APPENDIX A

Kimley-Horne and Associates, Inc., Offsite Enabling Projects –
Advanced Utility Planning, December 10, 2008

Offsite Enabling Projects – Advanced Utility Planning

Stormwater Drainage Study

December 10th, 2008

Proposed Prison Medical Facility at NCYCC Stockton

CPR

California
Prison Health Care
Receivership Corp.

Kimley-Horn and Associates, Inc.

URS Bovis Lend Lease Joint Venture

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1. EXECUTIVE SUMMARY

1.1 PURPOSE AND OBJECTIVES

Kimley-Horn and Associates, Inc. is submitting the following Drainage Study of the proposed medical facility at the Northern California Youth Correctional Center (NCYCC). This document contains the results from our hydrologic and hydraulic study and capacity assessment of the system and provides recommended improvements for the proposed off-site storm drain system.

The objectives of this study are:

- To assess the existing system capacity and detention basin operation and capacity.
- To present the runoff flow rates of the facilities in the existing condition and the runoff flow rates for the proposed medical facility for the 10-year and 100-year storm events.
- To prepare conceptual diagrams of recommendations for storm drain system alignment and connection points.
- To prepare conceptual diagrams for relocating the existing agricultural drainage ditch.
- To present an opinion of probable construction cost for suggested improvements.
- To present the timeline for required permits and approvals.

2. BACKGROUND

2.1 SITE LOCATION / WATERSHED DESCRIPTION

The NCYCC site is located south east of the City of Stockton in a portion of the San Joaquin Valley characterized by flat topography that generally slopes from east to west towards the San Joaquin River and Delta. Exhibit 1 shows a vicinity map of the area and identifies the location of the NCYCC. Most of the NCYCC site drains to the south into the North Fork of South Littlejohns Creek. South Littlejohns Creek flows into French Camp Slough, which flows into the San Joaquin River. These stormwater drainage paths are shown in Exhibit 1.

2.2 STORM DRAIN SYSTEM DESCRIPTION

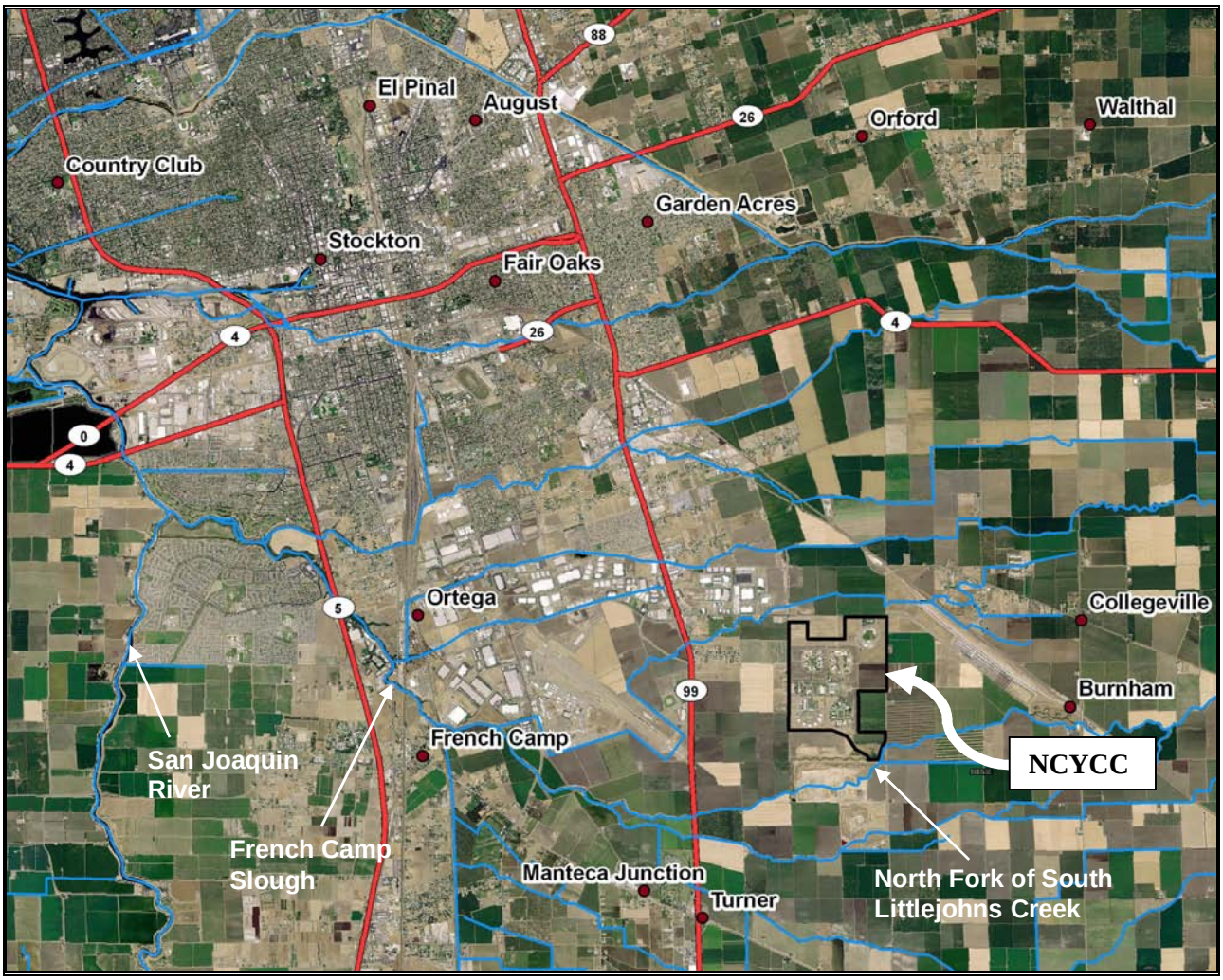
The existing stormwater drainage system is shown in Appendix A - Figure 1. Each developed facility within the NCYCC drains into this system. The existing NCYCC drainage system includes a trunk line that collects runoff from the Women's Facility in a 30" storm drain that increases to 36" with the inflow from the O.H. Close Facility and to 42" with the inflow from the Karl Holton Facility. The 42" line flows into a sump at stormwater Pump Station No. 1 near the center of the site. Four stormwater pumps (three 40 horsepower pumps and one 15 horsepower pump) discharge into a concrete trapezoidal channel which conveys the flow south and south east to a 10.2-acre detention basin adjacent to the North Fork of South Littlejohns Creek. Pump Station No. 2, which contains two pumps (one 15 horsepower pump and one 50 horsepower pump), is located within the detention basin to pump runoff into the North Fork of South Littlejohns Creek.

2.3 FLOOD HAZARD ZONES ON PROPERTY, FIRM MAPS

To determine the impact that flooding could have on drainage from the site, FEMA Flood Insurance Rate Maps were researched. FIRM 0602990465 C, dated April 2, 2002 and FIRM 0602990470 B, dated April 2, 2002 indicate that this site is located entirely within Zone C. Per FEMA, Zone C is defined as areas of minimal flooding. To see the proximity of the project site to the nearest floodplain refer to Appendix C – Flood Insurance Rate Map.

The land areas west of SR 99 tend to be low with much of the area in FEMA floodplains and many of the creeks and channels, including Littlejohns Creek, with levees. East of SR 99, the land tends to be higher without levees. The NCYCC site is not in the FEMA floodplain, but is surrounded by areas that are. The property just north of Arch Road and areas farther to the west of the site, along SR 99, are included in FEMA Zone AO. Per FEMA, Zone AO is defined as areas of 100-year shallow flooding where depths are between one and three feet.

Exhibit 1. Vicinity Map



Stormwater Pump Station No. 1 Vertical Turbine Pumps (4)

Stormwater Pump Station No. 1 Outlet to Concrete-Lined Discharge Channel

View Along Concrete-Lined Discharge Channel

Stormwater Pump Station No. 2 and Detention / Retention Pond

Unlined Agricultural Drainage Ditch Entrance into Project Site

3. HYDROLOGIC ANALYSIS

3.1 METHODOLOGY

The method used to determine the runoff flow rates for this analysis is as described in Section D – "Rational Method" of the County of San Joaquin Hydrology Manual (Hydrology Manual) dated September 1997. The rational method is used to estimate peak discharges from small developed areas that are usually less than one square mile. The rational method relates rainfall intensity, the drainage area of the watershed, and a runoff coefficient to estimate peak runoff flow rates using the following equation.

$$Q = CIA$$

Where:

Q = the peak discharge in cubic feet per second (cfs)

C = a runoff coefficient representing the ratio of runoff depth to rainfall depth (dimensionless)

I = the time-averaged rainfall intensity for a storm duration equal to the time of concentration in inches/hour (in/hr)

A = drainage area in acres (ac)

A hydrologic analysis of the entire NCYCC was conducted to allow a comparison of the estimated runoff flow rates to the capacity of the existing storm drain system and facilities. This comparison is examined and discussed in Section 4.

3.1.1 Area

The survey by Conti and Associates, Inc. of the Karl Holton Youth Correctional Facility dated June 7, 2008 provided the information to delineate the extents of the drainage area for that facility. Based on the survey, the perimeter road of the Karl Holton YCF acted as the divide for that drainage area. Any rainfall that falls outside of the perimeter road does not enter the NCYCC underground storm drain system. This assumption was applied for the remaining youth correctional facilities, namely that the perimeter road of each facility was used as the boundary of each drainage area.

The connecting streets between the youth correctional facilities also contain storm drains that connect to the 42-inch storm drain trunk that is being analyzed. These areas were delineated based on the construction drawings of the storm drain system in those areas.

Each drainage area was then sub-divided into impervious and pervious areas to be used to determine the appropriate runoff coefficient and rate of infiltration as described in Section 3.1.3. An aerial photograph along with the Conti survey was used to differentiate pervious and impervious areas. The impervious area for the proposed Medical Facility was estimated based on the Draft Medical Facility Site Plan dated August 14, 2008.

Table 1. Existing Drainage Areas

Drainage Area	Abbreviated Name	Impervious Area (ac)	Pervious Area (ac)	Total Area (ac)
Women's Facility	Women's	10.9	31.6	42.5
O.H. Close YCF	Close	12.5	20.5	33.0
Karl Holton YCF	Holton	13.7	26.9	40.6
Area around Slane Road	Slane Rd	7.6	11.0	18.6
Area around 3rd Street	3rd St	7.8	6.5	14.3
Area around McKesson Street	McKesson	11.6	11.9	23.5
Dewitt Nelson YCF	Nelson	12.3	28.4	40.7
N.A. Chaderjian YCF	Chaderjian	18.3	39.8	58.1
	Totals (ac)	94.7	176.6	271.3

3.1.2 Intensity

The mean annual precipitation for the NCYCC site, based on Figure B-1 – Isohyetal Rainfall Map from the Hydrology Manual, is 14 inches. Intensity-Duration-Frequency curves were developed using the mean annual precipitation for the project site and the values provided in Table B.10 and B.13 of the Hydrology Manual. Table 2 shows a summary of the rainfall intensities for the 10-year and 100-year events.

Table 2. Rainfall Intensities

Duration	Intensity (in)	
	10-year	100-year
5 min	2.94	4.18
10 min	1.94	2.76
15 min	1.52	2.16
30 min	1.01	1.43
1 hr	0.66	0.94
2 hr	0.44	0.62
3 hr	0.34	0.49
6 hr	0.23	0.32
12 hr	0.15	0.21
24 hr	0.10	0.14

The intensity used in the rational method to determine peak flow rates was interpolated from this data based on the time of concentration of each drainage area. The time of concentration for a watershed is defined as the time required for rainfall from the most hydraulically remote portion of the drainage area to reach the point of concentration. The time of concentration for each drainage area was determined by first establishing the flow path from the most hydraulically remote portion of each drainage area as shown

on Figures 1& 2 (Appendix A). Then, the length of the flow path was sub-divided into the length governed by sheet flow and the length governed by channel flow. Slopes and surface types were used to estimate the travel time for each length and combined to estimate the time of concentration for Karl Holton YCF. The same time of concentration was assumed for other youth correctional facilities. Appendix B contains worksheets that summarize the time of concentration and related intensities for each drainage area.

3.1.3 Runoff Coefficient

The runoff coefficient is the ratio of rate of runoff to the rate of rainfall at an average rainfall intensity at the time of concentration. According to the Hydrology Manual, the runoff coefficient depends on the rainfall intensity, drainage area slope, type and amount of vegetative cover, and infiltration capacity of the ground surface. The Hydrology Manual defines the runoff coefficient with the following equation.

$$C = 0.90\ (a_i + a_p(I-F_p)/I),\ \textit{for I greater than } F_p$$

or

$$C = 0.90\ a_i,\ \textit{for I less than or equal to } F_p$$

Where:

C = runoff coefficient

I = rainfall intensity (inches/hour)

F_p = area-averaged infiltration rate (inches/hour)

a_i = ratio of impervious area to total area (decimal fraction)

a_p = ratio of pervious area to total area (decimal fraction)

The area-averaged infiltration rate (F_p) is a function of the curve number as shown in Figure C-5 of the Hydrology Manual. Curve numbers are dimensionless values developed by the SCS for different cover types that represent the relative amounts of runoff given a rainfall event. The appropriate selection of a curve number for a cover type is dependent on the nature of the soil.

Soils are classified into four hydrologic soil groups. The hydrologic soil group information for this analysis was obtained from shapefiles of the State Soil Geographic (STATSGO) database distributed by the Environmental Protection Agency (EPA) through their website. Figure 4 (Appendix D) displays the different general types of soil groups that exist in the areas surrounding the NCYCC. The information from the STATSGO was confirmed with the soil map 2 of 4 of the San Joaquin County Flood Control and Water Conservation District found in the back of the Hydrology Manual. The hydrologic soil group for the NCYCC is group D. As described in the Hydrology Manual, group D is characterized as a soil with high runoff potential. Group D soils are soils with very slow infiltration rates and consist chiefly of clay soils and/or soils with a permanent high water table.

As described in Section 3.1.1, the drainage areas were sub-divided into pervious and impervious areas. Pervious areas were generally defined as a cover type of good annual or perennial grass. Impervious areas were defined as a cover type of paved parking lots, roofs, and driveways. The curve numbers for these cover types are summarized in the table below.

Table 3. Curve Numbers

Cover Type	Curve Number
Pervious - Grass, Annual or Perennial (Good)	80
Impervious - Paved parking lots, Roofs, Driveways	98

3.1.4 Confluence Analysis

The use of the rational method results only in an estimation of the peak discharge from a drainage area. Because one of the purposes of this study is to evaluate the capacity of the existing storm drain system, it was necessary to combine the results of the rational method used on each drainage basin to obtain an estimate for the rate of flow in the 42-inch storm drain trunk and other downstream storm drain facilities. Section D.9 of the Hydrology Manual provides a procedure to conduct a confluence analysis at the junction of two or more streams. This confluence analysis was applied at all of the points of concentration identified on Figures 1 and 2. A summary of the existing and proposed flow rates at the point of connection for the current Karl Holton YCF (and future Medical Facility), downstream end of the 42" line before entry into the Pump Station No. 1, and total flows entering Pump Station No.1 are summarized below.

Table 4. Summary of Runoff Flow Rates

	Existing Conditions		Proposed Conditions – [Proposed Medical Facility Replaces Existing Karl Holton YCF]	
	10-year	**100-year**	**10-year**	**100-year**
Point of Connection (CP-6)	45.9 cfs	71.3 cfs	89.5 cfs	137.4 cfs
Downstream End of 42" Pipe (CP-2)	79.1 cfs	123.7 cfs	123.1 cfs	190.3 cfs
Entering Pump Station No. 1 (CP-1)	96.4 cfs	152.2 cfs	140.5 cfs	219.0 cfs

3.2 HYDROLOGIC RESULTS

Appendix B contains the four Rational Method Study Forms in the format required in the Hydrology Manual for the existing and proposed conditions for the 10-year and 100-year return periods. These forms summarize the hydrologic analysis. The only change between the existing and proposed conditions is the conversion of the Karl Holton YCF to the proposed Medical Facility. Part of this conversion will direct runoff from areas outside of the current NCYCC facilities into the storm drain system. The total drainage area of the NCYCC will increase by approximately 100 acres with the construction of the proposed Medical Facility. The increased drainage area of the Medical Facility as compared to the Karl Holton YCF increased the peak runoff by 43.6 cfs during the 10-year event and 66.1 cfs during the 100-year event.

4. HYDRAULIC ANALYSIS

4.1 CAPACITY OF EXISTING STORM DRAIN SYSTEM

The existing capacity of several of the NCYCC drainage facilities were estimated and compared to the results from the hydrologic analysis.

4.1.1 42-inch Storm Drain Trunk

Information for the 42-inch storm drain trunk was taken from construction drawings for the structure as shown on the State of California General Services Department Office of Architecture and Construction Plans dated December 24, 1964. The slope of the 42-inch trunk is 0.0010 ft/ft and the material of the trunk line was assumed to be reinforced concrete pipe (RCP). The full flow capacity of the 42-inch trunk line was determined to be 31.8 cfs using Manning's Equation. A FlowMaster worksheet showing a summary of the calculations titled "Worksheet for 42" Storm Drain Trunk" is included in Appendix E.

4.1.2 Pump Station No. 1

The discharge capacity for one of the 40 horsepower pumps was listed at 7,500 gpm at 16 feet of total dynamic head (TDH), according to its motor name-plate. The operating condition for the other two 40 horsepower pumps was assumed to be the same. The capacity of the 15 horsepower pump was estimated based on the pump power equation below:

$$efficiency(\%)P(horsepower) = \gamma(\frac{lb}{ft^3})Q(\frac{ft^3}{\sec})H(ft)$$

where

$$\gamma = 62.4\frac{lb}{ft^3}\ ,\ H=16',\ g = 32.2\frac{ft}{\sec^2}\ ,\ Q = pumping\ flow\ rate$$

The total dynamic head of the 15 horsepower pump was assumed to be 16', similar to the 40 horsepower pumps. Based on these calculations, the stormwater pumps have the following capacities:

Table 5. Flow Capacity of Pump Station No. 1

Stormwater Pump Station No. 1 Pump Capacities			
Pump Number	**Power(hp)**	**TDH(ft)**	**Q(cfs)/(gpm)**
1	15	16'	6.0 / 2,700
2	40	16'	16.7 / 7,500
3	40	16'	16.7 / 7,500
4	40	16'	16.7 / 7,500
		Total	56.1 / 25,200

4.1.3 Concrete-Lined Channel

Pump Station No. 1 discharges into the upstream end of a concrete-lined channel that conveys runoff to the detention/retention basin situated southeast of the NCYCC. Information for the concrete-lined channel was taken from construction drawings for the channel as shown on the State of California General Services Department Office of Architecture and Construction Plans dated July 29, 1965. Drawing C-6 shows the detail of the typical channel cross section. The slope of the channel was taken from sheets C-2, C-3, and C-4 and is 0.0012 ft/ft. The material of the trunk line is concrete. The full flow

capacity of the concrete-lined channel was determined to be 241.6 cfs using Manning's Equation. A FlowMaster worksheet showing a summary of the calculations titled "Worksheet for Concrete-Line Drainage Channel" is included in Appendix E.

The concrete-lined channel passes through three culverts along its alignment from Pump Station No. 1 to the basin. The channel passes beneath dirt patrol roads twice through 36" x 58" corrugated metal pipe (CMP) arch culverts, and a 60" concrete pipe culvert through the basin bank wall. The slope of these culverts matches the slope of the channel, at 0.0012 ft/ft. The capacity of the CMP arch culverts and 60" concrete pipe culvert were determined to be 23.4 cfs and 90.2 cfs respectively (see Appendix E). The culverts greatly reduce the effective hydraulic capacity of the concrete-lined channel.

4.1.4 Unlined Agricultural Drainage Ditch Realignment

An unlined agricultural ditch which flows from east to west currently runs through the field to the east of the Karl Holton YCF until it jogs around the northeast corner of the facility and then continues west. The current alignment of this unlined ditch travels through the center of the proposed medical facility. This unlined drainage ditch is recommended to be realigned to run along the northern boundary of the potential medical facility site as shown in the drainage map for the proposed conditions (Figure 2). Altering the drainage ditch along this alignment will allow the length of the ditch to remain approximately the same. This will allow the channel to maintain the existing slope and capacity. The topography in this area is essentially flat so the ditch should be able to maintain the existing depth and freeboard. A watercourse encroachment permit will need to be filed with the County of San Joaquin before work realigning the drainage can commence. Permits are typically approved provided the modifications do not alter the points at which the watercourse enter and exit the property, as is the case with this proposed realignment.

4.2 COMPARISON BETWEEN CAPACITY OF EXISTING SYSTEM AND RUNOFF

Based on the estimates and calculations made in Sections 3.1 and 4.1, a comparison can be made between the existing capacity of the different facilities making up the NCYCC's storm drain system and the anticipated runoff. Table 6 summarizes the major facilities within the storm drain system, their estimated capacities and the expected runoff based on the conditions (existing and proposed) and the storm frequencies (10-year and 100-year). The storm drain system should be able to convey the 10-year storm event per County Improvement Standards (3.21-A) and the detention basin should be able to adequately route the peak flows from the 100-year storm event per County Improvement Standards (3.21-B). Numbers in red indicate that the facility is undersized for the given condition and storm frequency.

Table 6. Storm Drain Facility Capacity Assessment

Facility	Capacity	10-year		100-year	
		Existing	Proposed	Existing	Proposed
42-inch Storm Drain	31.8 cfs	45.9 cfs	71.3.1 cfs	89.5 cfs	137.4 cfs
Pump Station No. 1	56.1 cfs	79.1 cfs	123.7 cfs	123.1 cfs	190.3 cfs
Concrete Lined Channel	241.6 cfs	96.4 cfs	152.2 cfs	140.5 cfs	219.0 cfs
36" x 58" CMP Arch Culverts	23.4 cfs	96.4 cfs	152.2 cfs	140.5 cfs	219.0 cfs
60" Concrete Pipe Culvert	90.2 cfs	96.4 cfs	152.2 cfs	140.5 cfs	219.0 cfs

From Table 6, it is evident that all of the major facilities except for the concrete-lined channel are undersized for the existing and proposed conditions. Therefore, no additional capacity within the existing system is available to convey the increased runoff from the proposed medical facility.

The NCYCC staff indicated during field investigation visits that there has not been a failure of the storm drain system to their memory. Based on the difference between the capacity of the system and the calculated peak flow rates, it seems that flooding should have occurred at some point in the past. A possible explanation as to why flooding has not occured is the flat terrain could be causing a significant amount of ponding before runoff enters the storm drain system, effectively attenuating the peak flow rate.

5. PROPOSED STORM DRAIN SYSTEM IMPROVEMENTS

5.1 OPTION 1 - USE EXISTING SYSTEM WITH ON-SITE DETENTION

The option to convey stormwater through the existing NCYCC storm drain system and pump station was considered. Because the medical facility is estimated to increase the peak runoff flow rate due to the increase in total tributary surface area and impervious surface area, the proposed 10-year peak flow rate of 58.6 cfs would need to be attenuated to at least the existing NCYCC 10-year peak flow rate of 24.2 cfs to prevent impacts to the existing storm drain system. A method to accomplish this is to install detention basin(s) on-site. However, during meetings with URS/BLL staff it was decided that the option of onsite detention is not preferred because maximizing available land area will be critical to the architectural design of the site.

The capacity of the existing drainage system is currently deficient even before the addition of the proposed project is considered. Although the construction of on-site detention basins will limit the runoff exiting the medical facility site to the flow rates experienced under the existing conditions, the capacity of the 42-inch trunk line and Pump Station No. 1 would still need to be increased. The hydrologic analysis showed that these facilities are currently over capacity with the 10-year storm event. Even if the proposed medical facility detains the runoff from its site and only releases the existing peak flow rate, the site may still experience localized flooding if downstream facilities are over capacity. Assuming the entire medical facility drains to an on-site detention system and then to the storm drain system, two options exist to address the lack of capacity in the 42-inch trunk to Pump Station 1. First, a new 54-inch trunk can be constructed in parallel to the existing 42-inch trunk. The 54-inch trunk would provide the required capacity for the expected runoff from the medical facility and would relieve the stress on the capacity of the existing 42-inch main by taking flow from the medical facility (see "Worksheet for Parallel SD Main", Appendix E). Second, the existing 42-inch trunk can be replaced-in-place with a 66-inch trunk to provide sufficient capacity for the estimated flows from the entire NCYCC (see "Worksheet for Upsized SD Main", Appendix E). It is anticipated that due to the cost to remove and dispose of the existing 42-inch trunk and the abundance of area in which to place a parallel trunk, the option of constructing a 54-inch parallel line would be the less expensive option.

Pump Station No. 1 would also need additional capacity to be capable of conveying the estimated peak flow rate to the concrete-line channel. This can be accomplished by replacing existing stormwater pump(s) with larger pump(s) and/or adding a new pump. There are available connections and space to add a fifth pump to the pump station. Pump Station No.1 would need to be capable of pumping the 100-year proposed peak flow rate of 219.0 cfs based on the hydrologic analysis, per County Improvement Standard 3.21-B, which requires "closed conduit" systems be designed for the 100-year event.

URS/BLL staff has indicated that the optimal solution would maintain the stand-alone character of the medical facility with respect to utilities. Based on these preliminary considerations, the option to utilize the existing storm drain system to convey runoff from the proposed medical facility was not pursued further.

5.2 OPTION 2 – DRAIN DIRECTLY TO BASIN THROUGH NEW STORM DRAIN

An alternative to conveying flow to the basin through the existing storm drain system is to construct a completely separate storm drain line to deliver flow directly to the basin from the medical facility. The new storm drain line should be designed to convey at a minimum, the 10 year peak runoff rate of 58.6 cfs. If 100-year storm capacity is desired, the new drain line would require a capacity of 90.0 cfs.

To estimate the required size of the new storm drain line, the following assumptions were used:

- Ground elevation on-site at start of storm drain line = 38.0' (assumes final grading will not result in a lower pad elevation than the existing on-site elevations)
- 3' of cover required
- Invert elevation at discharge to basin = 27.0'
- Length of pipeline = 4000'
- Worst case design scenario – basin is 1' from maximum water surface elevation, storm drain is surcharged to 1' below storm drain inlet rim (38.0')

The results of the pipe sizing analysis are included in the table below.

Table 7. Storm Drain Sizing Results

Pipe Size	Upstream Invert	Downstream Invert	Slope	Upstream HGL	Downstream HGL	Full Flow Capacity
60"	30.0'	27.0'	.000750	30.0'	27.0'	71.3 cfs
66"	29.5'	27.0'	.000625	29.5'	27.0'	84.0 cfs
60"	30.0'	27.0'	.000750	37.0'	34.0'	71.3 cfs
66"	29.5'	27.0'	.000625	37.0'	34.0'	91.96 cfs

The results in Table 7 show that a 60" pipe size provides the capacity to convey the 10-year design flow without surcharging if the basin water surface elevation is below 27.0' at the time of maximum discharge during the design storm. A 66" storm drain cannot carry the 100-year design flow without surcharging. A 66" pipeline is the maximum allowed storm drain pipe size per County Improvement Standards 3.56-B.1.a. However, in the worst case scenario, the 66" line is able to carry the 100-year design flow to the basin, and the 60" storm drain line is not. The cost difference between a 60" and 66" line is not significant, and therefore a 66" line is recommended. It appears that a pumping station will not be required to convey flow from the proposed medical facility to the basin.

Figure 5 (see Appendix F) shows the proposed alignment of the new 66" storm drain line. The storm drain line is proposed to be placed beneath the existing NCYCC perimeter road to the east of the Dewitt Nelson YCF.

6. BASIN ANALYSIS

6.1 BASIN SURVEY AND STORAGE VOLUME CALCULATION

A survey of the existing detention basin was performed on September 30th, 2008 (See Appendix K). Survey points were imported into AutoCAD Land Development Desktop. The storage capacity of the basin was calculated assuming a maximum water surface elevation of 35.0 feet. Construction drawings for Pump Station No. 1 (State of California General Services Department Office of Architecture and Construction Plans dated July 29, 1965, Drawing C-2) shows that the ground elevation at the upstream end of the concrete-lined drainage channel is approximately 36.0. There are many ground elevations near Pump Station No. 1 with a ground elevation near 35.0. To prevent overtopping of the channel and flooding of the NCYCC campus, the maximum allowable detention basin elevation is therefore assumed to be 35.0. At this water surface elevation, the detention basin volume as surveyed is 84.0 AF, and the upstream storage capacity in the concrete lined channel is 3.6 AF, for a total storage capacity of 87.6 AF.

According to the survey, the lowest point along the top of bank of the detention basin is at an elevation of 37.0. At this water surface elevation, the storage capacity of the basin is 98.6 AF. The detention basin is enclosed within a chain link fence, and a dirt access road bounds the basin to the east and south, in between the basin and North Fork South Littlejohn's Creek. The elevation of the dirt access road is elevation 42.0 on the east side of the basin. The access road elevation was not surveyed on the south side of the basin.

6.2 BASIN SIZING ANALYSIS

6.2.1 Total Storm Volume (San Joaquin County Hydrology Manual)

Because all of the runoff from the NCYCC site entering the storm drain system eventually flows to the basin at the southeast corner of the property, the volume of runoff was estimated so that it could be compared to the storage capacity of the existing basin. The volume of runoff was estimated following the example from Section E.14 of the Hydrology Manual. Table 8 shows the estimated volume of runoff for the existing conditions and the estimated volume of runoff when the medical facility is constructed.

Table 8. 100-year Storm Runoff Volume per San Joaquin County Drainage Manual

	Cover Type	Area (ac)	Area Fraction	Soil	CN	S	Ia	Y	Area Total (ac)	100yr P24 (in)	Average Y	Runoff Volume (AF)
Existing	Impervious	94.7	0.35	D	98	0.204	0.041	0.931	271.3	3.36	0.621	**47.2**
	Pervious	176.6	0.65	D	80	2.500	0.500	0.454				
Proposed	Impervious	140.7	0.38	D	98	0.204	0.041	0.931	372.2	3.36	0.635	**66.2**
	Pervious	231.5	0.62	D	80	2.500	0.500	0.454				

In the table above, "S" is an estimate of the soil capacity (related to the initial abstraction of rainfall), and is calculated according to the Hydrology Manual equation C.2. "Ia" is the initial abstraction, and is calculated according to equation C.1. Finally, "Y" is 24-hour storm runoff yield fraction for a given area,

and is calculated according to equation C.3. The 100-year 24-hour rainfall depth was obtained from Table B.7 of the Hydrology Manual. The total runoff is calculated according to the equation below:

Total Runoff Volume = Area (ac) x 100-year P24 (feet) x Average Yield

The available storage capacity of the NCYCC basin is 87.64 AF. The storage capacity is greater than the storage capacity required to retain the 100-year storm runoff.

6.2.2 Required Retention Basin Volume (San Joaquin County Improvement Standards)

The San Joaquin County Improvement Standards (1997) require sizing of "retention basins" according to the equation below:

Volume = 2.0 x C x Area x R

"C" is the average runoff coefficient, and "R" is the 10-year 48 hour storm depth of 3.03". Tables 3-1 and 3-2 of the County Improvement Standards specify runoff coefficients for various land use types. The table below summarizes the data used to calculate the required retention basin storage volume for the NCYCC including the proposed project according to the equation above:

Table 9. Required Retention Basin Storage Volume per San Joaquin County Improvement Standard

	Cover Type	Area (ac)	Area Fraction	Assumed Land Use	C	Area Total (ac)	10yr P48 (in)	Average C	Required Volume (AF)
Proposed	Impervious	140.7	0.38	Pavement & Roofs	0.95	372.2	3.03	0.485	**91.2**
	Pervious	231.5	0.62	Lawns & Open	0.20				

The required storage per the County Improvement Standard is 91.2 AF, which is only slightly more than the actual storage of 87.6 AF. A more detailed analysis and assignment of "C" values to various elements of the site may result in slightly different approximations of the required storage volume.

6.3 FLOW-THROUGH BASIN ANALYSIS

The calculations performed in section 6.2 show that the basin can store the 100-year 24-hour storm volume. For storms other than the 100-year 24-hour storm, the basin will function as a detention basin, with a pumped discharge of water from the basin into North Fork South Littlejohns Creek from stormwater Pump Station No. 2. The basin was analyzed to determine the required operation of Pump Station No. 2 during a storms of an extended duration. The San Joaquin County Drainage Manual suggests the analysis of flow-through basins based on multiday design storms (Section F.4). A flow-through basin analysis was conducted according to Section F of the Hydrology Manual. The following is a summary of the results of the analysis.

6.3.1 Small Area Synthetic Runoff Hydrograph Development

Separate small area runoff hydrographs were generated for the NCYCC / NCRF campus and medical facility using the methodology present in Section J of the Hydrology Manual. This method is applicable to drainage areas less than or equal to one square mile.

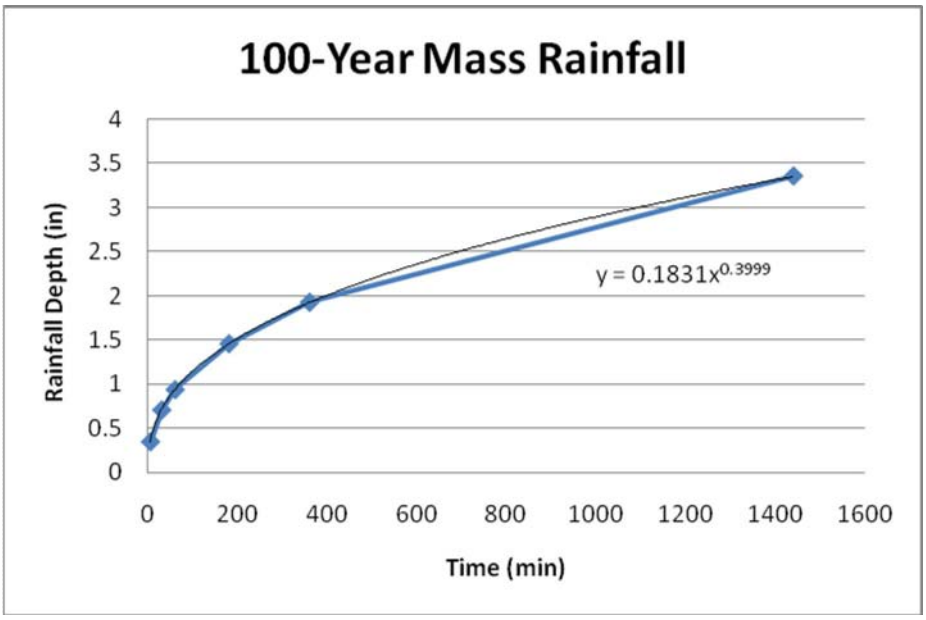
6.3.2 Mass Rainfall Plot

A mass rainfall plot showing storm duration on the x-axis and point rainfall (in inches) on the y-axis must be developed, similar to the example shown in Figure E-13 of the Hydrology Manual. The point precipitation values for the 5-minute, 30-minute, 1-hour, 3-hour, 6-hour, and 24-hour durations are plotted according to page E-17 of the Hydrology Manual. Point precipitation values for the 100-year storm were obtained from Table B.7 of the Manual, using the 14" contour and are summarized in Table 10. The mass rainfall plot is shown in Exhibit 2.

Table 10. Rainfall Mass Plot Points

Storm Duration (min)	Rainfall (inches)
5	0.35
30	0.71
60	0.94
180	1.46
360	1.93
1440	3.36

Exhibit 2. Mass Rainfall Plot



6.3.3 Unit Hydrograph Development for Proposed Project

The drainage system alternative selected for the proposed project (see section 5) includes a separate 66" storm drain line to convey flow from the medical facility area directly to the detention basin. For this reason, separate hydrographs were developed for the medical facility, and existing NCYCC / NCRF campus watersheds. Table 11 below contains a summary and description of the data used in the unit hydrograph development procedure for the existing NCYCC campus.

Table 11. NCYCC Campus (Without Medical Facility) Hydrograph Development Data

Term	Description	Value	Units
a_p	Total Pervious Area %	0.65	n/a
F_p	Average Pervious Area Infiltration Rate	0.18	in/hr
Y	Average 24-hour storm Runoff Yield Fraction	0.59	n/a
Area	Total Basin Area	230.7	acres
Tc	Total Basin Time of Concentration	90	min

The total pervious area percentage and total basin area match the data presented in Table 1. The time of concentration for the NCYCC watershed is approximately 90 minutes, as computed in Appendix B. Water must travel from the furthest reaches of the NCRF campus through the existing NCYCC storm drain system to reach Pump Station No. 1. The average 24-hour storm runoff yield fraction for the watershed was calculated based on the 24-hour storm rainfall and curve number based on equation C.3 of the Hydrology Manual. Finally, the average pervious area infiltration rate was calculated for the watershed based on the pervious area curve number (80) using Figure C-5 of the Hydrology Manual.

Table 12 below contains a summary and description of the data used in the unit hydrograph development procedure for the proposed medical facility. The data presented in this table was calculated as described above.

Table 12. Proposed Medical Facility Hydrograph Development Data

Term	Description	Value	Units
a_p	Total Pervious Area %	0.61	n/a
F_p	Average Pervious Area Infiltration Rate	0.18	in/hr
Y	Average 24-hour storm Runoff Yield Fraction	0.61	n/a
Area	Total Basin Area	140.5	acres
Tc	Total Basin Time of Concentration	70	min

6.3.4 Synthetic Hydrograph Development Procedure

Synthetic hydrographs were developed for the NCYCC and proposed medical facility (see Appendix G) utilizing the tabular method show in Table J.1 of the Hydrology Manual. The cumulative mass rainfall depths at time intervals equal to the time of concentration (column 2) of the watershed are calculated using the regression equation developed in Exhibit 2. The unit rainfall during each time interval is calculated by subtracting the cumulative mass rainfall for the current time step from the cumulative mass rainfall from the next time step (column 3). The unit rainfall during each time step is then converted to a rainfall intensity (column 4) by dividing the rainfall amount during the time step over the duration of the step (the time of concentration).

Next, the unit loss (rainfall that does not become runoff) is calculated for each time step, and is subtracted from the unit rainfall for each time step, yielding the net effective rainfall intensity (column 8). There are two ways of calculating the loss rate, known as the maximum loss rate (column 5) and the low loss rate (column 6). The Manual requires that the lower of the two loss rates calculated for each time step is used (column 7).

According to Hydrology Manual Section E.7.1, the maximum loss rate (Fm) is calculated according to the equation below:

$F_m = a_p \, x \, F_p$ where a_p = percent pervious area F_p = pervious area infiltration rate

According to Hydrology Manual Section E.7.2, the low loss rate (F*) is calculated according to the equation below:

$F^* = (1-Y) \, x \, I$ where Y = storm runoff yield fraction I = rainfall intensity

The average pervious area infiltration rate value was adjusted during this portion of the study in order to calibrate the results of the synthetic unit hydrograph to match the peak flow rate results of the hydrology analysis. During the periods of highest intensity rainfall, the maximum loss rate, which is calculated based on the pervious area infiltration rate, controls the loss of effective rainfall. The pervious infiltration rate initially calculated based on a curve number of 80 is too high, resulting in hydrograph peak flows that were below those calculated using the rational method. Therefore, the pervious infiltration rate was manually adjusted to produce results consistent with those obtained using the rational method. A final value of 0.18 in/hr was used for the pervious infiltration rate.

Once the next effective rainfall intensity is determined for each time step, the discharge rate can be calculated according to the equation below. This equation represents the scaling of a unit hydrograph.

$Q_{max} = 0.9 \, x \, Area \, x \, Net \, Effective \, Rainfall$

Finally, the synthetic unit hydrograph is developed by convolution of the scaled unit hydrographs developed for each time step. The scaled unit hydrograph for each time step is equivalent to a triangle with a peak of Q_{max} and a base equal to twice the time of concentration. The scaled unit hydrographs for each step are assembled as shown in Figure J-2 of the Hydrology Manual, and a composite curve for the synthetic unit hydrograph is developed. The synthetic unit hydrographs for the existing NCYCC watershed and the proposed medical facility watershed are presented below.

Exhibit 3. Synthetic Runoff Hydrograph – Proposed Medical Facility 100-Year Storm

Start Time (min)	Q (cfs)
60.00	6.98
150.00	7.27
240.00	7.59
330.00	8.35
420.00	8.82
510.00	10.02
600.00	10.80
690.00	13.02
780.00	14.69
870.00	21.00
960.00	28.88
1050.00	128.95
1140.00	17.11
1230.00	11.77
1320.00	9.37
1410.00	7.94

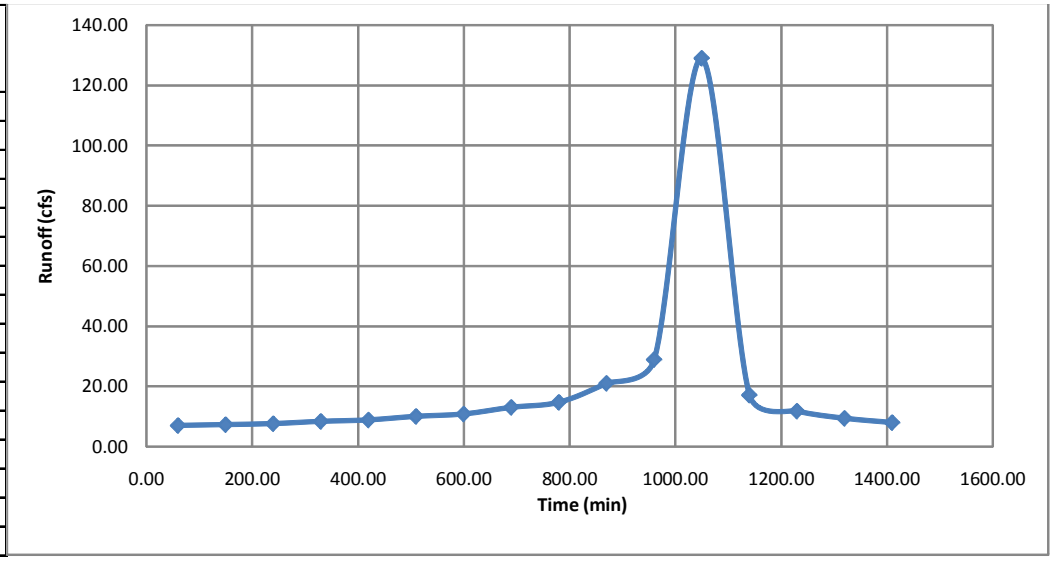
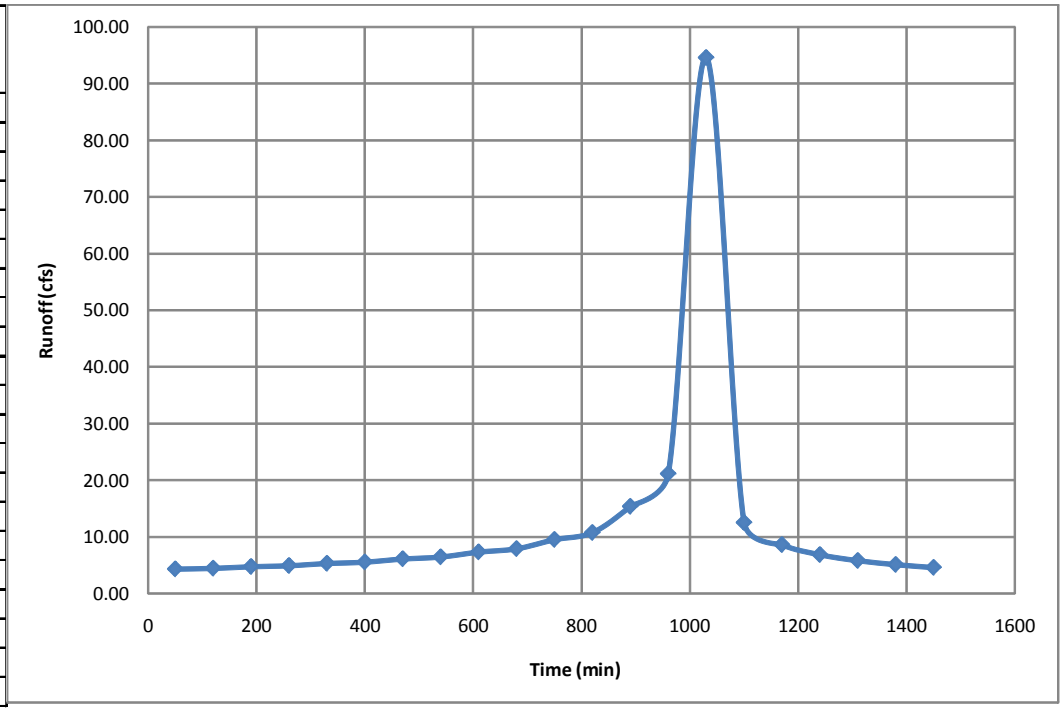


Exhibit 4. Synthetic Runoff Hydrograph – NCYCC / NCRF 100-Year Storm

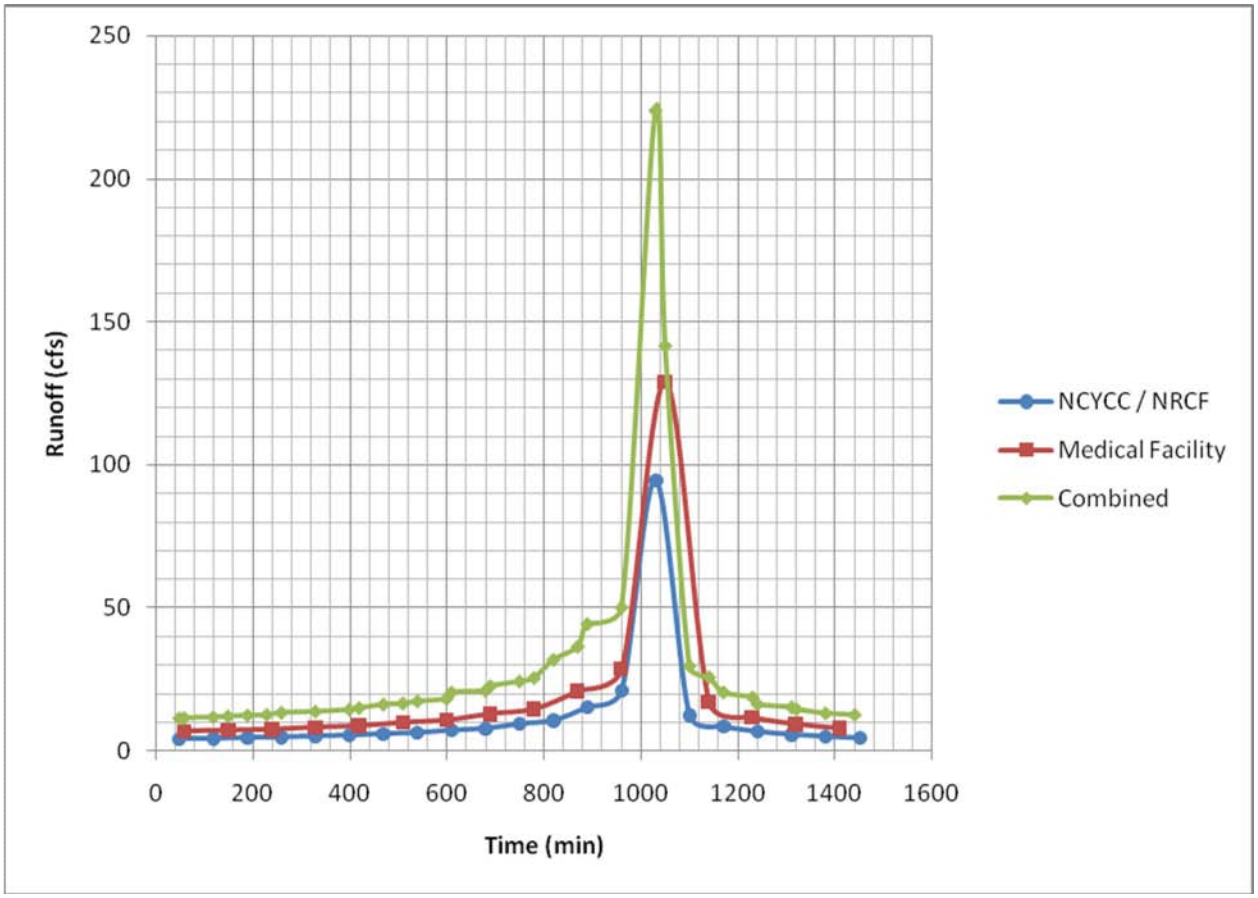
Start Time (min)	Q (cfs)
50	4.32
120	4.45
190	4.75
260	4.92
330	5.32
400	5.55
470	6.12
540	6.46
610	7.33
680	7.91
750	9.53
820	10.76
890	15.38
960	21.14
1030	94.64
1100	12.52
1170	8.62
1240	6.86
1310	5.82
1380	5.11
1450	4.60



To develop the combined synthetic runoff hydrograph experienced by the detention basin, the two separate NCYCC and medical facility hydrographs must be added together. Both hydrographs represent the inflow with time experienced by the detention basin. The runoff hydrograph from the NCYCC / NCRF watershed was not modified to consider the operation of Pump Station No. 1. In reality, the operational scheme of the pump station will change the inflow hydrographs to the detention basin to some extent, because some stormwater storage is available in the pump station wet wells, and the pumps can only operate at specific flow rates. However, the operation of Pump Station No. 1, including the fact that

it is currently under capacity to pump peak flow rates, was not considered in this analysis. The operation of the pump station would only serve to further attenuate peak flows into the basin. For a conservative analysis, it was assumed that Pump Station No. 1 will operate so as to keep pace with the stormwater inflow, resulting in no alteration of the determined inflow hydrographs. The combined inflow hydrograph into the detention basin is presented below. The combined hydrograph was developed on a 10-minute time step interval to provide greater definition and accuracy during the detention basin routing calculations.

