	WB:	0.71
	NB:	0.50
	SB:	0.79

Hospital Access Peak Hour (7:30-8:30 pm) - Traffic Volumes at Hospital Access ONLY

Turning Movement Volumes and Peak Hour Factors																
Volume:	64	62	16	30	13	0	1	3	2	2	0	0	46	22	4	58
PHF:	0.84	0.65	0.50	0.83	0.65	0.00	0.25	0.75	0.50	0.50	0.00	0.00	0.68	0.79	0.50	0.66

ENTER		EXIT		
LEFT	RIGHT	LEFT	RIGHT	TOTAL
125	86	21	91	323

Patterson Road Peak Hour (7:15-8:15 pm) - Traffic Volumes at Hospital Access ONLY

Turning Movement Volumes and Peak Hour Factors																
Volume:	64	61	14	27	12	0	0	2	2	2	0	0	46	26	3	58
PHF:	0.84	0.64	0.44	0.75	0.60	0.00	0.00	0.50	0.50	0.50	0.00	0.00	0.68	0.65	0.38	0.66

ENTER		EXIT		
LEFT	RIGHT	LEFT	RIGHT	TOTAL
124	89	17	87	317

Table B2b - Intersection Turning Movement Count (PM Peak) Summary

Project: St. Mary's Hospital - Patterson Rd Access
Location: Grand Junction, Colorado
EB/WB Road: Patterson Rd
NB/SB Road: Hospital Accesses (4)

Counted by: Mark Bunnell
Count Date: 9/17/2003
Peak Season Adjust: 1

Time	Main Access (West)				County Health Bldg. Access				Hospital Maintenance Access				Main Access (East)				Total
PM	Left IN	Right IN	Left OUT	Right OUT	Left IN	Right IN	Left OUT	Right OUT	Left IN	Right IN	Left OUT	Right OUT	Left IN	Right IN	Left OUT	Right OUT	Volume
3:00-3:15	6	14	1	11	4	0	0	7	0	0	0	0	7	2	1	15	68
3:15-3:30	13	15	4	22	3	3	1	4	0	0	0	0	8	7	2	10	92
3:30-3:45	8	9	6	20	3	1	0	3	1	0	0	1	3	1	2	11	69
3:45-4:00	9	5	2	13	2	0	1	6	0	0	0	0	2	1	1	12	54
4:00-4:15	8	4	7	7	0	0	0	3	0	0	1	0	6	1	2	7	46
4:15-4:30	6	6	9	13	0	1	1	5	0	0	0	0	4	1	0	5	51
4:30-4:45	7	10	5	17	2	0	4	3	0	0	0	0	2	2	0	4	56
4:45-5:00	10	10	7	10	0	1	0	7	0	0	0	1	13	1	3	11	74
5:00-5:15	3	6	7	17	2	1	0	5	0	0	0	1	2	1	0	10	55
5:15-5:30	7	9	7	8	1	0	0	5	0	0	1	0	3	1	1	17	60
5:30-5:45	3	11	5	10	2	0	0	1	0	0	0	0	4	3	2	6	47
5:45-6:00	9	10	11	7	0	1	1	3	0	1	0	0	9	3	0	10	65
Totals =	89	109	71	155	19	8	8	52	1	1	2	3	63	24	14	0	737

Intersection Peak Hour:	3:00-4:00 PM

Peak Hour Volumes		
	Intersection	283
	EB:	158
	WB:	38
	NB:	2
	SB:	85

Peak Hour Factors		
	Intersection:	0.66
	EB:	0.73
	WB:	0.86
	NB:	0.25
	SB:	0.79

Hospital Access Peak Hour (3:00-4:00 pm) - Traffic Volumes at Hospital Access ONLY

Turning Movement Volumes and Peak Hour Factors																
Volume:	36	43	13	66	12	4	2	20	1	0	0	1	20	11	6	48
PHF:	0.69	0.72	0.54	0.75	0.75	0.33	0.50	0.71	0.25	0.00	0.00	0.25	0.63	0.39	0.75	0.80

ENTER		EXIT		
LEFT	RIGHT	LEFT	RIGHT	TOTAL
69	58	21	135	283

Patterson Road Peak Hour (4:30-5:30 pm) - Traffic Volumes at Hospital Access ONLY

Turning Movement Volumes and Peak Hour Factors																
Volume:	27	35	26	52	5	2	4	20	0	0	1	2	20	5	4	42
PHF:	0.68	0.88	0.93	0.76	0.63	0.50	0.25	0.71	0.00	0.00	0.25	0.50	0.38	0.63	0.33	0.62

ENTER		EXIT		
LEFT	RIGHT	LEFT	RIGHT	TOTAL
52	42	35	116	245

Appendix C

Hospital Access Analysis Output (summary version)
Hospital Access Analysis Output (long version)

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mark Bunnell*
Agency/Co.	
Date Performed	*9/20/2003*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*Patterson Rd - Hospital Access*
Jurisdiction	*Grand Junction City*
Analysis Year	*2003*

Project Description *St. Mary's Hospital Access to Patterson Rd*

East/West Street: *Patterson Rd* | North/South Street: *Hospital Access +*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*4*	*668*	*89*	*124*	*1024*	*2*
Peak-Hour Factor, PHF	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*
Hourly Flow Rate, HFR	*4*	*804*	*107*	*149*	*1233*	*2*
Percent Heavy Vehicles	*0*	–	–	*2*	–	–
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*1*			*1*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*17*	*0*	*87*	*3*	*0*	*1*
Peak-Hour Factor, PHF	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*
Hourly Flow Rate, HFR	*20*	*0*	*104*	*3*	*0*	*1*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*		*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (vph)	*4*	*149*	*20*		*104*		*4*	
C (m) (vph)	*642*	*741*	*268*		*595*		*152*	
v/c	*0.01*	*0.20*	*0.07*		*0.17*		*0.03*	
95% queue length	*0.02*	*0.75*	*0.24*		*0.63*		*0.08*	
Control Delay	*10.6*	*11.1*	*19.5*		*12.3*		*29.3*	
LOS	*B*	*B*	*C*		*B*		*D*	
Approach Delay	–	–	*13.5*			*29.3*		
Approach LOS	–	–	*B*			*D*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mark Bunnell*
Agency/Co.	
Date Performed	*9/20/2003*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Patterson Rd - Hospital Access*
Jurisdiction	*Grand Junction City*
Analysis Year	*2003*

Project Description *St. Mary's Hospital Access to Patterson Rd*

East/West Street: *Patterson Rd* | North/South Street: *Hospital Access +*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*3*	*1330*	*42*	*52*	*1125*	*8*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR	*3*	*1385*	*43*	*54*	*1171*	*8*
Percent Heavy Vehicles	*0*	–	–	*2*	–	–
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*1*			*1*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*35*	*0*	*116*	*3*	*0*	*5*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR	*36*	*0*	*120*	*3*	*0*	*5*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*		*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (vph)	*3*	*54*	*36*		*120*		*8*	
C (m) (vph)	*598*	*590*	*229*		*854*		*265*	
v/c	*0.01*	*0.09*	*0.16*		*0.14*		*0.03*	
95% queue length	*0.02*	*0.30*	*0.55*		*0.49*		*0.09*	
Control Delay	*11.1*	*11.7*	*23.6*		*9.9*		*19.0*	
LOS	*B*	*B*	*C*		*A*		*C*	
Approach Delay	–	–	*13.1*			*19.0*		
Approach LOS	–	–	*B*			*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mark Bunnell*
Agency/Co.	
Date Performed	*9/20/2003*
Analysis Time Period	*AM Peak*

Site Information

Intersection	*Patterson Rd - Hospital Access*
Jurisdiction	*Grand Junction City*
Analysis Year	*2023*

Project Description *St. Mary's Hospital Access to Patterson Rd*

East/West Street: *Patterson Rd* | North/South Street: *Hospital Access +*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*4*	*1050*	*98*	*136*	*1605*	*2*
Peak-Hour Factor, PHF	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*
Hourly Flow Rate, HFR	*4*	*1265*	*118*	*163*	*1933*	*2*
Percent Heavy Vehicles	*0*	*–*	*–*	*2*	*–*	*–*
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*1*			*1*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*19*	*0*	*96*	*3*	*0*	*1*
Peak-Hour Factor, PHF	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*	*0.83*
Hourly Flow Rate, HFR	*22*	*0*	*115*	*3*	*0*	*1*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*		*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (vph)	*4*	*163*	*22*		*115*		*4*	
C (m) (vph)	*399*	*506*	*181*		*482*		*59*	
v/c	*0.01*	*0.32*	*0.12*		*0.24*		*0.07*	
95% queue length	*0.03*	*1.38*	*0.41*		*0.92*		*0.21*	
Control Delay	*14.1*	*15.5*	*27.6*		*14.8*		*70.4*	
LOS	*B*	*C*	*D*		*B*		*F*	
Approach Delay	*–*	*–*	*16.9*			*70.4*		
Approach LOS	*–*	*–*	*C*			*F*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Mark Bunnell*
Agency/Co.	
Date Performed	*9/20/2003*
Analysis Time Period	*PM Peak*

Site Information

Intersection	*Patterson Rd - Hospital Access*
Jurisdiction	*Grand Junction City*
Analysis Year	*2023*

Project Description *St. Mary's Hospital Access to Patterson Rd*

East/West Street: *Patterson Rd* | North/South Street: *Hospital Access +*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	*3*	*2064*	*46*	*57*	*1730*	*9*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR	*3*	*2150*	*47*	*59*	*1802*	*9*
Percent Heavy Vehicles	*0*	–	–	*2*	–	–
Median Type	*Two Way Left Turn Lane*					
RT Channelized			*0*			*0*
Lanes	*1*	*2*	*1*	*1*	*2*	*0*
Configuration	*L*	*T*	*R*	*L*	*T*	*TR*
Upstream Signal		*1*			*1*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	*39*	*0*	*128*	*3*	*0*	*6*
Peak-Hour Factor, PHF	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*	*0.96*
Hourly Flow Rate, HFR	*40*	*0*	*133*	*3*	*0*	*6*
Percent Heavy Vehicles	*2*	*0*	*2*	*0*	*0*	*0*
Percent Grade (%)		*0*			*0*	
Flared Approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*		*LR*	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*L*		*R*		*LR*	
v (vph)	*3*	*59*	*40*		*133*		*9*	
C (m) (vph)	*392*	*294*	*97*		*640*		*181*	
v/c	*0.01*	*0.20*	*0.41*		*0.21*		*0.05*	
95% queue length	*0.02*	*0.73*	*1.70*		*0.78*		*0.16*	
Control Delay	*14.3*	*20.3*	*66.0*		*12.1*		*25.9*	
LOS	*B*	*C*	*F*		*B*		*D*	
Approach Delay	–	–	*24.6*			*25.9*		
Approach LOS	–	–	*C*			*D*		