Exhibit 5. Combined Synthetic Runoff Hydrograph – 100-Year / 24-Hour Storm



6.3.5 Multiday Design Storm

Multiday design storms are generated by assuming that a scaled down version of the 24-hour design storm occurs prior to the full 24-hour design storm, as shown in Figure F-2 of the Hydrology Manual. To generate the multiday design storms, Table B.1 of the Manual was referenced to scale the 24-hour mass rainfall values (Table 10) which are used to generate the synthetic unit hydrographs. The methodology described in section 6.3.4 of this report is then used to generate the hydrographs. A 72-hour design storm was generated to study the basin. The basin has the ability to retain the 48-hour (2 day) 100-year design storm without requiring discharge to the creek. Longer multiday events beyond the 72-hour event were not modeled, and are not expected to result in significant increases in pumping from the basin due to the diminishing amount of additional rainfall that occurs as the design storm duration is extended.

The peak 24-48 hour time period and peak 48-72-hour time period unit hydrographs are presented in exhibits 6 and 7, respectively. The total 72-hour design storm is presented in exhibit 8.

Exhibit 6. Combined Synthetic Runoff Hydrograph – 100-Year / 24-48 Hour Storm

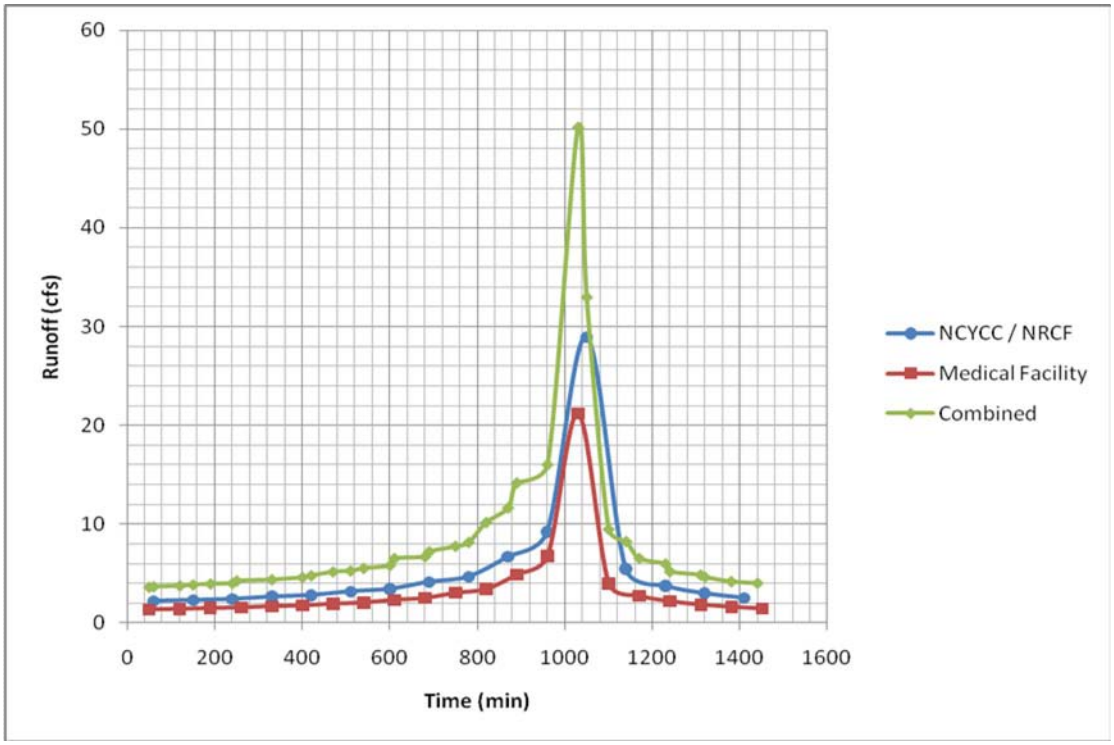


Exhibit 7. Combined Synthetic Runoff Hydrograph – 100-Year / 48-72 Hour Storm

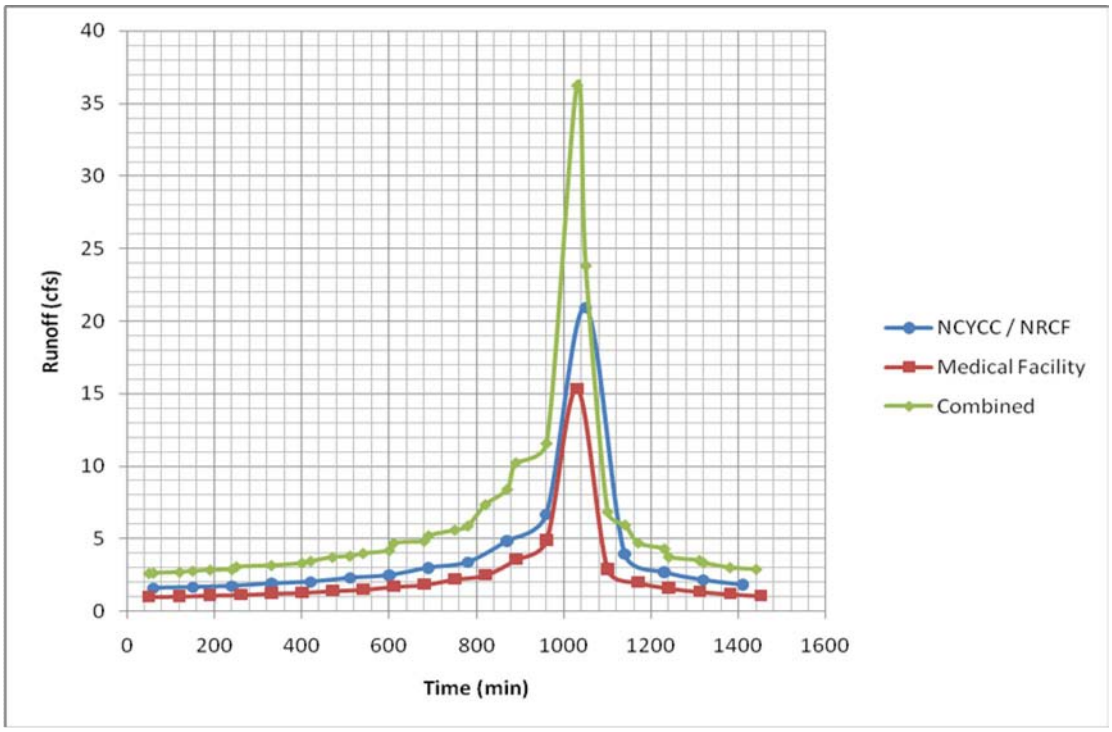
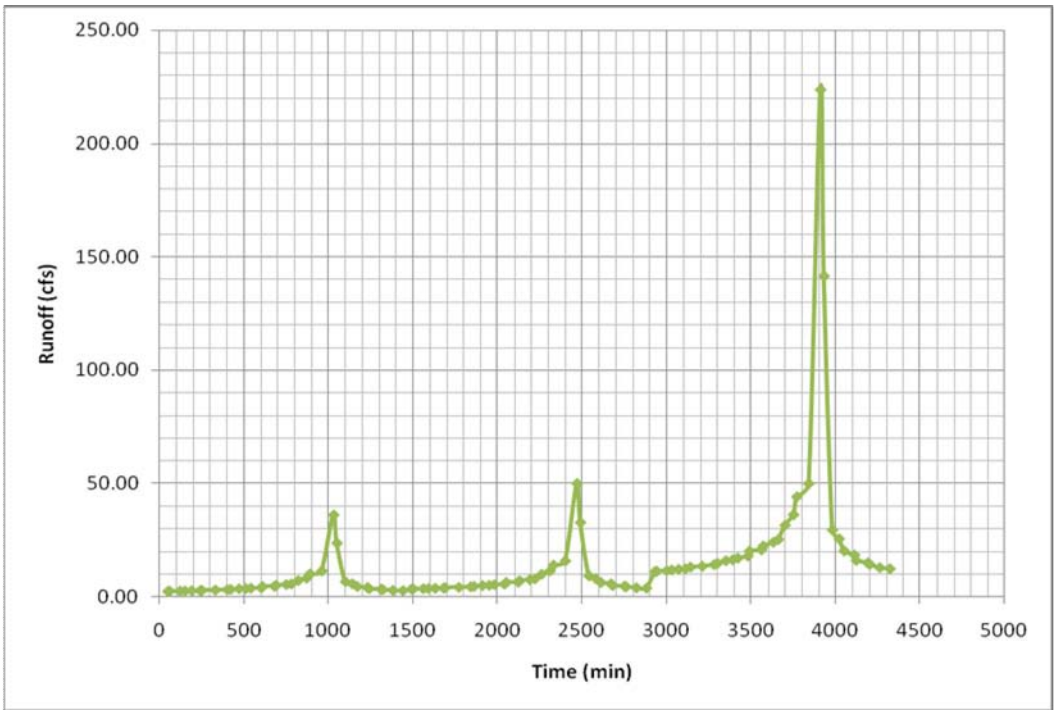


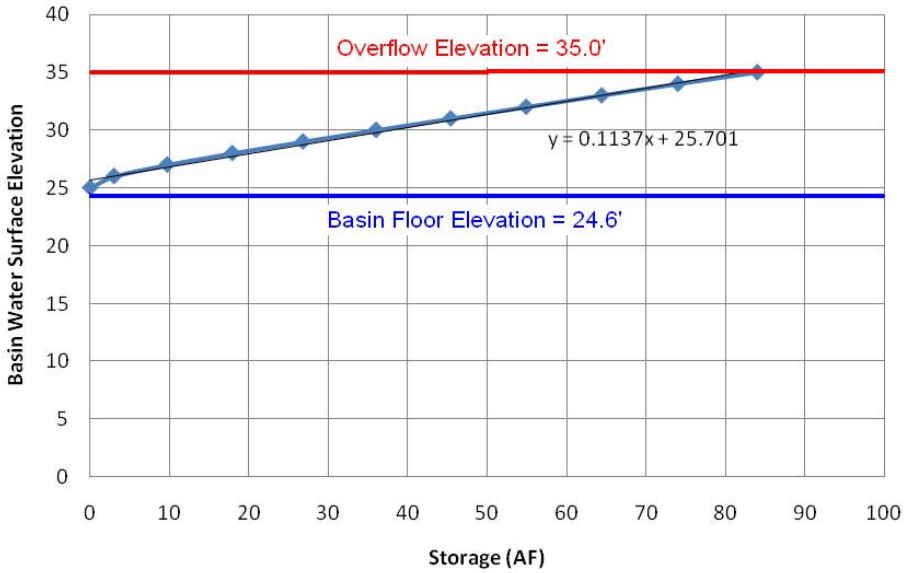
Exhibit 8. Combined Synthetic Runoff Hydrograph – 100-Year 3-Day Storm



6.3.6 Basin Elevation vs. Storage

The storage volume of the detention basin at various water elevations was determined using AutoCAD Land Development Desktop, and the basin survey (see Appendix K). The volume between a flat planar surface generated at each elevation and the floor of the basin was calculated to obtain accurate stage vs. storage data, which is presented below in exhibit 9. The basin geometry is nearly rectangular, resulting in a linear stage vs. storage relationship.

Exhibit 9. Basin Water Elevation (Stage) vs. Storage



For detention basins with outlets such as weirs or orifices, typically a stage/discharge curve is developed to show the relationship between basin water surface elevation and basin outflow, similar to that show in Table F.1 of the Hydrology Manual. However, the outflow from this detention basin is controlled by Pump Station No. 2. A meaningful stage/discharge curve cannot be developed when the basin outlet is controlled by pumps.

6.3.7 Pump Station No. 2 Operations

Construction plans for Pump Station No. 2 show that a 50 horsepower and 15 horsepower pump are currently installed. Pump performance curves were not available for the existing pumps, so the pumping capacity of these two pumps was estimated based on the pump power and dynamic headloss equations below:

$$\text{Pump Power Equation: } efficiency(\%)P(horsepower) = \gamma(\frac{lb}{ft^3})Q(\frac{ft^3}{\sec})H(ft)$$

where

$$\gamma = 62.4\frac{lb}{ft^3}\ ,\ \ g = 32.2\frac{ft}{\sec^2}\ ,\ Q = \textit{pumping flow rate},\ \ H = \textit{Dynamic head}$$

$$\text{Dynamic Headloss Equation: } H = f(\frac{L}{D})\frac{v^2}{2g} + \Delta Z$$

where

$$f = \textit{friction factor},\ L = \textit{length(ft)},\ D = \textit{diameter(ft)},$$

$$v = \textit{velocity (ft/s)},\ \ g = 32.2\frac{ft}{\sec^2},\ z = \textit{static lift (ft)}$$

The above equations were solved for the pumping flow rate, and a summary of the assumptions and results of the calculations are provided in the table below.

Table 13. Stormwater Pump Station No. 2 Capacity

	Pump 1	**Pump 2**
Horsepower	50 hp	15 hp
Static Head	12’	13.5’
Total Dynamic Head	14.3’	15.7’
Discharge Diameter	20”	12”
Discharge Pipe Length	130’	130’
Discharge Capacity	***23 cfs***	***6 cfs***

6.3.8 Detention Basin Routing Procedure

The 3-day (72 hour) 100-year design storm was routed through the basin using the modified Puls method, per Chapter F of the Hydrology Manual (see Hydrology Manual Table F.2), which is presented in Appendices H and I.

The basin inflow (column 2) is provided in 10 minute time intervals, and represents the combined medical facility and NCYCC 72-hour 100-year synthetic runoff hydrograph (exhibit 8). The average inflow rate for the time period between each time step is calculated in column 3. The total inflow volume (I1+I2)dt/2

for each time period is calculated in column 4. Loss in storage based on the basin outflow during the time period is calculated in column 5. Column 6 represents the new storage in the basin considering the loss from outflow (pumps) and inflow from the upstream watersheds. The outflow volume (column 7) is representative of the estimated pumping rate for pump station 2 during the time period. The storage and resulting water elevation at the end of each time step is calculated in columns 8 and 9 respectively.

6.3.9 Detention Basin Routing Results

The operation of Pump Station No. 2 was adjusted manually within the detention basin routing calculations, to determine the least amount of pumping required to prevent the basin from exceeding a water surface elevation of 35.0 during the runoff period from the design storm. Two possible pumping regimes were established, which are discussed below.

<u>Pumping Regime Option 1 – Minimize Pumping and Utilize Both Stormwater Pumps (Appendix H)</u>

- Lead Pump (6 cfs) on elevation – 30’
- Lag Pump (28 cfs) on elevation – 31’
- Lead & Lag Pump off elevation – 25’
- Maximum Water Surface Elevation – 33.9’

Employing the above pumping regime, the pumps would only be activated by the 100-Year 72-hour duration design storm, and would be activated at approximately the same time that the highest peak of the runoff hydrograph reaches the basin. This would result in the highest discharge rate to the creek at what could be a time of heavy flow in the creek at the same time. This pumping regime minimizes pumping time during the design storm and eliminates the need for pumping during storms less severe than the design storm.

<u>Pumping Regime Option 2 – Use Lead Pump Only (Appendix I)</u>

- Lead Pump (6 cfs) on elevation – 26’
- Lag Pump (28 cfs) on elevation – 35’
- Lead & Lag Pump off elevation – 25’
- Maximum Water Surface Elevation – 33’

Employing the above pumping regime, the pumps are likely to be activated far more often. However, this pumping regime prevents the need to activate the 50 hp pump and does not result in a high rate of discharge (28 cfs) to the creek during peak flow periods. If at a later time discharge requirements are put in place for the creek, this pumping regime may be employed to reduce hydraulic impacts.

7. PERMITTING TIMELINE

7.1 WATERCOURSE ENCROACHMENT PERMIT

The proposed improvement to realign the existing unlined drainage channel will require a submittal of an application for a permit with the County of San Joaquin Department of Public Works and the completion of an Environmental Assessment Questionnaire for the San Joaquin County Watercourse Encroachment Permit. Based on discussions with San Joaquin Flood Control District staff, permits typically are processed in two months. Modifications are typically approved provided the entry and exit points of the ditch from the property are not modified and the ditch maintains its current flow capacity. As discussed in section 4.1.4, it is recommended that the realignment of the existing unlined channel enter and exit the property at the current locations.

7.2 NPDES PERMIT

The project area is not included within the City of Stockton urbanized area, which also includes some areas outside of the current City limits that are subject to the City and County's joint stormwater NPDES permit. The City and County have implemented Storm Water Management Plans (SWMPs) (Larry Walker Associates, 2003) to comply with Phase I and Phase II NPDES requirements. The SWMPs describe required programs including public education and outreach, detection and elimination of illicit discharges and connections, construction site runoff control, post-construction runoff control (including the implementation of BMPs), system maintenance, and performance monitoring. As part of the NPDES program, the City and County require the use of the Stormwater Quality Control Plan (Larry Walker Associates, 2008) for new projects within the permitted area, which includes recommended BMPs for various types of developments. In the future, the urbanized limits of the City of Stockton are likely to expand due to the industrial development in the area of the proposed project. It is possible that the proposed medical facility and NCYCC would be required to comply with the NPDES permit in the future. For this reason, Kimley-Horn recommends that the City's Stormwater Quality Control Plan be used by the IPD teams to design and implement BMPs that will satisfy City and County NPDES program requirements in the future, even though the project is not currently required to comply with the permit.

8. OPINION OF PROBABLE CONSTRUCTION COST

8.1 ASSUMPTIONS AND SUPPORTING DATA

A preliminary opinion of probable construction cost (OPCC) was developed for the off-site storm drain improvements. Costs for installation of the on-site storm drain collection system are not presented, and will be designed at a later time by the IPD teams. The following is a list of assumptions relative to the line items shown on the preliminary opinions of probable construction cost.

- Mobilization / Demobilization: assumed to be 3% of the total construction cost based on general experience with similar storm drainage construction project final bid tabs.
- New 66" Storm Drain: cost includes materials, delivery, trench excavation and fill, and sheeting / shoring.
- 6' Diameter Manholes: Type 3 maintenance holes per City Standard Drawing No. 57A, assumes maximum spacing of 600'
- Fill and Compact Existing Drainage Ditch: assumes fill and roller compaction of 2925' LF of existing drainage ditch with native soil. Cross section of existing ditch assumed to be 5' deep trapezoidal channel with 25' top width and 15' bottom width per Conti & Associates survey.
- Realign Drainage Ditch: assumes excavation and grading of 2925' LF of new drainage ditch alignment to match existing ditch cross section.
- Water course Encroachment Permit Fee: permit cost obtained from San Joaquin County.

8.2 PRELIMINARY OPCC

Opinion of Probable Construction Cost at 10% Design — **Kimley-Horn and Associates, Inc.**

Client:	**California Prison Health Care Receivership**	**Date:**	**12/10/2008**
Project:	**1,734 Bed Prison Medical Facility**	**Prepared By:**	**JMZ**
Location:	**Stockton, California**	**Checked By:**	**CRS**
Subject:	**Offsite Enabling Project - Storm Drain System**	**Cost Basis:**	**Q3 2008**

Base Bid Items

Item No.	Description	Quantity	Unit	Unit Cost	Cost
	Storm Drainage Improvements				
1	Mobilization / Demobilization (3%)	1	LS	$93,000	$93,000
2	New 66" RCP Storm Drain to Basin	4,000	LF	$750	$3,000,000
3	6' Diameter Manholes	6	EA	$10,000	$60,000
4	Cut and Cap Existing Karl Holton Storm Drain Connection to 42" Main	1	EA	$5,000	$5,000
5	Fill and Compact Existing Agricultural Drainage Ditch	1,100	CY	$10	$11,000
6	Realign Agricultural Drainage Ditch	1,100	CY	$10	$11,000
	Fees				
7	Watercourse Encroachment Permit	1	EA	$100	$100
					$3,180,000

Basis for Cost Projection:

- [x] No Design Completed
- [ ] Preliminary Design
- [ ] Final Design

Sub-Total =	$3,180,000
Design Contingency @ 25% =	$795,000
Engineering & Design @ 10%=	$318,000
Construction Services @ 10%=	$318,000
TOTAL ESTIMATED COST =	$4,611,000

DISCLAIMER:

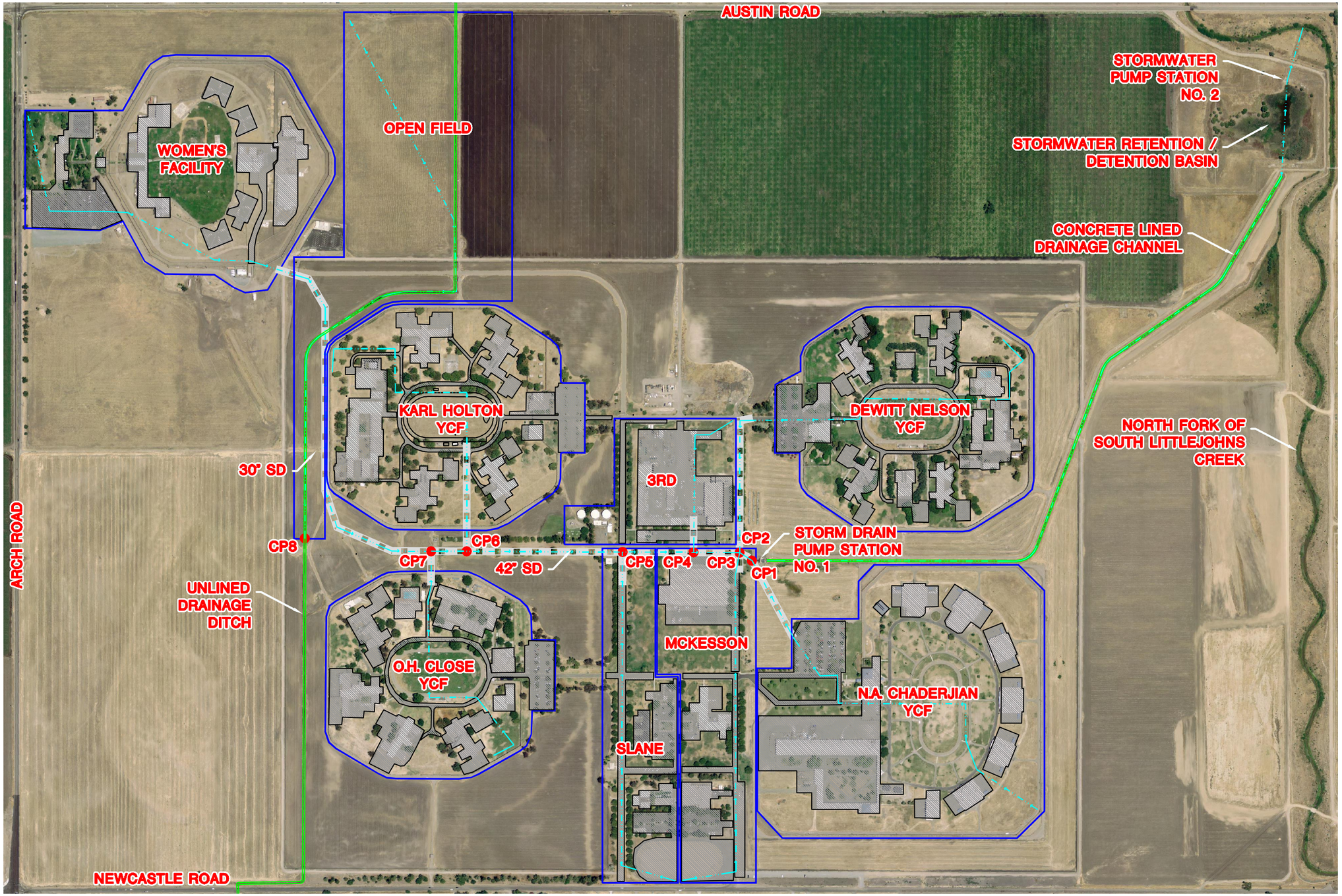
The Engineer has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Engineer at this time and represent only the Engineer's judgment as a design professional familiar with the construction industry. The Engineer cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

9. REFERENCES

- County of San Joaquin Hydrology Manual, Final Draft, September 1997
- County of San Joaquin Improvement Standards
- Phase 2 – Site Assessment Report for Northern California Youth Correctional Center – Stockton prepared by Kimley-Horn and Associates, Inc., June 3, 2008
- Contract Drawings for the General Administration and Services Facilities for the Department of the Youth Authority at the Northern California Youth Center, Stockton, 1964

Appendix A

Drainage Area Maps



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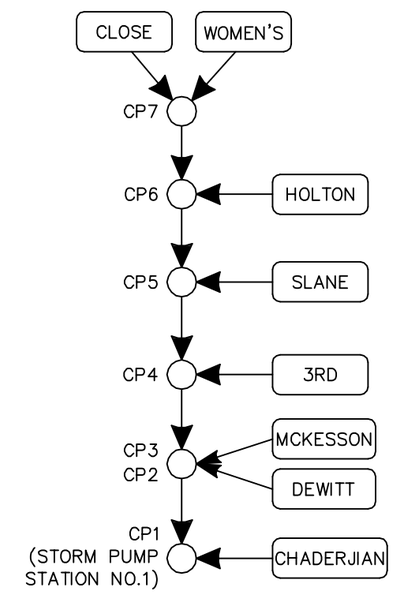
LEGEND

- WATERSHED BOUNDARY
- STORMWATER DRAINAGE PATH
- CONCENTRATION POINT
- STORM DRAIN
- IMPERVIOUS AREA

SCHEMATIC



Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

Figure 1
Drainage Map - Existing Conditions
December 2008

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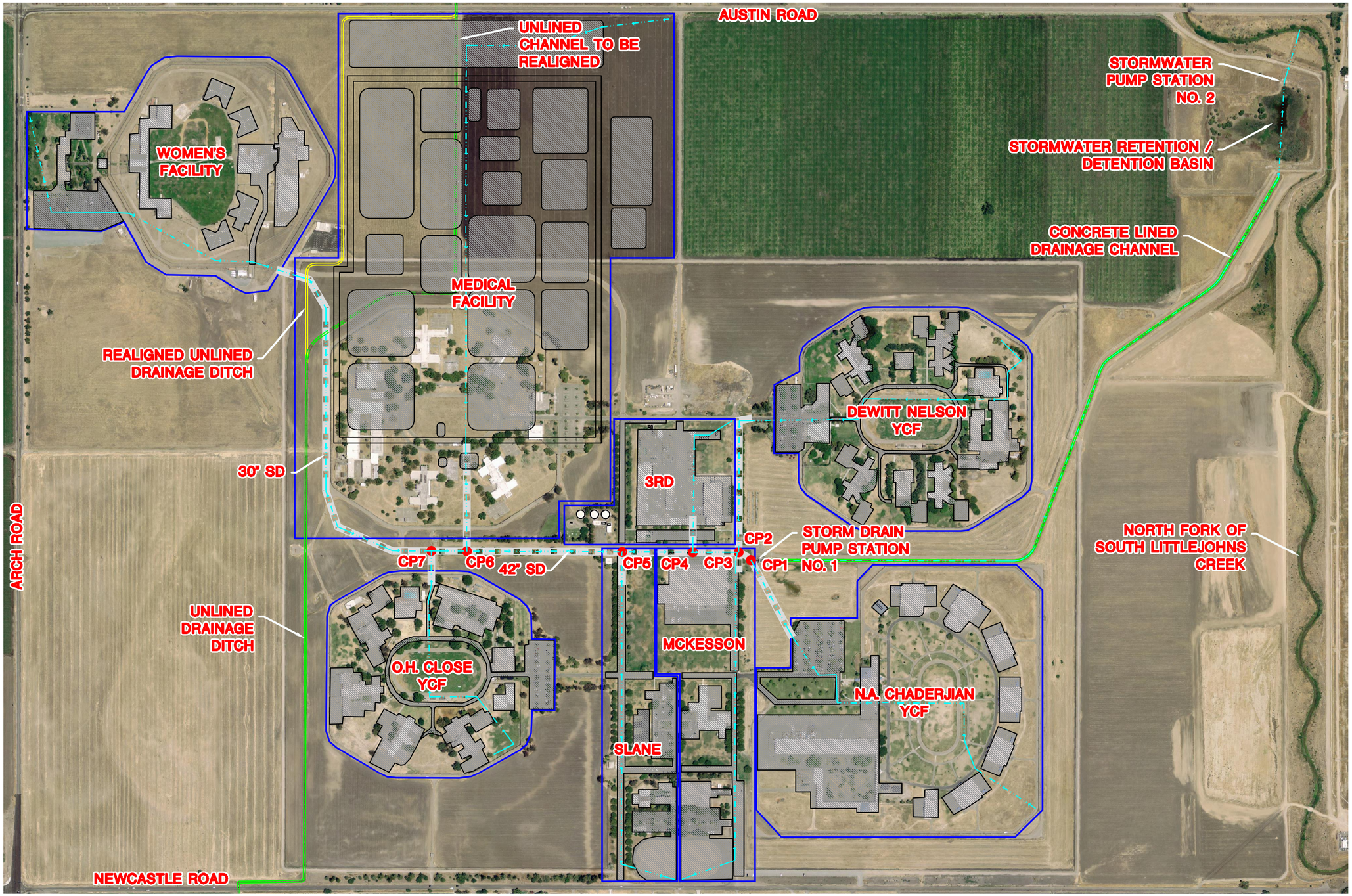

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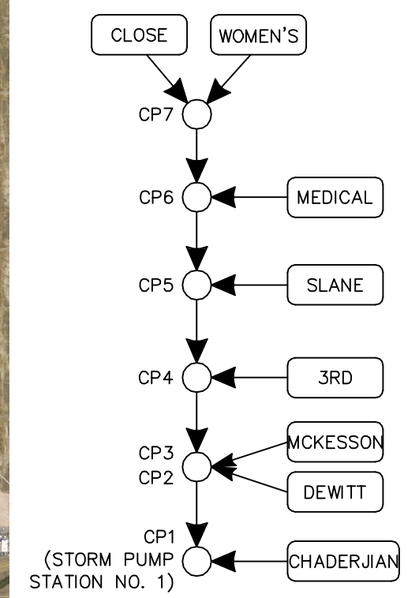
LEGEND

- WATERSHED BOUNDARY
- STORMWATER DRAINAGE PATH
- CONCENTRATION POINT
- STORM DRAIN
- IMPERVIOUS AREA

SCHEMATIC



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Engineering, Planning and Environmental Consultants

Figure 2
Drainage Map – Proposed Conditions
December 2008

K:\ROS_MUNI\097551001 – NCYCC Stockton Prison Assessment\CADD\Misc\DrainageProposed.dwg 12-09-08-7:55 PM

Appendix B

Basin Flow Rate Calculations

Rational Method Study Form	**Study Name:** NCYCC Drainage Study	**Calc'd By:** EJN	**Date:** 12/9/2008
San Joaquin County	**Frequency:** 10 year (Existing Conditions)	**Chk'd By:** CRS	**Date:** 12/9/2008
Hydrology Manual	**MAP:** 14" **24-hr:** 2.37 in		**Page** 1 of 4

CP	Area (ac) Subarea	Area (ac) Total	Soil Type	Dev. Type	Tt min.	T min.	I in/hr	Fm in/hr	Fm avg.	Q Total	Flow path Length ft.	Slope ft/ft	V ft/sec	Hydraulics and Notes
Women's	42.5	42.5	D	YCF		80	0.56	0.23	0.23	12.7	4,355	0.0055		
Close	33.0	33.0	D	YCF		40	0.85	0.16	0.16	20.3	2,150	0.0055		
CP #7		54.2				80	0.56			32.1				Women's + Close
Holton	40.6	40.6	D	YCF		40	0.85	0.19	0.19	24.2	2,150	0.0056	0.5	
CP #6		94.8			1	81	0.56			45.9	215	0.001	3.5	Confluence #7 + Holton
Slane Rd	18.6	18.6	D	Indus.		40	0.85	0.15	0.15	11.7	2,220			
CP #5		113.4			4	85	0.54			52.7	935	0.001	3.5	Confluence #6 + Slane
3rd St	14.3	14.3	D	Indus.		20	1.28	0.09	0.09	15.3	950			
CP #4		127.7			2	88	0.53			58.4	425	0.001	3.5	Confluence #5 + 3rd
McKesson	23.5	23.5	D	Indus.		40	0.85	0.11	0.11	15.5	2,200			
CP #3		151.3			1	89	0.53			67.2	275	0.001	3.5	Conflu #4 + McKesson
Nelson	40.7	40.7	D	YCF		40	0.85	0.20	0.20	23.6	2,150	0.0055		
CP #2		192.0			0	89	0.53			79.1	10	0.001	3.5	Confluence #3 + Nelson
Chaderjian	58.1	58.1	D	YCF		70	0.61	0.20	0.20	21.5	2,700	0.0055		
CP #1		250.0			1	89	0.52			96.4	120	0.001	3.5	Conflu #2 + Chaderjian
Open Field	49.2	49.2	D	Ag		90	0.52	0.22	0.22	13.2				Drains to unlined ditch

Rational Method Study Form	Study Name: NCYCC Drainage Study	Calc'd By: EJN	Date: 12/9/2008
San Joaquin County	Frequency: 100 year (Existing Conditions)	Chk'd By: CRS	Date: 12/9/2008
Hydrology Manual	MAP: 14" 24-hr: 3.36 in		Page 2 of 4

CP	Area (ac) Subarea	Area (ac) Total	Soil Type	Dev. Type	Tt min.	T min.	I in/hr	Fm in/hr	Fm avg.	Q Total	Flow path Length ft.	Slope ft/ft	V ft/sec	Hydraulics and Notes
Women's	42.5	42.5	D	YCF		80	0.79	0.23	0.23	21.5	4,355	0.0055		
Close	33.0	33.0	D	YCF		40	1.20	0.16	0.16	30.7	2,150	0.0055		
CP #7		54.2				80	0.79			49.2				Women's + Close
Holton	40.6	40.6	D	YCF		40	1.20	0.19	0.19	37.0	2,150	0.0056	0.5	
CP #6		94.8			1	81	0.78			71.3	215	0.001	3.5	Confluence #7 + Holton
Slane Rd	18.6	18.6	D	Ind.		40	1.20	0.15	0.15	17.6	2,220			
CP #5		113.4			4	85	0.76			82.0	935	0.001	3.5	Confluence #6 + Slane
3rd St	14.3	14.3	D	Ind.		20	1.82	0.09	0.09	22.2	950			
CP #4		127.7			2	88	0.75			90.5	425	0.001	3.5	Confluence #5 + 3rd
McKesson	23.5	23.5	D	Ind.		40	1.20	0.11	0.11	23.0	2,200			
CP #3		151.3			1	89	0.74			104.0	275	0.001	3.5	Conflu #4 + McKesson
Nelson	40.7	40.7	D	YCF		40	1.20	0.20	0.20	36.5	2,150	0.0055		
CP #2		192.0			0	89	0.74			123.7	10	0.001	3.5	Confluence #3 + Nelson
Chaderjian	58.1	58.1	D	YCF		70	0.86	0.20	0.20	34.5	2,700	0.0055		
CP #1		250.0			1	89	0.74			152.2	120	0.001	3.5	Conflu #2 + Chaderjian

Rational Method Study Form	Study Name: NCYCC Drainage Study	Calc'd By: EJN	Date: 12/9/2008
San Joaquin County	Frequency: 10 year (Proposed Conditions)	Chk'd By: CRS	Date: 12/9/2008
Hydrology Manual	MAP: 14" 24-hr: 2.37 in		Page 3 of 4

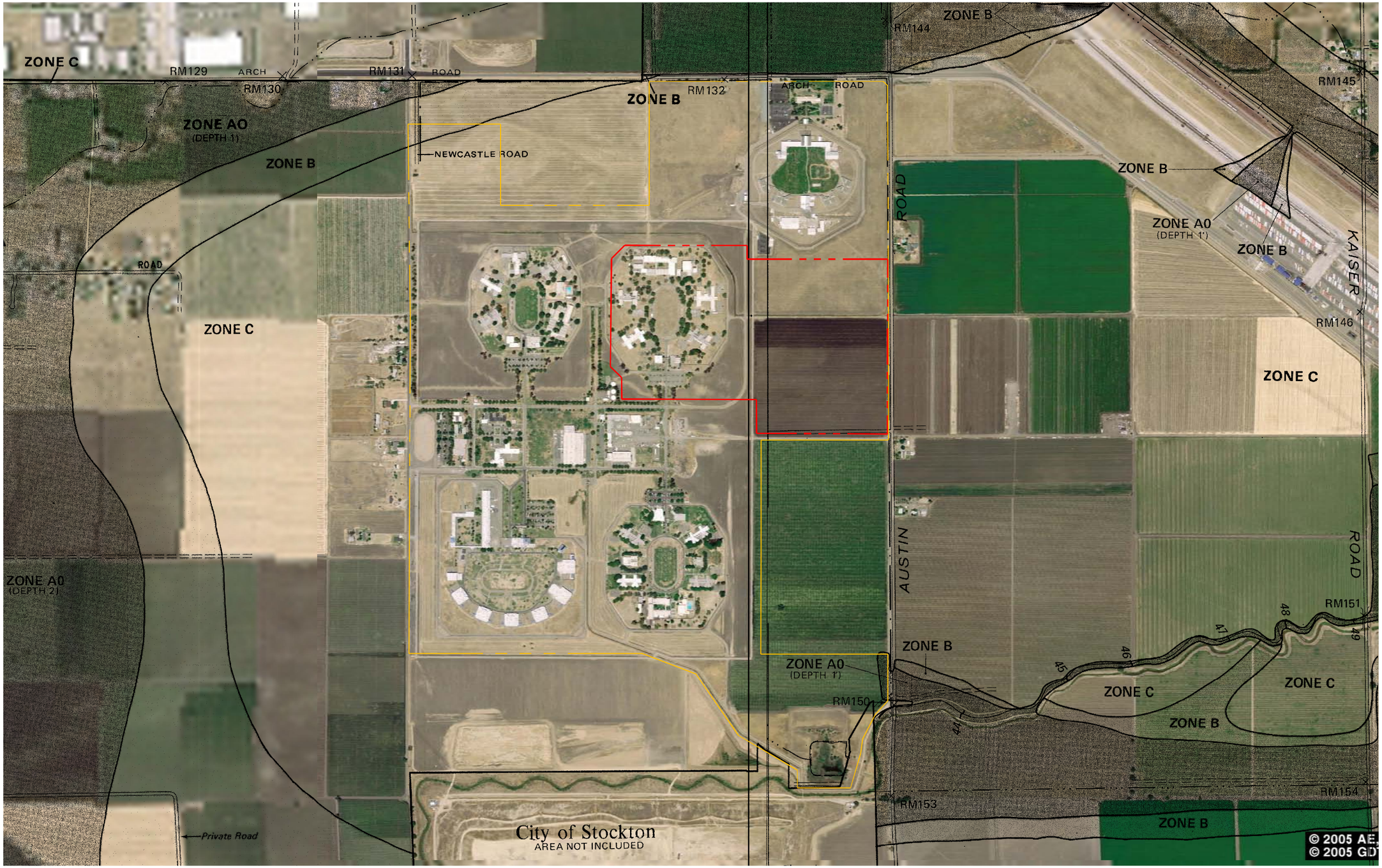
CP	Area (ac) Subarea	Area (ac) Total	Soil Type	Dev. Type	Tt min.	T min.	I in/hr	Fm in/hr	Fm avg.	Q Total	Flow path Length ft.	Slope ft/ft	V ft/sec	Hydraulics and Notes
Women's	42.5	42.5	D	YCF		80	0.56	0.23	0.23	12.7	4,355	0.0055		
Close	33.0	33.0	D	YCF		40	0.85	0.16	0.16	20.3	2,150	0.0055		
CP #7		54.2				80	0.56			32.1				Women's + Close
Medical	140.5	140.5	D	YCF		70	0.61	0.14	0.14	58.6	3,200	0.0038	0.5	
CP #6		188.7			1	80	0.56			89.5	215	0.001	3.5	Confluence #7 + Holton
Slane Rd	18.6	18.6	D	Ind.		40	0.85	0.15	0.15	11.7	2,220			
CP #5		207.3			4	84	0.54			96.4	935	0.001	3.5	Confluence #6 + Slane
3rd St	14.3	14.3	D	Ind.		20	1.28	0.09	0.09	15.3	950			
CP #4		221.6			2	86	0.54			102.1	425	0.001	3.5	Confluence #5 + 3rd
McKesson	23.5	23.5	D	Ind.		40	0.85	0.11	0.11	15.5	2,200			
CP #3		245.1			1	88	0.53			111.0	275	0.001	3.5	Conflu #4 + McKesson
Nelson	40.7	40.7	D	YCF		40	0.85	0.20	0.20	23.6	2,150	0.0055		
CP #2		285.8			0	88	0.53			123.1	10	0.001	3.5	Confluence #3 + Nelson
Chaderjian	58.1	58.1	D	YCF		70	0.61	0.20	0.20	21.5	2,700	0.0055		
CP #1		343.9			1	88	0.53			140.5	120	0.001	3.5	Conflu #2 + Chaderjian

Rational Method Study Form	**Study Name:** NCYCC Drainage Study	**Calc'd By:** EJN	**Date:** 12/9/2008
San Joaquin County	**Frequency:** 100 year (Proposed Conditions)	**Chk'd By:** CRS	**Date:** 12/9/2008
Hydrology Manual	**MAP:** 14" **24-hr:** 3.36 in		**Page** 4 of 4

CP	Area (ac) Subarea	Area (ac) Total	Soil Type	Dev. Type	Tt min.	T min.	I in/hr	Fm in/hr	Fm avg.	Q Total	Flow path Length ft.	Slope ft/ft	V ft/sec	Hydraulics and Notes
Women's	42.5	42.5	D	YCF		80	0.79	0.23	0.23	21.5	4,355	0.0055		
Close	33.0	33.0	D	YCF		40	1.20	0.16	0.16	30.7	2,150	0.0055		
CP #7		54.2				80	0.79			49.2				Women's + Close
Medical	140.5	140.5	D	YCF		70	0.86	0.14	0.14	90.0	3,200	0.0038	0.5	
CP #6		188.7			1	80	0.79			137.4	215	0.001	3.5	Confluence #7 + Holton
Slane Rd	18.6	18.6	D	Ind.		40	1.20	0.15	0.15	17.6	2,220			
CP #5		207.3			4	84	0.76			148.1	935	0.001	3.5	Confluence #6 + Slane
3rd St	14.3	14.3	D	Ind.		20	1.82	0.09	0.09	22.2	950			
CP #4		221.6			2	86	0.75			156.8	425	0.001	3.5	Confluence #5 + 3rd
McKesson	23.5	23.5	D	Ind.		40	1.20	0.11	0.11	23.0	2,200			
CP #3		245.1			1	88	0.75			170.3	275	0.001	3.5	Conflu #4 + McKesson
Nelson	40.7	40.7	D	YCF		40	1.20	0.20	0.20	36.5	2,150	0.0055		
CP #2		285.8			0	88	0.75			190.3	10	0.001	3.5	Confluence #3 + Nelson
Chaderjian	58.1	58.1	D	YCF		70	0.86	0.20	0.20	34.5	2,700	0.0055		
CP #1		343.9			1	88	0.74			219.0	120	0.001	3.5	Conflu #2 + Chaderjian

Appendix C

Flood Insurance Rate Maps



Scale: NA

TITLE REPORT PARCEL BOUNDARY

POTENTIAL MEDICAL FACILITY SITE

K:\ROS_MUN\097551001 – NCYCC Stockton Prison Assessment\CADD\Misc\FIRM Maps.dwg 12-09-08-8:09 PM

Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

Figure 3
FEMA FIRM Map Overlay
December 2008

RM148 *	59.888	A bench mark disk stamped "P 958 1962," set in the southeast concrete abutment of a Mariposa Road bridge 0.5 mile southeast of Jack Tone Road.
RM149 *	63.22	A spike painted and inscribed "US BM 63," set in the base of a county windmill on the south side of Mariposa Road, 1.0 mile southeast of Jack Tone Road.