HCS2000: Unsignalized Intersections Release 4.1c

TWO-WAY STOP CONTROL SUMMARY

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: AM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2003
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	668	89	124	1024	2
Peak-Hour Factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83
Hourly Flow Rate, HFR	4	804	107	149	1233	2
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration	L	T	R	L	T	TR
Upstream Signal?		Yes			Yes	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	17		87	3		1
Peak Hour Factor, PHF	0.83		0.83	0.83		0.83
Hourly Flow Rate, HFR	20		104	3		1
Percent Heavy Vehicles	2		2	0		0
Percent Grade (%)		0			0	
Median Storage 4						
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			
Lanes	1		1	0		0
Configuration	L		R		LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	4	149	20		104		4	
C(m) (vph)	642	741	268		595		152	
v/c	0.01	0.20	0.07		0.17		0.03	
95% queue length	0.02	0.75	0.24		0.63		0.08	
Control Delay	10.6	11.1	19.5		12.3		29.3	

LOS	B	B	C	B	D	
Approach Delay			13.5		29.3	
Approach LOS			B		D	

HCS2000: Unsignalized Intersections Release 4.1c

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: AM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2003
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	668	89	124	1024	2
Peak-Hour Factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83
Peak-15 Minute Volume	1	201	27	37	308	1
Hourly Flow Rate, HFR	4	804	107	149	1233	2
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration	L	T	R	L	T	TR
Upstream Signal?		Yes			Yes	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	17		87	3		1
Peak Hour Factor, PHF	0.83		0.83	0.83		0.83
Peak-15 Minute Volume	5		26	1		0
Hourly Flow Rate, HFR	20		104	3		1
Percent Heavy Vehicles	2		2	0		0
Percent Grade (%)		0			0	
Median Storage	4					
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			

Lanes	1	1	0	0
Configuration	L	R		LR

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	2	2
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn	111	1700	3	11	100	35	2000
Through	595	1700	5	39	100	35	2000
S5 Left-Turn	124	1700	3	11	100	35	600
Through	912	1700	5	37	100	35	600

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)	4.1	4.1	7.5		6.9	7.5		6.9
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0	2	2		2	0		0
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00		0.00	0.00		0.00
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1	4.1	7.5		6.9	7.5		6.9
2-stage	4.1	4.1	6.5		6.9	6.5		6.9

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)	2.20	2.20	3.50		3.30	3.50		3.30
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0	2	2		2	0		0
t(f)	2.2	2.2	3.5		3.3	3.5		3.3

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog	595	111	912	124
Total Saturation Flow Rate, s (vph)	3400	3400	3400	3400
Arrival Type	5	3	5	3
Effective Green, g (sec)	39	11	37	11
Cycle Length, C (sec)	100	100	100	100
Rp (from Exhibit 16-11)	1.667	1.000	1.667	1.000
Proportion vehicles arriving on green P	0.650	0.110	0.617	0.110
g(q1)	6.1	2.9	10.3	3.2
g(q2)	2.5	0.1	8.3	0.1
g(q)	8.6	3.0	18.6	3.4

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.350		0.350	
beta	0.741		0.741	
Travel time, t(a) (sec)	38.873		11.662	
Smoothing Factor, F	0.090		0.249	
Proportion of conflicting flow, f	0.650	0.121	0.659	0.090
Max platooned flow, V(c,max)	1235	102	2229	188
Min platooned flow, V(c,min)	2000	2000	2000	2000
Duration of blocked period, t(p)	0.0	0.0	11.5	0.0
Proportion time blocked, p	0.000		0.115	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.115
p(dom)	0.115
p(subo)	0.000
Constrained or unconstrained?	U

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)	0.885		
p(4)	1.000		
p(7)	0.885	1.000	0.885
p(8)			
p(9)	1.000		
p(10)	0.885	0.885	1.000
p(11)			
p(12)	0.885		

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	1237	913	1728	404	1944	620
s	3400	3400	3400	3400	3400	3400
Px	0.885	1.000	0.885	1.000	0.885	0.885
V c,u,x	956	913	1511	404	1755	258

C r,x	727	742	83	596	55	747
C plat,x	643	742	73	596	49	661

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)	814	914			1534	410		
s	3400	3400			3400	3400		
P(x)	1.000	0.885			0.885	1.000		
V(c,u,x)	814	591			1291	410		
C(r,x)	338	460			176	595		
C(plat,x)	338	407			156	595		

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	404	620
Potential Capacity	596	661
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	595	660
Probability of Queue free St.	0.83	1.00

Step 2: LT from Major St.	4	1
Conflicting Flows	913	1237
Potential Capacity	742	643
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	741	642
Probability of Queue free St.	0.80	0.99
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.79	0.79
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
Conflicting Flows	1728	1944
Potential Capacity	73	49
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.79	0.79
Maj. L, Min T Adj. Imp Factor.	0.84	0.84
Cap. Adj. factor due to Impeding mvmnt	0.84	0.69
Movement Capacity	61	34

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity	394	209
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.80
Movement Capacity	391	167
Probability of Queue free St.	1.00	1.00
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity	209	352
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.80	0.99
Movement Capacity	167	349
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.79	0.79
Movement Capacity		
Result for 2 stage process:		
a	0.98	0.98
y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows	814	1534
Potential Capacity	338	156
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.80
Movement Capacity	335	124
Part 2 - Second Stage		
Conflicting Flows	914	410
Potential Capacity	407	595
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.80	0.82
Movement Capacity	325	488
Part 3 - Single Stage		
Conflicting Flows	1728	1944
Potential Capacity	73	49
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.79	0.79
Maj. L, Min T Adj. Imp Factor.	0.84	0.84
Cap. Adj. factor due to Impeding mvmnt	0.84	0.69
Movement Capacity	61	34
Results for Two-stage process:		
a	0.98	0.98
y	1.05	0.30

C t	268	121

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	20		104	3		1
Movement Capacity (vph)		268		595	121	660
Shared Lane Capacity (vph)					152	

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	268		595	121		660
Volume	20		104	3		1
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				152		
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	4	149	20		104		4	
C(m) (vph)	642	741	268		595		152	
v/c	0.01	0.20	0.07		0.17		0.03	
95% queue length	0.02	0.75	0.24		0.63		0.08	
Control Delay	10.6	11.1	19.5		12.3		29.3	
LOS	B	B	C		B		D	
Approach Delay			13.5				29.3	
Approach LOS			B				D	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.80
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4	10.6	11.1
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS2000: Unsignalized Intersections Release 4.1c

TWO-WAY STOP CONTROL SUMMARY

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: PM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2003
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	3	1330	42	52	1125	8
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	3	1385	43	54	1171	8
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration	L	T	R	L	T	TR
Upstream Signal?		Yes			Yes	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	35	116		3	5	
Peak Hour Factor, PHF	0.96	0.96		0.96	0.96	
Hourly Flow Rate, HFR	36	120		3	5	
Percent Heavy Vehicles	2	2		0	0	
Percent Grade (%)		0			0	
Median Storage	4					
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			
Lanes	1	1		0	0	
Configuration	L	R			LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	3	54	36		120		8	
C(m) (vph)	598	590	229		854		265	
v/c	0.01	0.09	0.16		0.14		0.03	
95% queue length	0.02	0.30	0.55		0.49		0.09	
Control Delay	11.1	11.7	23.6		9.9		19.0	

LOS	B	B	C	A		C
Approach Delay				13.1		19.0
Approach LOS				B		C

HCS2000: Unsignalized Intersections Release 4.1c

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: PM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2003
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	3	1330	42	52	1125	8
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Peak-15 Minute Volume	1	346	11	14	293	2
Hourly Flow Rate, HFR	3	1385	43	54	1171	8
Percent Heavy Vehicles	0	--	--	2	--	--
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration		L	T	R	L T	TR
Upstream Signal?			Yes		Yes	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	35		116	3		5
Peak Hour Factor, PHF	0.96		0.96	0.96		0.96
Peak-15 Minute Volume	9		30	1		1
Hourly Flow Rate, HFR	36		120	3		5
Percent Heavy Vehicles	2		2	0		0
Percent Grade (%)		0			0	
Median Storage	4					
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			

Lanes	1	1	0	0
Configuration	L	R		LR

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	2	2
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn	55	1700	3	13	110	35	2000
Through	1195	1700	5	48	110	35	2000
S5 Left-Turn	291	1700	3	21	110	35	600
Through	772	1700	5	59	110	35	600

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)	4.1	4.1	7.5		6.9	7.5		6.9
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0	2	2		2	0		0
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00		0.00	0.00		0.00
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1	4.1	7.5		6.9	7.5		6.9
2-stage	4.1	4.1	6.5		6.9	6.5		6.9

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)	2.20	2.20	3.50		3.30	3.50		3.30
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0	2	2		2	0		0
t(f)	2.2	2.2	3.5		3.3	3.5		3.3

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog	1195	55	772	291
Total Saturation Flow Rate, s (vph)	3400	3400	3400	3400
Arrival Type	5	3	5	3
Effective Green, g (sec)	48	13	59	21
Cycle Length, C (sec)	110	110	110	110
Rp (from Exhibit 16-11)	1.667	1.000	1.667	1.000
Proportion vehicles arriving on green P	0.727	0.118	0.894	0.191
g(q1)	10.5	1.6	2.6	7.6
g(q2)	14.9	0.0	1.6	0.7
g(q)	25.5	1.6	4.3	8.3

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.350		0.350	
beta	0.741		0.741	
Travel time, t(a) (sec)	38.873		11.662	
Smoothing Factor, F	0.090		0.249	
Proportion of conflicting flow, f	0.835	0.038	0.626	0.236
Max platooned flow, V(c,max)	2584	18	1499	728
Min platooned flow, V(c,min)	2000	2000	2000	2000
Duration of blocked period, t(p)	23.2	0.0	0.0	0.0
Proportion time blocked, p	0.211		0.000	

Computation 3-Platoon Event Periods Result

p(2)	0.211
p(5)	0.000
p(dom)	0.211
p(subo)	0.000
Constrained or unconstrained?	U

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Stage II
p(1)	1.000		
p(4)	0.789		
p(7)	0.789	0.789	1.000
p(8)			
p(9)	0.789		
p(10)	0.789	1.000	0.789
p(11)			
p(12)	1.000		

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	1181	1430	2086	694	1983	592
s	3400	3400	3400	3400	3400	3400
Px	1.000	0.789	0.789	0.789	0.789	1.000
V c,u,x	1181	903	1735	0	1604	592

C r,x	599	749	56	1084	72	454
C plat,x	599	591	44	855	57	454

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)	1393	693			1285	698		
s	3400	3400			3400	3400		
P(x)	0.789	1.000			1.000	0.789		
V(c,u,x)	856	693			1285	0		
C(r,x)	319	400			177	1029		
C(plat,x)	252	400			177	812		

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	694	592
Potential Capacity	855	454
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	854	453
Probability of Queue free St.	0.86	0.99

Step 2: LT from Major St.	4	1
Conflicting Flows	1430	1181
Potential Capacity	591	599
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	590	598
Probability of Queue free St.	0.91	0.99
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.90	0.90
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
Conflicting Flows	2086	1983
Potential Capacity	44	57
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.90	0.90
Maj. L, Min T Adj. Imp Factor.	0.92	0.92
Cap. Adj. factor due to Impeding mvmnt	0.91	0.79
Movement Capacity	40	45