*ESTABLISHED BY U.S. GEOLOGICAL SURVEY

APPROXIMATE SCALE IN FEET
1000 0 1000

LEGEND

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations and therefore may not exactly reflect the flood elevation data presented in the FIS. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Elevation Reference Marks (ERM) elevations listed on this map were obtained and/or developed to establish vertical control for determination of flood elevations and floodplain boundaries portrayed on this map. Users should be aware that these ERM elevations may have changed since the publication of this map. To obtain up-to-date-elevation information on National Geodetic Survey (NGS) ERMs shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov. Map users should seek verification of non-NGS ERM monument elevations when using these elevations for construction or floodplain management purposes.

Coastal BFE's shown on this map apply only landward of 0.0' National Geodetic Vertical Datum *(NGVD)*. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction, and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

ZONE B
RM144
ARCH ROAD
RM145
ZONE B
ZONE A0
(DEPTH 1')
ZONE B
KAISER ROAD
RM146
ZONE C
ATCHISON TOPEKA AND SANTA FE
RM147
ZONE B
ZONE A0
(DEPTH 1')
ZONE B
ZONE C
JACK TONE ROAD
ZONE C
ZONE B
North Fork
ZONE A2
RM152
South
AUSTIN ROAD
RM151
ZONE B
ZONE A0
(DEPTH 1')
RM150
ZONE C
ZONE C
ZONE B
ZONE C
ZONE A0
(DEPTH 1')
RM153
RM154
RM155
ZONE B
ZONE
ZONE B
City of Stockton
AREA NOT INCLUDED

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SAN JOAQUIN COUNTY, CALIFORNIA
(UNINCORPORATED AREAS)

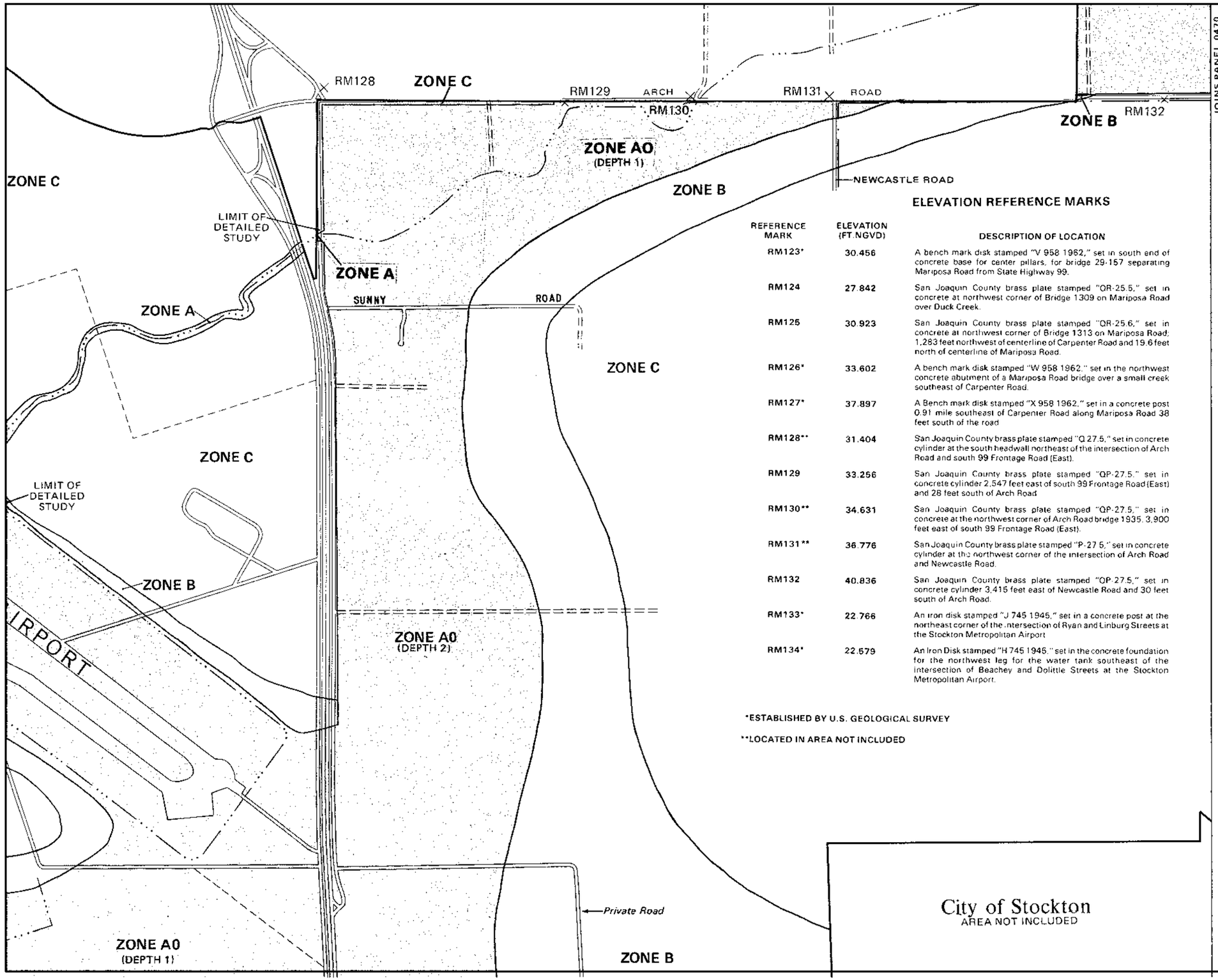
PANEL 470 OF 925
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
0602990470 B

MAP REVISED:
APRIL 2, 2002

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT.NGVD)	DESCRIPTION OF LOCATION
RM123*	30.456	A bench mark disk stamped "V 958 1962," set in south end of concrete base for center pillars, for bridge 29-157 separating Mariposa Road from State Highway 99.
RM124	27.842	San Joaquin County brass plate stamped "QR-25.5," set in concrete at northwest corner of Bridge 1309 on Mariposa Road over Duck Creek.
RM125	30.923	San Joaquin County brass plate stamped "QR-25.6," set in concrete at northwest corner of Bridge 1313 on Mariposa Road; 1,283 feet northwest of centerline of Carpenter Road and 19.6 feet north of centerline of Mariposa Road.
RM126*	33.602	A bench mark disk stamped "W 958 1962," set in the northwest concrete abutment of a Mariposa Road bridge over a small creek southeast of Carpenter Road.
RM127*	37.897	A Bench mark disk stamped "X 958 1962," set in a concrete post 0.91 mile southeast of Carpenter Road along Mariposa Road 38 feet south of the road
RM128**	31.404	San Joaquin County brass plate stamped "Q 27.5," set in concrete cylinder at the south headwall northeast of the intersection of Arch Road and south 99 Frontage Road (East).
RM129	33.256	San Joaquin County brass plate stamped "QP-27.5," set in concrete cylinder 2,547 feet east of south 99 Frontage Road (East) and 28 feet south of Arch Road
RM130**	34.631	San Joaquin County brass plate stamped "QP-27.5," set in concrete at the northwest corner of Arch Road bridge 1935. 3,900 feet east of south 99 Frontage Road (East).
RM131**	36.776	San Joaquin County brass plate stamped "P-27.5," set in concrete cylinder at the northwest corner of the intersection of Arch Road and Newcastle Road.
RM132	40.836	San Joaquin County brass plate stamped "QP-27.5," set in concrete cylinder 3,415 feet east of Newcastle Road and 30 feet south of Arch Road.
RM133*	22.766	An iron disk stamped "J 745 1945," set in a concrete post at the northeast corner of the intersection of Ryan and Linburg Streets at the Stockton Metropolitan Airport
RM134*	22.579	An Iron Disk stamped "H 745 1945," set in the concrete foundation for the northwest leg for the water tank southeast of the intersection of Beachey and Dolittle Streets at the Stockton Metropolitan Airport.

*ESTABLISHED BY U.S. GEOLOGICAL SURVEY

**LOCATED IN AREA NOT INCLUDED

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SAN JOAQUIN COUNTY, CALIFORNIA
(UNINCORPORATED AREAS)

PANEL 465 OF 925
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
0602990465 C

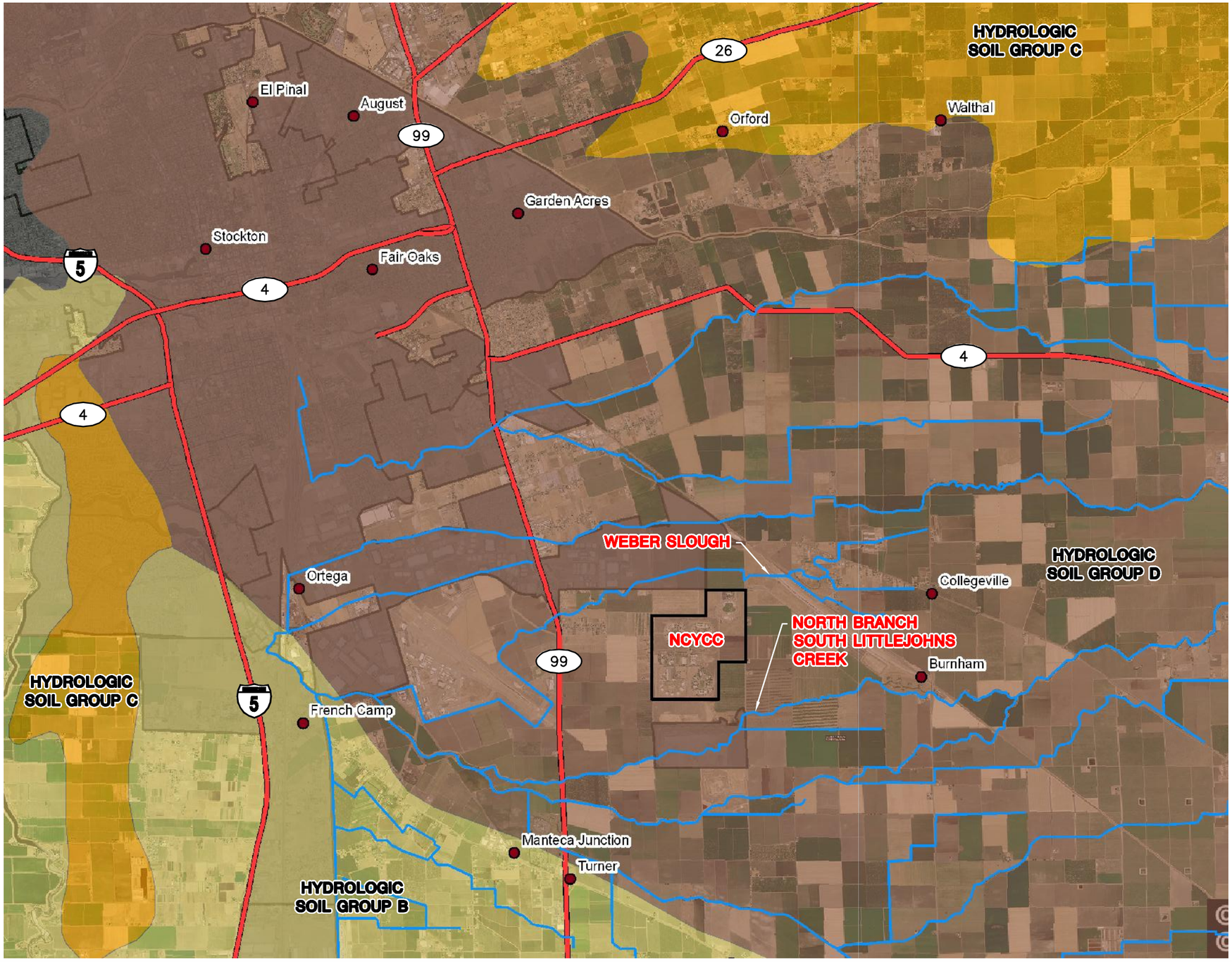
MAP REVISED:
APRIL 2, 2002

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix D

Soils Map



LEGEND

HYDROLOGIC SOIL GROUPS

- A
- B
- C
- D

Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

Figure 4
Soils Map
December 2008

\\ROSFP01\Projects\ROS_MUNI\097551001 – NCYCC Stockton Prison Assessment\CADD\Misc\Soils Map.dwg 12-09-08-7:50 PM

Appendix E

FlowMaster Worksheets

Worksheet for 42" Storm Drain Trunk

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00100	ft/ft
Normal Depth	3.50	ft
Diameter	42.00	in
Discharge	31.81	ft^3/s

Results

Discharge	31.81	ft^3/s
Normal Depth	3.50	ft
Flow Area	9.62	ft^2
Wetted Perimeter	11.00	ft
Top Width	0.00	ft
Critical Depth	1.74	ft
Percent Full	100.0	%
Critical Slope	0.00404	ft/ft
Velocity	3.31	ft/s
Velocity Head	0.17	ft
Specific Energy	3.67	ft
Froude Number	0.00	
Maximum Discharge	34.22	ft^3/s
Discharge Full	31.81	ft^3/s
Slope Full	0.00100	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

Worksheet for Concrete-Lined Drainage Channel

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00120	ft/ft
Normal Depth	4.00	ft
Left Side Slope	1.00	ft/ft (H:V)
Right Side Slope	1.00	ft/ft (H:V)
Bottom Width	5.00	ft

Results

Discharge	241.61	ft^3/s
Flow Area	36.00	ft^2
Wetted Perimeter	16.31	ft
Top Width	13.00	ft
Critical Depth	3.32	ft
Critical Slope	0.00245	ft/ft
Velocity	6.71	ft/s
Velocity Head	0.70	ft
Specific Energy	4.70	ft
Froude Number	0.71	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	3.32	ft
Channel Slope	0.00120	ft/ft
Critical Slope	0.00245	ft/ft

CMP Arch Culvert Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.024	
Channel Slope	0.00120	ft/ft
Constructed Depth	36.00	in
Normal Depth	36.00	in
Constructed Top Width	58.00	in

Results

Discharge	23.39	ft^3/s
Flow Area	9.67	ft^2
Wetted Perimeter	8.07	ft
Top Width	4.83	ft
Critical Depth	1.65	ft
Critical Slope	0.01319	ft/ft
Velocity	2.42	ft/s
Velocity Head	0.09	ft
Specific Energy	3.09	ft
Froude Number	0.30	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	36.00	in
Critical Depth	1.65	ft
Channel Slope	0.00120	ft/ft
Critical Slope	0.01319	ft/ft

60" Concrete Pipe Culvert Capacity

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00120	ft/ft
Normal Depth	60.00	in
Diameter	60.00	in

Results

Discharge	90.22	ft^3/s
Flow Area	19.63	ft^2
Wetted Perimeter	15.71	ft
Top Width	0.00	ft
Critical Depth	2.70	ft
Percent Full	100.0	%
Critical Slope	0.00373	ft/ft
Velocity	4.59	ft/s
Velocity Head	0.33	ft
Specific Energy	5.33	ft
Froude Number	0.00	
Maximum Discharge	97.04	ft^3/s
Discharge Full	90.22	ft^3/s
Slope Full	0.00120	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	in
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	in
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for Parallel SD Main

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Diameter

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00100	ft/ft
Normal Depth	4.43	ft
Diameter	53.15	in
Discharge	59.60	ft^3/s

Results

Diameter	53.15	in
Normal Depth	4.43	ft
Flow Area	15.41	ft^2
Wetted Perimeter	13.91	ft
Top Width	0.00	ft
Critical Depth	2.25	ft
Percent Full	100.0	%
Critical Slope	0.00377	ft/ft
Velocity	3.87	ft/s
Velocity Head	0.23	ft
Specific Energy	4.66	ft
Froude Number	0.00	
Maximum Discharge	64.11	ft^3/s
Discharge Full	59.60	ft^3/s
Slope Full	0.00100	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

Worksheet for Upsized SD Main

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Diameter

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00100	ft/ft
Normal Depth	5.51	ft
Diameter	66.07	in
Discharge	106.50	ft^3/s

Results

Diameter	66.07	in
Normal Depth	5.51	ft
Flow Area	23.81	ft^2
Wetted Perimeter	17.30	ft
Top Width	0.00	ft
Critical Depth	2.86	ft
Percent Full	100.0	%
Critical Slope	0.00354	ft/ft
Velocity	4.47	ft/s
Velocity Head	0.31	ft
Specific Energy	5.82	ft
Froude Number	0.00	
Maximum Discharge	114.56	ft^3/s
Discharge Full	106.50	ft^3/s
Slope Full	0.00100	ft/ft
Flow Type	SubCritical	

GVF Input Data

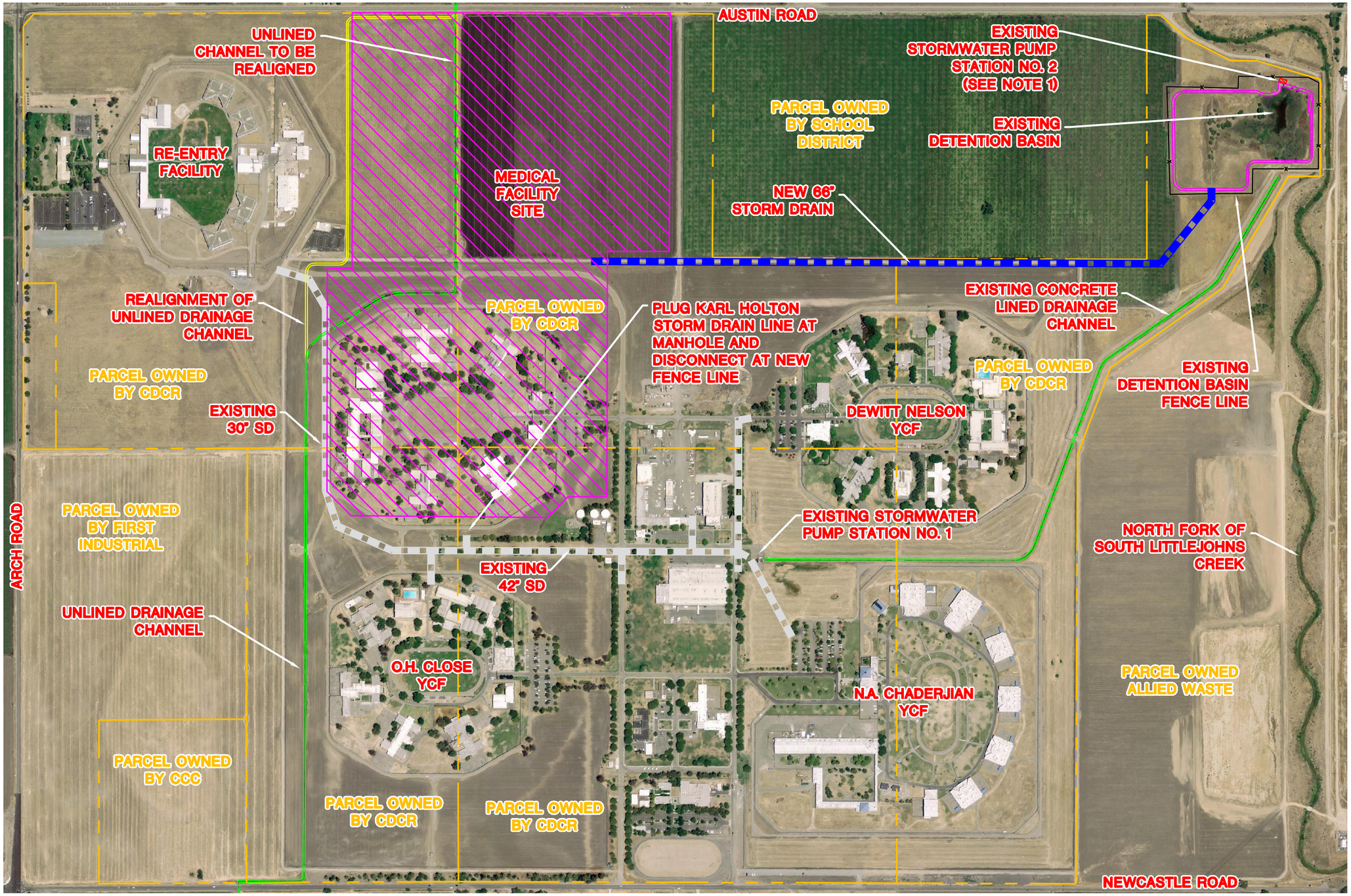
Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%

Appendix F

Proposed Improvements



LEGEND

Scale: 1"=600'

- EXISTING STORM DRAIN
- PROPOSED STORM DRAIN
- TITLE REPORT PARCEL BOUNDARY
- POTENTIAL MEDICAL FACILITY SITE

NOTES

1. EXISTING STORM DRAIN PUMP STATION 2 WILL NOT BE ALTERED, AND THEREFORE THE MAXIMUM DISCHARGE RATE TO THE CREEK WILL REMAIN UNCHANGED.

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Kimley-Horn and Associates, Inc.
Engineering, Planning and Environmental Consultants

Figure 5

Proposed Stockton NCYCC Medical Facility Off-Site Storm Drain System

December 2008

Appendix G

Synthetic Hydrographs

Synthetic Hydrograph - NCYCC

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
Storm Duration (min)	**Cum. Rainfall (inches)**	**Unit Rainfall (inches)**	**Unit Rainfall (in/hr)**	**Max Loss Rate (in/hr)**	**Low Loss Rate (in/hr)**	**Loss Rate (in/hr)**	**Net Rainfall (in/hr)**	**Discharge (cfs)**	**Start Time (min)**
90	1.107	1.107	0.738	0.117	0.303	0.117	0.621	128.95	1050
180	1.461	0.354	0.236	0.117	0.097	0.097	0.139	28.88	960
270	1.718	0.257	0.171	0.117	0.070	0.070	0.101	21.00	870
360	1.927	0.209	0.140	0.117	0.057	0.057	0.082	17.11	1140
450	2.107	0.180	0.120	0.117	0.049	0.049	0.071	14.69	780
540	2.267	0.159	0.106	0.117	0.044	0.044	0.063	13.02	690
630	2.411	0.144	0.096	0.117	0.039	0.039	0.057	11.77	1230
720	2.543	0.132	0.088	0.117	0.036	0.036	0.052	10.80	600
810	2.666	0.123	0.082	0.117	0.034	0.034	0.048	10.02	510
900	2.780	0.115	0.076	0.117	0.031	0.031	0.045	9.37	1320
990	2.888	0.108	0.072	0.117	0.030	0.030	0.042	8.82	420
1080	2.991	0.102	0.068	0.117	0.028	0.028	0.040	8.35	330
1170	3.088	0.097	0.065	0.117	0.027	0.027	0.038	7.94	1410
1260	3.181	0.093	0.062	0.117	0.025	0.025	0.037	7.59	240
1350	3.270	0.089	0.059	0.117	0.024	0.024	0.035	7.27	150
1440	3.355	0.085	0.057	0.117	0.023	0.023	0.034	6.98	60

Synthetic Hydrograph - Medical Facility

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
Storm Duration (min)	Cum. Rainfall (inches)	Unit Rainfall (inches)	Unit Rainfall (in/hr)	Max Loss Rate (in/hr)	Low Loss Rate (in/hr)	Loss Rate (in/hr)	Net Rainfall (in/hr)	Discharge (cfs)	Start Time (min)
70	1.001	1.001	0.858	0.1098	0.335	0.110	0.748	94.64	1030
140	1.321	0.320	0.274	0.1098	0.107	0.107	0.167	21.14	960
210	1.554	0.233	0.199	0.1098	0.078	0.078	0.122	15.38	890
280	1.743	0.189	0.162	0.1098	0.063	0.063	0.099	12.52	1100
350	1.906	0.163	0.139	0.1098	0.054	0.054	0.085	10.76	820
420	2.050	0.144	0.124	0.1098	0.048	0.048	0.075	9.53	750
490	2.180	0.130	0.112	0.1098	0.044	0.044	0.068	8.62	1170
560	2.300	0.120	0.103	0.1098	0.040	0.040	0.063	7.91	680
630	2.411	0.111	0.095	0.1098	0.037	0.037	0.058	7.33	610
700	2.514	0.104	0.089	0.1098	0.035	0.035	0.054	6.86	1240
770	2.612	0.098	0.084	0.1098	0.033	0.033	0.051	6.46	540
840	2.705	0.092	0.079	0.1098	0.031	0.031	0.048	6.12	470
910	2.793	0.088	0.075	0.1098	0.029	0.029	0.046	5.82	1310
980	2.877	0.084	0.072	0.1098	0.028	0.028	0.044	5.55	400
1050	2.957	0.080	0.069	0.1098	0.027	0.027	0.042	5.32	330
1120	3.034	0.077	0.066	0.1098	0.026	0.026	0.040	5.11	1380
1190	3.109	0.074	0.064	0.1098	0.025	0.025	0.039	4.92	260
1260	3.181	0.072	0.062	0.1098	0.024	0.024	0.038	4.75	190
1330	3.250	0.070	0.060	0.1098	0.023	0.023	0.036	4.60	1450
1400	3.318	0.067	0.058	0.1098	0.023	0.023	0.035	4.45	120
1470	3.383	0.065	0.056	0.1098	0.022	0.022	0.034	4.32	50