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity	297	237
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.91
Movement Capacity	295	215
Probability of Queue free St.	1.00	1.00
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity	236	281
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.91	0.99
Movement Capacity	214	279
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.90	0.90
Movement Capacity		
Result for 2 stage process:		
a	0.98	0.98
y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows	1393	1285
Potential Capacity	252	177
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.91
Movement Capacity	250	161
Part 2 - Second Stage		
Conflicting Flows	693	698
Potential Capacity	400	812
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.90	0.86
Movement Capacity	359	694
Part 3 - Single Stage		
Conflicting Flows	2086	1983
Potential Capacity	44	57
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.90	0.90
Maj. L, Min T Adj. Imp Factor.	0.92	0.92
Cap. Adj. factor due to Impeding mvmnt	0.91	0.79
Movement Capacity	40	45
Results for Two-stage process:		
a	0.98	0.98
y	0.66	0.19

C t	229	157

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	36		120	3		5
Movement Capacity (vph)		229		854	157	453
Shared Lane Capacity (vph)					265	

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	229		854	157		453
Volume	36		120	3		5
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				265		
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	3	54	36		120		8	
C(m) (vph)	598	590	229		854		265	
v/c	0.01	0.09	0.16		0.14		0.03	
95% queue length	0.02	0.30	0.55		0.49		0.09	
Control Delay	11.1	11.7	23.6		9.9		19.0	
LOS	B	B	C		A		C	
Approach Delay			13.1				19.0	
Approach LOS			B				C	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.91
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4	11.1	11.7
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS2000: Unsignalized Intersections Release 4.1c

TWO-WAY STOP CONTROL SUMMARY

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: AM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2023
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	1050	98	136	1605	2
Peak-Hour Factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83
Hourly Flow Rate, HFR	4	1265	118	163	1933	2
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration	L	T	R	L	T	TR
Upstream Signal?		Yes			Yes	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	19	96	3	1		
Peak Hour Factor, PHF	0.83	0.83	0.83	0.83		
Hourly Flow Rate, HFR	22	115	3	1		
Percent Heavy Vehicles	2	2	0	0		
Percent Grade (%)	0		0			
Median Storage	4					
Flared Approach: Exists?			No			
Storage						
RT Channelized?			No			
Lanes	1	1	0	0		
Configuration	L	R		LR		

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	4	163	22		115	4		
C(m) (vph)	399	506	181		482	59		
v/c	0.01	0.32	0.12		0.24	0.07		
95% queue length	0.03	1.38	0.41		0.92	0.21		
Control Delay	14.1	15.5	27.6		14.8	70.4		

LOS	B	C	D	B		F
Approach Delay			16.9		70.4	
Approach LOS			C		F	

HCS2000: Unsignalized Intersections Release 4.1c

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: AM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2023
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	4	1050	98	136	1605	2
Peak-Hour Factor, PHF	0.83	0.83	0.83	0.83	0.83	0.83
Peak-15 Minute Volume	1	316	30	41	483	1
Hourly Flow Rate, HFR	4	1265	118	163	1933	2
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration		L	T	R	L	T TR
Upstream Signal?			Yes			Yes

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	19		96	3		1
Peak Hour Factor, PHF	0.83		0.83	0.83		0.83
Peak-15 Minute Volume	6		29	1		0
Hourly Flow Rate, HFR	22		115	3		1
Percent Heavy Vehicles	2		2	0		0
Percent Grade (%)		0			0	
Median Storage	4					
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			

Lanes	1	1	0	0
Configuration	L	R		LR

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	2	2
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn	168	1700	3	20	150	35	2000
Through	902	1700	5	52	150	35	2000
S5 Left-Turn	188	1700	3	17	150	35	600
Through	1382	1700	5	62	150	35	600

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)	4.1	4.1	7.5		6.9	7.5		6.9
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0	2	2		2	0		0
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00		0.00	0.00		0.00
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1	4.1	7.5		6.9	7.5		6.9
2-stage	4.1	4.1	6.5		6.9	6.5		6.9

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)	2.20	2.20	3.50		3.30	3.50		3.30
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0	2	2		2	0		0
t(f)	2.2	2.2	3.5		3.3	3.5		3.3

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog	902	168	1382	188
Total Saturation Flow Rate, s (vph)	3400	3400	3400	3400
Arrival Type	5	3	5	3
Effective Green, g (sec)	52	20	62	17
Cycle Length, C (sec)	150	150	150	150
Rp (from Exhibit 16-11)	1.667	1.000	1.667	1.000
Proportion vehicles arriving on green P	0.578	0.133	0.689	0.113
g(q1)	16.8	6.4	19.0	7.4
g(q2)	13.3	0.3	39.8	0.4
g(q)	30.1	6.8	58.8	7.8

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.350		0.350	
beta	0.741		0.741	
Travel time, t(a) (sec)	38.873		11.662	
Smoothing Factor, F	0.090		0.249	
Proportion of conflicting flow, f	0.650	0.121	0.659	0.090
Max platooned flow, V(c,max)	2083	195	2240	272
Min platooned flow, V(c,min)	2000	2000	2000	2000
Duration of blocked period, t(p)	6.1	0.0	52.4	0.0
Proportion time blocked, p	0.041		0.349	

Computation 3-Platoon Event Periods	Result
p(2)	0.041
p(5)	0.349
p(dom)	0.349
p(subo)	0.041
Constrained or unconstrained?	U

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)	0.651		
p(4)	0.959		
p(7)	0.630	0.959	0.651
p(8)			
p(9)	0.959		
p(10)	0.630	0.651	0.959
p(11)			
p(12)	0.651		

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	1937	1385	2567	634	2902	970
s	3400	3400	3400	3400	3400	3400
Px	0.651	0.959	0.630	0.959	0.630	0.651
V c,u,x	1152	1299	2078	516	2610	0

C r,x	614	529	31	504	12	1091
C plat,x	400	507	20	483	8	710

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)	1275	1292			2262	640		
s	3400	3400			3400	3400		
P(x)	0.959	0.651			0.651	0.959		
V(c,u,x)	1185	160			1651	523		
C(r,x)	201	826			105	510		
C(plat,x)	193	537			68	489		

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	634	970
Potential Capacity	483	710
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	482	709
Probability of Queue free St.	0.76	1.00

Step 2: LT from Major St.	4	1
Conflicting Flows	1385	1937
Potential Capacity	507	400
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	506	399
Probability of Queue free St.	0.68	0.99
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.67	0.67
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
Conflicting Flows	2567	2902
Potential Capacity	20	8
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.67	0.67
Maj. L, Min T Adj. Imp Factor.	0.74	0.74
Cap. Adj. factor due to Impeding mvmnt	0.74	0.56
Movement Capacity	15	5

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity	254	103
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.68
Movement Capacity	251	70
Probability of Queue free St.	1.00	1.00
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity	102	222
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.68	0.99
Movement Capacity	69	219
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.67	0.67
Movement Capacity		
Result for 2 stage process:		
a	0.98	0.98
y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows	1275	2262
Potential Capacity	193	68
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.68
Movement Capacity	191	46
Part 2 - Second Stage		
Conflicting Flows	1292	640
Potential Capacity	537	489
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.68	0.75
Movement Capacity	364	369
Part 3 - Single Stage		
Conflicting Flows	2567	2902
Potential Capacity	20	8
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.67	0.67
Maj. L, Min T Adj. Imp Factor.	0.74	0.74
Cap. Adj. factor due to Impeding mvmnt	0.74	0.56
Movement Capacity	15	5
Results for Two-stage process:		
a	0.98	0.98
y	0.51	0.20

C t			181			45						

Worksheet 8-Shared Lane Calculations

Movement			7	8	9	10	11	12				
	L		T	R	L		T	R				
Volume (vph)			22		115	3		1				
Movement Capacity (vph)			181			482	45			709		
Shared Lane Capacity (vph)							59					

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement			7	8	9	10	11	12				
	L		T	R	L		T	R				
C sep			181			482	45			709		
Volume			22			115	3			1		
Delay												
Q sep												
Q sep +1												
round (Qsep +1)												
n max												
C sh							59					
SUM C sep												
n												
C act												

Worksheet 10-Delay, Queue Length, and Level of Service

Movement		1	4	7	8	9	10	11	12			
Lane Config		L	L	L		R		LR				
v (vph)		4	163	22		115		4				
C(m) (vph)		399	506	181		482		59				
v/c	0.01	0.32	0.12		0.24		0.07					
95% queue length	0.03	1.38	0.41		0.92		0.21					
Control Delay	14.1	15.5	27.6		14.8		70.4					
LOS	B	C	D		B		F					
Approach Delay				16.9			70.4					
Approach LOS				C			F					

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.68
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4	14.1	15.5
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS2000: Unsignalized Intersections Release 4.1c

TWO-WAY STOP CONTROL SUMMARY

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: PM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2023
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	3	2064	46	57	1730	9
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Hourly Flow Rate, HFR	3	2150	47	59	1802	9
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration	L	T	R	L	T	TR
Upstream Signal?		Yes			Yes	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	39		128	3		6
Peak Hour Factor, PHF	0.96		0.96	0.96		0.96
Hourly Flow Rate, HFR	40		133	3		6
Percent Heavy Vehicles	2		2	0		0
Percent Grade (%)		0			0	
Median Storage 4						
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			
Lanes	1	1		0	0	
Configuration		L	R		LR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	3	59	40		133		9	
C(m) (vph)	392	294	97		640		181	
v/c	0.01	0.20	0.41		0.21		0.05	
95% queue length	0.02	0.73	1.70		0.78		0.16	
Control Delay	14.3	20.3	66.0		12.1		25.9	

LOS	B	C	F	B	D	
Approach Delay				24.6	25.9	
Approach LOS				C	D	

HCS2000: Unsignalized Intersections Release 4.1c

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Mark Bunnell
Agency/Co.:
Date Performed: 9/20/2003
Analysis Time Period: PM Peak
Intersection: Patterson Rd - Hospital Access
Jurisdiction: Grand Junction City
Units: U. S. Customary
Analysis Year: 2023
Project ID: St. Mary's Hospital Access to Patterson Rd
East/West Street: Patterson Rd
North/South Street: Hospital Access +
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	3	2064	46	57	1730	9
Peak-Hour Factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Peak-15 Minute Volume	1	538	12	15	451	2
Hourly Flow Rate, HFR	3	2150	47	59	1802	9
Percent Heavy Vehicles	0	–	–	2	–	–
Median Type	TWLTL					
RT Channelized?			No			
Lanes	1	2	1	1	2	0
Configuration		L	T	R	L	T TR
Upstream Signal?			Yes		Yes	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	39		128	3		6
Peak Hour Factor, PHF	0.96		0.96	0.96		0.96
Peak-15 Minute Volume	10		33	1		2
Hourly Flow Rate, HFR	40		133	3		6
Percent Heavy Vehicles	2		2	0		0
Percent Grade (%)		0			0	
Median Storage	4					
Flared Approach: Exists?					No	
Storage						
RT Channelized?			No			

Lanes	1	1	0	0
Configuration	L	R		LR

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	2	2
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed mph	Distance to Signal feet
S2 Left-Turn	83	1700	3	15	150	35	2000
Through	1720	1700	5	76	150	35	2000
S5 Left-Turn	441	1700	3	32	150	35	600
Through	1170	1700	5	60	150	35	600

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1	4.1	7.5		6.9	7.5		6.9
t(c,hv)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
P(hv)	0	2	2		2	0		0
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00		0.00	0.00		0.00
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1	4.1	7.5		6.9	7.5		6.9
2-stage	4.1	4.1	6.5		6.9	6.5		6.9

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20	2.20	3.50		3.30	3.50		3.30
t(f,HV)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(HV)	0	2	2		2	0		0
t(f)	2.2	2.2	3.5		3.3	3.5		3.3

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog	1720	83	1170	441
Total Saturation Flow Rate, s (vph)	3400	3400	3400	3400
Arrival Type	5	3	5	3
Effective Green, g (sec)	76	15	60	32
Cycle Length, C (sec)	150	150	150	150
Rp (from Exhibit 16-11)	1.667	1.000	1.667	1.000
Proportion vehicles arriving on green P	0.844	0.100	0.667	0.213
g(q1)	11.8	3.3	17.2	15.3
g(q2)	63.4	0.1	23.1	2.3
g(q)	75.2	3.4	40.3	17.6

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.350		0.350	
beta	0.741		0.741	
Travel time, t(a) (sec)	38.873		11.662	
Smoothing Factor, F	0.090		0.249	
Proportion of conflicting flow, f	0.782	0.038	0.626	0.236
Max platooned flow, V(c,max)	2656	35	2127	797
Min platooned flow, V(c,min)	2000	2000	2000	2000
Duration of blocked period, t(p)	61.2	0.0	31.0	0.0
Proportion time blocked, p	0.408		0.207	

Computation 3-Platoon Event Periods Result

p(2)	0.408
p(5)	0.207
p(dom)	0.408
p(subo)	0.207
Constrained or unconstrained?	U

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)	0.793		
p(4)	0.592		
p(7)	0.488	0.592	0.793
p(8)			
p(9)	0.592		
p(10)	0.488	0.793	0.592
p(11)			
p(12)	0.793		

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	1813	2199	3177		1077	3007		908		
s	3400	3400	3400		3400	3400		3400		
Px	0.793	0.592	0.488		0.592	0.488		0.793		
V c,u,x	1399	1370	2943		0	2595		258		
C r,x	495	497	7		1084	13		747		
C plat,x	393	294	3		641	6		593		

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)	2158	1019			1926	1081		
s	3400	3400			3400	3400		
P(x)	0.592	0.793			0.793	0.592		
V(c,u,x)	1301	398			1542	0		
C(r,x)	170	599			123	1029		
C(plat,x)	101	475			98	609		

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	1077	908
Potential Capacity	641	593
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	640	592
Probability of Queue free St.	0.79	0.99

Step 2: LT from Major St.	4	1
Conflicting Flows	2199	1813
Potential Capacity	294	393
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	294	392
Probability of Queue free St.	0.80	0.99
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.79	0.79
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
Conflicting Flows	3177	3007
Potential Capacity	3	6
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.79	0.79
Maj. L, Min T Adj. Imp Factor.	0.84	0.84
Cap. Adj. factor due to Impeding mvmnt	0.83	0.66
Movement Capacity	2	4

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity	138	141
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.80
Movement Capacity	137	113
Probability of Queue free St.	1.00	1.00
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity	140	127
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.80	0.99
Movement Capacity	112	126
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.79	0.79
Movement Capacity		
Result for 2 stage process:		
a	0.98	0.98
y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows	2158	1926
Potential Capacity	101	98
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.80
Movement Capacity	100	78
Part 2 - Second Stage		
Conflicting Flows	1019	1081
Potential Capacity	475	609
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.79	0.79
Movement Capacity	376	479
Part 3 - Single Stage		
Conflicting Flows	3177	3007
Potential Capacity	3	6
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.79	0.79
Maj. L, Min T Adj. Imp Factor.	0.84	0.84
Cap. Adj. factor due to Impeding mvmnt	0.83	0.66
Movement Capacity	2	4
Results for Two-stage process:		
a	0.98	0.98
y	0.26	0.18

C t	97	76

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	40		133	3		6
Movement Capacity (vph)		97		640	76	592
Shared Lane Capacity (vph)					181	

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	97		640	76		592
Volume	40		133	3		6
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				181		
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	L	L	L		R		LR	
v (vph)	3	59	40		133		9	
C(m) (vph)	392	294	97		640		181	
v/c	0.01	0.20	0.41		0.21		0.05	
95% queue length	0.02	0.73	1.70		0.78		0.16	
Control Delay	14.3	20.3	66.0		12.1		25.9	
LOS	B	C	F		B		D	
Approach Delay			24.6				25.9	
Approach LOS			C				D	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.80
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4	14.3	20.3
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

Appendix D

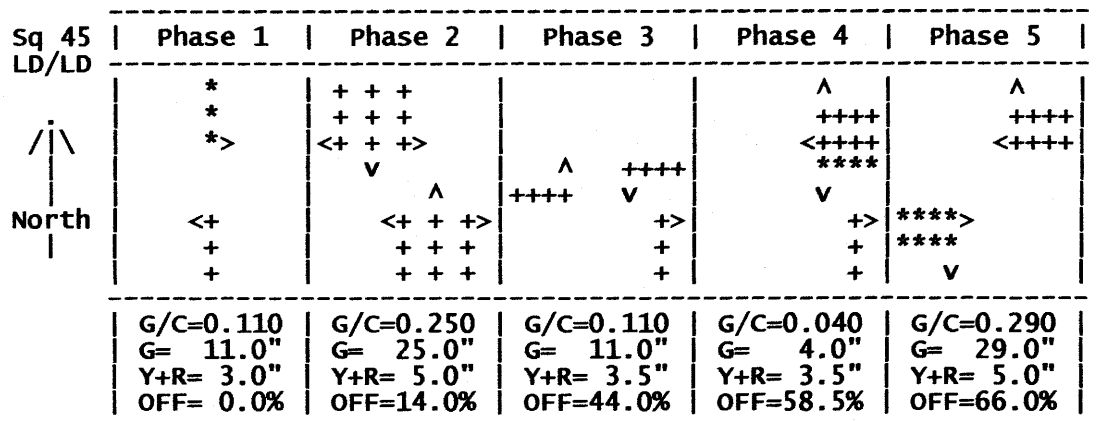
Patterson Road / 7th Street Queuing Analysis Output

St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2003 - AM Peak

10/05/03
18:58:39

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Patterson Rd & 7th Street
Degree of Saturation (v/c) 0.73 Vehicle Delay 29.6 Level of Service C



C=100 sec G= 80.0 sec = 80.0% Y=20.0 sec = 20.0% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach								40.3	D+	
RT+TH	24/2	0.283	0.250	585	914	753	0.824	41.6	*D+	477 ft
LT	12/1	0.000	0.100	346	432	47	0.109	18.8	*B	39 ft
S Approach								25.7	C+	
RT	12/1	0.209	0.485	674	763	134	0.176	14.6	B+	99 ft
TH	24/2	0.202	0.250	606	943	305	0.323	30.8	C	160 ft
LT	12/1	0.073	0.100	194	256	149	0.582	25.4	*C+	159 ft
E Approach								24.8	C+	
RT+TH	24/2	0.314	0.365	1361	1362	1136	0.834	20.5	C+	550 ft
LT	12/1	0.235	0.180	65	325	253	0.778	44.1	*D+	303 ft
W Approach								30.0	C	
RT+TH	24/2	0.264	0.290	927	1001	813	0.812	28.3	*C	442 ft
LT	12/1	0.190	0.105	1	180	100	0.526	44.0	D+	122 ft

$$$

St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2003 - AM Peak

10/05/03
19:02:59

SIGNAL2000/TEAPAC[Ver 1.01.00] - Summary of Parameter Values

Intersection Parameters for Int # 0 - Patterson Rd & 7th Street

METROAREA	NONCBD			
SIMULATION PERIOD	15			
LEVELOFSERVICE	C	D		
NODELOCATION	0	0		
QUEUEMODELS	1	90	25	40

Approach Parameters

	N	E	S	W
APPLABELS				
GRADES	0.0	0.0	0.0	0.0
PEDLEVELS	9	4	1	101
BIKEVOLUMES	0	0	0	0
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	0	0	0	0
BUSVOLUMES	0	0	0	0
RIGHTTURNONREDS	0	0	0	0
UPSTREAMVC	0.00	0.85	0.00	0.75

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	114	511	39	31	912	210	111	253	124	201	474	83
WIDTHS	0.0	24.0	12.0	0.0	24.0	12.0	12.0	24.0	12.0	0.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	0.0	1.1	0.0	0.0	1.4	0.0	2.6	0.7	0.0	2.7	1.6	0.0
PEAKHOURFACTORS	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
ARRIVALTYPES	3	3	3	5	5	3	3	3	3	5	5	3
ACTUATIONS	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES
REQCLEARANCES	5.0	5.0	3.0	5.0	5.0	3.5	5.0	5.0	3.0	5.0	5.0	3.5
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
STARTUPLOST	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ENDGAIN	4.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	3.5
STORAGE	0	0	0	0	0	0	0	0	0	0	0	0
INITIALQUEUE	0	0	0	0	0	0	0	0	0	0	0	0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SATURATIONFLOWS	0	3656	1804	0	3731	1805	1573	3774	1805	0	3451	1805

Phasing Parameters

SEQUENCES	45	ALL						
PERMISSIVES	YES	NO	YES	NO		LEADLAGS	LEAD	LEAD
OVERLAPS	NO	NO	YES	NO		OFFSET	0.00	1
CYCLES	100	100	30			PEDTIME	0.0	0
GREENTIMES	11.00	25.00	11.00	4.00	29.00			
YELLOWTIMES	3.00	5.00	3.50	3.50	5.00			
CRITICALS	3	9	2	6	11			
EXCESS	11							