Appendix H

Basin Pumping Regime Option 1

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
0	2.62					0	0	25
		2.617444	0.036053	0	0.036053			
10	2.62					0	0.036053	25.7041
		2.617444	0.036053	0.036053	0.072106			
20	2.62					0	0.072106	25.7082
		2.617444	0.036053	0.072106	0.108159			
30	2.62					0	0.108159	25.7123
		2.617444	0.036053	0.108159	0.144212			
40	2.62					0	0.144212	25.7164
		2.617444	0.036053	0.144212	0.180265			
50	2.62					0	0.180265	25.7205
		2.632694	0.036263	0.180265	0.216528			
60	2.65					0	0.216528	25.72462
		2.680971	0.036928	0.216528	0.253456			
70	2.71					0	0.253456	25.72882
		2.713998	0.037383	0.253456	0.290839			
80	2.71					0	0.290839	25.73307
		2.713998	0.037383	0.290839	0.328221			
90	2.71					0	0.328221	25.73732
		2.713998	0.037383	0.328221	0.365604			
100	2.71					0	0.365604	25.74157
		2.713998	0.037383	0.365604	0.402987			
110	2.71					0	0.402987	25.74582
		2.713998	0.037383	0.402987	0.44037			
120	2.71					0	0.44037	25.75007
		2.748607	0.03786	0.44037	0.47823			
130	2.78					0	0.47823	25.75437
		2.783217	0.038336	0.47823	0.516566			
140	2.78					0	0.516566	25.75873
		2.783217	0.038336	0.516566	0.554902			
150	2.78					0	0.554902	25.76309
		2.820108	0.038844	0.554902	0.593747			
160	2.86					0	0.593747	25.76751
		2.856998	0.039353	0.593747	0.633099			
170	2.86					0	0.633099	25.77198
		2.856998	0.039353	0.633099	0.672452			
180	2.86					0	0.672452	25.77646
		2.856998	0.039353	0.672452	0.711805			
190	2.86					0	0.711805	25.78093
		2.876784	0.039625	0.711805	0.75143			
200	2.90					0	0.75143	25.78544
		2.896569	0.039898	0.75143	0.791327			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
210	2.90					0	0.791327	25.78997
		2.896569	0.039898	0.791327	0.831225			
220	2.90					0	0.831225	25.79451
		2.896569	0.039898	0.831225	0.871123			
230	2.90					0	0.871123	25.79905
		2.896569	0.039898	0.871123	0.91102			
240	2.90					0	0.91102	25.80358
		2.985356	0.041121	0.91102	0.952141			
250	3.07					0	0.952141	25.80826
		3.074143	0.042344	0.952141	0.994485			
260	3.07					0	0.994485	25.81307
		3.120129	0.042977	0.994485	1.037461			
270	3.17					0	1.037461	25.81796
		3.166114	0.04361	1.037461	1.081072			
280	3.17					0	1.081072	25.82292
		3.166114	0.04361	1.081072	1.124682			
290	3.17					0	1.124682	25.82788
		3.166114	0.04361	1.124682	1.168293			
300	3.17					0	1.168293	25.83283
		3.166114	0.04361	1.168293	1.211903			
310	3.17					0	1.211903	25.83779
		3.166114	0.04361	1.211903	1.255513			
320	3.17					0	1.255513	25.84275
		3.166114	0.04361	1.255513	1.299124			
330	3.17					0	1.299124	25.84771
		3.247446	0.044731	1.299124	1.343854			
340	3.33					0	1.343854	25.8528
		3.328778	0.045851	1.343854	1.389705			
350	3.33					0	1.389705	25.85801
		3.328778	0.045851	1.389705	1.435556			
360	3.33					0	1.435556	25.86322
		3.328778	0.045851	1.435556	1.481407			
370	3.33					0	1.481407	25.86844
		3.328778	0.045851	1.481407	1.527258			
380	3.33					0	1.527258	25.87365
		3.328778	0.045851	1.527258	1.573109			
390	3.33					0	1.573109	25.87886
		3.328778	0.045851	1.573109	1.61896			
400	3.33					0	1.61896	25.88408
		3.393784	0.046746	1.61896	1.665706			
410	3.46					0	1.665706	25.88939
		3.45879	0.047642	1.665706	1.713348			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
420	3.46					0	1.713348	25.89481
		3.597098	0.049547	1.713348	1.762895			
430	3.74					0	1.762895	25.90044
		3.735406	0.051452	1.762895	1.814347			
440	3.74					0	1.814347	25.90629
		3.735406	0.051452	1.814347	1.865799			
450	3.74					0	1.865799	25.91214
		3.735406	0.051452	1.865799	1.917251			
460	3.74					0	1.917251	25.91799
		3.735406	0.051452	1.917251	1.968702			
470	3.74					0	1.968702	25.92384
		3.775179	0.052	1.968702	2.020702			
480	3.81					0	2.020702	25.92975
		3.814951	0.052548	2.020702	2.07325			
490	3.81					0	2.07325	25.93573
		3.814951	0.052548	2.07325	2.125797			
500	3.81					0	2.125797	25.9417
		3.814951	0.052548	2.125797	2.178345			
510	3.81					0	2.178345	25.94768
		3.905607	0.053796	2.178345	2.232141			
520	4.00					0	2.232141	25.95379
		3.996263	0.055045	2.232141	2.287186			
530	4.00					0	2.287186	25.96005
		3.996263	0.055045	2.287186	2.342231			
540	4.00					0	2.342231	25.96631
		4.097526	0.05644	2.342231	2.398671			
550	4.20					0	2.398671	25.97273
		4.198789	0.057835	2.398671	2.456505			
560	4.20					0	2.456505	25.9793
		4.198789	0.057835	2.456505	2.51434			
570	4.20					0	2.51434	25.98588
		4.198789	0.057835	2.51434	2.572174			
580	4.20					0	2.572174	25.99246
		4.198789	0.057835	2.572174	2.630009			
590	4.20					0	2.630009	25.99903
		4.198789	0.057835	2.630009	2.687843			
600	4.20					0	2.687843	26.00561
		4.455497	0.06137	2.687843	2.749214			
610	4.71					0	2.749214	26.01259
		4.778579	0.065821	2.749214	2.815035			
620	4.84					0	2.815035	26.02007
		4.844953	0.066735	2.815035	2.881769			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
630	4.84					0	2.881769	26.02766
		4.844953	0.066735	2.881769	2.948504			
640	4.84					0	2.948504	26.03524
		4.844953	0.066735	2.948504	3.015239			
650	4.84					0	3.015239	26.04283
		4.844953	0.066735	3.015239	3.081974			
660	4.84					0	3.081974	26.05042
		4.844953	0.066735	3.081974	3.148709			
670	4.84					0	3.148709	26.05801
		4.844953	0.066735	3.148709	3.215444			
680	4.84					0	3.215444	26.0656
		5.032903	0.069324	3.215444	3.284768			
690	5.22					0	3.284768	26.07348
		5.414834	0.074584	3.284768	3.359352			
700	5.61					0	3.359352	26.08196
		5.608814	0.077256	3.359352	3.436609			
710	5.61					0	3.436609	26.09074
		5.608814	0.077256	3.436609	3.513865			
720	5.61					0	3.513865	26.09953
		5.608814	0.077256	3.513865	3.591121			
730	5.61					0	3.591121	26.10831
		5.608814	0.077256	3.591121	3.668378			
740	5.61					0	3.668378	26.11709
		5.608814	0.077256	3.668378	3.745634			
750	5.61					0	3.745634	26.12588
		5.750838	0.079213	3.745634	3.824847			
760	5.89					0	3.824847	26.13489
		5.892862	0.081169	3.824847	3.906016			
770	5.89					0	3.906016	26.14411
		5.892862	0.081169	3.906016	3.987185			
780	5.89					0	3.987185	26.15334
		6.623265	0.09123	3.987185	4.078414			
790	7.35					0	4.078414	26.16372
		7.353667	0.10129	4.078414	4.179704			
800	7.35					0	4.179704	26.17523
		7.353667	0.10129	4.179704	4.280994			
810	7.35					0	4.280994	26.18675
		7.353667	0.10129	4.280994	4.382285			
820	7.35					0	4.382285	26.19827
		7.888436	0.108656	4.382285	4.490941			
830	8.42					0	4.490941	26.21062
		8.423206	0.116022	4.490941	4.606963			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
840	8.42					0	4.606963	26.22381
		8.423206	0.116022	4.606963	4.722985			
850	8.42					0	4.722985	26.237
		8.423206	0.116022	4.722985	4.839007			
860	8.42					0	4.839007	26.2502
		8.423206	0.116022	4.839007	4.955029			
870	8.42					0	4.955029	26.26339
		9.335625	0.12859	4.955029	5.083619			
880	10.25					0	5.083619	26.27801
		10.24804	0.141158	5.083619	5.224777			
890	10.25					0	5.224777	26.29406
		10.91608	0.150359	5.224777	5.375136			
900	11.58					0	5.375136	26.31115
		11.58411	0.159561	5.375136	5.534697			
910	11.58					0	5.534697	26.3293
		11.58411	0.159561	5.534697	5.694258			
920	11.58					0	5.694258	26.34744
		11.58411	0.159561	5.694258	5.853818			
930	11.58					0	5.853818	26.36558
		11.58411	0.159561	5.853818	6.013379			
940	11.58					0	6.013379	26.38372
		11.58411	0.159561	6.013379	6.17294			
950	11.58					0	6.17294	26.40186
		11.58411	0.159561	6.17294	6.332501			
960	11.58					0	6.332501	26.42001
		23.9253	0.32955	6.332501	6.66205			
970	36.27					0	6.66205	26.45748
		36.26649	0.499538	6.66205	7.161589			
980	36.27					0	7.161589	26.51427
		36.26649	0.499538	7.161589	7.661127			
990	36.27					0	7.661127	26.57107
		36.26649	0.499538	7.661127	8.160666			
1000	36.27					0	8.160666	26.62787
		36.26649	0.499538	8.160666	8.660204			
1010	36.27					0	8.660204	26.68467
		36.26649	0.499538	8.660204	9.159742			
1020	36.27					0	9.159742	26.74146
		36.26649	0.499538	9.159742	9.659281			
1030	36.27					0	9.659281	26.79826
		30.05187	0.413938	9.659281	10.07322			
1040	23.84					0	10.07322	26.84532
		23.83725	0.328337	10.07322	10.40156			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1050	23.84					0	10.40156	26.88266
		15.34916	0.211421	10.40156	10.61298			
1060	6.86					0	10.61298	26.9067
		6.861064	0.094505	10.61298	10.70748			
1070	6.86					0	10.70748	26.91744
		6.861064	0.094505	10.70748	10.80199			
1080	6.86					0	10.80199	26.92819
		6.861064	0.094505	10.80199	10.89649			
1090	6.86					0	10.89649	26.93893
		6.861064	0.094505	10.89649	10.991			
1100	6.86					0	10.991	26.94968
		6.408791	0.088275	10.991	11.07927			
1110	5.96					0	11.07927	26.95971
		5.956518	0.082046	11.07927	11.16132			
1120	5.96					0	11.16132	26.96904
		5.956518	0.082046	11.16132	11.24336			
1130	5.96					0	11.24336	26.97837
		5.956518	0.082046	11.24336	11.32541			
1140	5.96					0	11.32541	26.9877
		5.338791	0.073537	11.32541	11.39895			
1150	4.72					0	11.39895	26.99606
		4.721063	0.065028	11.39895	11.46397			
1160	4.72					0	11.46397	27.00345
		4.721063	0.065028	11.46397	11.529			
1170	4.72					0	11.529	27.01085
		4.517456	0.062224	11.529	11.59123			
1180	4.31					0	11.59123	27.01792
		4.313848	0.059419	11.59123	11.65065			
1190	4.31					0	11.65065	27.02468
		4.313848	0.059419	11.65065	11.71007			
1200	4.31					0	11.71007	27.03143
		4.313848	0.059419	11.71007	11.76948			
1210	4.31					0	11.76948	27.03819
		4.313848	0.059419	11.76948	11.8289			
1220	4.31					0	11.8289	27.04495
		4.313848	0.059419	11.8289	11.88832			
1230	4.31					0	11.88832	27.0517
		4.035755	0.055589	11.88832	11.94391			
1240	3.76					0	11.94391	27.05802
		3.636949	0.050096	11.94391	11.99401			
1250	3.52					0	11.99401	27.06372
		3.516236	0.048433	11.99401	12.04244			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1260	3.52					0	12.04244	27.06923
		3.516236	0.048433	12.04244	12.09087			
1270	3.52					0	12.09087	27.07473
		3.516236	0.048433	12.09087	12.13931			
1280	3.52					0	12.13931	27.08024
		3.516236	0.048433	12.13931	12.18774			
1290	3.52					0	12.18774	27.08575
		3.516236	0.048433	12.18774	12.23617			
1300	3.52					0	12.23617	27.09125
		3.516236	0.048433	12.23617	12.28461			
1310	3.52					0	12.28461	27.09676
		3.434627	0.047309	12.28461	12.33192			
1320	3.35					0	12.33192	27.10214
		3.188144	0.043914	12.33192	12.37583			
1330	3.02					0	12.37583	27.10713
		3.023271	0.041643	12.37583	12.41747			
1340	3.02					0	12.41747	27.11187
		3.023271	0.041643	12.41747	12.45911			
1350	3.02					0	12.45911	27.1166
		3.023271	0.041643	12.45911	12.50076			
1360	3.02					0	12.50076	27.12134
		3.023271	0.041643	12.50076	12.5424			
1370	3.02					0	12.5424	27.12607
		3.023271	0.041643	12.5424	12.58404			
1380	3.02					0	12.58404	27.13081
		2.963627	0.040821	12.58404	12.62486			
1390	2.90					0	12.62486	27.13545
		2.903983	0.04	12.62486	12.66486			
1400	2.90					0	12.66486	27.14
		2.903983	0.04	12.66486	12.70486			
1410	2.90					0	12.70486	27.14454
		2.903983	0.04	12.70486	12.74486			
1420	2.90					0	12.74486	27.14909
		2.903983	0.04	12.74486	12.78486			
1430	2.90					0	12.78486	27.15364
		2.903983	0.04	12.78486	12.82486			
1440	2.90					0	12.82486	27.15819
		3.260744	0.044914	12.82486	12.86978			
1450	3.62					0	12.86978	27.16329
		3.617505	0.049828	12.86978	12.91961			
1460	3.62					0	12.91961	27.16896
		3.617505	0.049828	12.91961	12.96943			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1470	3.62					0	12.96943	27.17462
		3.617505	0.049828	12.96943	13.01926			
1480	3.62					0	13.01926	27.18029
		3.617505	0.049828	13.01926	13.06909			
1490	3.62					0	13.06909	27.18596
		3.638581	0.050118	13.06909	13.11921			
1500	3.66					0	13.11921	27.19165
		3.705304	0.051037	13.11921	13.17024			
1510	3.75					0	13.17024	27.19746
		3.75095	0.051666	13.17024	13.22191			
1520	3.75					0	13.22191	27.20333
		3.75095	0.051666	13.22191	13.27358			
1530	3.75					0	13.27358	27.20921
		3.75095	0.051666	13.27358	13.32524			
1540	3.75					0	13.32524	27.21508
		3.75095	0.051666	13.32524	13.37691			
1550	3.75					0	13.37691	27.22095
		3.75095	0.051666	13.37691	13.42857			
1560	3.75					0	13.42857	27.22683
		3.798783	0.052325	13.42857	13.4809			
1570	3.85					0	13.4809	27.23278
		3.846616	0.052984	13.4809	13.53388			
1580	3.85					0	13.53388	27.2388
		3.846616	0.052984	13.53388	13.58687			
1590	3.85					0	13.58687	27.24483
		3.897602	0.053686	13.58687	13.64055			
1600	3.95					0	13.64055	27.25093
		3.948587	0.054388	13.64055	13.69494			
1610	3.95					0	13.69494	27.25711
		3.948587	0.054388	13.69494	13.74933			
1620	3.95					0	13.74933	27.2633
		3.948587	0.054388	13.74933	13.80372			
1630	3.95					0	13.80372	27.26948
		3.975932	0.054765	13.80372	13.85848			
1640	4.00					0	13.85848	27.27571
		4.003277	0.055142	13.85848	13.91362			
1650	4.00					0	13.91362	27.28198
		4.003277	0.055142	13.91362	13.96877			
1660	4.00					0	13.96877	27.28825
		4.003277	0.055142	13.96877	14.02391			
1670	4.00					0	14.02391	27.29452
		4.003277	0.055142	14.02391	14.07905			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1680	4.00					0	14.07905	27.30079
		4.125988	0.056832	14.07905	14.13588			
1690	4.25					0	14.13588	27.30725
		4.248698	0.058522	14.13588	14.1944			
1700	4.25					0	14.1944	27.3139
		4.312253	0.059397	14.1944	14.2538			
1710	4.38					0	14.2538	27.32066
		4.375808	0.060273	14.2538	14.31407			
1720	4.38					0	14.31407	27.32751
		4.375808	0.060273	14.31407	14.37435			
1730	4.38					0	14.37435	27.33436
		4.375808	0.060273	14.37435	14.43462			
1740	4.38					0	14.43462	27.34122
		4.375808	0.060273	14.43462	14.49489			
1750	4.38					0	14.49489	27.34807
		4.375808	0.060273	14.49489	14.55516			
1760	4.38					0	14.55516	27.35492
		4.375808	0.060273	14.55516	14.61544			
1770	4.38					0	14.61544	27.36178
		4.488215	0.061821	14.61544	14.67726			
1780	4.60					0	14.67726	27.3688
		4.600622	0.063369	14.67726	14.74063			
1790	4.60					0	14.74063	27.37601
		4.600622	0.063369	14.74063	14.804			
1800	4.60					0	14.804	27.38321
		4.600622	0.063369	14.804	14.86737			
1810	4.60					0	14.86737	27.39042
		4.600622	0.063369	14.86737	14.93074			
1820	4.60					0	14.93074	27.39762
		4.600622	0.063369	14.93074	14.9941			
1830	4.60					0	14.9941	27.40483
		4.600622	0.063369	14.9941	15.05747			
1840	4.60					0	15.05747	27.41203
		4.690466	0.064607	15.05747	15.12208			
1850	4.78					0	15.12208	27.41938
		4.780309	0.065844	15.12208	15.18793			
1860	4.78					0	15.18793	27.42687
		4.971461	0.068477	15.18793	15.2564			
1870	5.16					0	15.2564	27.43465
		5.162613	0.07111	15.2564	15.32751			
1880	5.16					0	15.32751	27.44274
		5.162613	0.07111	15.32751	15.39862			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1890	5.16					0	15.39862	27.45082
		5.162613	0.07111	15.39862	15.46973			
1900	5.16					0	15.46973	27.45891
		5.162613	0.07111	15.46973	15.54084			
1910	5.16					0	15.54084	27.46699
		5.217582	0.071868	15.54084	15.61271			
1920	5.27					0	15.61271	27.47517
		5.27255	0.072625	15.61271	15.68534			
1930	5.27					0	15.68534	27.48342
		5.27255	0.072625	15.68534	15.75796			
1940	5.27					0	15.75796	27.49168
		5.27255	0.072625	15.75796	15.83059			
1950	5.27					0	15.83059	27.49994
		5.397844	0.07435	15.83059	15.90494			
1960	5.52					0	15.90494	27.50839
		5.523137	0.076076	15.90494	15.98101			
1970	5.52					0	15.98101	27.51704
		5.523137	0.076076	15.98101	16.05709			
1980	5.52					0	16.05709	27.52569
		5.66309	0.078004	16.05709	16.13509			
1990	5.80					0	16.13509	27.53456
		5.803043	0.079932	16.13509	16.21502			
2000	5.80					0	16.21502	27.54365
		5.803043	0.079932	16.21502	16.29496			
2010	5.80					0	16.29496	27.55274
		5.803043	0.079932	16.29496	16.37489			
2020	5.80					0	16.37489	27.56182
		5.803043	0.079932	16.37489	16.45482			
2030	5.80					0	16.45482	27.57091
		5.803043	0.079932	16.45482	16.53475			
2040	5.80					0	16.53475	27.58
		6.157833	0.084819	16.53475	16.61957			
2050	6.51					0	16.61957	27.58965
		6.604357	0.090969	16.61957	16.71054			
2060	6.70					0	16.71054	27.59999
		6.696091	0.092233	16.71054	16.80277			
2070	6.70					0	16.80277	27.61048
		6.696091	0.092233	16.80277	16.895			
2080	6.70					0	16.895	27.62096
		6.696091	0.092233	16.895	16.98724			
2090	6.70					0	16.98724	27.63145
		6.696091	0.092233	16.98724	17.07947			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2100	6.70					0	17.07947	27.64194
		6.696091	0.092233	17.07947	17.1717			
2110	6.70					0	17.1717	27.65242
		6.696091	0.092233	17.1717	17.26394			
2120	6.70					0	17.26394	27.66291
		6.955852	0.095811	17.26394	17.35975			
2130	7.22					0	17.35975	27.6738
		7.483709	0.103081	17.35975	17.46283			
2140	7.75					0	17.46283	27.68552
		7.751805	0.106774	17.46283	17.5696			
2150	7.75					0	17.5696	27.69766
		7.751805	0.106774	17.5696	17.67638			
2160	7.75					0	17.67638	27.7098
		7.751805	0.106774	17.67638	17.78315			
2170	7.75					0	17.78315	27.72194
		7.751805	0.106774	17.78315	17.88992			
2180	7.75					0	17.88992	27.73408
		7.751805	0.106774	17.88992	17.9967			
2190	7.75					0	17.9967	27.74622
		7.948093	0.109478	17.9967	18.10618			
2200	8.14					0	18.10618	27.75867
		8.14438	0.112182	18.10618	18.21836			
2210	8.14					0	18.21836	27.77143
		8.14438	0.112182	18.21836	18.33054			
2220	8.14					0	18.33054	27.78418
		9.153852	0.126086	18.33054	18.45663			
2230	10.16					0	18.45663	27.79852
		10.16332	0.139991	18.45663	18.59662			
2240	10.16					0	18.59662	27.81444
		10.16332	0.139991	18.59662	18.73661			
2250	10.16					0	18.73661	27.83035
		10.16332	0.139991	18.73661	18.8766			
2260	10.16					0	18.8766	27.84627
		10.90241	0.150171	18.8766	19.02677			
2270	11.64					0	19.02677	27.86334
		11.64151	0.160351	19.02677	19.18712			
2280	11.64					0	19.18712	27.88158
		11.64151	0.160351	19.18712	19.34747			
2290	11.64					0	19.34747	27.89981
		11.64151	0.160351	19.34747	19.50782			
2300	11.64					0	19.50782	27.91804
		11.64151	0.160351	19.50782	19.66817			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2310	11.64					0	19.66817	27.93627
		12.90254	0.177721	19.66817	19.84589			
2320	14.16					0	19.84589	27.95648
		14.16357	0.195091	19.84589	20.04099			
2330	14.16					0	20.04099	27.97866
		15.08685	0.207808	20.04099	20.24879			
2340	16.01					0	20.24879	28.00229
		16.01012	0.220525	20.24879	20.46932			
2350	16.01					0	20.46932	28.02736
		16.01012	0.220525	20.46932	20.68984			
2360	16.01					0	20.68984	28.05244
		16.01012	0.220525	20.68984	20.91037			
2370	16.01					0	20.91037	28.07751
		16.01012	0.220525	20.91037	21.13089			
2380	16.01					0	21.13089	28.10258
		16.01012	0.220525	21.13089	21.35142			
2390	16.01					0	21.35142	28.12766
		16.01012	0.220525	21.35142	21.57194			
2400	16.01					0	21.57194	28.15273
		33.06657	0.455462	21.57194	22.02741			
2410	50.12					0	22.02741	28.20452
		50.12303	0.6904	22.02741	22.71781			
2420	50.12					0	22.71781	28.28301
		50.12303	0.6904	22.71781	23.40821			
2430	50.12					0	23.40821	28.36151
		50.12303	0.6904	23.40821	24.09861			
2440	50.12					0	24.09861	28.44001
		50.12303	0.6904	24.09861	24.789			
2450	50.12					0	24.789	28.51851
		50.12303	0.6904	24.789	25.4794			
2460	50.12					0	25.4794	28.59701
		50.12303	0.6904	25.4794	26.1698			
2470	50.12					0	26.1698	28.67551
		41.53396	0.572093	26.1698	26.7419			
2480	32.94					0	26.7419	28.74055
		32.94488	0.453786	26.7419	27.19568			
2490	32.94					0	27.19568	28.79215
		21.2137	0.2922	27.19568	27.48788			
2500	9.48					0	27.48788	28.82537
		9.482508	0.130613	27.48788	27.6185			
2510	9.48					0	27.6185	28.84022
		9.482508	0.130613	27.6185	27.74911			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2520	9.48					0	27.74911	28.85507
		9.482508	0.130613	27.74911	27.87972			
2530	9.48					0	27.87972	28.86992
		9.482508	0.130613	27.87972	28.01034			
2540	9.48					0	28.01034	28.88478
		8.857433	0.122003	28.01034	28.13234			
2550	8.23					0	28.13234	28.89865
		8.232357	0.113393	28.13234	28.24573			
2560	8.23					0	28.24573	28.91154
		8.232357	0.113393	28.24573	28.35913			
2570	8.23					0	28.35913	28.92443
		8.232357	0.113393	28.35913	28.47252			
2580	8.23					0	28.47252	28.93733
		7.378611	0.101634	28.47252	28.57415			
2590	6.52					0	28.57415	28.94888
		6.524866	0.089874	28.57415	28.66403			
2600	6.52					0	28.66403	28.9591
		6.524866	0.089874	28.66403	28.7539			
2610	6.52					0	28.7539	28.96932
		6.243465	0.085998	28.7539	28.8399			
2620	5.96					0	28.8399	28.9791
		5.962063	0.082122	28.8399	28.92202			
2630	5.96					0	28.92202	28.98843
		5.962063	0.082122	28.92202	29.00414			
2640	5.96					0	29.00414	28.99777
		5.962063	0.082122	29.00414	29.08627			
2650	5.96					0	29.08627	29.00711
		5.962063	0.082122	29.08627	29.16839			
2660	5.96					0	29.16839	29.01645
		5.962063	0.082122	29.16839	29.25051			
2670	5.96					0	29.25051	29.02578
		5.577718	0.076828	29.25051	29.32734			
2680	5.19					0	29.32734	29.03452
		5.026538	0.069236	29.32734	29.39657			
2690	4.86					0	29.39657	29.04239
		4.859703	0.066938	29.39657	29.46351			
2700	4.86					0	29.46351	29.05
		4.859703	0.066938	29.46351	29.53045			
2710	4.86					0	29.53045	29.05761
		4.859703	0.066938	29.53045	29.59739			
2720	4.86					0	29.59739	29.06522
		4.859703	0.066938	29.59739	29.66433			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2730	4.86					0	29.66433	29.07283
		4.859703	0.066938	29.66433	29.73126			
2740	4.86					0	29.73126	29.08044
		4.859703	0.066938	29.73126	29.7982			
2750	4.86					0	29.7982	29.08806
		4.746913	0.065384	29.7982	29.86359			
2760	4.63					0	29.86359	29.09549
		4.406256	0.060692	29.86359	29.92428			
2770	4.18					0	29.92428	29.10239
		4.178389	0.057554	29.92428	29.98183			
2780	4.18					0	29.98183	29.10893
		4.178389	0.057554	29.98183	30.03939			
2790	4.18					0	30.03939	29.11548
		4.178389	0.057554	30.03939	30.09694			
2800	4.18					0	30.09694	29.12202
		4.178389	0.057554	30.09694	30.15449			
2810	4.18					0	30.15449	29.12857
		4.178389	0.057554	30.15449	30.21205			
2820	4.18					0	30.21205	29.13511
		4.095957	0.056418	30.21205	30.26846			
2830	4.01					0	30.26846	29.14152
		4.013524	0.055283	30.26846	30.32375			
2840	4.01					0	30.32375	29.14781
		4.013524	0.055283	30.32375	30.37903			
2850	4.01					0	30.37903	29.1541
		4.013524	0.055283	30.37903	30.43431			
2860	4.01					0	30.43431	29.16038
		4.013524	0.055283	30.43431	30.4896			
2870	4.01					0	30.4896	29.16667
		4.013524	0.055283	30.4896	30.54488			
2880	4.01					0	30.54488	29.17295
		7.658342	0.105487	30.54488	30.65037			
2890	11.30					0	30.65037	29.18495
		11.30316	0.155691	30.65037	30.80606			
2900	11.30					0	30.80606	29.20265
		11.30316	0.155691	30.80606	30.96175			
2910	11.30					0	30.96175	29.22035
		11.30316	0.155691	30.96175	31.11744			
2920	11.30					0	31.11744	29.23805
		11.30316	0.155691	31.11744	31.27313			
2930	11.30					0	31.27313	29.25575
		11.36901	0.156598	31.27313	31.42973			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2940	11.43					0	31.42973	29.27356
		11.57749	0.15947	31.42973	31.5892			
2950	11.72					0	31.5892	29.29169
		11.72012	0.161434	31.5892	31.75063			
2960	11.72					0	31.75063	29.31005
		11.72012	0.161434	31.75063	31.91206			
2970	11.72					0	31.91206	29.3284
		11.72012	0.161434	31.91206	32.0735			
2980	11.72					0	32.0735	29.34676
		11.72012	0.161434	32.0735	32.23493			
2990	11.72					0	32.23493	29.36511
		11.72012	0.161434	32.23493	32.39637			
3000	11.72					0	32.39637	29.38347
		11.86958	0.163493	32.39637	32.55986			
3010	12.02					0	32.55986	29.40206
		12.01903	0.165551	32.55986	32.72541			
3020	12.02					0	32.72541	29.42088
		12.01903	0.165551	32.72541	32.89096			
3030	12.02					0	32.89096	29.4397
		12.17834	0.167746	32.89096	33.05871			
3040	12.34					0	33.05871	29.45878
		12.33765	0.16994	33.05871	33.22865			
3050	12.34					0	33.22865	29.4781
		12.33765	0.16994	33.22865	33.39859			
3060	12.34					0	33.39859	29.49742
		12.33765	0.16994	33.39859	33.56853			
3070	12.34					0	33.56853	29.51674
		12.42309	0.171117	33.56853	33.73965			
3080	12.51					0	33.73965	29.5362
		12.50853	0.172294	33.73965	33.91194			
3090	12.51					0	33.91194	29.55579
		12.50853	0.172294	33.91194	34.08423			
3100	12.51					0	34.08423	29.57538
		12.50853	0.172294	34.08423	34.25653			
3110	12.51					0	34.25653	29.59497
		12.50853	0.172294	34.25653	34.42882			
3120	12.51					0	34.42882	29.61456
		12.89195	0.177575	34.42882	34.6064			
3130	13.28					0	34.6064	29.63475
		13.27537	0.182856	34.6064	34.78925			
3140	13.28					0	34.78925	29.65554
		13.47395	0.185592	34.78925	34.97484			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3150	13.67					0	34.97484	29.67664
		13.67253	0.188327	34.97484	35.16317			
3160	13.67					0	35.16317	29.69805
		13.67253	0.188327	35.16317	35.3515			
3170	13.67					0	35.3515	29.71947
		13.67253	0.188327	35.3515	35.53982			
3180	13.67					0	35.53982	29.74088
		13.67253	0.188327	35.53982	35.72815			
3190	13.67					0	35.72815	29.76229
		13.67253	0.188327	35.72815	35.91648			
3200	13.67					0	35.91648	29.7837
		13.67253	0.188327	35.91648	36.10481			
3210	13.67					0	36.10481	29.80512
		14.02376	0.193165	36.10481	36.29797			
3220	14.37					0	36.29797	29.82708
		14.37498	0.198003	36.29797	36.49597			
3230	14.37					0	36.49597	29.84959
		14.37498	0.198003	36.49597	36.69398			
3240	14.37					0	36.69398	29.8721
		14.37498	0.198003	36.69398	36.89198			
3250	14.37					0	36.89198	29.89462
		14.37498	0.198003	36.89198	37.08998			
3260	14.37					0	37.08998	29.91713
		14.37498	0.198003	37.08998	37.28798			
3270	14.37					0	37.28798	29.93964
		14.37498	0.198003	37.28798	37.48599			
3280	14.37					0	37.48599	29.96216
		14.6557	0.201869	37.48599	37.68785			
3290	14.94					0	37.68785	29.98511
		14.93643	0.205736	37.68785	37.89359			
3300	14.94					6	37.85227	30.0038
		15.53369	0.213963	37.81095	38.02491			
3310	16.13					6	37.98359	30.01873
		16.13096	0.22219	37.94226	38.16445			
3320	16.13					6	38.12313	30.0346
		16.13096	0.22219	38.08181	38.304			
3330	16.13					6	38.26268	30.05047
		16.13096	0.22219	38.22135	38.44354			
3340	16.13					6	38.40222	30.06633
		16.13096	0.22219	38.3609	38.58309			
3350	16.13					6	38.54177	30.0822
		16.30272	0.224555	38.50044	38.725			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3360	16.47					6	38.68368	30.09833
		16.47447	0.226921	38.64235	38.86928			
3370	16.47					6	38.82795	30.11474
		16.47447	0.226921	38.78663	39.01355			
3380	16.47					6	38.97223	30.13114
		16.47447	0.226921	38.93091	39.15783			
3390	16.47					6	39.11651	30.14755
		16.86596	0.232313	39.07518	39.3075			
3400	17.26					6	39.26617	30.16456
		17.25745	0.237706	39.22485	39.46256			
3410	17.26					6	39.42124	30.18219
		17.25745	0.237706	39.37991	39.61762			
3420	17.26					6	39.5763	30.19983
		17.69474	0.243729	39.53498	39.7787			
3430	18.13					6	39.73738	30.21814
		18.13203	0.249753	39.69606	39.94581			
3440	18.13					6	39.90449	30.23714
		18.13203	0.249753	39.86317	40.11292			
3450	18.13					6	40.0716	30.25614
		18.13203	0.249753	40.03028	40.28003			
3460	18.13					6	40.23871	30.27514
		18.13203	0.249753	40.19738	40.44714			
3470	18.13					6	40.40581	30.29414
		18.13203	0.249753	40.36449	40.61424			
3480	18.13					6	40.57292	30.31314
		19.2406	0.265022	40.5316	40.79662			
3490	20.35					6	40.7553	30.33388
		20.6358	0.28424	40.71398	40.99822			
3500	20.92					6	40.95689	30.3568
		20.92243	0.288188	40.91557	41.20376			
3510	20.92					6	41.16244	30.38017
		20.92243	0.288188	41.12111	41.4093			
3520	20.92					6	41.36798	30.40354
		20.92243	0.288188	41.32666	41.61485			
3530	20.92					6	41.57352	30.42691
		20.92243	0.288188	41.5322	41.82039			
3540	20.92					6	41.77907	30.45028
		20.92243	0.288188	41.73774	42.02593			
3550	20.92					6	41.98461	30.47365
		20.92243	0.288188	41.94329	42.23147			
3560	20.92					6	42.19015	30.49702
		21.73407	0.299367	42.14883	42.4482			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3570	22.55					6	42.40688	30.52166
		23.3834	0.322085	42.36555	42.68764			
3580	24.22					6	42.64632	30.54889
		24.22108	0.333624	42.60499	42.93862			
3590	24.22					6	42.8973	30.57742
		24.22108	0.333624	42.85597	43.1896			
3600	24.22					6	43.14827	30.60596
		24.22108	0.333624	43.10695	43.44058			
3610	24.22					6	43.39925	30.6345
		24.22108	0.333624	43.35793	43.69155			
3620	24.22					6	43.65023	30.66303
		24.22108	0.333624	43.60891	43.94253			
3630	24.22					6	43.90121	30.69157
		24.8344	0.342072	43.85989	44.20196			
3640	25.45					6	44.16064	30.72106
		25.44771	0.350519	44.11932	44.46984			
3650	25.45					6	44.42851	30.75152
		25.44771	0.350519	44.38719	44.73771			
3660	25.45					6	44.69639	30.78198
		28.60188	0.393965	44.65507	45.04903			
3670	31.76					6	45.00771	30.81738
		31.75605	0.437411	44.96639	45.4038			
3680	31.76					6	45.36248	30.85771
		31.75605	0.437411	45.32115	45.75856			
3690	31.76					6	45.71724	30.89805
		31.75605	0.437411	45.67592	46.11333			
3700	31.76					6	46.07201	30.93839
		34.06539	0.46922	46.03069	46.49991			
3710	36.37					6	46.45858	30.98234
		36.37474	0.501029	46.41726	46.91829			
3720	36.37					28	46.72545	31.01268
		36.37474	0.501029	46.53262	47.03365			
3730	36.37					28	46.84081	31.0258
		36.37474	0.501029	46.64797	47.149			
3740	36.37					28	46.95616	31.03892
		36.37474	0.501029	46.76333	47.26435			
3750	36.37					28	47.07152	31.05203
		40.31493	0.555302	46.87868	47.43398			
3760	44.26					28	47.24114	31.07132
		44.25512	0.609575	47.04831	47.65788			
3770	44.26					28	47.46504	31.09678
		47.13995	0.649311	47.27221	47.92152			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3780	50.02					28	47.72868	31.12675
		50.02479	0.689047	47.53584	48.22489			
3790	50.02					28	48.03205	31.16124
		50.02479	0.689047	47.83921	48.52826			
3800	50.02					28	48.33542	31.19574
		50.02479	0.689047	48.14259	48.83163			
3810	50.02					28	48.6388	31.23023
		50.02479	0.689047	48.44596	49.135			
3820	50.02					28	48.94217	31.26472
		50.02479	0.689047	48.74933	49.43838			
3830	50.02					28	49.24554	31.29922
		50.02479	0.689047	49.0527	49.74175			
3840	50.02					28	49.54891	31.33371
		136.8075	1.884401	49.35607	51.24047			
3850	223.59					28	51.04764	31.50412
		223.5903	3.079756	50.8548	53.93456			
3860	223.59					28	53.74172	31.81043
		223.5903	3.079756	53.54888	56.62864			
3870	223.59					28	56.4358	32.11675
		223.5903	3.079756	56.24296	59.32272			
3880	223.59					28	59.12988	32.42307
		223.5903	3.079756	58.93704	62.0168			
3890	223.59					28	61.82396	32.72938
		223.5903	3.079756	61.63112	64.71088			
3900	223.59					28	64.51804	33.0357
		223.5903	3.079756	64.3252	67.40496			
3910	223.59					28	67.21212	33.34202
		182.5335	2.514236	67.01928	69.53352			
3920	141.48					28	69.34068	33.58404
		141.4768	1.948716	69.14785	71.09656			
3930	141.48					28	70.90372	33.76175
		85.5528	1.178413	70.71089	71.8893			
3940	29.63					28	71.69646	33.85189
		29.62879	0.40811	71.50363	71.91174			
3950	29.63					28	71.7189	33.85444
		29.62879	0.40811	71.52606	71.93417			
3960	29.63					28	71.74133	33.85699
		29.62879	0.40811	71.5485	71.95661			
3970	29.63					28	71.76377	33.85954
		29.62879	0.40811	71.57093	71.97904			
3980	29.63					28	71.7862	33.86209
		27.6757	0.381208	71.59337	71.97457			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3990	25.72					28	71.78174	33.86158
		25.7226	0.354306	71.5889	71.94321			
4000	25.72					28	71.75037	33.85802
		25.7226	0.354306	71.55753	71.91184			
4010	25.72					28	71.719	33.85445
		25.7226	0.354306	71.52616	71.88047			
4020	25.72					28	71.68763	33.85088
		23.05501	0.317562	71.49479	71.81235			
4030	20.39					28	71.61952	33.84314
		20.38742	0.280818	71.42668	71.7075			
4040	20.39					28	71.51466	33.83122
		20.38742	0.280818	71.32182	71.60264			
4050	20.39					28	71.4098	33.81929
		19.50816	0.268707	71.21697	71.48567			
4060	18.63					28	71.29284	33.806
		18.6289	0.256596	71.1	71.3566			
4070	18.63					28	71.16376	33.79132
		18.6289	0.256596	70.97092	71.22752			
4080	18.63					28	71.03468	33.77664
		18.6289	0.256596	70.84184	71.09844			
4090	18.63					28	70.9056	33.76197
		18.6289	0.256596	70.71276	70.96936			
4100	18.63					28	70.77652	33.74729
		18.6289	0.256596	70.58369	70.84028			
4110	18.63					28	70.64744	33.73261
		17.42799	0.240055	70.45461	70.69466			
4120	16.23					28	70.50182	33.71606
		15.70579	0.216333	70.30899	70.52532			
4130	15.18					28	70.33248	33.6968
		15.1845	0.209153	70.13964	70.3488			
4140	15.18					28	70.15596	33.67673
		15.1845	0.209153	69.96312	70.17228			
4150	15.18					28	69.97944	33.65666
		15.1845	0.209153	69.7866	69.99575			
4160	15.18					28	69.80292	33.63659
		15.1845	0.209153	69.61008	69.81923			
4170	15.18					28	69.62639	33.61652
		15.1845	0.209153	69.43356	69.64271			
4180	15.18					28	69.44987	33.59645
		15.1845	0.209153	69.25703	69.46619			
4190	15.18					28	69.27335	33.57638
		14.83208	0.204299	69.08051	69.28481			

72-Hour Simulation - Option 1

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
4200	14.48					28	69.09197	33.55576
		13.76767	0.189637	68.89914	69.08877			
4210	13.06					28	68.89594	33.53347
		13.05568	0.17983	68.7031	68.88293			
4220	13.06					28	68.69009	33.51006
		13.05568	0.17983	68.49725	68.67708			
4230	13.06					28	68.48425	33.48666
		13.05568	0.17983	68.29141	68.47124			
4240	13.06					28	68.2784	33.46325
		13.05568	0.17983	68.08557	68.2654			
4250	13.06					28	68.07256	33.43985
		13.05568	0.17983	67.87972	68.05955			
4260	13.06					28	67.86671	33.41645
		12.79812	0.176283	67.67388	67.85016			
4270	12.54					28	67.65732	33.39264
		12.54055	0.172735	67.46448	67.63722			
4280	12.54					28	67.44438	33.36843
		12.54055	0.172735	67.25154	67.42428			
4290	12.54					28	67.23144	33.34421
		12.54055	0.172735	67.0386	67.21134			
4300	12.54					28	67.0185	33.32
		12.54055	0.172735	66.82566	66.9984			
4310	12.54					28	66.80556	33.29579
		12.54055	0.172735	66.61272	66.78546			
4320	12.54					28	66.59262	33.27158