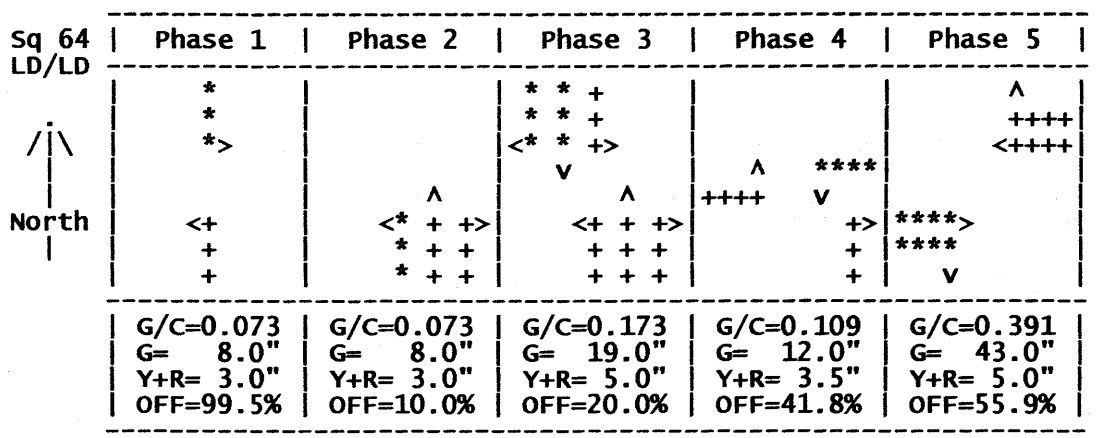
$$$

St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2003 - PM Peak

10/05/03
19:03:52

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Patterson Rd & 7th Street
Degree of Saturation (v/c) 0.73 Vehicle Delay 31.8 Level of Service C



C=110 sec G= 90.0 sec = 81.8% Y=19.5 sec = 17.7% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @C (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach								46.5	D	
RT+TH	24/2	0.259	0.173	1	620	461	0.740	47.9	*D	323 ft
LT	12/1	0.035	0.064	134	276	46	0.160	32.4	*C	52 ft
S Approach								31.3	C	
RT	12/1	0.317	0.427	544	671	319	0.475	23.2	C+	321 ft
TH	24/2	0.255	0.273	575	1029	451	0.438	33.3	C	259 ft
LT	12/1	0.168	0.164	295	386	303	0.785	36.7	*D+	395 ft
E Approach								22.0	C+	
RT+TH	24/2	0.261	0.391	1453	1453	853	0.587	15.9	B	321 ft
LT	12/1	0.238	0.105	1	181	149	0.788	57.0	*E+	208 ft
W Approach								33.7	C	
RT+TH	24/2	0.386	0.391	1410	1424	1390	0.976	32.2	*C	1008 ft
LT	12/1	0.232	0.105	1	175	120	0.635	51.3	D	164 ft

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St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2003 - PM Peak

10/05/03
19:05:09

SIGNAL2000/TEAPAC[Ver 1.01.00] - Summary of Parameter Values

Intersection Parameters for Int # 0 - Patterson Rd & 7th Street

METROAREA	NONCBD			
SIMULATION PERIOD	15			
LEVELOFSERVICE	C	S		
NODELOCATION	0	0		
QUEUEMODELS	1	90	25	40

Approach Parameters

	N	E	S	W
APPLABELS				
GRADES	0.0	0.0	0.0	0.0
PEDLEVELS	4	3	3	77
BIKEVOLUMES	0	0	0	0
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	0	0	0	0
BUSVOLUMES	0	0	0	0
RIGHTTURNONREDS	0	0	0	0
UPSTREAMVC	0.00	0.85	0.00	0.75

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	122	321	44	47	772	143	306	433	291	160	1174	115
WIDTHS	0.0	24.0	12.0	0.0	24.0	12.0	12.0	24.0	12.0	0.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	0.0	1.1	0.0	0.0	1.4	0.0	2.6	0.7	0.0	2.7	1.6	0.0
PEAKHOURFACTORS	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
ARRIVALTYPES	3	3	3	5	5	3	3	3	3	5	5	3
ACTUATIONS	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES
REQCLEARANCES	5.0	5.0	3.0	5.0	5.0	3.5	5.0	5.0	3.0	5.0	5.0	3.5
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
STARTUPLOST	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ENDGAIN	4.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	3.5
STORAGE	0	0	0	0	0	0	0	0	0	0	0	0
INITIALQUEUE	0	0	0	0	0	0	0	0	0	0	0	0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SATURATIONFLOWS	0	3607	1803	0	3718	1805	1571	3774	1804	0	3642	1805

Phasing Parameters

SEQUENCES	64	ALL						
PERMISSIVES	YES	NO	YES	NO		LEADLAGS	LEAD	LEAD
OVERLAPS	NO	NO	YES	NO		OFFSET	0.00	1
CYCLES	110	110	30			PEDTIME	0.0	0
GREENTIMES	8.00	8.00	19.00	12.00	43.00			
YELLOWTIMES	3.00	3.00	5.00	3.50	5.00			
CRITICALS	3	9	2	6	11			
EXCESS	11							

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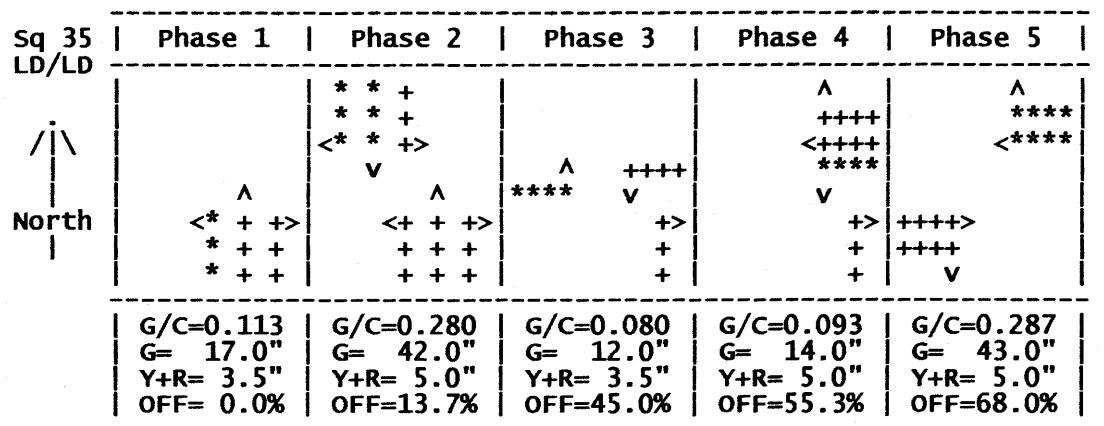
St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2023 - AM Peak

10/05/03
19:06:00

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Patterson Rd & 7th Street
Degree of Saturation (v/c) 0.93 Vehicle Delay 75.5 Level of Service E



C=150 sec G=128.0 sec = 85.3% Y=22.0 sec = 14.7% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @D (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach								114.6	F	
RT+TH	24/2	0.348	0.280	825	1017	1141	1.114	119.0	*F	1294 ft
LT	12/1	0.188	0.273	173	228	71	0.275	43.4	D+	109 ft
S Approach								39.0	D+	
RT	12/1	0.219	0.647	1017	1017	202	0.199	10.8	B+	160 ft
TH	24/2	0.207	0.417	1494	1572	461	0.293	29.2	C	284 ft
LT	12/1	0.132	0.107	192	224	227	0.930	83.9	*F	467 ft
E Approach								84.6	F	
RT+TH	24/2	0.432	0.413	1542	1542	1722	1.117	78.1	*E	1866 ft
LT	12/1	0.258	0.193	192	346	383	1.097	114.2	*F	814 ft
W Approach								50.9	D	
RT	12/1	0.273	0.287	390	398	367	0.922	46.8	D	610 ft
TH	24/2	0.236	0.287	1072	1072	865	0.807	37.8	D+	620 ft
LT	12/1	0.182	0.077	1	120	152	1.101	135.2	*F	356 ft

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St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2023 - AM Peak

10/05/03
19:07:02

SIGNAL2000/TEAPAC[Ver 1.01.00] - Summary of Parameter Values

Intersection Parameters for Int # 0 - Patterson Rd & 7th Street

METROAREA		NONCBD		
SIMULATION PERIOD		15		
LEVELOFSERVICE	D	D		
NODELOCATION	0	0		
QUEUEMODELS	1	90	25	40

Approach Parameters

	N	E	S	W
APPLABELS				
GRADES	0.0	0.0	0.0	0.0
PEDLEVELS	10	4	1	111
BIKEVOLUMES	0	0	0	0
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	0	0	0	0
BUSVOLUMES	0	0	0	0
RIGHTTURNONREDS	0	0	0	0
UPSTREAMVC	0.00	0.95	0.00	0.95

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	173	774	59	47	1382	318	168	383	188	305	718	126
WIDTHS	0.0	24.0	12.0	0.0	24.0	12.0	12.0	24.0	12.0	12.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	1	2	1
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	0.0	1.1	0.0	0.0	1.4	0.0	2.6	0.7	0.0	2.7	1.6	0.0
PEAKHOURFACTORS	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
ARRIVALTYPES	3	3	3	5	5	3	3	3	3	5	5	3
ACTUATIONS	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES
REQCLEARANCES	5.0	5.0	3.0	5.0	5.0	3.5	5.0	5.0	3.0	5.0	5.0	3.5
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
STARTUPLOST	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ENDGAIN	4.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	3.5
STORAGE	0	0	0	0	0	0	0	0	0	0	0	0
INITIALQUEUE	0	0	0	0	0	0	0	0	0	0	0	0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SATURATIONFLOWS	0	3656	945	0	3730	1805	1573	3774	1805	1390	3740	1805

Phasing Parameters

SEQUENCES	35	ALL						
PERMISSIVES	YES	NO	YES	NO		LEADLAGS	LEAD	LEAD
OVERLAPS	NO	NO	YES	NO		OFFSET	0.00	1
CYCLES	100	150	10			PEDTIME	0.0	0
GREENTIMES	17.00	42.00	12.00	14.00	43.00			
YELLOWTIMES	3.50	5.00	3.50	5.00	5.00			
CRITICALS	9	2	12	6	5			
EXCESS	11							

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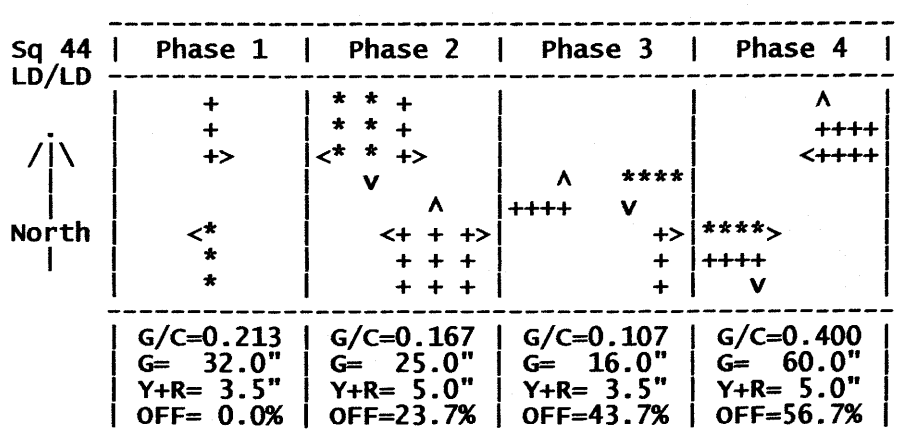
St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2023 - PM Peak

10/05/03
19:07:50

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Patterson Rd & 7th Street
Degree of Saturation (v/c) 1.05 Vehicle Delay 101.8 Level of Service F



C=150 sec G=133.0 sec = 88.7% Y=17.0 sec = 11.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @D (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach								142.0	F	
RT+TH	24/2	0.257	0.167	175	550	699	1.163	153.2	*F	883 ft
LT	12/1	0.038	0.207	353	409	70	0.165	30.0	C	87 ft
S Approach								112.4	F	
RT	12/1	0.364	0.307	373	458	483	1.004	94.1	F	1006 ft
TH	24/2	0.247	0.167	184	578	683	1.086	123.9	F	801 ft
LT	12/1	0.266	0.207	353	409	459	1.083	114.5	*F	1028 ft
E Approach								46.5	D	
RT+TH	24/2	0.336	0.400	1487	1487	1293	0.870	24.6	C+	871 ft
LT	12/1	0.204	0.103	1	171	226	1.209	171.5	*F	584 ft
W Approach								117.5	F	
RT	12/1	0.200	0.400	589	589	252	0.428	18.6	B	217 ft
TH	24/2	0.460	0.400	1496	1496	1853	1.239	133.7	*F	2357 ft
LT	12/1	0.190	0.103	1	171	181	0.968	89.4	F	351 ft

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St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street
Year 2023 - PM Peak

10/05/03
19:09:55

SIGNAL2000/TEAPAC[Ver 1.01.00] - Summary of Parameter Values

Intersection Parameters for Int # 0 - Patterson Rd & 7th Street

METROAREA			NONCBD	
SIMULATION PERIOD			15	
LEVELOFSERVICE		D	D	
NODELOCATION		0	0	
QUEUEMODELS	1	90	25	40

Approach Parameters

	N	E	S	W
APPLABELS				
GRADES	0.0	0.0	0.0	0.0
PEDLEVELS	4	3	3	85
BIKEVOLUMES	0	0	0	0
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	0	0	0	0
BUSVOLUMES	0	0	0	0
RIGHTTURNONREDS	0	0	0	0
UPSTREAMVC	0.00	0.95	0.00	0.95

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	185	486	67	71	1170	217	464	656	441	242	1779	174
WIDTHS	0.0	24.0	12.0	0.0	24.0	12.0	12.0	24.0	12.0	12.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	1	2	1
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	0.0	1.1	0.0	0.0	1.4	0.0	2.6	0.7	0.0	2.7	1.6	0.0
PEAKHOURFACTORS	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
ARRIVALTYPES	3	3	3	5	5	3	3	3	3	5	5	3
ACTUATIONS	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES
REQCLEARANCES	5.0	5.0	3.0	5.0	5.0	3.5	5.0	5.0	3.0	5.0	5.0	3.5
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
STARTUPLOST	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ENDGAIN	4.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	3.5
STORAGE	0	0	0	0	0	0	0	0	0	0	0	0
INITIALQUEUE	0	0	0	0	0	0	0	0	0	0	0	0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SATURATIONFLOWS	0	3607	1805	0	3718	1805	1569	3774	1805	1472	3740	1805

Phasing Parameters

SEQUENCES	44	44					
PERMISSIVES	YES	NO	YES	NO	LEADLAGS	LEAD	LEAD
OVERLAPS	NO	NO	YES	NO	OFFSET	0.00	1
CYCLES	150	150	10		PEDTIME	0.0	0
GREENTIMES	32.00	25.00	16.00	60.00			
YELLOWTIMES	3.50	5.00	3.50	5.00			
CRITICALS	9	2	6	11			
EXCESS	11						

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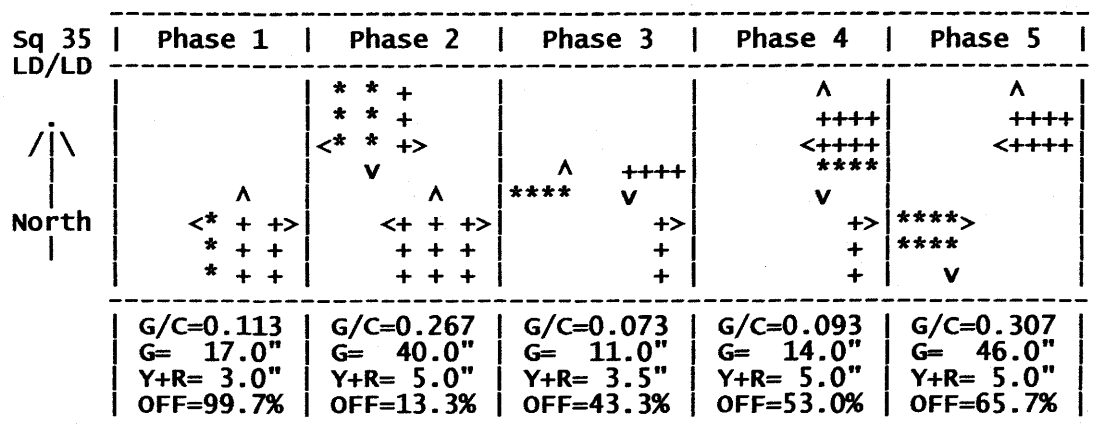
St. Mary's Hospital Patterson Access
Patterson Rd & 7th Street - No Eastbound Right-Turn Lane
Year 2023 - AM Peak

10/16/03
10:36:44

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Patterson Rd & 7th Street
Degree of Saturation (v/c) 1.01 Vehicle Delay 91.4 Level of Service F



C=150 sec G=128.0 sec = 85.3% Y=21.5 sec = 14.3% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @D (vph)	Service Rate @E (vph)	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach								137.0	F	
RT+TH	24/2	0.348	0.267	760	962	1141	1.170	142.7	*F	1372 ft
LT	12/1	0.188	0.260	159	215	71	0.289	45.1	D	111 ft
S Approach								40.1	D+	
RT	12/1	0.219	0.623	975	981	202	0.206	12.3	B+	170 ft
TH	24/2	0.207	0.400	1418	1509	461	0.306	30.9	C	292 ft
LT	12/1	0.132	0.107	192	224	227	0.930	83.5	*F	467 ft
E Approach								67.7	E	
RT+TH	24/2	0.432	0.433	1616	1616	1722	1.066	53.7	D	1727 ft
LT	12/1	0.258	0.187	170	333	383	1.136	130.5	*F	859 ft
W Approach								120.6	F	
RT+TH	24/2	0.345	0.307	1057	1057	1232	1.166	113.6	*F	1440 ft
LT	12/1	0.182	0.070	1	108	152	1.206	177.5	*F	406 ft

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St. Mary's Hospital Patterson Access 10/16/03
Patterson Rd & 7th Street - No Eastbound Right-Turn Lane 10:38:28
Year 2023 - AM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Summary of Parameter Values

Intersection Parameters for Int # 0 - Patterson Rd & 7th Street

METROAREA		NONCBD		
SIMULATION PERIOD		15		
LEVELOFSERVICE	D	D		
NODELOCATION	0	0		
QUEUEMODELS	1 90	25	40	

Approach Parameters

	N	E	S	W
APPLABELS	N	E	S	W
GRADES	0.0	0.0	0.0	0.0
PEDLEVELS	10	4	1	111
BIKEVOLUMES	0	0	0	0
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	0	0	0	0
BUSVOLUMES	0	0	0	0
RIGHTTURNONREDS	0	0	0	0
UPSTREAMVC	0.00	0.95	0.00	0.95

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	173	774	59	47	1382	318	168	383	188	305	718	126
WIDTHS	0.0	24.0	12.0	0.0	24.0	12.0	12.0	24.0	12.0	0.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	0.0	1.1	0.0	0.0	1.4	0.0	2.6	0.7	0.0	2.7	1.6	0.0
PEAKHOURFACTORS	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
ARRIVALTYPES	3	3	3	5	5	3	3	3	3	5	5	3
ACTUATIONS	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES
REQCLEARANCES	5.0	5.0	3.0	5.0	5.0	3.5	5.0	5.0	3.0	5.0	5.0	3.5
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
STARTUPLOST	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ENDGAIN	4.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	3.5
STORAGE	0	0	0	0	0	0	0	0	0	0	0	0
INITIALQUEUE	0	0	0	0	0	0	0	0	0	0	0	0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SATURATIONFLOWS	0	3656	945	0	3730	1805	1573	3774	1805	0	3446	1805

Phasing Parameters

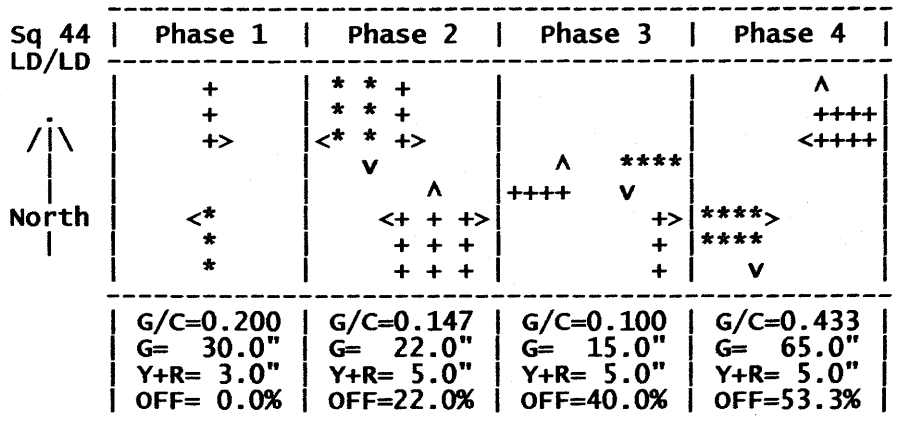
SEQUENCES	35	35					
PERMISSIVES	YES	NO	YES	NO		LEADLAGS	LEAD LEAD
OVERLAPS	NO	NO	YES	NO		OFFSET	0.00 1
CYCLES	100	150	10			PEDTIME	0.0 0
GREENTIMES	17.00	40.00	11.00	14.00	46.00		
YELLOWTIMES	3.00	5.00	3.50	5.00	5.00		
CRITICALS	9	2	12	6	11		
EXCESS	11						

$$$

St. Mary's Hospital Patterson Access 10/16/03
Patterson Rd & 7th Street - No Eastbound Right-Turn Lane 10:39:20
Year 2023 - PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Capacity Analysis Summary

Intersection Averages for Int # 0 - Patterson Rd & 7th Street
Degree of Saturation (v/c) 1.16 Vehicle Delay 139.1 Level of Service F