Appendix I

Basin Pumping Regime Option 2

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
0	2.62					0	0	25
		2.617444	0.036053	0	0.036053			
10	2.62					0	0.036053	25.7041
		2.617444	0.036053	0.036053	0.072106			
20	2.62					0	0.072106	25.7082
		2.617444	0.036053	0.072106	0.108159			
30	2.62					0	0.108159	25.7123
		2.617444	0.036053	0.108159	0.144212			
40	2.62					0	0.144212	25.7164
		2.617444	0.036053	0.144212	0.180265			
50	2.62					0	0.180265	25.7205
		2.632694	0.036263	0.180265	0.216528			
60	2.65					0	0.216528	25.72462
		2.680971	0.036928	0.216528	0.253456			
70	2.71					0	0.253456	25.72882
		2.713998	0.037383	0.253456	0.290839			
80	2.71					0	0.290839	25.73307
		2.713998	0.037383	0.290839	0.328221			
90	2.71					0	0.328221	25.73732
		2.713998	0.037383	0.328221	0.365604			
100	2.71					0	0.365604	25.74157
		2.713998	0.037383	0.365604	0.402987			
110	2.71					0	0.402987	25.74582
		2.713998	0.037383	0.402987	0.44037			
120	2.71					0	0.44037	25.75007
		2.748607	0.03786	0.44037	0.47823			
130	2.78					0	0.47823	25.75437
		2.783217	0.038336	0.47823	0.516566			
140	2.78					0	0.516566	25.75873
		2.783217	0.038336	0.516566	0.554902			
150	2.78					0	0.554902	25.76309
		2.820108	0.038844	0.554902	0.593747			
160	2.86					0	0.593747	25.76751
		2.856998	0.039353	0.593747	0.633099			
170	2.86					0	0.633099	25.77198
		2.856998	0.039353	0.633099	0.672452			
180	2.86					0	0.672452	25.77646
		2.856998	0.039353	0.672452	0.711805			
190	2.86					0	0.711805	25.78093
		2.876784	0.039625	0.711805	0.75143			
200	2.90					0	0.75143	25.78544
		2.896569	0.039898	0.75143	0.791327			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
210	2.90					0	0.791327	25.78997
		2.896569	0.039898	0.791327	0.831225			
220	2.90					0	0.831225	25.79451
		2.896569	0.039898	0.831225	0.871123			
230	2.90					0	0.871123	25.79905
		2.896569	0.039898	0.871123	0.91102			
240	2.90					0	0.91102	25.80358
		2.985356	0.041121	0.91102	0.952141			
250	3.07					0	0.952141	25.80826
		3.074143	0.042344	0.952141	0.994485			
260	3.07					0	0.994485	25.81307
		3.120129	0.042977	0.994485	1.037461			
270	3.17					0	1.037461	25.81796
		3.166114	0.04361	1.037461	1.081072			
280	3.17					0	1.081072	25.82292
		3.166114	0.04361	1.081072	1.124682			
290	3.17					0	1.124682	25.82788
		3.166114	0.04361	1.124682	1.168293			
300	3.17					0	1.168293	25.83283
		3.166114	0.04361	1.168293	1.211903			
310	3.17					0	1.211903	25.83779
		3.166114	0.04361	1.211903	1.255513			
320	3.17					0	1.255513	25.84275
		3.166114	0.04361	1.255513	1.299124			
330	3.17					0	1.299124	25.84771
		3.247446	0.044731	1.299124	1.343854			
340	3.33					0	1.343854	25.8528
		3.328778	0.045851	1.343854	1.389705			
350	3.33					0	1.389705	25.85801
		3.328778	0.045851	1.389705	1.435556			
360	3.33					0	1.435556	25.86322
		3.328778	0.045851	1.435556	1.481407			
370	3.33					0	1.481407	25.86844
		3.328778	0.045851	1.481407	1.527258			
380	3.33					0	1.527258	25.87365
		3.328778	0.045851	1.527258	1.573109			
390	3.33					0	1.573109	25.87886
		3.328778	0.045851	1.573109	1.61896			
400	3.33					0	1.61896	25.88408
		3.393784	0.046746	1.61896	1.665706			
410	3.46					0	1.665706	25.88939
		3.45879	0.047642	1.665706	1.713348			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
420	3.46					0	1.713348	25.89481
		3.597098	0.049547	1.713348	1.762895			
430	3.74					0	1.762895	25.90044
		3.735406	0.051452	1.762895	1.814347			
440	3.74					0	1.814347	25.90629
		3.735406	0.051452	1.814347	1.865799			
450	3.74					0	1.865799	25.91214
		3.735406	0.051452	1.865799	1.917251			
460	3.74					0	1.917251	25.91799
		3.735406	0.051452	1.917251	1.968702			
470	3.74					0	1.968702	25.92384
		3.775179	0.052	1.968702	2.020702			
480	3.81					0	2.020702	25.92975
		3.814951	0.052548	2.020702	2.07325			
490	3.81					0	2.07325	25.93573
		3.814951	0.052548	2.07325	2.125797			
500	3.81					0	2.125797	25.9417
		3.814951	0.052548	2.125797	2.178345			
510	3.81					0	2.178345	25.94768
		3.905607	0.053796	2.178345	2.232141			
520	4.00					0	2.232141	25.95379
		3.996263	0.055045	2.232141	2.287186			
530	4.00					0	2.287186	25.96005
		3.996263	0.055045	2.287186	2.342231			
540	4.00					0	2.342231	25.96631
		4.097526	0.05644	2.342231	2.398671			
550	4.20					0	2.398671	25.97273
		4.198789	0.057835	2.398671	2.456505			
560	4.20					0	2.456505	25.9793
		4.198789	0.057835	2.456505	2.51434			
570	4.20					0	2.51434	25.98588
		4.198789	0.057835	2.51434	2.572174			
580	4.20					0	2.572174	25.99246
		4.198789	0.057835	2.572174	2.630009			
590	4.20					0	2.630009	25.99903
		4.198789	0.057835	2.630009	2.687843			
600	4.20					6	2.646521	26.00091
		4.455497	0.06137	2.605199	2.666569			
610	4.71					6	2.625247	25.99849
		4.778579	0.065821	2.583925	2.649745			
620	4.84					6	2.608423	25.99658
		4.844953	0.066735	2.567101	2.633836			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
630	4.84					6	2.592513	25.99477
		4.844953	0.066735	2.551191	2.617926			
640	4.84					6	2.576604	25.99296
		4.844953	0.066735	2.535281	2.602016			
650	4.84					6	2.560694	25.99115
		4.844953	0.066735	2.519371	2.586106			
660	4.84					6	2.544784	25.98934
		4.844953	0.066735	2.503462	2.570197			
670	4.84					6	2.528874	25.98753
		4.844953	0.066735	2.487552	2.554287			
680	4.84					6	2.512965	25.98572
		5.032903	0.069324	2.471642	2.540966			
690	5.22					6	2.499644	25.98421
		5.414834	0.074584	2.458321	2.532906			
700	5.61					6	2.491584	25.98329
		5.608814	0.077256	2.450261	2.527518			
710	5.61					6	2.486195	25.98268
		5.608814	0.077256	2.444873	2.522129			
720	5.61					6	2.480807	25.98207
		5.608814	0.077256	2.439485	2.516741			
730	5.61					6	2.475419	25.98146
		5.608814	0.077256	2.434097	2.511353			
740	5.61					6	2.470031	25.98084
		5.608814	0.077256	2.428708	2.505965			
750	5.61					6	2.464642	25.98023
		5.750838	0.079213	2.42332	2.502533			
760	5.89					6	2.46121	25.97984
		5.892862	0.081169	2.419888	2.501057			
770	5.89					6	2.459735	25.97967
		5.892862	0.081169	2.418412	2.499581			
780	5.89					6	2.458259	25.9795
		6.623265	0.09123	2.416937	2.508166			
790	7.35					6	2.466844	25.98048
		7.353667	0.10129	2.425522	2.526812			
800	7.35					6	2.485489	25.9826
		7.353667	0.10129	2.444167	2.545457			
810	7.35					6	2.504135	25.98472
		7.353667	0.10129	2.462813	2.564103			
820	7.35					6	2.522781	25.98684
		7.888436	0.108656	2.481458	2.590114			
830	8.42					6	2.548792	25.9898
		8.423206	0.116022	2.50747	2.623492			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
840	8.42					6	2.58217	25.99359
		8.423206	0.116022	2.540847	2.656869			
850	8.42					6	2.615547	25.99739
		8.423206	0.116022	2.574225	2.690247			
860	8.42					6	2.648924	26.00118
		8.423206	0.116022	2.607602	2.723624			
870	8.42					6	2.682302	26.00498
		9.335625	0.12859	2.64098	2.76957			
880	10.25					6	2.728247	26.0102
		10.24804	0.141158	2.686925	2.828083			
890	10.25					6	2.78676	26.01685
		10.91608	0.150359	2.745438	2.895797			
900	11.58					6	2.854475	26.02455
		11.58411	0.159561	2.813153	2.972713			
910	11.58					6	2.931391	26.0333
		11.58411	0.159561	2.890069	3.049629			
920	11.58					6	3.008307	26.04204
		11.58411	0.159561	2.966985	3.126546			
930	11.58					6	3.085223	26.05079
		11.58411	0.159561	3.043901	3.203462			
940	11.58					6	3.162139	26.05954
		11.58411	0.159561	3.120817	3.280378			
950	11.58					6	3.239056	26.06828
		11.58411	0.159561	3.197733	3.357294			
960	11.58					6	3.315972	26.07703
		23.9253	0.32955	3.274649	3.604199			
970	36.27					6	3.562877	26.1051
		36.26649	0.499538	3.521554	4.021093			
980	36.27					6	3.979771	26.1525
		36.26649	0.499538	3.938448	4.437987			
990	36.27					6	4.396664	26.1999
		36.26649	0.499538	4.355342	4.85488			
1000	36.27					6	4.813558	26.2473
		36.26649	0.499538	4.772236	5.271774			
1010	36.27					6	5.230452	26.2947
		36.26649	0.499538	5.18913	5.688668			
1020	36.27					6	5.647346	26.3421
		36.26649	0.499538	5.606023	6.105562			
1030	36.27					6	6.06424	26.3895
		30.05187	0.413938	6.022917	6.436855			
1040	23.84					6	6.395533	26.42717
		23.83725	0.328337	6.35421	6.682547			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1050	23.84					6	6.641225	26.45511
		15.34916	0.211421	6.599902	6.811323			
1060	6.86					6	6.770001	26.46975
		6.861064	0.094505	6.728679	6.823184			
1070	6.86					6	6.781861	26.4711
		6.861064	0.094505	6.740539	6.835044			
1080	6.86					6	6.793722	26.47245
		6.861064	0.094505	6.7524	6.846905			
1090	6.86					6	6.805582	26.47379
		6.861064	0.094505	6.76426	6.858765			
1100	6.86					6	6.817443	26.47514
		6.408791	0.088275	6.77612	6.864396			
1110	5.96					6	6.823073	26.47578
		5.956518	0.082046	6.781751	6.863797			
1120	5.96					6	6.822474	26.47572
		5.956518	0.082046	6.781152	6.863198			
1130	5.96					6	6.821875	26.47565
		5.956518	0.082046	6.780553	6.862599			
1140	5.96					6	6.821277	26.47558
		5.338791	0.073537	6.779954	6.853491			
1150	4.72					6	6.812169	26.47454
		4.721063	0.065028	6.770847	6.835875			
1160	4.72					6	6.794553	26.47254
		4.721063	0.065028	6.75323	6.818259			
1170	4.72					6	6.776937	26.47054
		4.517456	0.062224	6.735614	6.797838			
1180	4.31					6	6.756516	26.46822
		4.313848	0.059419	6.715194	6.774613			
1190	4.31					6	6.733291	26.46558
		4.313848	0.059419	6.691968	6.751388			
1200	4.31					6	6.710065	26.46293
		4.313848	0.059419	6.668743	6.728162			
1210	4.31					6	6.68684	26.46029
		4.313848	0.059419	6.645518	6.704937			
1220	4.31					6	6.663615	26.45765
		4.313848	0.059419	6.622293	6.681712			
1230	4.31					6	6.64039	26.45501
		4.035755	0.055589	6.599067	6.654656			
1240	3.76					6	6.613334	26.45194
		3.636949	0.050096	6.572012	6.622107			
1250	3.52					6	6.580785	26.44824
		3.516236	0.048433	6.539463	6.587896			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1260	3.52					6	6.546573	26.44435
		3.516236	0.048433	6.505251	6.553684			
1270	3.52					6	6.512362	26.44046
		3.516236	0.048433	6.471039	6.519472			
1280	3.52					6	6.47815	26.43657
		3.516236	0.048433	6.436828	6.485261			
1290	3.52					6	6.443939	26.43268
		3.516236	0.048433	6.402616	6.451049			
1300	3.52					6	6.409727	26.42879
		3.516236	0.048433	6.368405	6.416838			
1310	3.52					6	6.375515	26.4249
		3.434627	0.047309	6.334193	6.381502			
1320	3.35					6	6.34018	26.42088
		3.188144	0.043914	6.298857	6.342771			
1330	3.02					6	6.301449	26.41647
		3.023271	0.041643	6.260126	6.301769			
1340	3.02					6	6.260447	26.41181
		3.023271	0.041643	6.219125	6.260768			
1350	3.02					6	6.219445	26.40715
		3.023271	0.041643	6.178123	6.219766			
1360	3.02					6	6.178443	26.40249
		3.023271	0.041643	6.137121	6.178764			
1370	3.02					6	6.137442	26.39783
		3.023271	0.041643	6.096119	6.137762			
1380	3.02					6	6.09644	26.39317
		2.963627	0.040821	6.055118	6.095939			
1390	2.90					6	6.054617	26.38841
		2.903983	0.04	6.013294	6.053294			
1400	2.90					6	6.011972	26.38356
		2.903983	0.04	5.970649	6.010649			
1410	2.90					6	5.969327	26.37871
		2.903983	0.04	5.928005	5.968004			
1420	2.90					6	5.926682	26.37386
		2.903983	0.04	5.88536	5.925359			
1430	2.90					6	5.884037	26.36902
		2.903983	0.04	5.842715	5.882715			
1440	2.90					6	5.841392	26.36417
		3.260744	0.044914	5.80007	5.844984			
1450	3.62					6	5.803661	26.35988
		3.617505	0.049828	5.762339	5.812167			
1460	3.62					6	5.770845	26.35615
		3.617505	0.049828	5.729522	5.77935			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1470	3.62					6	5.738028	26.35241
		3.617505	0.049828	5.696706	5.746534			
1480	3.62					6	5.705211	26.34868
		3.617505	0.049828	5.663889	5.713717			
1490	3.62					6	5.672395	26.34495
		3.638581	0.050118	5.631072	5.68119			
1500	3.66					6	5.639868	26.34125
		3.705304	0.051037	5.598546	5.649583			
1510	3.75					6	5.608261	26.33766
		3.75095	0.051666	5.566938	5.618604			
1520	3.75					6	5.577282	26.33414
		3.75095	0.051666	5.53596	5.587626			
1530	3.75					6	5.546303	26.33061
		3.75095	0.051666	5.504981	5.556647			
1540	3.75					6	5.515325	26.32709
		3.75095	0.051666	5.474002	5.525668			
1550	3.75					6	5.484346	26.32357
		3.75095	0.051666	5.443024	5.49469			
1560	3.75					6	5.453367	26.32005
		3.798783	0.052325	5.412045	5.46437			
1570	3.85					6	5.423048	26.3166
		3.846616	0.052984	5.381725	5.434709			
1580	3.85					6	5.393387	26.31323
		3.846616	0.052984	5.352064	5.405048			
1590	3.85					6	5.363726	26.30986
		3.897602	0.053686	5.322403	5.376089			
1600	3.95					6	5.334767	26.30656
		3.948587	0.054388	5.293445	5.347833			
1610	3.95					6	5.306511	26.30335
		3.948587	0.054388	5.265188	5.319577			
1620	3.95					6	5.278254	26.30014
		3.948587	0.054388	5.236932	5.29132			
1630	3.95					6	5.249998	26.29692
		3.975932	0.054765	5.208676	5.263441			
1640	4.00					6	5.222118	26.29375
		4.003277	0.055142	5.180796	5.235938			
1650	4.00					6	5.194615	26.29063
		4.003277	0.055142	5.153293	5.208434			
1660	4.00					6	5.167112	26.2875
		4.003277	0.055142	5.12579	5.180931			
1670	4.00					6	5.139609	26.28437
		4.003277	0.055142	5.098287	5.153428			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1680	4.00					6	5.112106	26.28125
		4.125988	0.056832	5.070784	5.127615			
1690	4.25					6	5.086293	26.27831
		4.248698	0.058522	5.044971	5.103493			
1700	4.25					6	5.062171	26.27557
		4.312253	0.059397	5.020848	5.080246			
1710	4.38					6	5.038923	26.27293
		4.375808	0.060273	4.997601	5.057874			
1720	4.38					6	5.016552	26.27038
		4.375808	0.060273	4.975229	5.035502			
1730	4.38					6	4.99418	26.26784
		4.375808	0.060273	4.952857	5.01313			
1740	4.38					6	4.971808	26.26529
		4.375808	0.060273	4.930486	4.990759			
1750	4.38					6	4.949436	26.26275
		4.375808	0.060273	4.908114	4.968387			
1760	4.38					6	4.927064	26.26021
		4.375808	0.060273	4.885742	4.946015			
1770	4.38					6	4.904693	26.25766
		4.488215	0.061821	4.86337	4.925191			
1780	4.60					6	4.883869	26.2553
		4.600622	0.063369	4.842547	4.905916			
1790	4.60					6	4.864594	26.2531
		4.600622	0.063369	4.823272	4.886641			
1800	4.60					6	4.845319	26.25091
		4.600622	0.063369	4.803996	4.867366			
1810	4.60					6	4.826044	26.24872
		4.600622	0.063369	4.784721	4.848091			
1820	4.60					6	4.806768	26.24653
		4.600622	0.063369	4.765446	4.828816			
1830	4.60					6	4.787493	26.24434
		4.600622	0.063369	4.746171	4.80954			
1840	4.60					6	4.768218	26.24215
		4.690466	0.064607	4.726896	4.791503			
1850	4.78					6	4.75018	26.2401
		4.780309	0.065844	4.708858	4.774703			
1860	4.78					6	4.73338	26.23819
		4.971461	0.068477	4.692058	4.760535			
1870	5.16					6	4.719213	26.23657
		5.162613	0.07111	4.677891	4.749001			
1880	5.16					6	4.707679	26.23526
		5.162613	0.07111	4.666357	4.737467			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
1890	5.16					6	4.696145	26.23395
		5.162613	0.07111	4.654822	4.725933			
1900	5.16					6	4.68461	26.23264
		5.162613	0.07111	4.643288	4.714398			
1910	5.16					6	4.673076	26.23133
		5.217582	0.071868	4.631754	4.703621			
1920	5.27					6	4.662299	26.2301
		5.27255	0.072625	4.620977	4.693601			
1930	5.27					6	4.652279	26.22896
		5.27255	0.072625	4.610957	4.683581			
1940	5.27					6	4.642259	26.22782
		5.27255	0.072625	4.600937	4.673561			
1950	5.27					6	4.632239	26.22669
		5.397844	0.07435	4.590917	4.665267			
1960	5.52					6	4.623945	26.22574
		5.523137	0.076076	4.582623	4.658699			
1970	5.52					6	4.617377	26.225
		5.523137	0.076076	4.576054	4.65213			
1980	5.52					6	4.610808	26.22425
		5.66309	0.078004	4.569486	4.64749			
1990	5.80					6	4.606168	26.22372
		5.803043	0.079932	4.564845	4.644777			
2000	5.80					6	4.603455	26.22341
		5.803043	0.079932	4.562132	4.642064			
2010	5.80					6	4.600742	26.2231
		5.803043	0.079932	4.559419	4.639351			
2020	5.80					6	4.598029	26.2228
		5.803043	0.079932	4.556707	4.636638			
2030	5.80					6	4.595316	26.22249
		5.803043	0.079932	4.553994	4.633925			
2040	5.80					6	4.592603	26.22218
		6.157833	0.084819	4.551281	4.636099			
2050	6.51					6	4.594777	26.22243
		6.604357	0.090969	4.553455	4.644424			
2060	6.70					6	4.603102	26.22337
		6.696091	0.092233	4.561779	4.654012			
2070	6.70					6	4.61269	26.22446
		6.696091	0.092233	4.571367	4.6636			
2080	6.70					6	4.622278	26.22555
		6.696091	0.092233	4.580955	4.673188			
2090	6.70					6	4.631866	26.22664
		6.696091	0.092233	4.590543	4.682776			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2100	6.70					6	4.641454	26.22773
		6.696091	0.092233	4.600131	4.692364			
2110	6.70					6	4.651042	26.22882
		6.696091	0.092233	4.609719	4.701952			
2120	6.70					6	4.66063	26.22991
		6.955852	0.095811	4.619307	4.715118			
2130	7.22					6	4.673796	26.23141
		7.483709	0.103081	4.632473	4.735555			
2140	7.75					6	4.694232	26.23373
		7.751805	0.106774	4.65291	4.759684			
2150	7.75					6	4.718362	26.23648
		7.751805	0.106774	4.67704	4.783814			
2160	7.75					6	4.742492	26.23922
		7.751805	0.106774	4.701169	4.807943			
2170	7.75					6	4.766621	26.24196
		7.751805	0.106774	4.725299	4.832073			
2180	7.75					6	4.790751	26.24471
		7.751805	0.106774	4.749428	4.856202			
2190	7.75					6	4.81488	26.24745
		7.948093	0.109478	4.773558	4.883036			
2200	8.14					6	4.841713	26.2505
		8.14438	0.112182	4.800391	4.912573			
2210	8.14					6	4.87125	26.25386
		8.14438	0.112182	4.829928	4.94211			
2220	8.14					6	4.900787	26.25722
		9.153852	0.126086	4.859465	4.985551			
2230	10.16					6	4.944229	26.26216
		10.16332	0.139991	4.902906	5.042897			
2240	10.16					6	5.001575	26.26868
		10.16332	0.139991	4.960252	5.100243			
2250	10.16					6	5.058921	26.2752
		10.16332	0.139991	5.017598	5.157589			
2260	10.16					6	5.116267	26.28172
		10.90241	0.150171	5.074945	5.225116			
2270	11.64					6	5.183793	26.2894
		11.64151	0.160351	5.142471	5.302822			
2280	11.64					6	5.2615	26.29823
		11.64151	0.160351	5.220178	5.380529			
2290	11.64					6	5.339207	26.30707
		11.64151	0.160351	5.297884	5.458236			
2300	11.64					6	5.416913	26.3159
		11.64151	0.160351	5.375591	5.535942			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2310	11.64					6	5.49462	26.32474
		12.90254	0.177721	5.453298	5.631019			
2320	14.16					6	5.589696	26.33555
		14.16357	0.195091	5.548374	5.743464			
2330	14.16					6	5.702142	26.34833
		15.08685	0.207808	5.66082	5.868628			
2340	16.01					6	5.827305	26.36256
		16.01012	0.220525	5.785983	6.006508			
2350	16.01					6	5.965186	26.37824
		16.01012	0.220525	5.923863	6.144388			
2360	16.01					6	6.103066	26.39392
		16.01012	0.220525	6.061744	6.282269			
2370	16.01					6	6.240947	26.4096
		16.01012	0.220525	6.199624	6.420149			
2380	16.01					6	6.378827	26.42527
		16.01012	0.220525	6.337505	6.55803			
2390	16.01					6	6.516707	26.44095
		16.01012	0.220525	6.475385	6.69591			
2400	16.01					6	6.654588	26.45663
		33.06657	0.455462	6.613266	7.068728			
2410	50.12					6	7.027406	26.49902
		50.12303	0.6904	6.986083	7.676483			
2420	50.12					6	7.635161	26.56812
		50.12303	0.6904	7.593839	8.284238			
2430	50.12					6	8.242916	26.63722
		50.12303	0.6904	8.201594	8.891993			
2440	50.12					6	8.850671	26.70632
		50.12303	0.6904	8.809349	9.499749			
2450	50.12					6	9.458426	26.77542
		50.12303	0.6904	9.417104	10.1075			
2460	50.12					6	10.06618	26.84452
		50.12303	0.6904	10.02486	10.71526			
2470	50.12					6	10.67394	26.91363
		41.53396	0.572093	10.63261	11.20471			
2480	32.94					6	11.16339	26.96928
		32.94488	0.453786	11.12206	11.57585			
2490	32.94					6	11.53453	27.01148
		21.2137	0.2922	11.4932	11.7854			
2500	9.48					6	11.74408	27.0353
		9.482508	0.130613	11.70276	11.83337			
2510	9.48					6	11.79205	27.04076
		9.482508	0.130613	11.75073	11.88134			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2520	9.48					6	11.84002	27.04621
		9.482508	0.130613	11.7987	11.92931			
2530	9.48					6	11.88799	27.05166
		9.482508	0.130613	11.84666	11.97728			
2540	9.48					6	11.93596	27.05712
		8.857433	0.122003	11.89463	12.01664			
2550	8.23					6	11.97531	27.06159
		8.232357	0.113393	11.93399	12.04739			
2560	8.23					6	12.00606	27.06509
		8.232357	0.113393	11.96474	12.07813			
2570	8.23					6	12.03681	27.06859
		8.232357	0.113393	11.99549	12.10888			
2580	8.23					6	12.06756	27.07208
		7.378611	0.101634	12.02624	12.12787			
2590	6.52					6	12.08655	27.07424
		6.524866	0.089874	12.04523	12.1351			
2600	6.52					6	12.09378	27.07506
		6.524866	0.089874	12.05246	12.14233			
2610	6.52					6	12.10101	27.07588
		6.243465	0.085998	12.05969	12.14568			
2620	5.96					6	12.10436	27.07627
		5.962063	0.082122	12.06304	12.14516			
2630	5.96					6	12.10384	27.07621
		5.962063	0.082122	12.06252	12.14464			
2640	5.96					6	12.10332	27.07615
		5.962063	0.082122	12.06199	12.14412			
2650	5.96					6	12.10279	27.07609
		5.962063	0.082122	12.06147	12.14359			
2660	5.96					6	12.10227	27.07603
		5.962063	0.082122	12.06095	12.14307			
2670	5.96					6	12.10175	27.07597
		5.577718	0.076828	12.06043	12.13726			
2680	5.19					6	12.09593	27.07531
		5.026538	0.069236	12.05461	12.12385			
2690	4.86					6	12.08252	27.07378
		4.859703	0.066938	12.0412	12.10814			
2700	4.86					6	12.06682	27.072
		4.859703	0.066938	12.0255	12.09243			
2710	4.86					6	12.05111	27.07021
		4.859703	0.066938	12.00979	12.07673			
2720	4.86					6	12.0354	27.06843
		4.859703	0.066938	11.99408	12.06102			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2730	4.86					6	12.0197	27.06664
		4.859703	0.066938	11.97838	12.04531			
2740	4.86					6	12.00399	27.06485
		4.859703	0.066938	11.96267	12.02961			
2750	4.86					6	11.98828	27.06307
		4.746913	0.065384	11.94696	12.01235			
2760	4.63					6	11.97102	27.06111
		4.406256	0.060692	11.9297	11.99039			
2770	4.18					6	11.94907	27.05861
		4.178389	0.057554	11.90775	11.9653			
2780	4.18					6	11.92398	27.05576
		4.178389	0.057554	11.88266	11.94021			
2790	4.18					6	11.89889	27.0529
		4.178389	0.057554	11.85757	11.91512			
2800	4.18					6	11.8738	27.05005
		4.178389	0.057554	11.83248	11.89003			
2810	4.18					6	11.84871	27.0472
		4.178389	0.057554	11.80739	11.86494			
2820	4.18					6	11.82362	27.04435
		4.095957	0.056418	11.78229	11.83871			
2830	4.01					6	11.79739	27.04136
		4.013524	0.055283	11.75607	11.81135			
2840	4.01					6	11.77003	27.03825
		4.013524	0.055283	11.72871	11.78399			
2850	4.01					6	11.74267	27.03514
		4.013524	0.055283	11.70134	11.75663			
2860	4.01					6	11.7153	27.03203
		4.013524	0.055283	11.67398	11.72927			
2870	4.01					6	11.68794	27.02892
		4.013524	0.055283	11.64662	11.7019			
2880	4.01					6	11.66058	27.02581
		7.658342	0.105487	11.61926	11.72475			
2890	11.30					6	11.68342	27.02841
		11.30316	0.155691	11.6421	11.79779			
2900	11.30					6	11.75647	27.03671
		11.30316	0.155691	11.71515	11.87084			
2910	11.30					6	11.82952	27.04502
		11.30316	0.155691	11.78819	11.94388			
2920	11.30					6	11.90256	27.05332
		11.30316	0.155691	11.86124	12.01693			
2930	11.30					6	11.97561	27.06163
		11.36901	0.156598	11.93429	12.09088			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
2940	11.43					6	12.04956	27.07004
		11.57749	0.15947	12.00824	12.16771			
2950	11.72					6	12.12639	27.07877
		11.72012	0.161434	12.08506	12.2465			
2960	11.72					6	12.20518	27.08773
		11.72012	0.161434	12.16385	12.32529			
2970	11.72					6	12.28397	27.09669
		11.72012	0.161434	12.24264	12.40408			
2980	11.72					6	12.36275	27.10565
		11.72012	0.161434	12.32143	12.48287			
2990	11.72					6	12.44154	27.1146
		11.72012	0.161434	12.40022	12.56166			
3000	11.72					6	12.52033	27.12356
		11.86958	0.163493	12.47901	12.6425			
3010	12.02					6	12.60118	27.13275
		12.01903	0.165551	12.55986	12.72541			
3020	12.02					6	12.68409	27.14218
		12.01903	0.165551	12.64277	12.80832			
3030	12.02					6	12.767	27.15161
		12.17834	0.167746	12.72567	12.89342			
3040	12.34					6	12.8521	27.16128
		12.33765	0.16994	12.81077	12.98071			
3050	12.34					6	12.93939	27.17121
		12.33765	0.16994	12.89807	13.06801			
3060	12.34					6	13.02669	27.18113
		12.33765	0.16994	12.98537	13.15531			
3070	12.34					6	13.11398	27.19106
		12.42309	0.171117	13.07266	13.24378			
3080	12.51					6	13.20246	27.20112
		12.50853	0.172294	13.16113	13.33343			
3090	12.51					6	13.2921	27.21131
		12.50853	0.172294	13.25078	13.42308			
3100	12.51					6	13.38175	27.22151
		12.50853	0.172294	13.34043	13.51273			
3110	12.51					6	13.4714	27.2317
		12.50853	0.172294	13.43008	13.60237			
3120	12.51					6	13.56105	27.24189
		12.89195	0.177575	13.51973	13.69731			
3130	13.28					6	13.65598	27.25269
		13.27537	0.182856	13.61466	13.79752			
3140	13.28					6	13.75619	27.26408
		13.47395	0.185592	13.71487	13.90046			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3150	13.67					6	13.85914	27.27578
		13.67253	0.188327	13.81782	14.00615			
3160	13.67					6	13.96482	27.2878
		13.67253	0.188327	13.9235	14.11183			
3170	13.67					6	14.07051	27.29982
		13.67253	0.188327	14.02918	14.21751			
3180	13.67					6	14.17619	27.31183
		13.67253	0.188327	14.13487	14.32319			
3190	13.67					6	14.28187	27.32385
		13.67253	0.188327	14.24055	14.42888			
3200	13.67					6	14.38755	27.33586
		13.67253	0.188327	14.34623	14.53456			
3210	13.67					6	14.49324	27.34788
		14.02376	0.193165	14.45191	14.64508			
3220	14.37					6	14.60376	27.36045
		14.37498	0.198003	14.56243	14.76044			
3230	14.37					6	14.71911	27.37356
		14.37498	0.198003	14.67779	14.87579			
3240	14.37					6	14.83447	27.38668
		14.37498	0.198003	14.79315	14.99115			
3250	14.37					6	14.94983	27.3998
		14.37498	0.198003	14.90851	15.10651			
3260	14.37					6	15.06519	27.41291
		14.37498	0.198003	15.02386	15.22187			
3270	14.37					6	15.18054	27.42603
		14.37498	0.198003	15.13922	15.33723			
3280	14.37					6	15.2959	27.43914
		14.6557	0.201869	15.25458	15.45645			
3290	14.94					6	15.41513	27.4527
		14.93643	0.205736	15.3738	15.57954			
3300	14.94					6	15.53822	27.4667
		15.53369	0.213963	15.4969	15.71086			
3310	16.13					6	15.66954	27.48163
		16.13096	0.22219	15.62821	15.8504			
3320	16.13					6	15.80908	27.49749
		16.13096	0.22219	15.76776	15.98995			
3330	16.13					6	15.94863	27.51336
		16.13096	0.22219	15.9073	16.12949			
3340	16.13					6	16.08817	27.52923
		16.13096	0.22219	16.04685	16.26904			
3350	16.13					6	16.22772	27.54509
		16.30272	0.224555	16.18639	16.41095			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3360	16.47					6	16.36963	27.56123
		16.47447	0.226921	16.3283	16.55523			
3370	16.47					6	16.5139	27.57763
		16.47447	0.226921	16.47258	16.6995			
3380	16.47					6	16.65818	27.59404
		16.47447	0.226921	16.61686	16.84378			
3390	16.47					6	16.80246	27.61044
		16.86596	0.232313	16.76113	16.99345			
3400	17.26					6	16.95213	27.62746
		17.25745	0.237706	16.9108	17.14851			
3410	17.26					6	17.10719	27.64509
		17.25745	0.237706	17.06586	17.30357			
3420	17.26					6	17.26225	27.66272
		17.69474	0.243729	17.22093	17.46465			
3430	18.13					6	17.42333	27.68103
		18.13203	0.249753	17.38201	17.63176			
3440	18.13					6	17.59044	27.70003
		18.13203	0.249753	17.54912	17.79887			
3450	18.13					6	17.75755	27.71903
		18.13203	0.249753	17.71623	17.96598			
3460	18.13					6	17.92466	27.73803
		18.13203	0.249753	17.88333	18.13309			
3470	18.13					6	18.09176	27.75703
		18.13203	0.249753	18.05044	18.30019			
3480	18.13					6	18.25887	27.77603
		19.2406	0.265022	18.21755	18.48257			
3490	20.35					6	18.44125	27.79677
		20.6358	0.28424	18.39993	18.68417			
3500	20.92					6	18.64284	27.81969
		20.92243	0.288188	18.60152	18.88971			
3510	20.92					6	18.84839	27.84306
		20.92243	0.288188	18.80707	19.09525			
3520	20.92					6	19.05393	27.86643
		20.92243	0.288188	19.01261	19.3008			
3530	20.92					6	19.25947	27.8898
		20.92243	0.288188	19.21815	19.50634			
3540	20.92					6	19.46502	27.91317
		20.92243	0.288188	19.42369	19.71188			
3550	20.92					6	19.67056	27.93654
		20.92243	0.288188	19.62924	19.91743			
3560	20.92					6	19.8761	27.95991
		21.73407	0.299367	19.83478	20.13415			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3570	22.55					6	20.09283	27.98455
		23.3834	0.322085	20.0515	20.37359			
3580	24.22					6	20.33227	28.01178
		24.22108	0.333624	20.29094	20.62457			
3590	24.22					6	20.58325	28.04032
		24.22108	0.333624	20.54192	20.87555			
3600	24.22					6	20.83422	28.06885
		24.22108	0.333624	20.7929	21.12653			
3610	24.22					6	21.0852	28.09739
		24.22108	0.333624	21.04388	21.37751			
3620	24.22					6	21.33618	28.12592
		24.22108	0.333624	21.29486	21.62848			
3630	24.22					6	21.58716	28.15446
		24.8344	0.342072	21.54584	21.88791			
3640	25.45					6	21.84659	28.18396
		25.44771	0.350519	21.80527	22.15579			
3650	25.45					6	22.11446	28.21441
		25.44771	0.350519	22.07314	22.42366			
3660	25.45					6	22.38234	28.24487
		28.60188	0.393965	22.34102	22.73498			
3670	31.76					6	22.69366	28.28027
		31.75605	0.437411	22.65234	23.08975			
3680	31.76					6	23.04843	28.32061
		31.75605	0.437411	23.0071	23.44451			
3690	31.76					6	23.40319	28.36094
		31.75605	0.437411	23.36187	23.79928			
3700	31.76					6	23.75796	28.40128
		34.06539	0.46922	23.71664	24.18586			
3710	36.37					6	24.14453	28.44523
		36.37474	0.501029	24.10321	24.60424			
3720	36.37					6	24.56292	28.4928
		36.37474	0.501029	24.5216	25.02263			
3730	36.37					6	24.9813	28.54037
		36.37474	0.501029	24.93998	25.44101			
3740	36.37					6	25.39969	28.58794
		36.37474	0.501029	25.35837	25.8594			
3750	36.37					6	25.81807	28.63551
		40.31493	0.555302	25.77675	26.33205			
3760	44.26					6	26.29073	28.68926
		44.25512	0.609575	26.24941	26.85898			
3770	44.26					6	26.81766	28.74917
		47.13995	0.649311	26.77634	27.42565			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3780	50.02					6	27.38433	28.8136
		50.02479	0.689047	27.343	28.03205			
3790	50.02					6	27.99073	28.88255
		50.02479	0.689047	27.94941	28.63845			
3800	50.02					6	28.59713	28.95149
		50.02479	0.689047	28.55581	29.24486			
3810	50.02					6	29.20353	29.02044
		50.02479	0.689047	29.16221	29.85126			
3820	50.02					6	29.80994	29.08939
		50.02479	0.689047	29.76861	30.45766			
3830	50.02					6	30.41634	29.15834
		50.02479	0.689047	30.37502	31.06406			
3840	50.02					6	31.02274	29.22729
		136.8075	1.884401	30.98142	32.86582			
3850	223.59					6	32.8245	29.43215
		223.5903	3.079756	32.78317	35.86293			
3860	223.59					6	35.82161	29.77292
		223.5903	3.079756	35.78029	38.86004			
3870	223.59					6	38.81872	30.11369
		223.5903	3.079756	38.7774	41.85715			
3880	223.59					6	41.81583	30.45446
		223.5903	3.079756	41.77451	44.85426			
3890	223.59					6	44.81294	30.79523
		223.5903	3.079756	44.77162	47.85137			
3900	223.59					6	47.81005	31.136
		223.5903	3.079756	47.76873	50.84849			
3910	223.59					6	50.80716	31.47677
		182.5335	2.514236	50.76584	53.28008			
3920	141.48					6	53.23876	31.75325
		141.4768	1.948716	53.19743	55.14615			
3930	141.48					6	55.10483	31.96542
		85.5528	1.178413	55.0635	56.24192			
3940	29.63					6	56.2006	32.09001
		29.62879	0.40811	56.15927	56.56738			
3950	29.63					6	56.52606	32.12701
		29.62879	0.40811	56.48474	56.89285			
3960	29.63					6	56.85153	32.16402
		29.62879	0.40811	56.8102	57.21831			
3970	29.63					6	57.17699	32.20102
		29.62879	0.40811	57.13567	57.54378			
3980	29.63					6	57.50246	32.23803
		27.6757	0.381208	57.46113	57.84234			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
3990	25.72					6	57.80102	32.27198
		25.7226	0.354306	57.7597	58.114			
4000	25.72					6	58.07268	32.30286
		25.7226	0.354306	58.03136	58.38567			
4010	25.72					6	58.34434	32.33375
		25.7226	0.354306	58.30302	58.65733			
4020	25.72					6	58.616	32.36464
		23.05501	0.317562	58.57468	58.89224			
4030	20.39					6	58.85092	32.39135
		20.38742	0.280818	58.8096	59.09042			
4040	20.39					6	59.0491	32.41388
		20.38742	0.280818	59.00777	59.28859			
4050	20.39					6	59.24727	32.43641
		19.50816	0.268707	59.20595	59.47465			
4060	18.63					6	59.43333	32.45757
		18.6289	0.256596	59.39201	59.64861			
4070	18.63					6	59.60728	32.47735
		18.6289	0.256596	59.56596	59.82256			
4080	18.63					6	59.78124	32.49713
		18.6289	0.256596	59.73991	59.99651			
4090	18.63					6	59.95519	32.5169
		18.6289	0.256596	59.91387	60.17046			
4100	18.63					6	60.12914	32.53668
		18.6289	0.256596	60.08782	60.34441			
4110	18.63					6	60.30309	32.55646
		17.42799	0.240055	60.26177	60.50182			
4120	16.23					6	60.4605	32.57436
		15.70579	0.216333	60.41918	60.63551			
4130	15.18					6	60.59419	32.58956
		15.1845	0.209153	60.55287	60.76202			
4140	15.18					6	60.7207	32.60394
		15.1845	0.209153	60.67938	60.88853			
4150	15.18					6	60.84721	32.61833
		15.1845	0.209153	60.80588	61.01504			
4160	15.18					6	60.97372	32.63271
		15.1845	0.209153	60.93239	61.14155			
4170	15.18					6	61.10022	32.6471
		15.1845	0.209153	61.0589	61.26805			
4180	15.18					6	61.22673	32.66148
		15.1845	0.209153	61.18541	61.39456			
4190	15.18					6	61.35324	32.67586
		14.83208	0.204299	61.31192	61.51622			

72-Hour Simulation - Option 2

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9
Time (min)	Inflow (cfs)	Average Inflow (cfs)	(I1+I2)dt/2	S1-01*dt/2	S2+02*dt/2	Outflow (cfs)	Storage (AF)	Water Elevation
4200	14.48					6	61.47489	32.6897
		13.76767	0.189637	61.43357	61.62321			
4210	13.06					6	61.58189	32.70186
		13.05568	0.17983	61.54056	61.72039			
4220	13.06					6	61.67907	32.71291
		13.05568	0.17983	61.63775	61.81758			
4230	13.06					6	61.77626	32.72396
		13.05568	0.17983	61.73494	61.91477			
4240	13.06					6	61.87344	32.73501
		13.05568	0.17983	61.83212	62.01195			
4250	13.06					6	61.97063	32.74606
		13.05568	0.17983	61.92931	62.10914			
4260	13.06					6	62.06782	32.75711
		12.79812	0.176283	62.02649	62.20278			
4270	12.54					6	62.16145	32.76776
		12.54055	0.172735	62.12013	62.29287			
4280	12.54					6	62.25154	32.778
		12.54055	0.172735	62.21022	62.38296			
4290	12.54					6	62.34163	32.78824
		12.54055	0.172735	62.30031	62.47305			
4300	12.54					6	62.43172	32.79849
		12.54055	0.172735	62.3904	62.56314			
4310	12.54					6	62.52181	32.80873
		12.54055	0.172735	62.48049	62.65323			
4320	12.54					6	62.6119	32.81897

Appendix J

Excerpts from County of San Joaquin Hydrology Manual

DRAFT 6

HYDROLOGY MANUAL FOR

SAN JOAQUIN COUNTY CALIFORNIA

DEPARTMENT OF PUBLIC WORKS

Curve [1] Numbers of Hydrologic Soil-Cover Complexes for Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Ref. No. 21) (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Ref. No. 21) (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Ref. No. 21) (Chamise and Redskank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadows or Seasonal Wetlands (Ref. No. 21) (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Ref. No. 21) (Soft wood shrubs-buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (4) (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawns, shrubs, etc.)	Good	39	61	74	80
Turf (Irrigated and mowed grass)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80

REFERENCE NO. 26 UNLESS NOTED

SAN JOAQUIN COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

FIGURE C-2 (1 of 3)

Curve [1] Numbers of Hydrologic Soil-Cover Complexes for Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS -					
Fallow (Bare Soil)		77	86	91	94
Close Seeded (alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Contoured	Poor	64	75	83	85
	Good	55	69	78	83
Countoured and Terraced	Poor	63	73	80	83
	Good	51	67	76	80
Orchards, Evergreen (Ref. No. 2) (Citrus, avacodos, etc.)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Pasture (Grassland or range, continuous forage for grazing)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Contoured	Poor	47	67	81	88
	Fair	25	59	75	83
	Good	6	35	70	79
Row Crops (Straight row, non-contoured)	Poor	72	81	88	91
	Good	67	78	85	89
Contoured	Poor	70	79	84	88
	Good	65	75	82	86
Contoured and Terraced	Poor	66	74	80	82
	Good	62	71	78	81
Small Grain (Straight row, non-contoured))	Poor	65	76	84	88
	Good	63	75	83	87
Contoured	Poor	63	74	82	85
	Good	61	73	81	84
Contoured and Terraced	Poor	61	72	79	82
Grapes, New Orchards (4), and Decidious Orchards (Ref. No. 27)	Poor	62	76	84	88
	Fair	46	67	78	83
	Good	37	60	73	79

REFERENCE NO. 3 UNLESS NOTED

SAN JOAQUIN COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

FIGURE C-2 (2 of 3)

Notes:

1. Average runoff condition, Ia = 0.2(S)

2. Poor: Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair: Moderate cover with 50 percent to 75 percent of the ground surface protected. In wood areas the woods are grazed but not burned, and some forest litter covers the soil.

   Good: Heavy or dense cover with more than 75 percent of the ground surface protected. In wooded areas the woods are protected from grazing, litter and brush adequately cover soil.

3. See Figure C-1 for definition of cover types.

4. Based on 25% by vines or trees.

REFERENCE NO. 3

SAN JOAQUIN COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS
FOR
PERVIOUS AREAS

TABLE B.4

10-YEAR DEPTH-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

10-year DEPTH-DURATION-FREQUENCY

K = 1.341

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	0.19	0.26	0.30	0.40	0.53	0.69	0.82	1.08	1.42	1.88
10	0.20	0.27	0.32	0.42	0.55	0.73	0.86	1.13	1.50	1.97
11	0.21	0.28	0.33	0.44	0.58	0.77	0.90	1.19	1.57	2.07
12	0.22	0.30	0.35	0.46	0.61	0.80	0.94	1.25	1.65	2.17
13	0.24	0.31	0.37	0.48	0.64	0.84	0.99	1.30	1.72	2.27
14	0.25	0.32	0.38	0.50	0.66	0.88	1.03	1.36	1.80	2.37
15	0.26	0.34	0.40	0.52	0.69	0.91	1.07	1.42	1.87	2.47
16	0.27	0.35	0.41	0.54	0.72	0.95	1.12	1.47	1.95	2.57
17	0.28	0.36	0.43	0.57	0.75	0.99	1.16	1.53	2.02	2.67
18	0.29	0.38	0.44	0.59	0.77	1.02	1.20	1.59	2.10	2.77
19	0.30	0.39	0.46	0.61	0.80	1.06	1.25	1.65	2.17	2.87

TABLE B.5

25-YEAR DEPTH-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

25-year DEPTH-DURATION-FREQUENCY

K = 2.066

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	0.23	0.30	0.35	0.47	0.62	0.81	0.96	1.26	1.67	2.20
10	0.24	0.32	0.37	0.49	0.65	0.86	1.01	1.33	1.76	2.32
11	0.25	0.33	0.39	0.52	0.68	0.90	1.06	1.40	1.84	2.43
12	0.26	0.35	0.41	0.54	0.71	0.94	1.11	1.46	1.93	2.55
13	0.28	0.36	0.43	0.57	0.75	0.99	1.16	1.53	2.02	2.67
14	0.29	0.38	0.45	0.59	0.78	1.03	1.21	1.60	2.11	2.78
15	0.30	0.40	0.47	0.62	0.81	1.07	1.26	1.66	2.20	2.90
16	0.31	0.41	0.48	0.64	0.84	1.11	1.31	1.73	2.29	3.02
17	0.32	0.43	0.50	0.66	0.88	1.16	1.36	1.80	2.37	3.13
18	0.34	0.44	0.52	0.69	0.91	1.20	1.41	1.86	2.46	3.25
19	0.35	0.46	0.54	0.71	0.94	1.24	1.46	1.93	2.55	3.37

TABLE B.6

50-YEAR DEPTH-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

50-year **DEPTH-DURATION-FREQUENCY**

K = 2.420

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	0.24	0.32	0.38	0.50	0.66	0.87	1.03	1.36	1.79	2.36
10	0.26	0.34	0.40	0.53	0.70	0.92	1.08	1.43	1.88	2.49
11	0.27	0.36	0.42	0.55	0.73	0.96	1.14	1.50	1.98	2.61
12	0.28	0.37	0.44	0.58	0.77	1.01	1.19	1.57	2.07	2.74
13	0.30	0.39	0.46	0.61	0.80	1.06	1.24	1.64	2.17	2.86
14	0.31	0.41	0.48	0.63	0.84	1.10	1.30	1.71	2.26	2.99
15	0.32	0.42	0.50	0.66	0.87	1.15	1.35	1.78	2.36	3.11
16	0.33	0.44	0.52	0.69	0.91	1.20	1.41	1.86	2.45	3.23
17	0.35	0.46	0.54	0.71	0.94	1.24	1.46	1.93	2.54	3.36
18	0.36	0.48	0.56	0.74	0.98	1.29	1.52	2.00	2.64	3.48
19	0.37	0.49	0.58	0.77	1.01	1.33	1.57	2.07	2.73	3.61

TABLE B.7

100-YEAR DEPTH-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

100-year **DEPTH-DURATION-FREQUENCY**

K = 3.087

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	0.28	0.36	0.43	0.56	0.75	0.98	1.16	1.53	2.02	2.66
10	0.29	0.38	0.45	0.59	0.78	1.04	1.22	1.61	2.12	2.80
11	0.30	0.40	0.47	0.62	0.82	1.09	1.28	1.69	2.23	2.94
12	0.32	0.42	0.50	0.65	0.86	1.14	1.34	1.77	2.34	3.08
13	0.33	0.44	0.52	0.68	0.90	1.19	1.40	1.85	2.44	3.22
14	0.35	0.46	0.54	0.71	0.94	1.24	1.46	1.93	2.55	3.36
15	0.36	0.48	0.56	0.74	0.98	1.30	1.52	2.01	2.66	3.51
16	0.38	0.50	0.59	0.77	1.02	1.35	1.59	2.09	2.76	3.65
17	0.39	0.52	0.61	0.80	1.06	1.40	1.65	2.17	2.87	3.79
18	0.41	0.54	0.63	0.83	1.10	1.45	1.71	2.25	2.98	3.93
19	0.42	0.56	0.65	0.86	1.14	1.50	1.77	2.33	3.08	4.07

TABLE B.10

10-YEAR INTENSITY-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

10-year INTENSITY-DURATION-FREQUENCY

K = -0.180

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	2.33	1.54	1.21	0.80	0.53	0.35	0.27	0.18	0.12	0.08
10	2.45	1.62	1.27	0.84	0.55	0.36	0.29	0.19	0.12	0.08
11	2.57	1.70	1.33	0.88	0.59	0.38	0.30	0.20	0.13	0.09
12	2.70	1.78	1.40	0.92	0.61	0.40	0.31	0.21	0.14	0.09
13	2.82	1.86	1.46	0.96	0.64	0.42	0.33	0.22	0.14	0.09
14	2.94	1.94	1.52	1.01	0.66	0.44	0.34	0.23	0.15	0.10
15	3.07	2.02	1.59	1.05	0.69	0.46	0.36	0.24	0.16	0.10
16	3.19	2.11	1.65	1.09	0.72	0.47	0.37	0.25	0.16	0.11
17	3.31	2.19	1.71	1.13	0.75	0.49	0.39	0.26	0.17	0.11
18	3.44	2.27	1.78	1.17	0.77	0.51	0.40	0.26	0.17	0.12
19	3.56	2.35	1.84	1.22	0.80	0.53	0.42	0.27	0.18	0.12

TABLE B.11

25-YEAR INTENSITY-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

25-year INTENSITY-DURATION-FREQUENCY

K = 0.745

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	2.73	1.80	1.42	0.93	0.62	0.41	0.32	0.21	0.14	0.09
10	2.88	1.90	1.49	0.98	0.65	0.43	0.34	0.22	0.15	0.10
11	3.02	2.00	1.56	1.03	0.68	0.45	0.35	0.23	0.15	0.10
12	3.17	2.09	1.64	1.08	0.71	0.47	0.37	0.24	0.16	0.11
13	3.31	2.19	1.71	1.13	0.75	0.49	0.39	0.26	0.17	0.11
14	3.46	2.28	1.79	1.18	0.78	0.51	0.40	0.27	0.18	0.12
15	3.60	2.38	1.86	1.23	0.81	0.54	0.42	0.28	0.18	0.12
16	3.74	2.47	1.94	1.28	0.84	0.56	0.44	0.29	0.19	0.13
17	3.89	2.57	2.01	1.33	0.88	0.58	0.45	0.30	0.20	0.13
18	4.03	2.66	2.09	1.38	0.91	0.60	0.47	0.31	0.21	0.14
19	4.18	2.76	2.16	1.43	0.94	0.62	0.49	0.32	0.21	0.14

TABLE B.12

50-YEAR INTENSITY-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

50-year INTENSITY-DURATION-FREQUENCY

K = 2.420

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	2.93	1.93	1.52	1.00	0.66	0.44	0.34	0.23	0.15	0.10
10	3.09	2.04	1.60	1.05	0.70	0.46	0.36	0.24	0.16	0.10
11	3.24	2.14	1.68	1.11	0.73	0.48	0.38	0.25	0.16	0.11
12	3.40	2.24	1.76	1.16	0.77	0.51	0.40	0.26	0.17	0.11
13	3.55	2.34	1.84	1.21	0.80	0.53	0.41	0.27	0.18	0.12
14	3.71	2.45	1.92	1.27	0.84	0.55	0.43	0.29	0.19	0.12
15	3.86	2.55	2.00	1.32	0.87	0.57	0.45	0.30	0.20	0.13
16	4.02	2.65	2.08	1.37	0.91	0.60	0.47	0.31	0.20	0.13
17	4.17	2.75	2.16	1.42	0.94	0.62	0.49	0.32	0.21	0.14
18	4.33	2.86	2.24	1.48	0.98	0.64	0.50	0.33	0.22	0.15
19	4.48	2.96	2.32	1.53	1.01	0.67	0.52	0.35	0.23	0.15

TABLE B.13

100-YEAR INTENSITY-DURATION-FREQUENCY FOR COUNTY OF SAN JOAQUIN

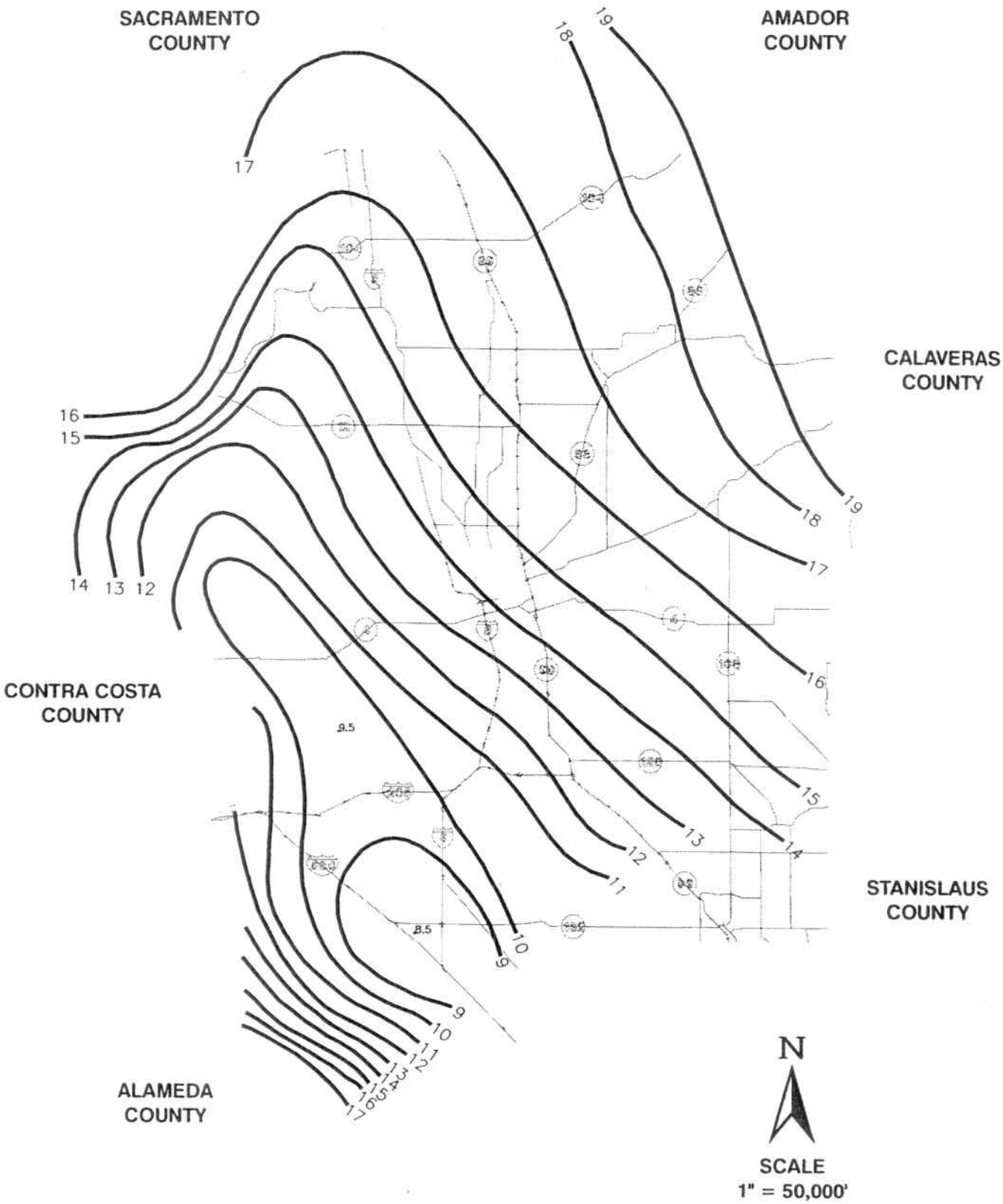
100-year INTENSITY-DURATION-FREQUENCY

K = 3.087

Skew = 1.1

Cv = 0.354

MAP	5-min	10-min	15-min	30-min	1-hr	2-hr	3-hr	6-hr	12-hr	24-hr
9	3.30	2.18	1.71	1.13	0.75	0.49	0.39	0.25	0.17	0.11
10	3.48	2.30	1.80	1.19	0.78	0.52	0.41	0.27	0.18	0.12
11	3.65	2.41	1.89	1.25	0.82	0.54	0.43	0.28	0.19	0.12
12	3.83	2.53	1.98	1.31	0.86	0.57	0.45	0.29	0.19	0.13
13	4.00	2.64	2.07	1.37	0.90	0.60	0.47	0.31	0.20	0.13
14	4.18	2.76	2.16	1.43	0.94	0.62	0.49	0.32	0.21	0.14
15	4.35	2.87	2.25	1.49	0.98	0.65	0.51	0.34	0.22	0.15
16	4.53	2.99	2.34	1.55	1.02	0.67	0.53	0.35	0.23	0.15
17	4.70	3.10	2.43	1.61	1.06	0.70	0.55	0.36	0.24	0.16
18	4.88	3.22	2.52	1.67	1.10	0.73	0.57	0.38	0.25	0.16
19	5.05	3.33	2.61	1.73	1.14	0.75	0.59	0.39	0.26	0.17



SAN JOAQUIN COUNTY
HYDROLOGY MANUAL

ISOHYETAL RAINFALL MAP

FIGURE B-1

Appendix K

Basin Survey (Conti & Associates)

BENCHMARK DESCRIPTION:

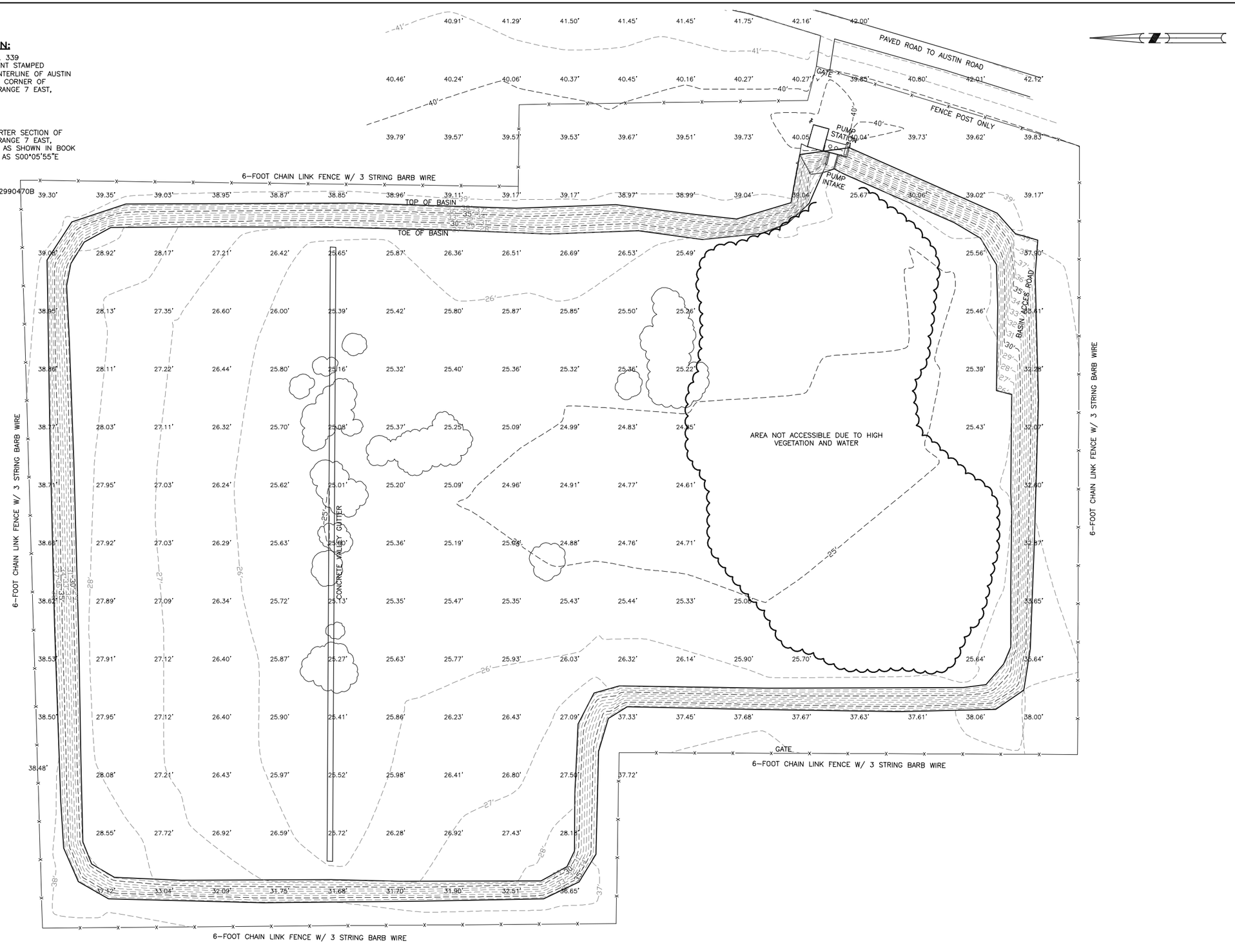
CITY OF STOCKTON BENCHMARK No. 339
BRASS DISK MARKING COS MONUMENT STAMPED "11S-8" IN MONUMENT BOX IN CENTERLINE OF AUSTIN ROAD AT A POINT MARKING THE NE CORNER OF SECTION 34, TOWNSHIP 1 NORTH, RANGE 7 EAST, MOUNT DIABLO BASE AND MERIDIAN
ELEVATION: 41.60

BASIS OF BEARING:

EAST LINE OF THE SOUTHEAST QUARTER SECTION OF SECTION 27, TOWNSHIP 1 NORTH, RANGE 7 EAST, MOUNT DIABLO BASE AND MERIDIAN AS SHOWN IN BOOK 36 OF SURVEYS PAGE 104 SHOWN AS S00°05'55"E

FLOOD INFORMATION

ZONE C PER 0602990465C & 0602990470B



LICENSED LAND SURVEYOR
ANTONIO M. CONTI
NO. 8199
EXP. 3-31-09
STATE OF CALIFORNIA

CONTI & ASSOCIATES, INC.
ENGINEERING SERVICES
PO Box 1396 Woodbridge CA 95258
209.745.9435 aconti@conteng.com

NORTHERN CALIFORNIA YOUTH CORRECTIONAL CENTER STOCKTON, CA

DETENTION BASIN

TOPOGRAPHY SURVEY

Design	AMC
Check	AMC
Date	09/30/08
Scale	1" = 40'
Original Drawing Scale	0 ½" 1"
Sheet Number	1 Of 1
Project File No.	08-055

APPENDIX B

Court Cases

- Marciano Plata, et al., v. Arnold Schwarzenegger, et al., 10/3/05
- Marciano Plata, et al., v. Arnold Schwarzenegger, et al., 2/14/06
- Ralph Coleman, et al., Marciano Plata et al. v. Arnold Schwarzenegger, et al. and Carlos Perez, et al., v. James Tilton, et al., 5/29/07
- Marciano Plata, et al., v. Arnold Schwarzenegger, et al., 1/23/08
- Ralph Coleman, et al., Marciano Plata, et al. v. Arnold Schwarzenegger, et al. and Carlos Perez, et al., v. James Tilton, et al., 3/10/08

IN THE UNITED STATES DISTRICT COURTS

FOR THE EASTERN DISTRICT OF CALIFORNIA

AND THE NORTHERN DISTRICT OF CALIFORNIA

RALPH COLEMAN, et al.,

Plaintiffs, No. CIV S-90-0520 LKK JFM P (E.D.Cal.)

vs.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

MARCIANO PLATA, et al.,

Plaintiffs, No. C 01-1351 TEH (N.D.Cal.)

vs.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

CARLOS PEREZ, et al.,

Plaintiffs, No. C 05-05241 JSW (N.D.Cal.)

vs.

JAMES TILTON, et al.,

Defendants.

_____/

JOHN ARMSTRONG, et al.,

Plaintiffs,

v.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

No. C 94-2307 CW (N.D.Cal.)

ORDER TO SHOW CAUSE

The Receiver in Plata, the Special Master in Coleman, and the Court Representatives in Perez and Armstrong have presented to the judges in the above-captioned cases an agreement that they have reached during the coordination meetings that they have held to date. The agreement, which is attached to this order, is presented to the undersigned for review and approval.

Good cause appearing, IT IS HEREBY ORDERED that the parties in the above-captioned cases are granted until November 26, 2007 to show cause why the attached agreement should not be adopted as an order of the court. Any response to this order to show cause shall be filed in each of the above-captioned cases and served on all of the parties to all of the cases and on the Receiver, the Special Master, and the Court Representatives. Thereafter, the request for

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approval of the agreement will be taken under submission for individual and joint consideration by the undersigned.

DATED: 11/13/07

LAWRENCE K. KARLTON
SENIOR JUDGE
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF CALIFORNIA

DATED: 11/13/07

THELTON E. HENDERSON
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

DATED: 11/13/07

JEFFREY S. WHITE
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

DATED: 11/13/07

CLAUDIA WILKEN
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

CONSTRUCTION

The Receiver in *Plata* has begun to implement three separate but related construction projects:

A. The construction of a medical center at San Quentin State Prison;

B. The addition of needed temporary and permanent clinical, office, supply, and record space at existing California Department of Corrections and Rehabilitation (CDCR) adult prisons; and

C. The construction of approximately 5,000 additional CDCR medical beds and approximately 5,000 CDCR mental heath beds.[1]

The Office of the Receiver will assume leadership responsibility for each of the above referenced projects.

1. San Quentin Medical Center. The *Plata* receivership is the project lead for the San Quentin construction. The Medical Center, which has already been designed and for which construction has commenced, will provide additional reception, clinical, treatment, and office space for CDCR medical, mental health, and dental personnel. Medical Center facilities will be ADA compliant. Court representatives from *Perez* and *Coleman* as well as CDCR mental health and dental officials have been active participants in the design stage for this construction. The State has determined that funding for the San Quentin Medical Center will be provided through Assembly Bill (AB) 900 funds.

2. Additional temporary and permanent clinical, office, supply, and record space at CDCR prisons. The *Plata* receivership is the project lead for the additional medical construction projects at existing CDCR institutions. The Receiver is in the process of implementing his initial prison upgrade project at Avenal State Prison. Court representatives from *Coleman* and *Perez* have participated in this initial effort. The upgrades anticipated will be primarily medical; however the upgrades will conform to *Armstrong* requirements and will consider, when possible, some of the additional space needs of the CDCR mental health and dental programs. In this regard, the Court representatives in *Armstrong*, *Coleman*, and *Perez* agree to work with the Receiver by exploring with CDCR and their respective courts ways to effectuate the funding necessary for their specific programs in a timely and effective manner. This project will *not* involve the construction of the additional dental facilities necessary to effectuate the *Perez* roll-outs.

3. The construction of approximately 5,000 additional CDCR medical beds and approximately 5,000 CDCR mental heath beds. The *Plata* receivership is the project lead for the 5,000/10,000 bed construction project. URS Corporation, Bovis Lend Lease, Brookwood Program Management, Lee Burkhard Liu, and Robert Glass & Associates will serve as the Receiver's Project Coordinator for 5,000/10,000 bed construction. The initial planning for design, site selection, and patient demographics will commence during August 2007.

Based on an initial review of the patient demographics by the Abt study, the Receiver anticipates that the majority of medical beds constructed will not be licensed. Given the significant need to

[1] The actual number of medical and mental health beds to be constructed by the Receiver will depend upon site selection, contingency issues, determinations concerning what year to build out to, as well as possible coordination of construction with CDCR's AB 900 building projects.

coordinate the long-term treatment and care of mentally ill patients who also have serious medical problems, there exist both strong patient care and fiscal incentives to plan, design, and construct health care facilities that will effectuate coordinated medical and mental health treatment. Therefore, participation by *Coleman* representatives in this construction program is imperative. Likewise, the special needs of disabled and elderly prisoner/patients, who represent a significant number of patients who require improved housing, warrant participation by an expert in accessibility for persons with disabilities. The Court expert in *Armstrong* and the Receiver in *Plata* mutually selected such an expert who will be added to the program and who will communicate with both the *Armstrong* court expert and the Receiver about his recommendations. The new facilities will be designed and built to be in full compliance with applicable ADA requirements for both staff and inmates, including applicable accessibility provisions of the ADA Accessibility Guidelines, the Uniform Federal Accessibility Standards, and California Code of Regulations, Title 24, Part 2, California Building Code (CBC). The Receiver also intends to construct adequate dental clinics and other necessary dental program space in order to provide Perez standards of care for the prisoner/patients housed in the 5,000/10,000 bed facilities. Therefore, participation by a *Perez* representative will be necessary to coordinate dental construction design and planning. In this regard, the Court representatives in *Armstrong, Coleman,* and *Perez* agree to work with the Receiver by exploring with CDCR and their respective courts ways to effectuate the funding necessary for their specific programs in a timely and effective manner.

This project will *not* involve the construction of the additional dental facilities necessary to effectuate the *Perez* roll-outs.

The State has determined that funding for an 8,000-beds construction project will be provided through AB 900 funds. The *Coleman* Special Master and the *Plata* Receiver have indicated that up to 10,000 beds may be necessary. Whether the projected funding is adequate for the necessary construction will be determined by the Receiver after site selection issues, coordination issues, and design issues are resolved.

IN THE UNITED STATES DISTRICT COURTS

FOR THE EASTERN DISTRICT OF CALIFORNIA

AND THE NORTHERN DISTRICT OF CALIFORNIA

RALPH COLEMAN, et al.,

Plaintiffs, No. CIV S-90-0520 LKK JFM P (E.D.Cal.)

vs.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

MARCIANO PLATA, et al.,

Plaintiffs, No. C 01-1351 TEH (N.D.Cal.)

vs.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

CARLOS PEREZ, et al.,

Plaintiffs, No. C 05-05241 JSW (N.D.Cal.)

vs.

JAMES TILTON, et al., ORDER

Defendants.

_____/

The Receiver in Plata, the Special Master in Coleman, and the Court Representatives in Perez have presented to the judges in the above-captioned cases six agreements that they have reached during the coordination meetings that they have held to date. The agreements, which are attached to this order, are presented to the undersigned for review and approval. The undersigned are aware that there is a hearing scheduled on June 1, 2007 in the Perez matter with respect to increasing dental salaries and a hiring and management plan. All parties are advised that this hearing shall go forward and the motion shall be considered on its own merits.

Good cause appearing, IT IS HEREBY ORDERED that the parties in the above-captioned cases are granted until June 15, 2007 to file and serve a response to the request for court approval of these agreements. Any response to this order shall be filed in each of the above-captioned cases and served on all of the parties to all of the cases and on the Receiver, the Special Master, and the Court Representatives. Thereafter, the request for approval of the agreements will be taken under submission for individual and joint consideration by the undersigned.

DATED: 5/29/07

/s/

LAWRENCE K. KARLTON
SENIOR JUDGE
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF CALIFORNIA

DATED: 5/29/07

THELTON E. HENDERSON
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

DATED: 5/29/07

/s/

JEFFREY S. WHITE
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

CIM-GACH

The Receiver and the Special Master have agreed that the General Acute Care Hospital (GACH) license at the California Institute for Men (CIM) should be suspended. The physical unit will remain open and house 40-45 Mental Health Crisis Beds (MHCBs). Staffing levels will not change for mental health care.

The Receiver and the Special Master are concerned that defendants will not be allowed to operate MHCBs in unlicensed facilities. A state court decision, *Budd, et al. v. Cambra, et al.*, Case No.319578, required the California Department of Corrections and Rehabilitation (CDCR) to bring its correctional treatment centers (CTCs) into compliance with state law licensing requirements. Counsel for the parties may argue that *Budd* requires defendants to provide inpatient health services to inmates presently below an acute level of care in a licensed facility.

The *Coleman* Special Master has agreed to explore whether a CTC license is necessary to operate a MHCB. If such a license is necessary, the Special Master will seek an emergency order from the *Coleman* Court to allow for the operation of the MHCBs at CIM, as was done in the case of CMC.

On May 1, 2006, when faced with a MHCB crisis, the *Coleman* Court ordered the establishment of 36 MHCBs in the former locked observation unit (LOU) at California Men's Colony (CMC). The LOU at CMC had been closed and reopened as an outpatient housing unit, in light of *Budd*. The *Coleman* Court stated that until further notice and on a temporary emergency basis "defendants shall not close any intermediate inpatient bed or mental health crisis bed on the basis of state licensing requirements without approval of the special master." In its order, the Court stated that "it is essential to provide immediately mental health crisis beds to critically ill inmates in the CDCR…Under present circumstances, state licensing requirements must temporarily give way to measures necessary to remedy the Eighth Amendment violations that remained unsolved in this action." (See *Coleman* Order dated May 1, 2006, document number 1800).

The purpose of the order was to provide, on an interim basis, sufficient temporary MHCBs until the 50-bed MHCB projects at CMF and CMC were completed. Allowing the license to remain for the 40-45 agreed upon MHCBs at CIM-GACH could possibly avoid *Budd*-driven complications.

Contracts

Effective April 17, 2006 the Receiver assumed responsibility for overseeing the State's compliance with the Federal Court's mandate (1) that "all current outstanding, valid, and CDCR-approved medical invoices" be paid within 60 days of March 30, 2006; and (2) that under the direction of the Receiver, the CDCR and State entities responsible for contracts develop and institute health care-oriented policies and standards to govern the CDCR medical contract management system considering both the need for timely on-going care and the fiscal concerns of the State.

The Receiver has created a Contract Pilot Unit that includes personnel from CDCR's Office of Business Services, staff who now report directly to the Office of the Receiver through the *Plata* Support Division. In addition, selected personnel from the Health Care Operations Support Section of the DCHCS, as well as personnel from the Health Care Cost and Utilization Program have been added to the Pilot, as have staff at four prisons (San Quentin State Prison, Pelican Bay State Prison, California Medical Facility, and the Central California Women's Facility) and two Regional Accounting Offices (North Coast and Corcoran). Upon successful completion of the Pilot, the new streamlined contract procurement and payment policies established by the Pilot will be adopted by all CDCR facilities according to a time-phase schedule which has not yet been determined.

These new policies are supported by a newly created, computerized Health Care Document Management System (HCDMS) which will manage all medical contracts, replacing the former paper based system. The HCDMS has three primary components in that it:

- Assists CDCR staff by utilizing uniform contract templates for the creation of contracts that do not permit deviation from health care policies and standards.
- Stores all health care contracts in a database accessible to all authorized users.
- Establishes an effective payment system designed to receive, store and communicate invoices electronically. By computerizing all contracts and invoices, the HCDMS eliminates the time spent transferring paper copies throughout CDCR and electronically prints invoices with their governing contracts for faster information retrieval.

The Receiver will assume responsibility for direct oversight of the contracting functions for medical, dental and mental health programs. The *Coleman* Special Master and *Perez* Court appointed experts will participate in the design and implementation of periodic reports to monitor the status of contract management. The *Coleman* Special Master and *Perez* Court appointed experts, along with defendants' mental health and dental administrators, will also be involved in establishing standards (including proposed rates of reimbursement for contract clinicians) for registry contracts within their respective areas of concern.

Credentialing

Credentialing is the process of obtaining, verifying, and assessing the qualifications of an applicant to provide patient care, treatment, and services in a California Department of Corrections and Rehabilitation (CDCR) medical facility. The credentials review process is the basis for making appointments to the clinical staff; it also provides information for granting clinical privileges to licensed independent practitioners. The purpose of verifying credential data is to ensure that the individual requesting privileges is in fact the same individual that is identified in the credentialing documents. In addition, it is to ensure that the applicant has attained the credentials as stated, that the credentials are current, and that there are no challenges to any of the credentials.

Privileging is the process used to grant to a specific practitioner the authorization to provide specific inmate-patient care services. Privileging ensures that the individual is capable of providing those services in accordance with the standard of care of the Division of Correctional Health Care Services (DCHCS).

These processes are performed at time of appointment and at least every two years to ensure the credentials remain current. Final approvals of credentialing/privileging are made by the chief of either the medical, dental or mental health programs as appropriate.

These functions are currently performed by the Division of Correctional Health Care Services Pre-Employment Credential Unit which consists of three positions. These positions are all classified as Staff Services Analyst/Associate Governmental Program Analyst. The Receiver will assume responsibility for the credentialing/privileging functions for the medical, mental health, and dental programs to include direct oversight of the Pre-Employment Credential Unit.

The *Coleman* Special Master and the *Perez* Court experts will consult with the defendants' mental health and dental administrators and will participate in, and have final approval of, the establishment of credentialing/privileging standard within their respective disciplines.

Hiring

The Receiver has established the *Plata* Support Division to provide administrative support for the reform initiatives he has established. The Personnel Services and Staff Development Section have implemented new recruiting and hiring programs to improve the retention of medical staff (including creating new or revising current job classifications, implementing salary increases for specified classifications, designing new hiring and on-boarding processes, establishing training programs for institution personnel staff and for new supervisors, and improving the credentialing process of medical staff). This section has assumed full responsibility for all human resources-related functions for the *Plata* classifications, removing those functions from the CDCR's Support Services Division.

The *Plata* Workforce Development Section is working to recruit and hire additional medical professionals to fill the many vacancies that exist throughout California's prison system. To ensure that proactive steps are taken on a daily basis to fill medical professions vacancies in an expeditious manner, a pilot for "one-day hiring" was rolled out February 22, 2007.

The Receiver will assume responsibility for hiring of medical personnel only. However, *Plata* Support Division staff will provide consultation to the *Coleman* Special Master and *Perez* Court experts, as well as to defendants' mental health and dental administrators, on recruitment and hiring practices.

The Receiver will consider assuming responsibility for hiring dental and mental health personnel only after:

- The *Plata* hiring programs are fully implemented and the future workload has been assessed.

IT

The objective of the Receiver's long term IT program is to construct and support the California Correction Health Care Information System based on the importance of "correct data at the point of care." The core design is based on an Electronic Medical Record (EMR) for each inmate/patient. The EMR will be paperless, medical information gathered in one location for physicians and clinicians to access, at various locations, and thereby enable them to make informed and safe medical decisions. All data obtained will be patient centric to allow for an "Information at the Point of Care" system.

To support the establishment of an EMR, a foundation will be formed. It will contain four components: 1) technical infrastructure, 2) clinical infrastructure, 3) data infrastructure, and 4) operational infrastructure. The technical infrastructure will provide a high-speed connection to a network of multiple sites. The clinical infrastructure will provide a repository of standardized data through verifiable data processes and compile medical data across all compliant data sources into a unified database that can be used to generate information valuable for patient care and healthcare management. The data infrastructure will implement a secure clinical web-based portal tool that allows clinical staff appropriate access to verified and standardized patient data at the point of care or clinical work areas (i.e. university hospitals, local specialty care centers). The operational infrastructure will provide clinical informatics with a near zero fault tolerance system to support various operations (i.e. Maxor Pharmaceuticals). Upon this foundation, the EMR will be supported by uniform clinical data provided by two types of clinical information systems: 1) clinical business systems and 2) clinical systems. The Clinical Business System will sustain such areas as access tracking, scheduling, correctional interface, clinical resource scheduling, clinical contracting, credentialing, and CME (define acronym) verification. The clinical systems will sustain such areas as laboratory, radiology, pharmacy, clinical department workflow, telemedicine, digital imaging, dental systems and mental health systems.

Based on these systems the EMR will facilitate:

- a clinical data warehouse
- views on data - patient, clinician, administrator portals and reports
- integrated patient care at the a regional level
- clinical/case management and outcome reporting
- chronic disease registries
- enterprise wide/common scheduling
- supported clinical decisions
- cost effective and timely patient-centered care
- telemedicine delivery

The Receiver will assume responsibility for implementation of the long term IT program to include the medical, dental and mental health programs. The *Coleman* Special Master, the *Perez* Court experts, and defendants' mental health and dental administrators will be kept informed of the progress of this long range project and will provide necessary input concerning mental health and dental clinical data needs.

Telemedicine is a critical component of the Receiver's plan to bring the California Prison Health Care system to a constitutional standard. The Receiver has determined

that the current Telemedicine program managed by the Division of Correctional Health Care Services (DCHCS) has been mismanaged resulting in lack of utilization and understaffing. The Receiver will assume responsibility for the telemedicine program serving the medical, dental and mental health programs to include direct oversight of the office of telemedicine services comprised of eight personnel (4 RNs, 2 SSAs, 1 HRT II, and 1 TCA II). The *Coleman* Special Master will consult with defendants' mental health administrators to assist in establishing clinical guidelines for the mental health component of the telemedicine program.

The Receiver will assume responsibility to support the current Mental Health Tracking System until it can be integrated into the long term IT program.

The *Perez* Court experts will meet with the Receiver's IT staff to determine:

- Whether the "intermediate" dental IT system ordered by Judge White can be implemented within the prescribed time constraints?
- If it cannot be implemented as directed, whether the Court experts should seek a modification of the court order to integrate the dental IT system within the infrastructure and timeline of the long term IT program?

Pharmacy

In late 2006 the Office of the Receiver entered into an agreement with Maxor National Pharmacy Services Corporation (Maxor) to provide pharmacy management consulting services. That contract was effective January 1, 2007. On March 30, 2007 the Receiver's request for an order *nunc pro tunc* to waive state law applicable to this agreement was granted by the Court.

Maxor has developed a "road map" designed to restructure and manage a constitutionally adequate pharmacy services delivery system. The primary objective of the road map is to produce sustainable, patient-centered, outcome-driven processes, with the ultimate goal of creating a CDCR-managed and operated "best practice" pharmacy system within three years. The road map consists of the following interior goals for pharmacy operations that will serve medical, dental and mental health delivery systems:

- Develop meaningful and effective centralized oversight, control and monitoring of the pharmacy services program.
- Implement and enforce clinical pharmacy management processes including formulary controls, Pharmacy and Therapeutics (P&T) committee, disease management guidelines, and the establishment of a program of regular institutional operational audits.
- Establish a comprehensive program to review, audit and monitor pharmaceutical contracting and procurement processes to ensure cost efficiency in pharmaceutical purchases.
- Develop a meaningful pharmacy human resource program that effectively manages staffing, compensation, job descriptions, competency, performance, assessment, discipline, training, and use of the workforce including temporary employees and non-pharmacist staff.
- Redesign and standardize overall institution level pharmacy drug distribution operations for inpatient and outpatient needs. Design, construct and operate a centralized pharmacy facility.
- Design and implement a uniform pharmacy information management system needed to successfully operate and maintain the CDCR pharmacy operation in a safe, effective and cost efficient way, based on a thorough understanding of a redesigned work process.
- Develop a process to assure that CDCR pharmacy meets accreditation standards of the designated healthcare review body (NCCHC or ACA) and assist in obtaining accredited status.

The Receiver through Maxor will assume oversight of pharmacy operations serving medical, dental and mental health programs. *Coleman* and *Perez* Court appointed experts will consult with defendants' mental health and dental administrators and participate in the P&T committee in development of formularies within their respective areas of concern. Maxor will provide periodic reports to the Receiver, the *Coleman* Special Master and the *Perez* Court appointed experts concerning road map compliance.

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IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

MARCIANO PLATA, et al.,

Plaintiffs,

v.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

NO. C01-1351 TEH

ORDER APPOINTING NEW RECEIVER

On October 3, 2005, this Court issued detailed findings of fact and conclusions of law explaining the Court's June 30, 2005 oral ruling to establish a Receivership to take control of the delivery of medical services to all California state prisoners confined by the California Department of Corrections and Rehabilitation ("CDCR"). The Court concluded that "the California prison medical care system is broken beyond repair," and that an "unconscionable degree of suffering and death is sure to continue if the system is not dramatically overhauled." Oct. 3, 2005 Findings of Fact & Conclusions of Law at 1-2. The Court "impose[d] the drastic but necessary remedy of a Receivership in anticipation that a Receiver [could] reverse the entrenched paralysis and dysfunction and bring the delivery of health care in California prisons up to constitutional standards." *Id.* at 2. The Court further explained that, "[o]nce the system is stabilized and a constitutionally adequate medical system is established, the Court will remove the Receiver and return control to the State." *Id.*

On February 14, 2006, the Court appointed Robert Sillen "to serve as the Receiver in this case, at the pleasure of the Court, effective Monday, April 17, 2006." Feb. 14, 2006

Order Appointing Receiver at 2. In that appointment order, the Court also set forth the Receiver's duties and powers and provided for the establishment of an advisory board to assist and advise the Court and Receiver. *Id.* at 2-9.

Much progress has been made since the Receivership was established, and the Receiver has successfully recruited and hired a team of correctional and clinical experts to assist him with his remedial obligations. As detailed in the Receiver's bimonthly and, subsequently, quarterly reports to the Court, the Receiver and his staff, including the many CDCR employees who report to the Receiver, have undertaken significant efforts to improve the delivery of medical care to California inmates. For example, vacancy rates among clinical staff in prisons have been dramatically reduced as a result of increased salaries and improved hiring processes. Similarly, many clinically appropriate changes have been made, including the replacement of medical technical assistants with licensed vocational nurses, and several necessary clinical construction projects have been initiated. In its first two years, the Receivership has also resolved the CDCR specialty care contracting crisis, which was preventing inmates from receiving needed care from clinical specialists, and established a successful prison improvement pilot project at San Quentin State Prison. Nonetheless, it is beyond dispute that the system for delivering health care to California's inmate population remains below constitutional standards and continues to be in need of repair – not through any fault of the Receiver or his staff, but, rather, primarily as a result of the extreme dysfunction the Receiver inherited from the State, as well as the numerous problems and obstacles encountered by the Receiver that were not anticipated at the time the Receivership was established.

In addition to being charged with undertaking immediate and short-term measures "designed to improve medical care and begin the process of restructuring and development of a constitutionally adequate medical health care delivery system," the Receiver was also ordered to develop a detailed Plan of Action to complete the development and implementation of such a system. *Id.* at 2-3. The Court originally ordered the Receiver to file his Plan of Action within 180 to 210 days of his appointment, *id.* at 2, but later granted

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the Receiver's request for an extension of time. On December 19, 2006, the Court granted the Receiver until May 15, 2007, to file his initial Plan of Action with metrics "that are realistic, fully informed, detailed, and effective," with a revised Plan of Action due by November 15, 2007. Dec. 19, 2006 Order at 2, 5. In the same order, the Court granted the Receiver's request to delay appointment of an advisory board until after the filing of the initial Plan of Action. *Id.* at 3-4.

The Receiver timely filed his initial Plan of Action on May 10, 2007. Following the Court's independent review of that plan and consideration of Plaintiffs' responses to the plan, including arguments raised during an August 27, 2007 hearing, the Court found that the initial Plan of Action failed to contain adequate metrics and time lines. The Court ordered that the Receiver include such benchmarks in his revised Plan of Action to be filed in November 2007. Sept. 6, 2007 Order Re (1) Receiver's May 2007 Preliminary Plan of Action, & Mot. for Order Modifying Stip. Inj. & Orders Entered Herein, & (2) Pls.' Mot. for Order Directing Receiver to Comply with April 4, 2003 Order etc. at 3-5. The Court also observed at the August 27, 2007 hearing that it had not furnished the type of hands-on leadership that, in retrospect, it wished it had, and the Court resolved to provide such leadership as this case moved forward.

To that end, the Court appointed Starr Babcock as a Pro Bono Special Assistant to the Court to assist with special projects, including the creation of "an advisory working group to assist the Court with evaluating the Receiver's [revised] Plan of Action . . . and determining how best to assemble the advisory board." Oct. 29, 2007 Order Appointing Pro Bono Special Assistant to the Court at 1. Following the Receiver's timely filing of his revised Plan of Action on November 15, 2007, the Court provided the advisory working group with a copy of the revised plan and convened the group for a one-day meeting on December 8, 2007. The Pro Bono Special Assistant to the Court had numerous individual conversations with advisory working group members both before and after the December 8 meeting.

The Receiver, as well as counsel for Plaintiffs and Defendants, made presentations to and answered questions from the advisory working group at that meeting. The group

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subsequently reached two main consensus opinions during closed-session discussions. First, the advisory group recommended that a professional planner be hired to assist the Receiver in revising the Plan of Action so that it both complied with the Court's orders and directions and could serve as a useful leadership document that would provide a common vision for all stakeholders. In addition, the working group was unanimous in its recommendation that an advisory board be formed to assist in the planning process and, more broadly, to advise the Court on issues relating to the Receivership's operation and progress towards implementing a prison medical care system that meets constitutional standards. The Court agrees with and adopts both of these recommendations, as ordered below.

The Receivership has reached a critical juncture at which it must now move from a primarily investigative and evaluative phase, during which the Receivership analyzed the current system to determine what reforms were necessary and worked to create the infrastructure required to effectuate such reforms, into an implementation phase, during which the Receivership must translate the conceptualized reforms into reality. Throughout its existence, the Receivership has developed and put into practice critical short-term measures, and such measures must continue to be adopted to address issues requiring urgent attention. However, the Receivership's focus can and must now shift towards long-term reform that will achieve the implementation of a sustainable, constitutionally adequate system of delivering medical care to Plaintiffs – and, not inconsequentially, a system that must ultimately be transitioned back to the State of California's control. Put another way, the Receivership's overarching goal should be working itself out of existence once delivery of medical care to California's inmates has been brought up to constitutional standards.

After careful reflection and deliberation, the Court has concluded that such work would best be accomplished by appointing a new Receiver who brings a different set of strengths appropriate to guiding the Receivership through its second phase. While the current Receiver has successfully used his unique skills and bold, creative leadership style to investigate, confront, and break down many of the barriers that existed at the inception of the Receivership, the second phase of the Receivership demands a substantially different set of

administrative skills and style of collaborative leadership. The Receivership must continue to maintain its independence as an arm of the federal courts established to take over state operations, but it also must work more closely at this stage with all stakeholders, including State officials, to ensure that the system developed and implemented by the Receivership can be transferred back to the State in a reasonable time frame. Such collaboration appears to be more important now than ever, given the current budget crisis faced by the State of California.

Accordingly, with good cause appearing, IT IS HEREBY ORDERED that:

1. The Court's appointment of Robert Sillen as the Receiver in this case is hereby terminated, and all prior authority vested by the Court in Mr. Sillen is hereby revoked, effective immediately.

2. J. Clark Kelso is appointed to serve as the Receiver in this case, at the pleasure of the Court, effective immediately. All powers, privileges, and responsibilities of the Receiver, as set forth in the Court's February 14, 2006 Order Appointing Receiver, shall continue in full effect, except as modified by subsequent orders of this Court. A short biography of Mr. Kelso is attached to this order.

3. The Pro Bono Special Assistant to the Court shall assist the Receiver in reworking the November 15, 2007 Plan of Action so that it is a more useful leadership document. The Receiver and Pro Bono Special Assistant shall consider how best to choose and use the services of a professional planner to assist in this process, the costs of which shall be borne by Defendants as part of the Receivership's budget.

4. The Court will shortly be appointing an advisory board to assist and advise the Court and the Receiver as this case moves forward. All costs associated with the appointment and service of the advisory board shall be borne by Defendants as part of the Receivership's budget. Although the Court is cognizant of not making the advisory board so large as to be unhelpful and inefficient, the Court may expand the advisory board beyond the five individuals provided for by the February 14, 2006 Order Appointing Receiver to ensure that medical, correctional, and any other areas of necessary expertise are adequately

represented. The Pro Bono Special Assistant to the Court shall continue to assist the Court in assembling and staffing the advisory board, in consultation with the Receiver. Details of the advisory board will be announced by subsequent order of the Court.

IT IS SO ORDERED.

Dated: 01/23/08

THELTON E. HENDERSON, JUDGE
UNITED STATES DISTRICT COURT

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J. Clark Kelso

Biographical Information

J. Clark Kelso is a Professor of Law and, for the last twelve years, has been the Director of the Capital Center for Government Law and Policy at the University of the Pacific McGeorge School of Law in Sacramento, California. He comes to the California Prison Health Care Receivership with over fifteen years of experience in a wide variety of positions in all three branches of state government. Throughout this service, he has successfully improved state programs and operations while developing a well-known reputation for independence, integrity, and collaborative leadership.

In the 1990s, Kelso worked with the California Judicial Council and Administrative Office of the Courts on a number of task forces and commissions. This work, particularly his efforts in support of unification of the state's trial courts, led to his receipt of the 1998 Bernard E. Witkin Amicus Curiae Award, the highest honor given to an individual other than a member of the judiciary for outstanding contributions to California's courts.

In July 2000, Kelso was selected by then Attorney General Bill Lockyer and Governor Gray Davis as the interim replacement for outgoing Insurance Commissioner Chuck Quackenbush, who abruptly resigned amid allegations of corruption. Kelso's leadership quickly restored public trust to the Department of Insurance.

In June 2002, Governor Davis appointed Kelso to serve as the State's Chief Information Officer and charged him with restoring the state's crumbling information technology program. After Governor Davis's recall, Governor Arnold Schwarzenegger retained Kelso in the State CIO position. Focusing on the disciplines of strategic planning, collaborative execution, and workforce development, Kelso turned the state's information technology ("IT") program around, in two years moving the state from 47th to 12th in Brown University's annual e-government report. In his State CIO role, Kelso also supported the development of state policies encouraging health information technologies and data sharing to improve quality, transparency, and accountability in public and private health care delivery systems. In recognition of his accomplishments, he received a "Top 25 Award for 2004 Doers, Dreamers and Drivers" from Government Technology and was named by Computerworld to their list of "Premier 100 IT Leaders for 2007."

A 1983 graduate of the Columbia University School of Law, Professor Kelso clerked for Judge Anthony M. Kennedy on the United States Court of Appeals for the Ninth Circuit. Kelso joined the faculty at Pacific McGeorge in 1986 after practicing law briefly in the New York offices of Kaye, Scholer, Fierman, Hays & Handler. A registered Republican, Kelso is married to Kari Kelso, Ph.D., and they have two daughters.

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IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

MARCIANO PLATA, et al.,

Plaintiffs,

v.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

NO. C01-1351 TEH

CLASS ACTION

ORDER APPOINTING RECEIVER

On October 3, 2005, this Court issued its written Findings of Fact and Conclusions of Law in support of its June 30, 2005 decision to establish a Receivership to take control of the delivery of medical services to California state prisoners confined by the California Department of Corrections and Rehabilitation ("CDCR").[1] In its written ruling, the Court explained that it was undertaking a national search to find a Receiver with the leadership ability, experience, and vision to take on the monumental and critical task of bringing the

[1] As the October 3, 2005 ruling notes, Pelican Bay State Prison is exempted from this action and instead falls under this Court's jurisdiction in the separate case of *Madrid v. Woodford*, C90-3094 TEH.

level of medical care provided to California's 166,000 inmates up to federal constitutional standards. Having undergone a thorough and successful search process, the Court HEREBY APPOINTS Mr. Robert Sillen to serve as the Receiver in this case, at the pleasure of the Court, effective Monday, April 17, 2006. A copy of the Receiver's curriculum vitae is attached to this Order.

In furtherance of the Receivership, the Court sets forth the Receiver's duties and powers as follows:

I. DUTIES OF THE RECEIVER

A. Executive Management

The Receiver shall provide leadership and executive management of the California prison medical health care delivery system with the goals of restructuring day-to-day operations and developing, implementing, and validating a new, sustainable system that provides constitutionally adequate medical care to all class members as soon as practicable. To this end, the Receiver shall have the duty to control, oversee, supervise, and direct all administrative, personnel, financial, accounting, contractual, legal, and other operational functions of the medical delivery component of the CDCR.

B. Plan of Action

The Receiver shall, within 180 - 210 calendar days of the effective date of appointment, develop a detailed Plan of Action designed to effectuate the restructuring and development of a constitutionally adequate medical health care delivery system. This Plan shall include recommendations to the Court of which provisions of the (1) June 13, 2002 Stipulation for Injunctive Relief, and (2) September 17, 2004 Stipulated Order re Quality of Patient Care and Staffing Order and Injunction (and/or policies or procedures required thereby), should be carried forward and which, if any, should be modified or discontinued due to changed circumstances. The Plan of Action shall also include a proposed time line for

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all actions and a set of metrics by which to evaluate the Receiver's progress and success. The Receiver shall update and/or modify this Plan as necessary throughout the Receivership.

Pending development of the Plan of Action, the Receiver shall undertake immediate and/or short term measures designed to improve medical care and begin the process of restructuring and development of a constitutionally adequate medical health care delivery system.

C. Budgeting and Accounting

The Receiver shall determine the annual CDCR medical health care budgets consistent with his duties and implement an accounting system that meets professional standards. The Receiver shall develop a system for periodically reporting on the status of the CDCR's medical health care budget and shall establish relations with the California Office of Inspector General to ensure the transparency and accountability of budget operations.

D. Reporting

The Receiver shall provide the Court with bimonthly progress reports. These reports shall address: (a) all tasks and metrics contained in the Plan and subsequent reports, with degree of completion and date of anticipated completion for each task and metric, (b) particular problems being faced by the Receiver, including any specific obstacles presented by institutions or individuals, (c) particular successes achieved by the Receiver, (d) an accounting of expenditures for the relevant period, and (e) all other matters deemed appropriate for judicial review.

The Receiver shall meet with the Court on a bimonthly basis shortly following the issuance of each report and shall remain in contact with the Court throughout the Receivership on an informal, as needed, basis.

II. POWERS AND AUTHORITY OF THE RECEIVER

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The Receiver shall have all powers necessary to fulfill the above duties under this Order, including, but not limited to:

A. General Powers

The Receiver shall exercise all powers vested by law in the Secretary of the CDCR as they relate to the administration, control, management, operation, and financing of the California prison medical health care system. The Secretary's exercise of the above powers is suspended for the duration of the Receivership; it is expected, however, that the Secretary shall work closely with the Receiver to facilitate the accomplishment of his duties under this Order.

B. Personnel

The Receiver shall have the power to hire, fire, suspend, supervise, promote, transfer, discipline, and take all other personnel actions regarding CDCR employees or contract employees who perform services related to the delivery of medical health care to class members. The Receiver shall have the power to establish personnel policies and to create, abolish, or transfer positions related to the delivery of medical health care to class members. The Receiver also shall be empowered to negotiate new contracts and to renegotiate existing contracts, including contracts with labor unions, in the event that such action is necessary for the Receiver to fulfill his duties under this Order.

C. Property

The Receiver shall have the power to acquire, dispose of, modernize, repair, and lease property, equipment, and other tangible goods as necessary to carry out his duties under this Order, including but not limited to information technology and tele-medicine technology.

D. Governing State Laws, Regulations, and Contracts

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The Receiver shall make all reasonable efforts to exercise his powers, as described in this Order, in a manner consistent with California state laws, regulations, and contracts, including labor contracts. In the event, however, that the Receiver finds that a state law, regulation, contract, or other state action or inaction is clearly preventing the Receiver from developing or implementing a constitutionally adequate medical health care system, or otherwise clearly preventing the Receiver from carrying out his duties as set forth in this Order, and that other alternatives are inadequate, the Receiver shall request the Court to waive the state or contractual requirement that is causing the impediment. Upon receipt of any such request, the Court shall determine the appropriate procedures for addressing such request on a case-by-case basis.

E. Access

The Receiver shall have unlimited access to all records and files (paper or electronic) maintained by the CDCR, including but not limited to all institutional, personnel, financial, and prisoner records, as deemed necessary by the Receiver to carry out his duties under this Order.

The Receiver shall have unlimited access to all CDCR facilities, as deemed necessary by the Receiver, to carry out his duties under this Order. Ordinarily, the Receiver shall attempt to provide reasonable notice when scheduling such visits, but this shall not preclude the Receiver from making unannounced visits to facilities or offices as the Receiver deems necessary to carry out his duties under this Order.

The Receiver shall have unlimited access to prisoners and to line and managerial staff, including the authority to conduct confidential interviews with staff and prisoners.

F. Immunity and Indemnification

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The Receiver and his staff shall have the status of officers and agents of this Court, and as such shall be vested with the same immunities as vest with this Court.

Additionally, Defendants shall indemnify the Receiver and members of his staff to the same extent as Defendants are obligated to indemnify the Secretary of the CDCR.

III. OFFICE OF THE RECEIVER

A. The Receiver shall be paid a reasonable compensation for his services in an amount to be approved by this Court.

B. The Receiver shall establish an Office of the Receiver in a location to be determined in consultation with the Court, with staffing necessary to fully carry out his duties as set forth in this Order. Upon approval from the Court, the Receiver shall set reasonable compensation and terms of service for each member of his staff, (including employees and/or consultants) and shall be authorized to enter into contracts with the employees or consultants of the Office.

C. Because time is of the essence, and in order to begin operations immediately, Defendants shall, within 30 days of the date of this Order, establish an initial operating fund with the Court in the amount of $750,000. The Receiver shall submit monthly requests for payment from this fund to the Court. Further funds for the Office of the Receiver shall be deposited to the Receiver's Office Fund Account set forth in paragraph F below.

D. Throughout the Receivership, the Receiver shall submit to the Court a monthly accounting of all receipts and expenditures of the Office of the Receiver and shall arrange for an independent financial audit of the Receiver's Office Fund Account on an annual basis.

E. Within 45 calendar days from the date of effective appointment, the Receiver shall establish an interest-bearing account, with respect to which he shall be the signatory and fiduciary. This account shall be designated as the Receiver's Office Fund Account and shall be maintained solely for the reasonable and necessary expenses associated with the operation of the Office of the Receiver, including but not limited to salaries, consulting fees, and the

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costs of supplies, equipment, office space, transportation,[2] and the like. The Receiver shall arrange with Defendants a system for regularly replenishing the Receiver's Office Fund Account.

F. Within 75 calendar days of the date of effective appointment, the Receiver shall establish a budget for the Office of the Receiver's first year of operation. The Receiver shall also establish a budget for the Office of Receiver for each subsequent year of operation, with each such budget due 90 days in advance of each budget year.

IV. COSTS

All costs incurred in the implementation of the policies, plans, and decisions of the Receiver relating to the fulfillment of his duties under this Order shall be borne by Defendants. Defendants shall also bear all costs of establishing and maintaining the Office of Receiver, including the compensation of the Receiver and his staff.

V. LENGTH OF RECEIVERSHIP

The Receivership shall remain in place no longer than the conditions which justify it make necessary, and shall cease as soon as the Court is satisfied, and so finds in consultation with the Receiver, that Defendants have the will, capacity, and leadership to maintain a system of providing constitutionally adequate medical health care services to class members. The Court expects that as the Receivership progresses, the Receiver will attempt to engage Defendants in assuming responsibility over portions of the system that are within Defendants' demonstrated ability to perform, so that the ultimate transfer of power back to the State will be transitional.

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[2]When engaged in travel, the Receiver and his staff shall use their best efforts to contain direct expenses in a cost-effective fashion. For example, when engaged in necessary travel, the Receiver and his staff shall, when possible, utilize advanced-purchase economy airfares and reasonably priced accommodations.

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Prior to the cessation of the Receivership, the Receiver shall develop a Plan for Post-Receivership Governance of the system, which shall include consideration of its structure, funding, and governmental responsibility for its long-term operation. The Receiver shall present this plan to the Court for approval and adoption as an order.

VI. COOPERATION

A. All Defendants, and all agents, or persons within the employ, of any Defendant in this action (including contract employees), and all persons in concert and participation with them, and all counsel in this action, shall *fully* cooperate with the Receiver in the discharge of his duties under this Order, and shall promptly respond to all inquiries and requests related to compliance with the Court's orders in this case. Any such person who interferes with the Receiver's access, as set forth in section II.E., or otherwise thwarts or delays the Receiver's performance of his duties under this Order, shall be subject to contempt proceedings before this Court.

B. Counsel for Defendants shall ensure that the following state agencies are given prompt notice of the substance of this paragraph: the Department of Personnel Administration, the Department of Finance, the Department of General Services, the State Personnel Board, and any other state agencies that Defendants deem should be notified. Defendants shall notify the Court in writing of their compliance with this paragraph within 30 days of the date of this Order.

C. The Secretary of the CDCR shall ensure that all of the CDCR's employees and agents (including contract employees) are given prompt notice of the substance of this paragraph. Defendants shall notify the Court in writing of their compliance with this paragraph within 30 days of the date of this Order.

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VII. ADVISORY BOARD

The Court, in consultation with the Receiver, shall appoint an Advisory Board of no more than five members to assist and advise the Court and the Receiver with respect to achieving the goals of the Receivership.

VIII. MODIFICATION

Given that this Receivership is unprecedented in scope and dimension, this Court finds that flexibility will be an important element in ensuring its effectiveness. Accordingly, this Order may be modified as necessary from time to time to assure the success of this Receivership and the eventual return of the operation of the CDCR's medical health care delivery system to the State of California.

IT IS SO ORDERED.

Dated: February 14, 2006

THELTON E. HENDERSON
UNITED STATES DISTRICT JUDGE

United States District Court
For the Northern District of California

IN THE UNITED STATES DISTRICT COURTS

FOR THE EASTERN DISTRICT OF CALIFORNIA

AND THE NORTHERN DISTRICT OF CALIFORNIA

RALPH COLEMAN, et al.,

Plaintiffs, No. CIV S-90-0520 LKK JFM P (E.D. Cal.)

v.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

MARCIANO PLATA, et al.,

Plaintiffs, No. C 01-1351 TEH (N.D. Cal.)

v.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

CARLOS PEREZ, et al.,

Plaintiffs, No. C 05-5241 JSW (N.D. Cal.)

v.

JAMES TILTON, et al.,

Defendants.

_____/

JOHN ARMSTRONG, et al.,

Plaintiffs,

v.

ARNOLD SCHWARZENEGGER, et al.,

Defendants.

_____/

No. C 94-2307 CW (N.D. Cal.)

ORDER APPROVING INFORMATION TECHNOLOGY COORDINATION AGREEMENT

The Receiver in Plata, the Special Master in Coleman, and the Court Representatives in Perez and Armstrong presented to the judges in the above-captioned cases the attached agreement regarding information technology that they reached during the coordination meetings they have held to date. On February 4, 2008, the undersigned judges granted the parties until February 15, 2008, to show cause as to why the agreement should not be adopted as a court order. Defendants filed a timely response in each case, but none of the four sets of Plaintiffs filed a response.

In their response, Defendants stated that they did not object to the agreement but sought "to ensure that the [Plata] Receiver will coordinate with the Department of Mental Health in order to facilitate technological compatibility and communication regarding patient care between the Department of Mental Health [DMH] and the California Department of Corrections and Rehabilitation [CDCR]." Defs.' Response at 2. The Receiver has no objection to such coordination.