C=150 sec G=132.0 sec = 88.0% Y=18.0 sec = 12.0% Ped= 0.0 sec = 0.0%

Lane Group	Width/ Lanes	g/C Reqd	g/C Used	Service Rate @D (vph)	Service Rate @E	Adj Volume	v/c	HCM Delay	L S	Queue Model 1
N Approach								204.3	F	
RT+TH	24/2	0.257	0.147	24	472	699	1.321	221.5	*F	1010 ft
LT	12/1	0.041	0.193	332	385	70	0.175	32.7	C	91 ft
S Approach								154.4	F	
RT	12/1	0.364	0.280	321	411	483	1.100	126.9	F	1112 ft
TH	24/2	0.247	0.147	25	496	683	1.235	184.8	F	923 ft
LT	12/1	0.266	0.193	332	385	459	1.148	138.2	*F	1100 ft
E Approach								47.6	D	
RT+TH	24/2	0.336	0.433	1611	1611	1293	0.803	19.0	B	720 ft
LT	12/1	0.204	0.097	1	158	226	1.299	211.0	*F	639 ft
W Approach								167.1	F	
RT+TH	24/2	0.527	0.433	1578	1578	2105	1.334	172.1	*F	2952 ft
LT	12/1	0.190	0.097	1	158	181	1.040	109.7	F	384 ft

$$$

St. Mary's Hospital Patterson Access 10/16/03
Patterson Rd & 7th Street - No Eastbound Right-Turn Lane 10:39:55
Year 2023 - PM Peak

SIGNAL2000/TEAPAC[Ver 1.01.00] - Summary of Parameter Values

Intersection Parameters for Int # 0 - Patterson Rd & 7th Street

METROAREA	NONCBD			
SIMULATION PERIOD	15			
LEVELOFSERVICE	D	D		
NODELOCATION	0	0		
QUEUEMODELS	1	90	25	40

Approach Parameters

	N	E	S	W
APPLABELS				
GRADES	0.0	0.0	0.0	0.0
PEDLEVELS	4	3	3	85
BIKEVOLUMES	0	0	0	0
PARKINGSIDES	NONE	NONE	NONE	NONE
PARKVOLUMES	0	0	0	0
BUSVOLUMES	0	0	0	0
RIGHTTURNONREDS	0	0	0	0
UPSTREAMVC	0.00	0.95	0.00	0.95

Movement Parameters

MOVLABELS	RT	TH	LT	RT	TH	LT	RT	TH	LT	RT	TH	LT
VOLUMES	185	486	67	71	1170	217	464	656	441	242	1779	174
WIDTHS	0.0	24.0	12.0	0.0	24.0	12.0	12.0	24.0	12.0	0.0	24.0	12.0
LANES	0	2	1	0	2	1	1	2	1	0	2	1
GROUPTYPES	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM	NORM
UTILIZATIONS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
TRUCKPERCENTS	0.0	1.1	0.0	0.0	1.4	0.0	2.6	0.7	0.0	2.7	1.6	0.0
PEAKHOURFACTORS	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
ARRIVALTYPES	3	3	3	5	5	3	3	3	3	5	5	3
ACTUATIONS	NO	YES	YES	NO	NO	YES	YES	YES	YES	NO	NO	YES
REQCLEARANCES	5.0	5.0	3.0	5.0	5.0	3.5	5.0	5.0	3.0	5.0	5.0	3.5
MINIMUMS	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
STARTUPLOST	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
ENDGAIN	4.0	4.0	3.0	4.0	4.0	3.5	4.0	4.0	3.0	4.0	4.0	3.5
STORAGE	0	0	0	0	0	0	0	0	0	0	0	0
INITIALQUEUE	0	0	0	0	0	0	0	0	0	0	0	0
IDEALSATFLOWS	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
FACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
DELAYFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NSTOPFACTORS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SATURATIONFLOWS	0	3606	1805	0	3718	1805	1569	3774	1805	0	3642	1805

Phasing Parameters

SEQUENCES	44	44					
PERMISSIVES	YES	NO	YES	NO	LEADLAGS	LEAD	LEAD
OVERLAPS	NO	NO	YES	NO	OFFSET	0.00	1
CYCLES	150	150	10		PEDTIME	0.0	0
GREENTIMES	30.00	22.00	15.00	65.00			
YELLOWTIMES	3.00	5.00	5.00	5.00			
CRITICALS	9	2	6	11			
EXCESS	11						

$$$

Appendix E

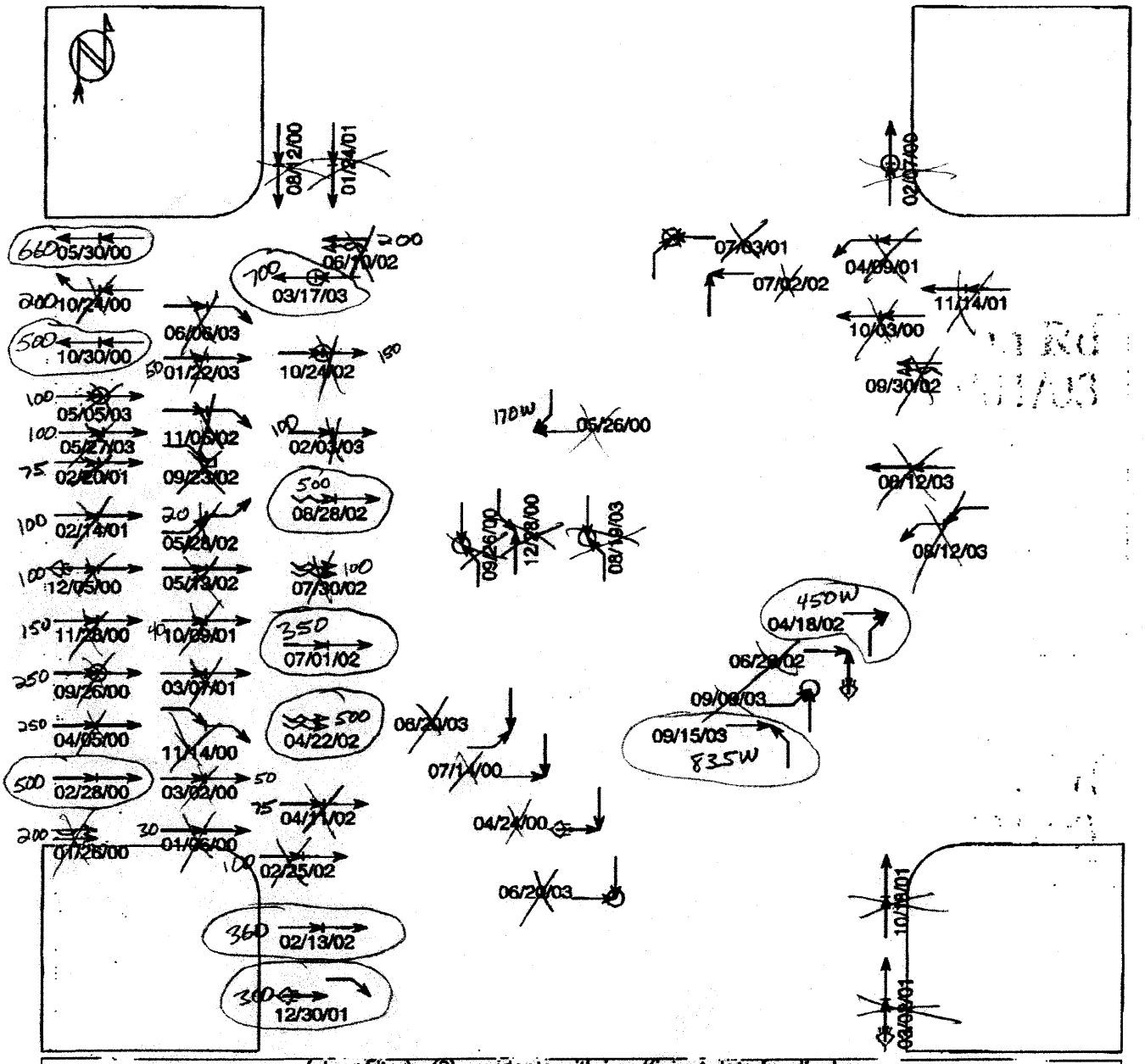
Patterson Road Crash Data

Note: Crashes occurring between Mira Vista Road and 250 feet west of 7th Street are circled on the diagrams and the data sheets.

7th St & Patterson Rd

61 Accidents

01/02/00 - 10/01/03



(clear filter), (0) accidents with insufficient data for display

Straight	Parked	Pedestrian	Fixed objects:
Stopped	Erratic	Bicycle	General, Pole
Unknown	Out of control	Injury	Signal, Curb
Backing	Right turn	Fatality	Tree, Animal
Overtaking	Left turn	Nighttime	3rd vehicle
Sideswipe	U-turn	DUI	Extra data

Intersection Magic VER 6.650
City of Grand Junction, CO 10/08/2003

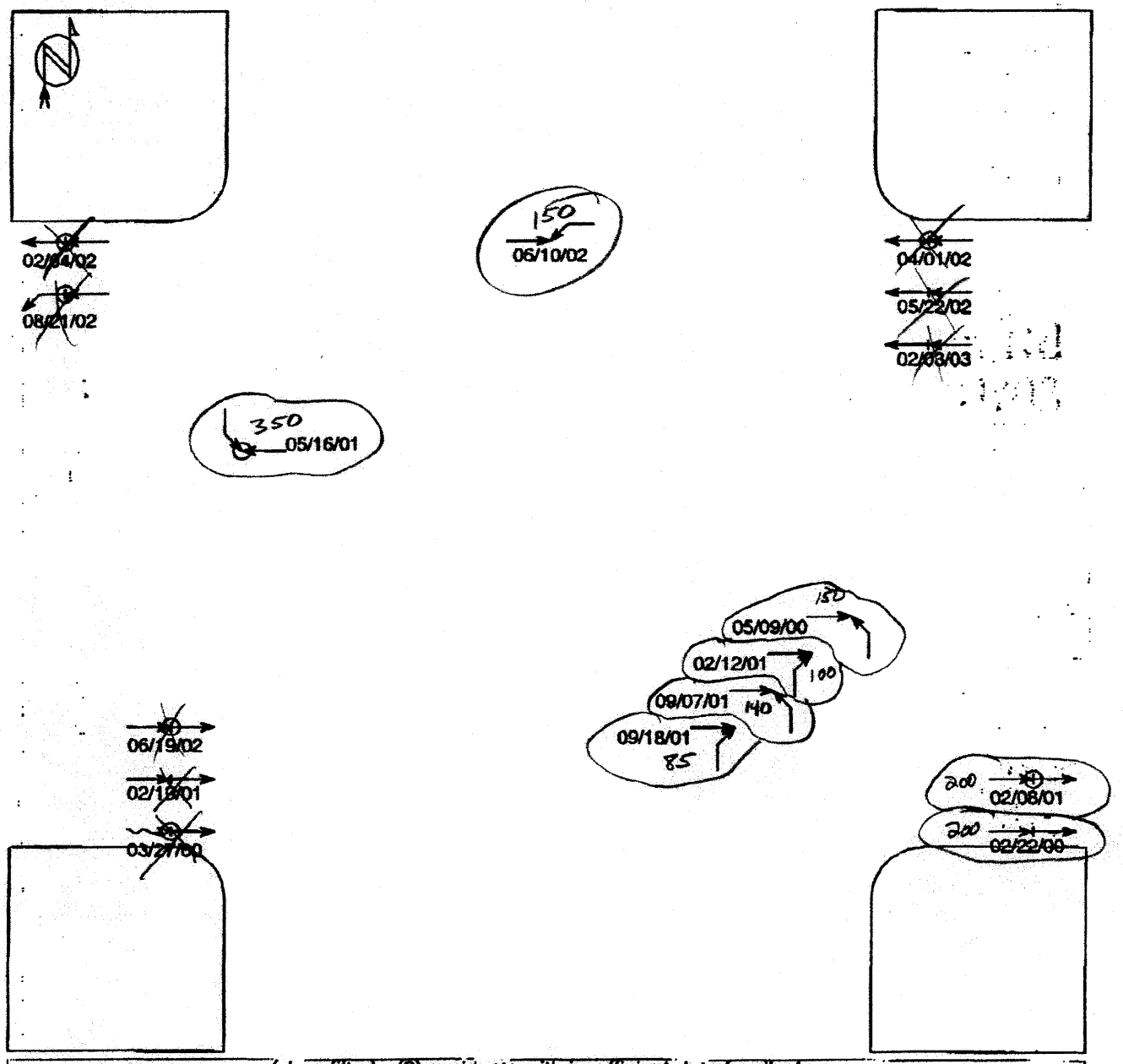
Accident listing
01/02/2000 - 10/01/2003
7th St & Patterson Rd
Sorted by <DATE;TIME;ACC#>