Accordingly, with good cause appearing, IT IS HEREBY ORDERED that:

1. The attached coordination agreement regarding information technology is approved.

2. The Plata Receiver shall coordinate with DMH to facilitate technological compatibility and communication regarding patient care between DMH and CDCR.

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3. The Plata Receiver shall file quarterly reports in each of the above-captioned cases concerning developments pertaining to matters that are the subject of the information technology agreement. The first such quarterly report shall be filed on or before June 15, 2008.

IT IS SO ORDERED.

DATED: 03/10/08

LAWRENCE K. KARLTON
SENIOR JUDGE
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF CALIFORNIA

DATED: 03/10/08

THELTON E. HENDERSON
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

DATED: 03/10/08

JEFFREY S. WHITE
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

DATED: 03/10/08

CLAUDIA WILKEN
UNITED STATES DISTRICT JUDGE
NORTHERN DISTRICT OF CALIFORNIA

INFORMATION TECHNOLOGY

The objective of the Receiver's long term information technology (IT) program is to construct and support the California Correction Health Care Information System based on the importance of "correct data at the point of care." The core design is based on an Electronic Medical Record (EMR) for each inmate/patient. The EMR will be paperless, medical information gathered in one location for physicians and clinicians to access, at various locations, and thereby enable them to make informed and safe medical decisions. All data obtained will be patient-centric to allow for an "Information at the Point of Care" system.

To support the establishment of an EMR, a foundation will be formed. It will contain four components: 1) technical infrastructure, 2) clinical infrastructure, 3) data infrastructure, and 4) operational infrastructure. The technical infrastructure will provide a high-speed connection to a network of multiple sites. The clinical infrastructure will provide a repository of standardized data through verifiable data processes and compile medical data across all compliant data sources into a unified database that can be used to generate information valuable for patient care and healthcare management. The data infrastructure will implement a secure clinical web-based portal tool that allows clinical staff appropriate access to verified and standardized patient data at the point of care or clinical work areas (i.e. university hospitals, local specialty care centers). The operational infrastructure will provide clinical informatics with a near zero fault tolerance system to support various operations (i.e. Maxor Pharmaceuticals).

Upon this foundation, the EMR will be supported by uniform clinical data provided by two types of clinical information systems: 1) clinical business systems and 2) clinical systems. The Clinical Business System will sustain such areas as access tracking, scheduling, correctional interface, clinical resource scheduling, clinical contracting, credentialing, and continuing medical education (CME) verification. The clinical systems will sustain such areas as laboratory, radiology, pharmacy, clinical department workflow, telemedicine, digital imaging, dental systems and mental health systems.

Based on these systems the EMR will facilitate:

- a clinical data warehouse
- views on data - patient, clinician, administrator portals and reports
- integrated patient care at the regional level
- clinical/case management and outcome reporting
- chronic disease registries
- enterprise wide/common scheduling
- supported clinical decisions
- cost effective and timely patient-centered care
- telemedicine delivery

The Receiver will assume responsibility for implementation of the long term IT program to include the medical, dental and mental health programs. The Coleman Special Master, the Perez court experts, the Armstrong court representative, and defendants' mental health and dental administrators will be kept informed of the progress of this long range project and will provide necessary input concerning mental health, dental and Armstrong clinical data needs.

Telemedicine is a critical component of the Receiver's plan to bring the California Prison Health Care system to a constitutional standard. The Receiver will assume responsibility for the telemedicine program serving the medical, dental, mental health and Armstrong programs to include direct oversight of the office of telemedicine services comprised of eight personnel [4 RNs, 2 Staff Services Analysts (SSAs), 1 Health Records Technician II (HRT II), and 1 TCA II]. The Coleman Special Master will consult with defendants' mental health administrators to assist in establishing clinical guidelines for the mental health component of the telemedicine program.

The Receiver will assume responsibility to support the current Mental Health Tracking System until it can be integrated into the long term IT program.

There will be ongoing coordination among the four cases to ensure that the Disability and Effective Communication System (DECS) and the Receiver's IT system are integrated appropriately.

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For the Northern District of California

IN THE UNITED STATES DISTRICT COURT

FOR THE NORTHERN DISTRICT OF CALIFORNIA

MARCIANO PLATA, et al., Plaintiffs, v. ARNOLD SCHWARZENEGGER, et al., Defendants.	NO. C01-1351 TEH CLASS ACTION FINDINGS OF FACT AND CONCLUSIONS OF LAW RE APPOINTMENT OF RECEIVER

INTRODUCTION

On June 30, 2005, after six days of evidentiary hearings, this Court ruled from the bench that it would establish a Receivership to take control of the delivery of medical services to all California state prisoners confined by the California Department of Corrections and Rehabilitation ("CDCR"). The purpose of this written decision is to amplify upon this Court's June 30, 2005 oral ruling by providing the specific Findings of Fact and Conclusions of Law that underlay this decision, as well as to address further proceedings in this case.

By all accounts, the California prison medical care system is broken beyond repair. The harm already done in this case to California's prison inmate population could not be more grave, and the threat of future injury and death is virtually guaranteed in the absence of drastic action. The Court has given defendants every reasonable opportunity to bring its prison medical system up to constitutional standards, and it is beyond reasonable dispute that the State has failed. Indeed, it is an uncontested fact that, on average, an inmate in one of California's prisons needlessly dies every six to seven days due to constitutional deficiencies in the CDCR's medical delivery system. This statistic, awful as it is, barely provides a

window into the waste of human life occurring behind California's prison walls due to the gross failures of the medical delivery system.

It is clear to the Court that this unconscionable degree of suffering and death is sure to continue if the system is not dramatically overhauled. Decades of neglecting medical care while vastly expanding the size of the prison system has led to a state of institutional paralysis. The prison system is unable to function effectively and suffers a lack of will with respect to prisoner medical care.

Accordingly, through the Court's oral ruling and with this Order, the Court imposes the drastic but necessary remedy of a Receivership in anticipation that a Receiver can reverse the entrenched paralysis and dysfunction and bring the delivery of health care in California prisons up to constitutional standards. Once the system is stabilized and a constitutionally adequate medical system is established, the Court will remove the Receiver and return control to the State. Progress toward that goal will be enhanced and quickened by the support of the defendants. Fortunately, the Court is confident that the leaders of the State prison system recognize the gravity of the problem and are committed to facilitating the Receivership.

PROCEDURAL BACKGROUND

Plaintiffs filed this class action on April 5, 2001, alleging that defendants were providing constitutionally inadequate medical care at all California state prisons.[1] Defendants agreed to enter into a consent decree and to implement comprehensive new medical care policies and procedures at all institutions. *See* June 13, 2002 Stipulation for Injunctive Relief. The Stipulated Injunction provides in part: "The Court shall have the power to enforce the Stipulation through specific performance and all other remedies

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[1] This suit exempts Pelican Bay State Prison, which is under Court jurisdiction in the case of *Madrid v. Woodford,* No. C90-3094 TEH. *See* June 13, 2002 Stipulation for Injunctive Relief at 3-4.

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permitted by law." It also provides that it "shall be binding upon, and faithfully kept, observed, performed and be enforceable by and against the parties." *Id.* at 14. Defendants also agreed to the court appointment of medical and nursing experts to assist with the remedial process. *See* June 13, 2002 Order Appointing Experts.

Defendants were ordered to implement new policies and procedures on a staggered basis, with seven prisons to complete implementation in 2003, and five additional prisons for each succeeding year until state-wide compliance is achieved. The Court Experts submitted a report on July 16, 2004 which found an "emerging pattern of inadequate and seriously deficient physician quality in CDC facilities." July 16, 2004 Report (part 2) at 1. In response, defendants agreed to address the very serious issues identified in the report through a Stipulated Order re Quality of Patient Care and Staffing, which this Court approved on September 17, 2004 ("Patient Care Order"). The Patient Care Order required defendants to engage an independent entity to (a) evaluate the competency of physicians employed by the CDCR and (b) provide training to those physicians found to be deficient. It also required defendants to undertake certain measures with respect to the treatment of high-risk patients, to develop proposals regarding physician and nursing classifications and supervision, and to fund and fill Quality Management Assistance Teams ("QMAT") and other support positions. Defendants failed to come close to meeting the terms of the Patient Care Order, even with generous extensions of time from the Court.

On May 10, 2005, this Court issued an Order to Show Cause ("OSC") as to (1) why a Receiver should not be appointed to manage health care delivery for the CDCR until defendants prove that they are capable and willing to do so without Court intervention, and (2) why defendants should not be held in civil contempt of this Court's prior orders. On May 31, and June 1-2 and 7-9, 2005, the Court conducted an evidentiary hearing in which the parties presented evidence relating to the OSC. That evidence took the form of testimony from the Court Experts, state employees in positions critical to the prison medical system, and the state's medical consultant, as well as eighty-two exhibits.

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On May 17 and June 1, 2005, the Court received correspondence from the president of the Service Employees International Union ("SEIU") Local 1000, on behalf of SEIU and other unions representing state prison medical personnel, asking to participate in the evidentiary hearings. The Court responded by inviting the unions to submit an amicus brief.

The parties subsequently submitted legal briefs addressing the issues of contempt and Receivership in light of the evidence elicited at the hearing, and the unions filed an amicus brief. On June 30, 2005 the Court held a hearing on the OSC. Based on the arguments of counsel, the evidence presented, the full record in this case, and the Court's own observations on prison tours, the Court delivered an oral ruling at the conclusion of the hearing that it would take control of the medical delivery system of the CDCR and place it under the auspices of a Receivership. This Order is consistent with that ruling and provides a full discussion of the Court's findings of fact and conclusions of law.

FINDINGS OF FACT

A. Background

1. Over the past 25 years, the California correctional system has undergone a vast expansion in size and complexity. Ex. 42 at 1 (Governor's Reorganization Plan 2 – "A Government for the People for a Change: Reforming California's Youth and Adult Correctional System"). Since 1980, the inmate population has grown well over 500 percent and the number of institutions has nearly tripled from 12 to 33. *Id.* Currently, the CDCR has approximately 164,000 inmates, 114,000 parolees, and 45,200 employees. Id. at 1, 3.

2. Defendants concede that this rapid growth of the correctional system was not accompanied by organizational restructuring to meet increasing system demands and that it requires fundamental reform in a variety of areas, including management structure, information technology and health care services in order to function effectively and in compliance with basic constitutional standards. *Id.* at 6-7.

3. A prevailing lack of accountability within California's struggling correctional system has resulted in a failure to correct basic problems and an increase in tell-tale signs of

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dysfunction. *Id.* at 5. The CDCR has functioned for years under a decentralized structure in which individual wardens wielded extensive independent authority in determining prison standards and operating procedures. *Id.* These "operational silos" resulted in a lack of accountability and responsibility among the various institutions. *Id.*

4. In the area of health care services, the consequences of system expansion without reform have been shocking. The Department's annual health care budget has risen to over $1 billion. Ex. 41 at 103 (06/04 "Reforming Corrections" – Report of the Corrections Independent Review Panel, Chapter 6 - Risk Management and Care). The CDCR's spending on health care is so poorly managed, however, that this increase in budget has been tantamount to throwing good (taxpayer) money after bad.

B. Defendants' Failure to Provide Constitutionally Adequate Medical Care has Caused Plaintiffs Extreme Harm

5. As required by the Court's June 13, 2002 Stipulation for Injunctive Relief, the Court's Medical Experts visited nine prisons that had begun implementation of the Inmate Medical Policies and Procedures. Reporter's Transcript of Evidentiary Hearing ("RT") 263:9-14 (LaMarre); RT 28:19-22 (Puisis); RT 339:11-340:10 (Goldenson). As set forth in their reports, the Experts concluded that defendants' failure to implement the required remedies had the effect of placing CDCR prisoners at serious risk of harm or death. *See, e.g.*, Exs. 51-64 and 95 (reports by Court Experts regarding conditions in various prisons). The extensive and disturbing findings of the Expert's reports are essentially uncontested, and the Court finds that they accurately describe an extreme crisis in CDCR's medical delivery system.

(1) Lack of Medical Leadership

6. The leaders of the CDCR medical system lack the capability and resources necessary to deliver adequate health care, much less fix the abysmal system that now exists. Dr. Rene Kanan, Acting Director of Health Care Services for the CDCR, testified that the CDCR lacks an adequate system to manage and supervise medical care, both in the central office and at nearly all of its prisons. RT 572:1-5 (Kanan).

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7. Indeed, Undersecretary of Corrections Kevin Carruth testified that medical care simply is not a priority within the CDCR, is not considered a "core competency" of the Department, and is "not the business of the CDC, and it never will be the business of the Department of Corrections to provide medical care." RT 554: 4-15. Mr. Carruth could not even estimate when significant improvements to the system might be made if the State were left to its own devises. RT 549:1-4 (Carruth); RT 571:11-22 (Kanan).

8. In order to implement medical care policy, Dr. Kanan must seek assistance from non-medical administrators with higher authority. RT 727:22-729:7 (Rougeux). To make matters worse, many prison medical staff believe that the warden is their "real boss" even though organization charts indicate that medical staff report to Dr. Kanan. RT 243:3-16 (Puisis). The Court finds, as defendants' own expert consultant Dr. Ronald Shansky testified, that the Deputy Director is inhibited "internally, organizationally," and in her dealings with external governmental organizations to implement Court Orders because the Deputy Director lacks the perceived and ultimate authority over the health care program. RT 671:14-672:15 (Shansky).

9. Furthermore, central office staff do not have the tools they need to handle the vast quantity of information necessary to manage a billion dollar, 164,000 inmate system. RT 545:8-546:10 (Carruth). Data management, which is essential to managing a large health care system safely and efficiently, is practically non-existent. RT 138:8-139:4; 140:3-9 (Puisis). The CDCR's system for managing appointments and tracking follow-up does not work. RT 140:12-24 (Puisis). These data management failures mean that central office staff cannot find and fix systemic failures or inefficiencies. As just one of innumerable examples, there are patients in the general prison population who need specialized housing, but the CDCR does not track them and headquarters staff is unaware of how many specialized beds are needed. Ex. 48 at 4.

10. The CDCR is aware of the actions required to improve the prison health care system, but its leaders have not been able to address issues requiring systemic change. RT 390:19-391:22 (Goldenson), RT 152:23-154:5 (Puisis). For example, although the Experts noted

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repeatedly in reports to the CDCR headquarters staff that the health care delivery system in San Quentin posed "a risk of imminent harm and death to patients," it took a year for the CDCR to take notice, due in part to a "lack of resource capacity in the Health Care Services Division to address problems at multiple sites." Ex. 56 at 1 (04/09/05 Expert LaMarre's Report on San Quentin State Prison from February 7-8, 2005 Visit). Dr. Kanan frankly testified that the CDCR lacks an adequate system to manage and supervise medical care. RT 572:1-5 (Kanan).

11. The State reorganized the prison system into a new organizational structure effective July 1, 2005. Ex 86 (Department of Corrections and Rehabilitation Organization Chart). While the new structure holds promise for some improvements in the Department, it fails to provide sufficient authority to the medical leadership, and may well exacerbate the problems that currently exist. RT 677:8-14 (Shansky). The highest ranking health care operations director is several levels down from the Secretary in the organizational hierarchy, and thus does not have sufficient authority. RT 670:11-19 (Shansky); RT 149:18-152:1 (Puisis). The new organization also splits health care operations and policy, thereby creating unnecessary room for conflict and inefficiency. RT 677:15-23 (Shansky).

12. The Court finds that the CDCR leadership simply has been – and presently is – incapable of successfully implementing systemic change or completing even minimal goals toward the design and implementation of a functional medical delivery system.

(2) Lack of Qualified Medical Staff

a. Medical Administrators

13. Of the higher level management positions in the CDCR's Health Care Services Division, *80% are vacant*, making effective supervision or management impossible. RT 572:6-8 (Kanan); RT 543:10-16 (Carruth). This is akin to having a professional baseball team with only a relief pitcher and no infielders.

14. Furthermore, the CDCR has not hired regional medical directors as ordered. RT 392:20-25 (Goldenson). These regional medical directors are needed to provide supervision of medical staff at the institutional level. RT 93:11-94:17 (Puisis). Court Expert Goldenson

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accurately described the absence of regional management, coupled with incompetent prison staff, as resulting in "the blind leading the blind." RT 387:21-388:10 (Goldenson).

15. There also is no central office leadership in nursing. This makes it difficult to initiate and ensure compliance with nursing policy and practice. Ex. 48 at 6 (07/09/04 Plata Experts' Second Report, Part One); RT 270:1-17 (LaMarre). Moreover, there is a severe shortage of nursing supervisors at the prisons. RT 274:12-19 (LaMarre).

b. Physicians

16. The CDCR sorely lacks sufficient qualified physicians to provide adequate patient care to prisoners. While there certainly are some competent and dedicated doctors working within the system, they are unable to service even a fraction of the entire prisoner population. RT 682:14-22 (Shanksy). Many other CDCR physicians are inadequately trained and poorly qualified as, for many years, CDCR did not have appropriate criteria for selecting and hiring doctors. RT 669:4-17 (Shansky). Dr. Shansky testified that historically the CDCR would hire any doctor who had "a license, a pulse and a pair of shoes." RT 669:7-9 (Shanksy). According to Dr. Puisis, 20-50% of physicians at the prisons provide poor quality of care. RT 51:17-19 (Puisis). Many of the CDCR physicians have prior criminal charges, have had privileges revoked from hospitals, or have mental health related problems. Ex. 49 at 3 (07/16/04 Plata Experts' Second Report, Part Two); Ex. 54 at 1 (03/17/05 Email from Expert Puisis re: Visit to Substance Abuse Treatment Facility State Prison ("SATF")). An August 2004 survey by CDCR's Health Care Services Division showed that approximately 20 percent of the CDCR physicians had a record of an adverse report on the National Practitioner Databank, had a malpractice settlement, had their license restricted, or had been put on probation by the Medical Board of California. RT 580:1-7 (Kanan). The Court Experts testified that the care provided by such doctors repeatedly harms prisoner patients. RT 350:18-355:21 (Goldenson); RT 51:12-13 (Puisis). The Court finds that the incompetence and indifference of these CDCR physicians has directly resulted in an unacceptably high rate of patient death and morbidity.

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17. Inadequate medical care in CDCR is due not merely to incompetence but, at times, to unprecedented gross negligence. RT 366:25-367:4 (Goldenson). Indeed, the evidence from multiple sources establishes that medical care too often sinks below gross negligence to outright cruelty. Ex. 54 at 1; RT 74:6-75:8 (Puisis).

18. The Court will give just a few representative examples from the testimonial and documentary evidence. In one instance, a prisoner reported a two to three week history of fever and chills and requested care. RT 346:9-10 (Goldenson). The prisoner repeatedly visited medical staff with an increasingly serious heart condition but was consistently sent back to his housing unit. RT 347:1-19 (Goldenson). Eventually, the patient received a correct diagnosis of endocarditis, a potentially fatal heart condition treatable with antibiotics, but did not get appropriate medication. *Id.* Finally, the prisoner went to the prison emergency room with very low blood pressure, a high fever and cyanotic (blue) fingertips, indications of seriously deficient blood flow and probable shock. RT 347:20-25; 350:3-10 (Goldenson). Despite the objections of a nurse who recognized the severity of the prisoner's condition, the physician attempted to return the patient to his housing unit without treatment. RT 348:1-5 (Goldenson). Rather than being sent to a community hospital emergency room for immediate treatment, as would have been appropriate, the patient was sent to the prison's Outpatient Housing Unit for observation. RT 348:7-12 (Goldenson). He died shortly thereafter from cardiac arrest. *Id.* Dr. Goldenson found that this course of treatment was "the most reckless and grossly negligent behavior [he had] ever seen by a physician." RT 350:21-24; Ex. 80 at 4 (10/09/04 Investigation into Patient Death).

19. In another example, a prisoner repeatedly requested to see a doctor regarding acute abdominal and chest pains; the triage nurse canceled the medical appointment, thinking the prisoner was faking illness. RT 63:10-20 (Puisis). When the prisoner requested transfer to another prison for treatment, his doctor refused the request without conducting an examination. RT 63:21-24 (Puisis). A doctor did see the prisoner a few weeks later but refused to examine him because the prisoner had arrived with a self-diagnosis and the doctor found this unacceptable. RT 63:25-64:7 (Puisis); Ex. 54 at 1. The prisoner died two weeks

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later. RT 64:11-12 (Puisis). Sixty-two grievances had been filed against that same physician, but when interviewed by the Court Expert, the physician advised that most of the prisoners she examined had no medical problems and were simply trying to take advantage of the medical care system. Ex. 54 at 1.

20. In a further example, in 2004 a San Quentin prisoner with hypertension, diabetes and renal failure was prescribed two different medications that actually served to exacerbate his renal failure. RT 64:13-19 (Puisis). An optometrist noted the patient's retinal bleeding due to very high blood pressure and referred him for immediate evaluation, but this evaluation never took place. RT 65:3-7 (Puisis). It was not until a year later that the patient's renal failure was recognized, at which point he was referred to a nephrologist on an urgent basis; he should have been seen by the specialist within 14 days but the consultation never happened and the patient died three months later. RT 64:22-65:4 (Puisis). Dr. Puisis testified that "it was like watching the natural history of high blood pressure turn into chronic renal failure somewhat similar to the Tuskegee experiment." RT 65:8-14 (Puisis).

21. Defendants have made some efforts to identify and remove from patient care those practitioners believed to be providing substandard care; in 2004, twelve such doctors were removed. RT 595:10-21 (Kanan). The Quality In Corrections Medical ("QICM") program, developed in conjunction with the Court Experts, Dr. Kanan, Dr. Shansky, and the University of California at San Diego ("UCSD"), seeks to evaluate the work of identified CDCR physicians in order to improve and assure physician quality. RT 606:25-609:6 (Kanan). However, QICM has encountered considerable obstacles to implementation and as of yet has not satisfactorily addressed the problems of incompetence and indifference. RT 539:7-13.

(I) Death Reviews

22. Death reviews provide a mechanism for medical delivery systems to identify and correct problems. RT 37:7-11 (Puisis); RT 367:10-17 (Goldenson). These reviews should determine whether there has been a gross deviation from the adequate provision of care and whether the death was preventable. RT 342:14-344:20 (Goldenson). These reviews should

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be conducted even when death is expected, such as with a terminal condition, to determine if appropriate care has been provided. *Id.*; *see also* RT 587:2-7 (Kanan).

23. Expert review of prisoner deaths in the CDCR shows repeated gross departures from even minimal standards of care.[2] In 2004, the Court Experts and Dr. Shansky reviewed approximately 193 deaths, the majority from August 2003 to August 2004. These death reviews were the result of an Order of this Court after CDCR failed to perform the death reviews independently. RT 38:10-21 (Puisis); *see also* Ex. 34 (Report on death reviews conducted by Drs. Puisis, Goldenson, and Shansky in December 2004). These were only a portion of the backlogged death review cases. RT 38:22-24 and 195:12-17 (Puisis); *see also* 370:1-7 (Goldenson).

24. The Court Experts concluded, and the Court finds, that thirty-four of the deaths were serious and probably preventible. RT 42:21-24 (Puisis). CDCR sent these thirty-four cases to physicians at UCSD for review. RT 370:22-371:1 (Goldenson). On May 31, 2005, the UCSD physicians provided reviews for 23 cases. RT 356:10-13 and 371:10-14 (Goldenson). In twenty cases, the UCSD physicians found serious errors that contributed to death. RT 372:2-9 (Goldenson); *see also* Ex. 84 (UCSD Physician Assessment and Clinical Education Program Review of CDC Death Records). The conclusions of the UCSD physicians confirmed that the medical care provided by the prison medical staff prior to the inmates' deaths was well below even minimal standards of care. Ex. 84. The reviewing physicians used the following language to describe some of their conclusions: "a gross" departure from the standard of care (Ex. 84, Case A at 2); "standard of care definitely not met" (Ex. 84, Case D at 17); "a number of deviations" and "a severe systemic problem" (Ex. 84, Case F at 24);

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[2] As stated in the Stipulated Order, the Court applies a "community standard," i.e. the standard of care imposed under the laws of the State of California upon health care providers licensed to practice in California. *See* Stipulation for Injunctive Relief at 11 n. 3; *see also* *U.S. v. DeCologero*, 821 F.2d 39, 43 (1st Cir. 1987) (defining constitutionally adequate medical services as being "at a level reasonably commensurate with modern medical science and of a quality acceptable within prudent professional standards"); *Smith v. Jenkins*, 919 F.2d 90, 93 (8th Cir. 1990) (measuring standard of care under Eighth Amendment by "professional standards").

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"a gross departure" and "treatment ... far below the standard" (Ex. 84, Case I at 32); "the corrections medical system failed the patient" and the inmate "died of what quite likely was a preventible process" (Ex. 84, Case K at 39 & 41); "an egregious deviation" (Ex. 84, Case Q at 59; Case X at 85); "a fatal omission" and "a gross deviation" (Ex. 84, Case U at 74); "multiple gross deviations" (Ex. 84, Case W at 83). A Court Expert also testified: "You would not expect [] one death like this in a relatively large-sized facility for years. As an example, if I took one of the most problematic deaths that we reviewed, I don't think I saw one of these in my entire 20 years" experience in managing prison facilities. RT 44:7-13 (Puisis); RT 350:18-351:4 (deaths were the result of the "most reckless and grossly negligent behavior" he has ever seen) (Goldenson).

25. The Court will provide just one of many examples to illustrate the problems revealed by the death reviews. An inmate arrived at 4:30 a.m. at the prison infirmary due to complaints of shortness of breath and tiredness. Ex. 84, Case W at 2-3. About a week prior, the inmate had reportedly been swollen all over with a blood pressure of 150/126 and a heart rate of 100. The night before his death the inmate had been brought to the infirmary for very similar complaints. *Id.* The following morning at 6:00 a.m., the nurse and physician determined that further care was unnecessary at that time and released the inmate from the infirmary. *Id.* On his return to the transport van, the inmate began staggering, went down on his hands and knees and went prone. *Id.* As the inmate was helped into the van, a medical provider told a correctional officer that the inmate "was fine and just needed sleep." *Id.* When the inmate arrived at his housing unit fifteen minutes later, he stumbled out of the van, went down on his hands and knees, then went prone and became unresponsive. *Id.* By 6:30 a.m., the inmate had no vital signs, and at 7:02 a.m. he was pronounced dead. *Id.* The UCSD physicians determined that there were "multiple gross deviations from the standard of care" in this case, including an inadequate monitoring of the inmate's diabetes and hypertension in the years before his death, a lack of concern for high blood pressure readings in the days and weeks before his death, the lack of a personal physician's evaluation of the

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inmate when he came to the infirmary, and the failure to diagnose or treat the congestive heart failure from which the inmate presumably died. Ex. 84, Case 22 at 3.

26. The Court Experts have made even further findings based on their reviews of additional death records beyond those sent to UCSD. In March 2005, a Court Expert reviewed the death files of ten prisoners at SATF prison and determined that at least seven deaths were preventible, and two more might have been preventible. Ex. 54 at 2. The Court Expert concluded that the care provided in most of the cases constituted medical incompetence. *Id.*

27. In February 2005, the Court Experts made similar conclusions regarding the review of ten deaths at San Quentin; most of the deaths had been preventible. Ex. 55 at 13. The Court adopts these uncontested expert findings regarding preventible deaths.

28. All of this information led Dr. Puisis to the uncontested conclusion, as referenced in the Introduction, that on average, every six to seven days one prisoner dies unnecessarily. RT 44:2-18, 86:8-13 (Puisis) ("based on estimates of deaths, there is probably one to two preventible deaths per site per year.").

(ii) Morbidity

29. The lack of adequate care in prisons also has resulted in a significant degree of morbidity to inmate-patients. RT 86:7-13 (Puisis); 372:14-373:14 (Goldenson). Morbidity is defined as any significant injury, harm or medical complication that falls short of death. RT 31:1-5 (Puisis).

30. In one instance, a physician's cruelty may have caused a prisoner to suffer paralysis. RT 74:6-75:8 (Puisis). The prisoner arrived at the clinic after a fight and was unable to move his legs. *Id.* As the patient had sustained a neck injury, the medical staff should have immobilized his neck to prevent further injury. *Id.* When the patient failed to respond as the doctor stuck needles in his legs, the doctor said that the patient was faking, and moved his neck from side to side, paralyzing the patient, assuming he was not already paralyzed. *Id.* Dr. Puisis termed his actions "fairly amazing" and cruel. *Id.*

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31. In addition, the CDCR has a significant number of preventable acute care hospitalizations. RT 161:7-20 (Puisis). Due to the lack of appropriate care, the health of high risk chronic care patients is particularly compromised, and though such care may not lead to death, lives are markedly shortened. RT 372:14-373:2 (Goldenson). Considering the general risk to patients due to inadequate medical care, the unnecessary deaths are just "the tip of the iceberg." *Id.*

32. Given the Court's findings regarding inmate deaths, it should be no surprise that the Court also finds that there is an inordinately high level of morbidity among CDCR prisoners.

c. Nurses

33. The evidence establishes beyond a doubt that the CDCR fails to provide competent nurses to fill the needs of the prison medical care system. According to the Court's nursing Expert, Maddie LaMarre, CDCR nurses often fail to perform basic functions and refuse to carry out specific physician's orders. RT 279:16-280:6 (LaMarre). She also found that a number of nurses were not even certified in basic CPR. Ex. 53 at 10 (02/28/05 Expert LaMarre's Report on CSP - Sacramento from January 24-25, 2005). At certain prisons, nurses often fail to identify urgent medical issues that require immediate referral to a physician. RT 285:17-286:7 (LaMarre). Even where face-to-face triage is implemented, nurses often fail to take vital signs or conduct examinations. Ex. 56 at 4; RT 286:8-24 (LaMarre). Nurses then often fail to adequately assess patients and dispense appropriate over-the-counter medications for problems. RT 286:25-287:7 (LaMarre).

34. Additionally, the evidence shows that those nurses who fail to perform basic duties over an extended period of time are not disciplined. Ex. 62 at 10 (05/16/05 Experts' Report on Visit to Substance Abuse Treatment Center); RT 275:7-276:7 (LaMarre).

(3) Lack of Medical Supervision

35. The Court finds that the lack of supervision in the prisons is a major contributor to the crisis in CDCR medical delivery.

36. At the institutional level, there are very few managers and supervisors that are competent. RT 386:9-23. (Goldenson). Thus, it is difficult to carry out central office

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directives. RT 94:5-8 (Puisis). Just five or six prisons have an adequate Chief Physician and Surgeon, and only one-third of the prisons have an adequate Health Care Manager. RT 578:7-579:2 (Kanan). For example, the Experts report that San Quentin is "a completely broken system bereft of local medical leadership." Ex. 55 at 9.

37. A large part of the problem is simply a lack of personnel and a chronic high vacancy rate. Ex. 51 at 2 (02/18/05 Expert LaMarre's Report on Salinas Valley State Prison from January 26-27, 2005 Visit); Ex. 55 at 11; Ex. 60 at 1 (05/04/05 Email from Expert Puisis re: Experts' concerns from visit to Pleasant Valley State Prison). Many line-staff, including both physicians and nurses, work without any supervision whatsoever. Ex. 39 at 5 (01/03 OIG Management Audit Review from California Substance Abuse Treatment Facility and State Prison (and supplement to report), pages 5-7, 22-38, Attachment A); Ex. 62 at 4; Ex. 63 at 2 (05/16/05 Experts' Report on Visit to California State Prison - Corcoran); Ex. 64 at 6 (Experts' Report on Visit to Pleasant Valley State Prison Miscellaneous); Ex. 95 at 2 (Email from Dr. Puisis re: Conference Call re: CSP-SAC); RT 273:18-25 (LaMarre).

38. This lack of leadership and supervision has resulted in a failure to correct the myriad problems within the CDCR medical clinics. Ex. 51 at 2; RT 95:18-22 (Puisis). Such unaddressed problems have made the provision of adequate medical care impossible and clearly have resulted in patient deaths. Ex. 54 at 1, 2; Ex. 62 at 5; RT 285:11-286:4 (LaMarre).

39. A further result of this non-supervision is that doctors responsible for patient death and morbidity receive little if any discipline from supervising physicians. RT 44:24-45:6 (Puisis). Beyond the obvious problem of condoning malpractice and allowing incompetent doctors to remain on staff, the leadership vacuum and lack of discipline also fosters a culture of non-accountability and non-professionalism whereby "the acceptance of degrading and humiliating conditions [becomes] routine and permissible." Ex. 55 at 11; Ex. 51 at 2. No organization can function for long when such a culture festers within it, and it has become increasingly clear to the Court that this is a major factor in the current crisis.

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(4) Failure to Engage in Meaningful Peer Review

40. Peer review is the periodic review of work by similarly qualified professionals. Ex. 49 at 3; RT 136:5-7 (Puisis). For quality control and the identification of bad practitioners, peer review is performed universally by health care organizations. RT 136:8-10, 137:9-13. (Puisis). But in the CDCR, peer review "is either bogus or it's not done at all." RT 136:21-23 (Puisis).

41. The peer review process sometimes fails because there is a paucity of qualified staff to engage in the process. Doctors with internal medicine qualifications are needed to review medical decisions, correct mistakes and provide training, but such doctors are rarely present at the institutions. Ex. 49 at 3-4. At some prisons, the doctors who engage in the peer review process are incompetent. As a result, "untrained physicians who make mistakes will continue to make them because there is no one to identify and correct their mistakes." *Id.*

(5) Defendants Lack the Capacity to Recruit Qualified Personnel for Key Medical Positions

42. The CDCR also suffers from a significant vacancy rate in critical positions within the medical care line-staff. Ex. 1 at 2 (01/09/04 Letter from QMAT Members re: San Quentin Visit on January 7, 2004); Ex. 2 at 4 (01/07/05 QMAT Process Review of San Quentin); Ex. 10 at 4 (11/04 QMAP System Review of California Correctional Institute); Ex. 18 at 1 (08/25/04 QMAP Institutional Review Weekly Report from Salinas Valley State Prison); Ex. 23 at 1 (09/03/04 QMAP Institutional Review Weekly Report from California State Prison - Sacramento); Ex. 33 at 11 (Corrective Action Plan for July 9, 2004 Letter from Court Experts, Revised 03/03/05); Ex. 41 at 113; Ex. 48 at 6-7; Ex. 51 at 2; Ex. 56 at 11; Ex. 84 at 4. The vacancy rate for physician positions is over 15%, and this does not account for the additional significant percentage of incompetent doctors who need to be replaced. RT 579:11-13 (Kanan). The rates differ from institution to institution, depending partly on the desirability of the location and the culture of the prison. At one institution, there are only two doctors responsible for approximately 7,000 prisoners. RT 643:22-644:7 (Kanan).

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43. The Court finds, based on estimates by the court Experts and CDCR's consultant, that the CDCR must hire approximately 150 competent physicians to fill vacancies and replace inadequate physicians throughout the system. RT 96:9-12 (Puisis); RT 680:19-23 (Shansky).

44. The vacancy problem also plagues the Department in all other areas of health care staffing. Vacancy rates at some institutions are as high as 80% for Registered Nurses (RNs) and 70% for Medical Technical Assistants (MTAs) (i.e. licensed vocational nurses who are also custody officers). RT 287:20-22 (LaMarre).

45. The CDCR has made some efforts to recruit and retain qualified supervisors, doctors, nurses and MTAs. However, these efforts have paled in the face of the enormity of need. RT 58:3-60:5 (Puisis); RT 288:3-5 (LaMarre). The CDCR's efforts also have been stymied to large degree by the state bureaucracy, as discussed below.

46. The reality facing the CDCR is that its efforts to recruit qualified medical staff into the current system have been ill-fated from the start. For example, compensation levels for CDCR medical staff are simply too low. RT 59: 8-17 (Puisis) According to a CDCR commissioned study, compensation for CDCR staff registered nurses is 20-40% lower than for RNs in the private sector, and up to 57% lower for some supervising nurses. Ex. 81 at 8 and 11 (CDCR Nurses and Pharmacists Compensation Survey, November 2004). Yet the State has failed to pay heed to the study and the nurse staffing crisis continues unabated.

47. The difficulty in recruiting qualified medical staff is compounded by the poor working conditions offered. RT 295:21-24 (LaMarre). In one instance, the triage nurse at San Quentin had to walk through the men's shower room, while it was in use, in order to get to her "clinic" in which she had no sink, exam table or medical equipment. RT 295:1-12 (LaMarre). Many competent professionals simply will not work, at least not for long, under such conditions.

48. In addition, the long and bureaucratic hiring process at CDCR increases the difficulty of retaining competent doctors and nurses. RT 99:21-25 (Puisis); RT 291:11-21(LaMarre). The testimony at the hearing makes it clear that the State bureaucracy is simply incapable of recognizing and acting upon the crisis in which the CDCR finds itself.

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49. In all fairness, the CDCR has made some progress lately, though it is far too limited relative to the enormity of the need. Since July 1, 2004, the Department has hired and retained approximately 27 additional board-certified or board-eligible family practitioners or internists and has contracted with two outside entities to provide additional care for high acuity patients to address shortages at various prisons. RT 580:8-15; 588:16-589:9; RT 591:6-592:12 (Kanan). It also has intensified recruitment through the creation of a "physician strike team" that has conducted rounds at a local university and has established an interagency agreement with the University of California to have access to primary care residency programs. RT 604:2-15 (Kanan) In order to provide hiring incentives to qualified physicians, the CDCR has expanded the federal loan repayment program. RT 603:19-21 (Kanan). Although these improvements facilitate recruitment, they are piece-meal steps that fail to make the necessary transformations in the system; thus, they are insufficient to resolve the crisis. Consequently, the Court finds that vacancy rates in CDCR medical staff remain at a critical level.

(6) Intake Screening and Treatment

50. At present, the reception center intake process, which involves only a brief medical examination, fails to adequately identify and treat the health care problems of new prisoners. RT 301:18-24 (LaMarre); RT 116:16-117:8, 120:5-10 (Puisis). This intake process is supposed to allow medical staff to identify the medical problems, in particular communicable diseases such as syphilis and tuberculosis, that pose a risk of transmission to other prisoners. RT 119:22-120:4 (Puisis); RT 301:2-12, 305:4-7 (LaMarre). In fact, tuberculosis is an "incredibly serious problem" in the prisons because it has the potential to affect other prisoners, the staff and the local community. RT 361:20-362:2 (Goldenson).

51. An adequate intake exam should take fifteen to twenty minutes for a young healthy prisoner and thirty to forty minutes for prisoners with more complicated health problems. RT 308:8-14 (LaMarre). However, prisoners' exams in CDCR reception centers typically last no more than seven minutes. RT 119:11-18 (Puisis). Further, some prisoners are

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removed from the reception process before their examination is complete and do not receive medical screening or care until weeks later. RT 304:23-305:18 (LaMarre).

52. For example, at San Quentin one to two physicians are responsible for conducting intake examinations of approximately eighty to one hundred new prisoners every day. The volume of work is too large to allow for adequate screening of illnesses. Ex. 55 at 7. The Court personally toured San Quentin and has first-hand knowledge of the shocking inadequacy of the reception screening process. The lack of sanitation, the dearth of basic medical examination tools, and the failure to provide any semblance of confidentiality in the medical examining rooms were apparent at first glance.

53. At the California Institution for Men (CIM), which the Court also personally visited, a single nurse individually interviews 100 to 180 incoming prisoners each day within a period of approximately four hours, allowing just a few minutes for each prisoner. RT 116:22-117:2 (Puisis). In addition, a fellow prisoner completes the TB screening form for incoming prisoners (RT 302:7-11 (LaMarre)), which is an improper violation of medical confidentiality and harkens to the discredited and foregone practice in Southern prisons where so-called prisoner "trustees" were used to guard other prisoners. Following the nurse's examination, prisoners undergo an examination by a physician at which up to three prisoners are interviewed and examined simultaneously with no individual protection of the prisoners' privacy. RT 117:22-118:11 (Puisis). According to a Court Expert, this lack of privacy "virtually ensures that an adequate exam would not be done." RT 118:12-13 (Puisis). In fact, in some cases, serious conditions are not identified or are given no treatment. RT 306:10-22 (LaMarre) (prisoner with cirrhosis and swelling ankles was identified at screening but was provided no treatment or follow-up; three days later, he collapsed in the cell block and required transfer to an acute care hospital).

(7) Patients' Access to Medical Care

54. As a matter of medical policy, the CDCR requires that within one business day of the submission of a prisoner request for medical care, an RN shall triage the request using an in-person interview and standardized protocols. Inmate Medical Services Policy ("IMSP") Vol.

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4, Chp. 4 & Vol. 5.[3] Unfortunately, this policy lives more on paper than in reality. The CDCR has left several basic nursing policy requirements only partially implemented and at some prisons face-to-face triage is nonfunctional. RT 268:1-7 (LaMarre); see also Ex. 4 at 1 (12/22/04 Email from Lilia Meyer re: Monthly Reports); Ex. 5 at 1 (QMAT Executive Summary of Medical Services Clinical Indicator Review of Corcoran from June 21-25, 2004 Visit); Ex. 15 at 2 (04/01/04 QMAT Executive Summary of Medical Services Process Review at Salinas Valley State Prison); Ex. 51 at 11; Ex. 53 at 8; Ex. 62 at 8; and Ex. 63 at 6-7. As a result, patients do not receive timely access to care and suffer a serious risk of harm and even death as a result. RT 267:5-268:7 (LaMarre).

55. In addition, inmates do not have timely access to physicians. Appointments with physicians often do not take place within the time frame established by CDCR policy. Ex. 13 at 5 (QMAT Executive Summary of Medical Services Clinical Indicator Review of Valley State Prison for Women from June 21-24, 2004 Visit); Ex. 15 at 2; Ex. 25 at 6 (QMAT Executive Summary of Medical Services Clinical Indicator Review of High Desert State Prison from May 10-14, 2004 Visit); Ex. 39 at 24; Ex. 51 at 11. A number of prisons experience "serious backlogs in patients receiving medical care." Ex. 62 at 5; Ex. 64 at 2.

(8) Medical Records

56. The medical records in most CDCR prisons are either in a shambles or non-existent. RT 109:18-23 (Puisis). This makes even mediocre medical care impossible. Medical records are an essential component of providing adequate patient care and should contain comprehensive information about a patient that can assist a physician in determining the patient's history and future treatment. RT 109:5-17 (Puisis).

57. The amount of unfiled, disorganized, and literally unusable medical records paperwork at some prisons is staggering. RT 109:23-110:6 (Puisis); see also Ex. 2 at 4 (three and one-half feet of loose filing at San Quentin in December 2004); Ex. 20 at 3 (QMAT

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[3] The Inmate Medical Policies and Procedures were lodged with this Court on February 15, 2002.

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Report from SVSP Institutional Visit for January 4-6, 2005)(twelve to eighteen inches of loose filing at Salinas Valley in January 2005); and Ex. 53 at 10 (six to eight feet of loose filing at CSP-Sacramento in January 2005). At CIM, the records were kept in a 30 foot long trailer with no light except for a small hole cut into the roof and were arranged into piles without any apparent order. RT 126:4-127:3 (Puisis). Conditions are similar at other prisons as well. RT 127:20-21 (Puisis). At some prisons medical records are completely lost or are unavailable in emergency situations. RT 111:4-112:6 (Puisis).

58. At CIM, the use of temporary medical records creates a confusing and dangerous situation for practicing physicians who often have access only to little or none of a patient's history. RT 114:2-115:11 (Puisis). The Court observed first-hand at CIM that doctors were forced to continually open new files on patients simply because the doctors could not get access to the permanent files. As a result, the risk of misdiagnosis, mistreatment, and at a minimum, wasted time, increase unnecessarily.

59. The Court concurs with Dr. Puisis's testimony that the CDCR medical records system is "broken" and results in dangerous mistakes, delay in patient care, and severe harm. RT 110:7-8; RT 112:8-22 (Puisis).

(9) Medical Facilities

60. The physical conditions in many CDCR clinics are completely inadequate for the provision of medical care. Ex. 1 at 2; Ex. 2 at 8; Ex. 60 at 1. Many clinics do not meet basic sanitation standards. Ex. 3 at 7 (04/22/05 Health Care Services, Quality Improvement Plan for San Quentin); Ex. 51 at 2; Ex. 53 at 7; Ex. 55 at 8 and 10; Ex. 58 at 2 (03/02/05 Email from Expert LaMarre re: Two Systemwide Issues); Ex. 62 at 9; Ex. 63 at 6; RT 296:23-298:9 (LaMarre). Exam tables and counter tops, where prisoners with infections such as Methicillin-Resistant Staph Aureus (MRSA) and other communicable diseases are treated, are not routinely disinfected or sanitized. RT 297:2-13 (LaMarre). Many medical facilities require fundamental repairs, installation of adequate lighting and such basic sanitary facilities as sinks for hand-washing. Ex. 62 at 11; Ex. 63 at 8. In fact, lack of adequate hygiene has

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forced the closure of some operating rooms. Ex. 94 at 10 (Report on CDCR Hospitals and Skilled Nursing Care, October 9, 2004).