CASE ID	DATE	TIME	DIS	DIR	TYPE	F	IN	NU	DRIV	LIGH	WEAT	VEH	PE	DRIV
00-000760	01/06/200	7:45	30	Wes	Rear	0	0	2	22	Dayl	None	Stra		No I
00-004213	01/26/200	17:25	200	Wes	Sides	0	0	2	20	Dayl	Rain	Othe		No I
00-006271	02/07/200	15:07	50	Nor	Rear	0	1	3	43	Dayl	None	Stra		No I
00-009940	02/28/200	15:51	500	Wes	Rear	0	0	2	47	Dayl	None	Star		No I
00-010479	03/02/200	11:18	50	Wes	Rear	0	0	2	65	Dayl	None	Stra		No I
00-016381	04/05/200	15:55	250	Wes	Rear	0	0	3	39	Dayl	None	Stra		No I
00-019959	04/24/200	21:00	0		Broad	0	0	2	43	Dark	None	Stra		No I
00-026304	05/26/200	13:55	170	Wes	Broad	0	0	2	80	Dayl	None	Righ		No I
00-027102	05/30/200	14:14	660	Wes	Rear	0	0	2	19	Dayl	None	Slow		No I
00-036767	07/14/200	16:26	100	Nor	Broad	0	0	2	79	Dayl	None	Stra		No I
00-042785	08/12/200	16:06	0		Rear	0	0	2	25	Dayl	None	Stra		No I
00-051691	09/26/200	14:53	0		Appro	0	3	2	18	Dayl	None	Left		No I
00-051716	09/26/200	17:10	250	Wes	Rear		1	3	24	Dayl	None	Stra		No I
00-053195	10/03/200	15:55	800	Eas	Rear	0	0	2	50	Dayl	None	Stra		No I
00-057734	10/24/200	12:30	200	Wes	Rear	0	0	2	21	Dayl	Rain	Stra		No I
00-058509	10/30/200	15:47	500	Wes	Rear	0	0	2	33	Dayl	None	Stra		No I
00-061169	11/14/200	12:09	0		Rear	0	0	2	69	Dayl	None	Righ		No I
00-063770	11/28/200	15:12	150	Wes	Rear	0	0	2	47	Dayl	None	Stra		No I
00-065081	12/05/200	17:13	100	Wes	Rear	0	0	2	22	Dark	None	Stra		No I
00-069260	12/28/200	15:46	0		Appro	0	0	2	81	Dayl	None	Left		No I
01-004404	01/24/200	11:45	0		Rear	0	0	2	16	Dayl	None	Stra		No I
01-008410	02/14/200	14:32	100	Wes	Rear	0	0	2	46	Dayl	Rain	Stra		No I
01-009664	02/20/200	17:09	75	Wes	Rear	0	0	2	18	Dayl	None	Stra		No I
01-011767	03/02/200	17:57	75	Sou	Rear	0	0	2	21	Dark	None	Stra		No I
01-012775	03/07/200	15:08	0	Wes	Rear	0	0	2	22	Dayl	None	Stra		No I
01-019563	04/09/200	14:15	0	Eas	Rear	0	0	2	48	Dayl	None	Stra		No I
01-037489	07/03/200	7:15	0		Ped -	0	1	2		Dayl	None	Righ	Cr	
01-058473	10/09/200	13:08	40	Wes	Rear	0	0	2	25	Dayl	None	Stra		No I
01-060258	10/18/200	11:45	0		Rear	0	0	2	33	Dayl	None	Stra		No I
01-065430	11/14/200	11:11	40	Eas	Rear	0	0	3	90	Dayl	None	Stra		No I
01-073966	12/30/200	5:54	300	Wes	Broad	0	0	2	56	Dark	Snow	Righ		No I
02-007825	02/13/200	14:39	360	Wes	Rear	0	0	2	20	Dayl	None	Star		No I
02-010109	02/25/200	16:40	100	Wes	Rear	0	0	2	31	Dayl	None	Slow		No I
02-018851	04/11/200	10:13	75	Wes	Rear	0	0	3	63	Dayl	None	Star		No I
02-020368	04/18/200	11:36	450	Wes	Broad	0	0	2	55	Dayl	None	Righ		No I
02-021264	04/22/200	17:43	500	Wes	Sides	0	0	2	37	Dayl	None	Chan		No I
02-025493	05/13/200	8:20	0		Rear	0	0	2	46	Dayl	None	Stra		No I
02-028749	05/28/200	15:45	20	Wes	Rear	0	0	2	17	Dayl	None	Left		No I
02-031609	06/10/200	14:14	200	Wes	Sides	0	0	2	100	Dayl	None	Chan		No I
02-035358	06/26/200	23:00	0		Broad	0	0	2	31	Dark	None	Stra		No I
02-036309	07/01/200	15:17	350	Wes	Rear	0	0	2	15	Dayl	None	Stra		No I
02-036483	07/02/200	11:45	0		Broad	0	0	2	17	Dayl	None	Stra		No I
02-042694	07/30/200	12:05	100	Wes	Sides	0	0	2	23	Dayl	None	Chan		No I
02-049260	08/28/200	17:39	500	Wes	Rear	0	0	2	19	Dayl	None	Chan		No I
02-054678	09/23/200	9:10	0		Emban	0	0	1	30	Dayl	None	Righ		No I

02-056224	09/30/200	16:00	100	Eas	Sides	0	0	2	22	Dayl	None	Chan	No I
02-061062	10/24/200	12:58	150	Wes	Rear	0	1	2	21	Dayl	None	Stra	No I
⊕02-063525	11/05/200	14:22	0		Rear	0	0	2	75	Dayl	None	Stra	No I
03-004370	01/22/200	15:08	50	Wes	Rear	0	0	2	60	Dayl	None	Star	No I
03-006833	02/03/200	14:56	100	Wes	Rear	0	0	3	48	Dayl	None	Stra	No I
03-014891	03/17/200	9:33	700	Wes	Rear	0	2	2	30	Dayl	Rain	Stra	No I
03-024945	05/05/200	15:35	100	Wes	Rear	0	1	2	47	Dayl	None	Star	No I
03-029825	05/27/200	14:02	100	Wes	Rear	0	0	2	25	Dayl	None	Stra	No I
03-032161	06/06/200	14:15	0		Rear	0	0	2		Dayl	None	Stra	Not
03-035378	06/20/200	14:55	100	Nor	Broad	0	0	2	25	Dayl	None	Left	No I
⊕03-035456	06/20/200	20:30	0		Broad	0	1	2	60	Dark	None	Stra	No I
03-047310	08/12/200	14:36	250	Eas	Rear	0	0	2	68	Dayl	None	Left	No I
03-047311	08/12/200	14:37	250	Eas	Rear	0	0	2	15	Dayl	None	Stra	No I
⊕03-048936	08/19/200	14:31	0		Appro	0	1	2	21	Dayl	None	Left	No I
⊗03-053574	09/09/200	6:20	0		Broad	0	1	2		Dark	None	Left	Not
03-055044	09/15/200	13:45	835	Wes	Broad	0	0	2	55	Dayl	None	Left	No I

Mira Vista Dr & Patterson Rd

16 Accidents 01/02/00 - 10/01/03



(clear filter), (0) accidents with insufficient data for display

Straight	Parked	Pedestrian	Fixed objects:
Stopped	Erratic	Bicycle	General, Pole, Signal, Curb, Tree, Animal
Unknown	Out of control	Injury	
Backing	Right turn	Fatality	
Overtaking	Left turn	Nighttime	3rd vehicle
Sideswipe	U-turn	DUI	Extra data

Intersection Magic VER 6.650
City of Grand Junction, CO 10/08/2003

Accident listing
01/02/2000 - 10/01/2003
Mira Vista Dr & Patterson Rd
Sorted by <DATE;TIME;ACC#>

CASE ID	DATE	TIME	DIS	DIR	TYPE	F	IN	NU	DRIV	LIGH	WEAT	VEH	PE	DRIV
00-008930	02/22/200	15:50	200	Eas	Rear	0	0	2		Dayl	None	Othe		Not
00-014775	03/27/200	15:46	0		Rear	0	1	2	19	Dayl	None	Chan		No I
00-022779	05/09/200	16:32	150	Eas	Broad	0	0	2	70	Dayl	None	Left		No I
01-007222	02/08/200	17:19	200	Eas	Rear	0	2	3	33	Dark	None	Stra		No I
01-008016	02/12/200	15:54	100	Eas	Broad	0	0	2	19	Dayl	None	Righ		No I
01-009362	02/19/200	13:10	0		Rear	0	0	2	17	Dayl	None	Stra		No I
01-027015	05/16/200	10:28	350	Eas	Broad	0	3	3	93	Dayl	None	Left		No I
01-051773	09/07/200	8:14	142	Eas	Broad	0	0	2	84	Dayl	None	Left		No I
01-053824	09/18/200	10:56	85	Eas	Broad	0	0	2	75	Dayl	None	Righ		No I
02-006115	02/04/200	14:00	600	Wes	Rear	0	4	3	16	Dayl	None	Stra		No I
02-016714	04/01/200	17:12	0		Rear	0	1	4	37	Dayl	None	Slow		No I
02-027522	05/22/200	14:15	0		Rear	0	0	2	15	Dayl	None	Stra		No I
02-031634	06/10/200	15:56	150	Eas	Appro	0	0	2	23	Dayl	None	Left		No I
02-033621	06/19/200	15:47	0		Rear	0	2	2	21	Dayl	None	Stra		No I
02-047602	08/21/200	14:52	420	Wes	Rear	0	1	2	68	Dayl	None	Stra		No I
03-006794	02/03/200	11:45	0		Rear	0	0	4	76	Dayl	None	Stra		No I