61. In addition, many of the facilities lack the necessary medical equipment to conduct routine examinations and to respond to emergencies. Ex. 1 at 2; Ex. 3 at 29; Ex. 10 at 1; Ex. 23 at 1; Ex. 33 at 4; Ex. 40 at 51 (03/16/05 Special Review into the Death of Correctional Officer Manuel A. Gonzalez, Jr. on January 10, 2005 at the California Institute for Men, pages 7, 49-63, Governor's Office and Related Materials); Ex. 48 at 3; Ex. 51 at 2 (02/18/05 Expert LaMarre's Report on Salinas Valley State Prison from January 26-27, 2005 Visit); Ex. 55 at 5; Ex. 58 at 1; Ex. 62 at 9; Ex. 94 at 10; RT 128:15-25 (Puisis); RT 295:4-12 (LaMarre). Clinics lack examination tables and physicians often have to examine patients who must sit in chairs or stand in cages. Ex. 48 at 3.

62. The Court observed first-hand at San Quentin that even the most simple and basic elements of a minimally adequate medical system were obviously lacking. For example, the main medical examining room lacked any means of sanitation – there was no sink and no alcohol gel – where roughly one hundred men per day undergo medical screening, and the Court observed that the dentist neither washed his hands nor changed his gloves after treating patients into whose mouths he had placed his hands.

(10) Interference by Custodial Staff with Medical Care

63. A major problem stemming from a lack of leadership and a prison culture that devalues the lives of its wards is that custody staff present a determined and persistent impediment to the delivery of even the most basic aspects of medical care. Too frequently medical care decisions are preempted by custodial staff who have been given improper managerial responsibility over medical decision-making. Ex. 60 at 1; Ex. 64 at 4; RT 162:18-23 (Puisis).

64. Correctional officers often are not available to take prisoners to medical appointments or to enable the physicians to do examinations. Ex. 94 at 10. In medical units that lack call buttons for prisoners to contact doctors, custody staff routinely fail to make rounds and check on patients. Ex. 61 at 1 (05/06/05 Email from expert Goldenson re: San Quentin OHU); Ex.

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22 at 5 (QMAT Executive Summary of Medical Services Clinical Indicator Review of California State Prison - Sacramento from May 24-28, 2004 Visit).

65. All in all, there is a common lack of respect by custody staff for medical staff, and custody staff far too often actively interfere with the provision of medical care, often for reasons that appear to have little or nothing to do with legitimate custody concerns. Ex. 66 at 3 (02/18/05 and 04/26/05 Letters from Dr. Khoo to Chief Physician and Surgeon Dr. Williams re: issues with Medical Staff at San Quentin). Ex. 51 at 2. This exacerbates the problem of physician retention, and the evidence reflects that a number of competent physicians have left CDCR specifically due to conflicts with custodial staff. Ex. 84 at 4; RT 98:19-23 (Puisis).

(11) Medication Administration

66. The Court concurs with Dr. Puisis that management of the prison pharmacy operations is "unbelievably poor." RT 160:13-14 (Puisis). There is no statewide coordination between pharmacies and there is no statewide pharmacist. RT 236:2-6 (Puisis). At the individual institutions, the administration of medications is in various states of disarray. RT 160:14-17 (Puisis).

67. The CDCR has failed to adequately implement the Inmate Medical Policies and Procedures that require each prison to develop local procedures for medication management. IMPP, Vol. 4, Chp. 11 at 1; RT 283:2-10 (LaMarre).

68. There are serious, long-standing problems with dispensing medication, renewing prescriptions, and tracking expired prescriptions. *Id.* Chronically ill patients are not able to refill their prescriptions in a timely manner. RT 283:20-25 (LaMarre); Ex. 15 at 3; Ex. 16 at 4 (04/01/04 QMAT Executive Summary of Medical Services Clinical Indicator Review of Salinas Valley State Prison from June 7-10, 2004 Visit); Ex. 25 at 4; Ex. 51 at 15-16; Ex. 55 at 51; Ex. 63 at 16; Ex. 64 at 49; Ex. 84 at 9.

69. The Court observed the pharmacy at San Quentin first-hand. As discussed in the Order to Show Cause, the pharmacy was in almost complete disarray. Additionally, there is no system to identify expiring prescriptions for critical medications and patients wait two to

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three weeks for refills, which places many inmates at unnecessarily increased risk. Ex. 84 at 9.

70. To ensure continuity of treatment, the policies require that prescriptions continue to be filled when a prisoner transfers to another prison. IMPP, Vol. 4, Chp. 11 at 7. In practice, however, the prisons do not consistently transfer prescriptions along with the inmates, resulting in large quantities of medication being thrown out rather than administered. Ex. 22 at 4; Ex. 39 at 36; Ex. 51 at 9; Ex. 84 at 9. On the other end, the receiving prisons routinely disregard prescriptions from sending prisons. Ex. 26 at 3 (Report from March 22-25, 2004 Assessment of High Desert State Prison, written by Suzette Geary, Jerry Mobery, and Amy Perez); Ex. 27 at 2 (QMAT Executive Summary of Medical Services Process Review of California Institution for Women from March 22-24, 2004 Visit); Ex. 64 at 12.

(12) Chronic Care

71. A sizable portion of CDCR prisoners suffer from chronic illness, yet defendants have failed to devise and implement a system to track and treat these patients, and such patients suffer from a lack of continuity of care. RT 90:15-20 (Puisis); RT 284:15-19 (LaMarre); Ex. 10 at 3; Ex. 18 at 1; Ex. 53 at 4; Ex. 61 at 1-2; Ex. 63 at 14; Ex. 64 at 11; Ex. 84 at 4; RT 284:20-285:1 (LaMarre)

(13) Specialty Services

72. Defendants have failed to provide patients with necessary specialty services. Patients with very serious medical problems often wait extended periods of time before they are able to see a specialist due to unnecessary and preventable delays. Ex. 60 at 2; Ex. 64 at 9 and 53; RT 312:5-15 (LaMarre). At Pleasant Valley State Prison ("PVSP") for example, it may take over a year to see certain specialists; as of May 2005, patients with consultation referrals from early 2004 had yet to be seen. Ex. 64 at 9-10; RT 313:3-12 (LaMarre). In one instance a patient with a colonoscopy referral had to wait ten months before his appointment; by the time he was seen the mass in his colon was so large that the colonoscope could not pass through. *Id.* at 9-10. Even when patients do see a specialty consultant, medical staff often do not follow-up on the specialist's recommendations. Ex. 64 at 10.

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(14) Medical Investigations

73. The CDCR's failure to perform adequate investigation of medical staff results in incompetent and abusive staff continuing to provide dangerous care. Ex. 85 (Category II Investigations dated May 5, 2005-Filed Under Seal); RT 582:24-583:24 (Kanan). Too often, medical investigations have been ineffective because of coverups. For example, when a CSP-Sacramento inmate died, a CDCR central office physician evaluated the prison physician's conduct through an Internal Affairs investigation. Ex. 80 (10/09/04 Investigation into Patient Death); RT 345:23-349:22 (Goldenson). The central office reviewing physician concluded that the patient was totally mismanaged and that the death was preventable. Ex. 80 at 4-5; RT 348:13-20 (Goldenson). Subsequently, a second central office physician reviewed the case and determined that care was adequate. Ex. 80; RT 348:13-349:13. Although this second report was superficial and totally inadequate, the CDCR accepted it, clearing the prison physician and disregarding the thorough findings of the earlier review. Ex. 80 at 5. Dr. Goldenson described this as a "cover up of a very serious medical error." RT 349:21 (Goldenson). The prison doctor continued to practice for more than a year. RT 349:14-18 (Goldenson).

(15) Defendants Have Been Unable to Overcome Various Obstacles to Providing Adequate Medical Care

74. The Court recognizes that certain obstacles external to the CDCR have hindered the Department's ability to effectively take action regarding medical care. RT 549:5-551:4 (Carruth); RT 671:23-672:23 (Shansky). These obstacles are presented by the State of California's civil service system and the related operations of the State Personnel Board ("SPB"), the Department of Personnel Administration ("DPA"), the State budget process, and the collective bargaining obligations of the CDCR with respect to its union-represented employee groups. RT 551:5-25 (Carruth). However, these obstacles do not in any manner excuse defendants, including the Governor, from taking effective action to cure constitutional violations.

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a. Civil Service Obligations

75. Certain State civil service rules, grounded in the California Constitution and other laws and regulations, place the authority over creating new job classifications, hiring, setting compensation levels, and creating recruitment and retention bonuses within the authority of the State Personnel Board, the Department of Personnel Administration and other agencies, thus preventing CDCR from acting unilaterally in these areas. RT 454:15-455:9, 465:19-466:13 (Duveneck). These requirements have directly affected the CDCR's ability to hire and recruit, because when the CDCR attempts to create new job classifications, or change the salary for an existing position, it generally must endure a lengthy process involving the DPA, SPB and the applicable bargaining unit representatives. RT 469:3-476:15, 479:23-480:24 (Duveneck).

b. The Dills Act

76. Under the Dills Act (Government Code § 3512 *et seq.,*), employees have the right to collectively bargain with the State over wages, hours, and other terms and conditions of employment. RT 426:15-23 (Hanson). The State has interpreted coverage of the Dills Act to extend to virtually any change in the terms or conditions of employment, including changing the way an employee is required to fill out a form. RT 428:1-11 (Hanson); RT 426:25-427:4, 427:13-25, 428:1-11 (Hanson); Cal. Govt. Code § 3512 *et seq.*

c. Procurement, Contracting, and Budgeting Rules

77. In general, the California Department of General Services must approve all State contracts, including contracts for personal services and contracts for information technology goods and services. Cal. Pub. Cont. Code §§ 10295, 10335-10381, 12102. Deputy Secretary for Information Technology for CDCR, Jeff Baldo, testified that the entire contracting process, from the initial stage of determining the need for goods or services for information technology to awarding a contract, can take up to two years. RT 493:9-18 (Baldo).

78. The State budgetary process similarly hinders defendants from instituting medical reforms. There is a lengthy process for obtaining resources for personnel, equipment or

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facilities. It generally takes between 14 months to two years for a budget concept to result in an appropriation of funds. RT 527:15-18 (Horel). An even lengthier capital outlay process must be used when the CDCR seeks to build a new building or make significant changes to an existing structure. RT 527:20-528:6 (Horel).

79. Thus, the Court recognizes that reforming the CDCR medical system is neither simple nor easy. However, the question is whether defendants have used the full extent of their power to raise the system to constitutional standards, and the answer is quite definitively: no. Perhaps no better illustration epitomizes the problem than the following colloquy that occurred during the OSC hearing between the Court and one of the State's Deputy Secretary for Human Resources as to why defendants have been so stymied by the bureaucracy. RT 457:2-458:17 (Duveneck). The Deputy Secretary testified that the State "cannot contract out for [medical] services unless it's an emergency, if State workers could do the work." RT 456:4-6 (Duveneck). When asked for an example of an emergency that had justified contracting out in the past, the witness testified that an agency received emergency approval to hire contractors when immediate hiring was a prerequisite to receiving federal funds. RT 457:14-21 (Duveneck). The Court responded that in one to six months "we would have 3 to 18 people dying... I can't think of a bigger emergency." RT 457:22-458:4 (Duveneck). Even in light of the Court's concern, the witness continued to balk at the idea of doing any emergency contracting whatsoever for prisoner medical services. RT 458:4-15 (Duveneck). This is exactly the kind of "can't do" attitude (or "trained incapacity," as discussed below) that has left the Court utterly frustrated and that has brought the Court to the point of establishing a Receivership.

C. Defendants Have Failed to Comply with Court Orders

The Court has attempted to move defendants toward meeting constitutional standards by issuing a series of court orders with detailed objectives and measures. Unfortunately, defendants have repeatedly delayed their progress and ultimately failed to achieve even a semblance of compliance.

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(1) The June 13, 2002 Stipulation for Injunctive Relief

80. Defendants entered into a Stipulation for Injunctive Relief which required CDCR to implement specified remedial medical policies and procedures designed to meet "the minimum level of care necessary to fulfill the Defendants' obligation to Plaintiffs under the Eighth Amendment of the Constitution." Stipulation for Injunctive Relief at 2-3.

a. Roll-Out Implementation

81. The Stipulated Injunction required the CDCR to implement the specified remedial medical policies and procedures at all California state prisons according to a staggered schedule beginning in calendar year 2003. Stipulation for Injunctive Relief at 3-4. The first "roll-out" institutions were given a calender year to implement the requisite policies and procedures. *Id.* As of this date, no prison has implemented them. RT 34:2-19 (Puisis); RT 267:15-25 (LaMarre); RT 341:17-24 (Goldenson); RT 666:3-7 (Shansky).

82. In fact, the roll-out institutions are not even close to attaining compliance. RT 666:5-7 (Shansky). Specifically, the Court Experts' review of San Quentin found that "overall compliance with the Stipulated Order and subsequent Court Orders was non-existent." Ex. 48 at 3. A May 2005 Expert review of PVSP (a 2004 roll-out prison) found it "substantially non-compliant." Ex 64 at 2. Fifteen months after the roll-out started, QMAT reported that Valley State Prison for Women ("VSPW") had not met six of eight indicators for overall compliance. Ex. 12 at 1.

83. Defendants rightly concede that they have not complied with the Court's Order. Defendants' Response to Order to Show Cause (filed June 20, 2005) at 2, 6. Moreover, Dr. Shansky testified that there "isn't a realistic possibility of compliance with the court orders . . . unless something dramatically changes." RT 666:13-25 (Shansky); RT 550:12-19 (Carruth).

b. January 1, 2003 Measures for all Institutions

84. In addition to the phase-in of the medical policies and procedures discussed above, the Stipulated Injunction also required the CDCR to implement five particular policies or procedures considered crucial to meeting class members' basic needs at all prisons statewide,

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effective January 1, 2003. Stipulation for Injunctive Relief at 4. For instance, the Stipulation mandated that, effective January 1, 2003, all prisons follow the medical protocol established for inter-institution transfers. *Id.* Defendants have not met this requirement. Ex. 48 at 1-2; Ex. 51 at 4; Ex. 89 at 7 (Report by the Plata Medical Experts: Review of Progress of Inmate Medical Services Program Implementations at California State Prison, San Quentin, June 1, 2005); Ex. 51 at 4. Nor have they fully executed the other four requirements.

c. Death Reviews

85. As discussed above, the Stipulated Order required defendants to formulate "a minimally adequate death review process." Stipulation for Injunctive Relief at 11. Although defendants have had over three years to comply, they have failed to establish an adequate death review system, and many of the unreviewed deaths present serious problems, including neglect and cruelty. RT 367: 18-21 (Goldenson); Ex. 36 at 18-24 (03/03 OIG Management Audit Review from California State Prison, Solano, pages 3-6, 11-14, 18-22, 28-30); Ex 54 at 2; Ex 55 at 16-17; Ex. 57 at 1-3 (04/22/05 Expert Goldenson's Report of Dr. Wu). The CDCR has a backlog of over 300 deaths that have not been reviewed. RT 585:9-586:10 (Kanan). In addition, almost all the deaths that occurred (at an approximate rate of one per day) in March, April and May of this year have not been reviewed. *Id.*

d. Hiring Procedures

86. The Stipulated Order mandated that "Prior to Calendar Year 2003, CDCR shall initiate appropriate hiring procedures to hire medical staff for employment beginning January 1st." Stipulation for Injunctive Relief at 4. The CDCR failed miserably in meeting this requirement. Ex. 49 at 2. Unfortunately, low standards in the hiring process have continued to plague the CDCR in recent times as well, with physicians being hired without primary care qualifications, with no background checks or primary care credential assessments, and with questionable practice histories. RT 669:4-17 (Shansky); RT 51:2-8 (Puisis). Dr. Puisis testified that the hiring procedures in California are "really the worst I have ever seen in my life . . . This is absolutely the worst." RT 100:25-101:2 (Puisis).

87. New screening procedures that have been implemented very recently, while an improvement, are inadequate, and require further steps to ensure that physicians are qualified to provide care to inmate patients. Ex. 49 at 4-5.

(2) 2004 Patient Care Order

88. In the Fall of 2004, it became apparent that further measures were required in light of the paltry progress that had been made to date. To this end, defendants stipulated to entry of the Patient Care Order.

This order required defendants to: (a) engage an independent entity to undertake measures with respect to the treatment of high risk patients; (b) evaluate the competency of physicians employed by the CDCR and provide training to those found to be deficient; (c) develop proposals regarding physicians, nursing classifications, and supervision; and (d) fund and fill Quality Management Assistance Teams (QMAT) and other support positions. *Id.* Defendants have failed to meet the terms of the Patient Care Order.

a. High Risk Patient Care

89. Under the Patient Care Order, the CDCR has the duty to identify "high risk patients" whose medical condition makes them more vulnerable to death or serious injury than other patients. Patient Care Order at 3-4; RT 67:18-25 (Puisis). However, only roughly one quarter of those patients with complex medical problems are actually classified as high-risk. RT 87:25-88:23 (Puisis). High-risk patients should be treated by specialists, but instead are often treated by minimally qualified and incompetent doctors. RT 89:3-9 (Puisis). Furthermore, the plain fact is that the CDCR simply does not have enough qualified doctors to treat high-risk patients. RT 66:20-24 (Puisis). Although the CDCR does work with University of California system internists to provide medical care to high-risk patients, these sporadic consultations are inadequate to address the vastness of the problem. RT 54:21-55:2, 72:7-13 (Puisis).

b. Quality in Corrections Medicine ("QICM") Evaluations

90. The Patient Care Order required Defendants to complete evaluations of its physicians, and, if appropriate, to provide training for all physicians with clinical responsibilities at the

calender year 2003-2004 roll-out institutions by December 31, 2005. Patient Care Order at 2. In cooperation with UC San Diego Medical Center, defendants created the Quality in Corrections Medicine (QICM) evaluation program. RT 432:18-21 (Hanson).

91. The CDCR has failed to make reasonable progress towards putting the QICM program into practice. It was not until a week after the OSC hearing that clinicians began reporting for their evaluations. Kanan Decl. at 2.

c. Credentialing Policy

92. The CDCR's high number of incompetent or unqualified doctors is due in part to defendants' failure to track physician credentials and to remain cognizant of the areas of practice in which their board-certified doctors are certified. RT 51:20-25 (Puisis). The Patient Care Order required CDCR to establish a policy of credentialing and privileging physicians as a critical step to preventing harm to prisoners. RT 79:11-14 (Puisis).

93. Defendants were allotted five and a half months to institute a credentialing policy. Patient Care Order at 5. Credentialing is widely used in the health care industry, and the policies are "not that complicated." RT 79:21-23, 80:4-8 (Puisis); RT 645:3-6 (Kanan). Instead of developing this policy in house, the CDCR contracted out the task, waiting nine months to even sign a contract with the firm performing the work. RT 645:7-22. (Kanan).

94. At the beginning of 2005, the CDCR implemented a policy that forbade hiring independent contractors and primary care physicians who were not board-certified or board-eligible in internal medicine or family practice. Ex. 32 at 1 (Corrective Action Plan for Stipulated Court Order re: Quality of Patient Care and Staffing, Version updated 2/17/05); Patient Care Order at 3. The central office now investigates each new CDCR physician by doing a broad search of practitioner databases to ascertain whether other health care entities have reported adverse credentialing actions regarding them or malpractice settlements on their behalf that are indicative of problems with their patient care. RT 597:11-600:1 (Kanan). However, the CDCR has not formally adopted this or any other credentialing policy, which is evidence of a lack of will (or at a minimum a lack of competence) for systemic reform in this area. RT 79:15-20 (Puisis). Due to the lack of a credentialing policy,

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many CDCR doctors are not qualified to practice the type of medicine required by their position and practice outside their area of medical expertise. Ex. 40 at 52-53; Ex. 49. For example, within the CDCR, one OBGYN manages HIV patients and an incompetent neurosurgeon practices internal medicine. Ex. 49 at 3.[4]

CONCLUSIONS OF LAW

I. The Establishment of a Receivership is Warranted

A. Historical Background of Receivership Remedy

The receivership remedy has its roots in the English Chancery Courts, where receivers were appointed to protect real property and monetary rents and profits. *See* RALPH EWING CLARK, A TREATISE ON THE LAW AND PRACTICE OF RECEIVERS (3d ed. 1959) ("TREATISE ON RECEIVERS"), *citing Barnardiston's Reports* (1740-1741) 69, 27 Eng. Rep. 558; *Gordon v. Washington*, 295 U.S. 30, 37 (1935). The traditional definition of a receiver is as follows:

> A receiver ... is a person who ... becomes an officer of the court to receive, collect, care for, administer, and dispose of the property or the fruits of the property of another or others brought under the orders of court by the institution of a proper action...

TREATISE ON RECEIVERS at 13, *citing Spring Valley W. Co. v. City and County of San Francisco*, 225 Fed. 728, 731 (1918), *aff'd* 246 U.S. 391 (1918). Additionally, "[t]echnically property placed by a court in the hands of a receiver is not in the possession of the receiver but in the possession of the court through such receiver as its officer." TREATISE ON RECEIVERS at 626; *Atlantic Trust Co. v. Chapman*, 208 U.S. 360, 371 (1907) (receiver is an officer of the court).

The receivership process became incorporated into early American jurisprudence, where it has established a long historical tradition as part of the federal courts' equity jurisdiction, arising from Article III, section 2 of the Constitution ("The judicial Power shall

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[4] Although the Court has attempted to avoid commingling findings of fact with conclusions of law, any conclusions that are inadvertently labeled as findings (or vice versa) shall be considered "in [their] true light, regardless of the label that the ... court may have placed on [them]." *Tri-Tron International v. Velto*, 525 F.2d 432, 435-36 (9th Cir.1975).

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extend to all Cases, in Law and Equity, arising under this Constitution..."). *See In re Reisenberg*, 208 U.S. 90 (1908) (upholding displacement of corporate management by court-appointed receiver); *Washington v. Washington State Commercial Passenger Fishing Vessel Assoc.*, 443 U.S. 658, 695 (1979) (holding that district court has power to "assum[e] direct supervision" of state property "if state recalcitrance or state-law barriers should be continued," and that the court may "displace local enforcement of [the court's] orders if necessary to remedy the violations of federal law found by the court"); FED. R. CIV. P. 66 (providing district court with control over appointment and dismissal of receivers); 4 JOHN NORTON POMEROY, POMEROY'S EQUITY JURISPRUDENCE § 1330 *et seq.* (Spencer W. Symons ed., Bancroft-Whitney 5th ed. 1941).

While the historical roots of receivership lie in the protection of property and assets, and at times in the implementation of corporate reorganizations, its usage expanded during the civil rights era. In the second decision in *Brown v. Board of Education*, the Supreme Court invoked the chancery tradition by stating that "equity has been characterized by a practical flexibility in shaping its remedies and by a facility for adjusting and reconciling public and private needs." *Brown v. Bd. of Educ.*, 349 U.S. 294, 300 (1955). The Court further discussed a "period of transition" during which the district courts should maintain jurisdiction over desegregation cases to "consider the adequacy of any plans the defendants may propose ... and to effectuate a transition to a racially nondiscriminatory school system," thus suggesting that federal courts might be called upon to engage in long-term institutional oversight. *Id.* at 300-01 (1955); *see also* Owen M. Fiss, *Foreword: The Forms of Justice*, 93 HARV. L. REV. 1, 3 (1979) (the second *Brown* decision "delegated the reconstructive task to the lower federal judges. They, in turn, discovered what the task required and adjusted traditional procedural forms to meet the felt necessities."). Subsequent intense resistence to integration presented certain federal district and appellate courts with no realistic choice other than taking control of school districts through the imposition of receiverships. *See, e.g.*, *Turner v. Goolsby*, 255 F.Supp. 724, 730 (S.D. Ga. 1966) (state superintendent

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appointed receiver for county school system); *Morgan v. McDonough*, 540 F.2d 527, 533 (1st Cir. 1976) (approving temporary receivership of South Boston High School).

The use of receivers to reform public institutions has spread to analogous contexts in the civil rights arena, including prisons. *See, e.g., Newman v. State of Ala.*, 466 F.Supp. 628, 635-36 (1979) (appointing receiver for Alabama State Prisons, stating: "The extraordinary circumstances of this case dictate that the only alternative to non-compliance with the Court's orders is the appointment of a receiver for the Alabama prisons."); *Shaw v. Allen*, 771 F.Supp. 760, 762 (S.D. W.Va. 1990) ("Where more traditional remedies, such as contempt proceedings or injunctions, are inadequate under the circumstances, a court acting with its equitable powers is justified, particularly in aid of an outstanding injunction, in implementing less common remedies, such as a receivership, so as to achieve compliance with a constitutional mandate."); *Wayne County Jail Inmates v. Wayne County Chief Executive Officer*, 444 N.W.2d 549, 556 (Mich. App. 1989); *Inmates of D.C. Jail v. Jackson*, 158 F.3d 1357 (D.C. Cir. 1998).[5]

Thus, the remedy being imposed through this Order follows a long historical line of precedent where nothing short of receivership could protect the plaintiffs' interests and remedy the violation of their constitutional rights.

B. Legal Analysis

The decision whether to appoint a receiver is a function of the court's discretion in evaluating what is reasonable under the particular circumstances of the case. *See Dixon*, 967 F.Supp. at 550; 12 CHARLES ALAN WRIGHT & ARTHUR R. MILLER, FEDERAL PRACTICE &

[5] The appointment of receivers has extended to other areas as well, such as mental health and child protection services. *See, e.g., Dixon v. Barry*, 967 F.Supp. 535 (D.D.C. 1997) (appointing receiver for Commission on Mental Health Services); *Gary W. v. Louisiana*, 1990 WL 17537, *17, *28-33 (E.D. La. 1990) (appointing receiver to oversee state children's services agencies where court's mandates were continually met with "a dismal record of non-compliance and management by crisis"); *Judge Rotenberg Educ. Cntr., Inc. v. Comm'r of the Dep't of Mental Retardation*, 677 N.E.2d 127 (1997) (appointing receiver of state Department of Mental Retardation).

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PROCEDURE § 2983 (2005). As the case law concerning the receivership remedy for the reform of public institutions has developed over the past few decades, a multi-pronged test has developed to guide the trial courts in making this often difficult determination. The test includes the following elements, the first two of which are given predominant weight:

(1) Whether there is a grave and immediate threat or actuality of harm to plaintiffs;

(2) Whether the use of less extreme measures of remediation have been exhausted or prove futile;

(3) Whether continued insistence that compliance with the Court's orders would lead only to confrontation and delay;

(4) Whether there is a lack of leadership to turn the tide within a reasonable period of time;

(5) Whether there is bad faith;

(6) Whether resources are being wasted; and

(7) Whether a receiver is likely to provide a relatively quick and efficient remedy. *See Dixon*, 967 F.Supp. at 550; *District of Columbia v. Jerry M.*, 738 A.2d 1206, 1213 (D.C. Ct. App. 1999) (reversing appointment of receiver based on trial court's consideration of only the single factor of defendant's historical failure to comply with court mandates); *Morgan*, 540 F.2d at 533 (appointing receiver as "the only reasonable alternative to non-compliance with [the] court's plan"); 12 FEDERAL PRACTICE & PROCEDURE § 2983 (factors relevant to establishing requisite need for receivership include "imminent danger," inadequacy of available legal remedies, probability of harm to plaintiff, and possibility of irreparable injury).

The Court will review each of these factors in turn.

(1) *Threat of Harm*

As the Findings of Fact amply demonstrate, the treatment of prisoners in California constitutes a "gross and extreme departure from the standard of care." The Supreme Court's discussion of prisoner medical care in *Estelle v. Gamble* was prescient in regard to the current situation in California:

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> An inmate must rely on prison authorities to treat his medical needs; if the authorities fail to do so, those needs will not be met. In the worst cases, such a failure may actually produce physical "torture or a lingering death," the evils of most immediate concern to the drafters of the [Eighth] Amendment. In less serious cases, denial of medical care may result in pain and suffering which no one suggests would serve any penological purpose. The infliction of such unnecessary suffering is inconsistent with contemporary standards of decency...

Estelle v. Gamble, 429 U.S. 97, 103 (1976).

Nothing beyond the Findings recited above need be said to express the severity of the health crisis facing California prisoners. Indeed, the findings in this Order scarcely do justice to the actual harm experienced by thousands upon thousands of individuals in the California prison system. As Judge Justice stated twenty-five years ago when describing the Texas prison system:

> [I]t is impossible for a written opinion to convey the pernicious conditions and the pain and degradation which ordinary inmates suffer ... [including] the physical suffering and wretched psychological stress which must be endured by those sick or injured who cannot obtain adequate medical care.

Ruiz v. Estelle, 503 F.Supp. 1265, 1390 (S.D. Tex. 1980).

Based on the Findings, removing defendants from control of the medical system and imposing a Receiver to radically transform it is the only viable means of saving lives and creating a stable and effective health care delivery system in the CDCR. *See, e.g., Dixon*, 967 F.Supp. 535, 554 ("There is no doubt that without severe action by the Court [in the appointment of a receiver] ... suffering and loss of life will continue unabated"); *LaShawn A. v. Kelly*, 887 F.Supp. 297, 315 (D.D.C. 1995) ("While it is true that the defendants have made some progress in various areas, the ... factual findings show the urgent need for a new, more fundamental approach to change."). Indeed, the suffering and deaths that have occurred since this Court's oral ruling on June 30, 2005 weigh most heavily on this Court's mind and conscience as it tries to move expeditiously through these complex proceedings.

(2) *Least Intrusive Means*

In fashioning an appropriate remedy, the Court must exercise restraint, using the least possible power adequate to the remediation of constitutional violations. *See, e.g., Missouri v. Jenkins*, 495 U.S. 33, 51 (1990) (before intruding on local authority, district court must

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assure itself that no lesser alternatives are adequate to the task). However, the Court is not required to restrict its powers to those means that have proven inadequate, or that show no promise of being fruitful. Rather, as the Supreme Court has held, "federal courts are not reduced to issuing injunctions against state officers and hoping for compliance. Once issued, an injunction may be enforced." *Hutto v. Finney*, 437 U.S. 678, 690 (1979). The Ninth Circuit similarly has held that "where federal constitutional rights have been traduced, principles of restraint, including comity, separation of powers and pragmatic caution dissolve..." *Stone v. City and County of San Francisco*, 968 F.2d 850, 861 (9th Cir. 1992).

The Prison Litigation Reform Act (PLRA), 18 U.S.C. § 3626(a)(1)(A), which governs this case, codifies the Court's authority to issue prospective relief that fully remedies constitutional violations, while mandating that the relief not be overly broad. The relevant language of the PLRA is as follows:

> Prospective relief in any civil action with respect to prison conditions shall extend no further than necessary to correct the violation of the Federal right of a particular plaintiff or plaintiffs. The court shall not grant or approve any prospective relief unless the court finds that such relief is narrowly drawn, extends no further than necessary to correct the violation of the Federal right, and is the least intrusive means necessary to correct the violation of the Federal right. The court shall give substantial weight to any adverse impact on public safety or the operation of a criminal justice system caused by the relief.

18 U.S.C. § 3626(a)(1)(A). The Second Circuit recently held that "the deference due prison administrators by courts is implicated primarily by questions relating to institutional security of a type not raised" in the context of health-related conditions. *Benjamin v. Fraser*, 343 F.3d 35, 52 (2nd Cir. 2003). Nevertheless, this Court is able to abide in full with the "needs-narrowness-intrusiveness" standard of the PLRA, so it need not address whether a lesser standard is applicable in this case.

a. Failure of the Court's Efforts to Use Lesser Intrusive Means

The task of running the CDCR medical system is a complex and difficult one, especially given the number of prisoners, the breadth and depth of their medical needs, the special difficulties posed in a correctional setting, the number and geographic dispersion of the state's 33 prisons, the extreme state of overcrowding, and the failures of past

administrations to take medical care seriously. The provision of adequate medical care in this situation presents a classic example of a "polycentric" problem. As then Professor of Law and now Ninth Circuit Judge William Fletcher has explained:

> The concept of polycentricity may help to clarify the problems involved in trial court remedial discretion in institutional suits. Polycentricity is the property of a complex problem with a number of subsidiary problem "centers," each of which is related to the others, such that the solution to each depends on the solution to all the others. A classic metaphor for a polycentric problem is a spider web, in which the tension of the various strands is determined by the relationship among all the parts of the web, so that if one pulls on a single strand, the tension of the entire web is redistributed in a new and complex pattern.

William A. Fletcher, *The Discretionary Constitution: Institutional Remedies and Judicial Legitimacy*, 91YALE L.J. 635, 645 (1982) (citation omitted) ("*Discretionary Constitution*"). As just one example of the interrelatedness of multiple problem centers, the Court notes that the hiring of competent medical staff and the creation of a working medical records system are two pressing issues. Both tasks must be accomplished simultaneously. Good doctors and nurses cannot be recruited if they know that they will be forced to treat patients without adequate medical records. At the same time, qualified doctors and administrators must be brought on board to establish and maintain the medical records system. One cannot function well without the other, and each element of the solution requires "mutual spontaneous adjustment." *Discretionary Constitution* at 647.

But to say that a problem is polycentric is not to say that it is insoluble. As expressed above, steps toward resolving this crisis have been ordered by the Court. Additionally, the Court Experts, plaintiffs, and the Court itself have provided specific achievable measures and have made innumerable informal suggestions as to how defendants can move forward. The Court invited the parties during monthly status conferences to contribute ideas as to possible remedies, and the Court especially encouraged defendants to consider ways in which they could take the actions necessary to solve the medical care problems through measures within their own control, including use of the extraordinary powers of the Governor. The Court went to the length of requesting that defendants present it with a series of proposed orders so that the Court could help empower them to overcome some of their bureaucratic hurdles on

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their own. *See* Order Following April 2005 Status Conference (filed April 29, 2005) at 2. Defendants did not submit a single proposed order. Finally, the Court issued the Order to Show Cause, which stated that "with respect to the substantive remedy itself, the Court encourages all parties to think as creatively as possible, and the Court will remain open to all reasonable alternatives." OSC at 17. Even following issuance of the OSC – on the brink of possible contempt and the imposition of a Receivership – defendants were able to enact only very limited and piece-meal measures, with no prospect for system-wide reform or restructuring.

In spite of all these efforts by the Court, defendants have been unwilling or incapable of breaking out of a deeply entrenched bureaucratic mind-set, and have refused or been unable to take the steps necessary to prevent further needless loss of life and suffering among its wards. As just one example, defendants have recognized that they need an immediate infusion of clinical and administrative staff, yet they have taken no measures to overcome the substantial barriers posed by the state bureaucracy. The result is that requests for medical staff, or for an increase in salary to attract qualified staff, or even for a salary survey, have been met with the same delay and resistance as requests for far less urgent matters.

This mind-set is a classic example of what the sociologist Thorstein Veblen terms "trained incapacity." THORSTEIN VEBLEN, THE INSTINCT OF WORKMANSHIP AND THE STATE OF THE INDUSTRIAL ARTS 347-48 (Macmillan 1914). State officials have become so inured to erecting barriers to problems that appear to threaten the bureaucracy (or that at least appear to require the bureaucracy to bend or flex) that the officials have trained themselves into a condition of becoming incapable of recognizing, and acting in response to, true crisis. *See, e.g.*, *Gary W.*, 1990 WL 17537 at *32 ("In instances of justifying [receivership], the courts have typically found a lack of leadership that could be expected to improve conditions within a reasonable period of time, systemic deficiencies in administrative, organizational, and fiscal structures, institutional inertia, and similar indicia of bureaucratic morass.").

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b. The Lack of Alternative Effective Remedies

In its attempt to allow defendants to resolve this crisis, the Court has exhausted all reasonable means of compulsion. Nonetheless, for the sake of thoroughness, the Court will briefly discuss the avenues that conceivably remain short of Receivership. First, the Court could impose contempt sanctions. However, the Court does not view a contempt remedy as having a realistic likelihood of proving effective. Pursuing a contempt remedy would greatly extend the future life-span of the current dysfunctional system, thereby placing innumerable lives in grave danger, with no hope that the sanctions would produce a positive result due to the State's self-professed inability to cope with the magnitude and complexity of this crisis. Even if this lack of will were overcome to some extent and the Court were to succeed in forcing the hand of certain individual defendants, the Court believes that other impediments – not least of which are the bureaucratic barriers discussed above and the long-standing culture of medical neglect – would largely subvert the effort and the system would still fall short of constitutional adequacy. Contempt simply is not an appropriate remedy in the current circumstances. As the court stated in *Gary W.*:

> [D]efendants have not only shown no capacity to implement corrective plans previously submitted, but also that they either are no longer willing or able to even devise remedial programs to address the clearly identified barriers to compliance with the Orders of the Court... Given the history of this case, including the past efforts of this Court to facilitate, cajole, and even coerce compliance, the demonstrated inability of defendants to comply substantially with this Court's previous Orders (despite many opportunities to do so), and the flawed organizational structure [of defendants], this Court concludes that an Order holding the defendants in contempt is not an adequate remedy... [S]uch measures "promise only confrontation and delay."

Gary W., 1990 WL 17537 at *29-30 (citation omitted); *see also Wayne County*, 444 N.W.2d at 561 (affirming receivership of county jail system, stating: "[W]e do not feel contempt is an appropriate vehicle to remedy the panoply of noncompliance in this case... The trial court correctly reached the realization that contempt proceedings would never bring full implementation of its orders."); *Newman*, 466 F.Supp. at 635; *Morgan*, 540 F.2d at 533 (rather than instituting contempt proceedings or issuing further injunctions, which "were plainly not very promising, as they invited further confrontation and delay," a receivership was necessary "to get the job done.").

The Court also could consider appointing a special master. However, given defendants' professed inability to take adequate measures to cure the constitutional violations even with the extraordinary guidance of the Court Experts and the mandates of the Court's orders, this would be an exercise in futility. As the court held in *Newman*:

> The lack of any significant progress since the original hearings in this case strongly suggests that the appointment of monitors offers little, if any, hope of swift compliance. The extraordinary circumstances of this case dictate that the only alternative to non-compliance with the Court's orders is the appointment of a receiver.

Newman, 466 F.Supp. at 635.

Another conceivable remedy is that of sequestration, whereby the courts traditionally have coerced compliance by detaining defendants' property, or by quasi-sequestration where the courts limit or shut off defendants' access to funds. *See, e.g., United States v. City of Chicago*, 549 F.2d 415 (7th Cir. 1977) (affirming district court's suspension of distribution of general revenue sharing funds to Chicago as means of compelling city to end racial discrimination in police department). However, the effect of depriving the CDCR of funds that are desperately needed for medical care would not only be counter-productive, but would result in a perversion of the equities in this instance.

The Court also could consider either closing some institutions or ordering the release of some prisoners (perhaps those who are at highest risk of receiving inadequate medical care, or those who pose the least security risk as a means of general population reduction). Since these options would be more onerous to defendants than the establishment of a Receivership, the Court need not entertain them at this time. *See Shaw*, 771 F.Supp. at 763 (receivership "is not as drastic and intrusive as the ultimate course of action this Court could, and may yet effectuate – that of ordering the [] jail closed."); *Newman*, 466 F.Supp. at 635 ("There is, of course, a more extreme alternative to a receivership ... [i.e.] the closing of several prison facilities. In light of that alternative, the more reasonable and the more promising approach is the appointment of [a] receiver for the prison system.").[6]

[6] *See also Crain v. Bordenkircher*, 376 S.E.2d 140, 142 (W.Va. 1988) (issuance of "rule to show cause" for the appointment of a receiver to oversee the funding and

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Notably, defendants have proposed no alternative measures to resolve the crisis and have not opposed the appointment of a Receiver. *See* Defendants' Response to Order to Show Cause.

Thus, having exhausted all reasonable coercive measures at its disposal, yet finding itself unable and unwilling to sit idly by while people are needlessly dying, the Court believes it is obligated to take control of the prison medical system. As the court stated in *Gary W.*:

> [T]he responsibility of this Court is "clear and compelling: to use its broad and flexible equitable powers to implement a remedy that, while sensitive to the burdens that can result from a decree and the practical limitations involved, promises, '*realistically to work now.*'"

Gary W., 1990 WL 17537, *30, *quoting Green v. County School Bd.*, 391 U.S. 430, 439 (1968); *see also Swann v. Charlotte-Mecklenberg Bd. of Ed.*, 402 U.S. 1, 16 (1971) (the scope of relief must be determined by the nature of the violation); *Feliciano*, 1990 WL 83321 at *11 (less than four years following stipulation to increase the size of prison cells, the court concluded: "[T]his court of equity will not suffer a wrong of such constitutional magnitude ... to go any longer without an adequate remedy," including a possible receivership). In essence, the time has now come when the number of options with any realistic chance of success has dwindled down to a single one – Receivership.

construction of a new prison, costing roughly $50 million, despite the court's recognition of the state's "great economic distress," stating that such appointment would be "clearly a lesser evil than ... [the prisoners'] release from the penitentiary because of unconstitutional conditions of confinement."); *Feliciano v. Colon*, 1990 WL 83321 at *10 (D. Puerto Rico 1990) (placing defendants on notice that their failure to cure contempt could subject them to "compensatory fines," "coercive fines," "accelerated award of good time to prisoners to reduce population density," and "the imposition of a receivership."); *Wayne County*, 444 N.W.2d at 561 ("The receivership remedy is far from the most intrusive action [the trial court] might have taken... He could have taken a different approach and closed the jail until the final judgment was fully implemented."); 18 U.S.C. § 3626(a)(3) (provision of PLRA governing prisoner release orders); MALCOLM M. FEELEY & EDWARD L. RUBIN, JUDICIAL POLICY MAKING AND THE MODERN STATE: HOW THE COURTS REFORMED AMERICA'S PRISONS 93 (Alfred Blumstein & David Farrington eds., Cambridge University Press 1998) (" JUDICIAL POLICY MAKING") (describing process in *Ruiz v. Estelle* litigation in Texas whereby the court ordered the release of a certain number of inmates whenever crowding reached a certain level, and the state legislature responded by enacting legislation to permit the prison authorities to select which inmates to release); *cf. Morgan*, 540 F.2d at 534 (establishment of receivership over school was less onerous than closing school, and district court "demonstrated both restraint and wisdom in selecting the receivership option," which was "not excessive but [rather] reasonably tailored to carrying out the court's responsibilities").

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(3) *Continued Delay*

It is resoundingly clear to the Court that continued insistence on defendants' compliance with Court orders would lead to nothing but further delay, as well as further needless death and morbidity. As discussed above, the State sees itself as incapable of handling this crisis, and no degree of support or coercion is likely to help. *See Newman*, 466 F.Supp. at 635 ("Time does not stand still, but the Board of Corrections and the Alabama Prison System have for six years. Their time has now run out. The Court can no longer brook non-compliance with the clear command of the Constitution, represented by the orders of the Court in this case."); *Gary W.*, 1990 WL 17537 at *29-30 ("The time for 'all deliberate speed' is long passed").

(4) *Leadership*

While blame for the deplorable condition of prison medical care in the state can properly be attributed to multiple causes, there is a single root cause of this crisis: an historical lack of leadership, planning, and vision by the State's highest officials during a period of exponential growth of the prison population. *See, e.g., Newman*, 466 F.Supp. at 630 ("The theme running throughout the evidence is a lack of professional leadership."). These State officials have the ultimate responsibility to hire, train, supervise, and audit their own staff, and to provide sufficient resources, technology, and support for those staff members to ensure that instances of negligent care and malpractice are kept to a minimum and that the system operates at least at the level of constitutionally adequate care.

The past and current leaders of the prison system have failed to take the bold measures necessary to protect the lives of prisoners, to find solutions to the impediments posed by the State bureaucracy, and to make systemic improvements. Many of these measures, such as taking incompetent doctors out of patient care, hiring qualified new doctors and nurses, and providing a medical records system are neither obscure nor infeasible.

Perhaps no better illustration exists of the lack of leadership than Dr. Shansky's testimony regarding the State's failure to maintain, and to capitalize upon, improvements made in the medical delivery system at San Quentin years ago pursuant to the litigation in

Marin v. Rushen, C-80-0012 MHP (N.D. Cal. 1980). RT 698:2-699:11. The Court's first-hand observation of the depths to which that institution was allowed to sink in the aftermath of careful and productive judicial intervention in *Marin* has had a profound effect on this Court.

Defendants also have failed to take a strong leadership position in resolving a long-standing impediment to medical care, which is the over-prioritization of custody interests even in the face of pressing medical needs. The testimony is replete with stories of prisoners suffering from obvious illness and injuries who are blocked from receiving medical attention by custody staff. While the Court is cognizant of the legitimate special difficulties posed in dealing with an incarcerated population, these challenges fail to explain or justify the severe imbalance of priorities in this case. *See* Susan Sturm, *Resolving the Remedial Dilemma: Strategies of Judicial Intervention in Prisons*, 138 U. PA. L REV. 805, 818 (1990) (describing phenomenon of "goal displacement" in prison administration).

The numerous deaths and harm from medical misfeasance and neglect have been predictable consequences of what can best be described as a "non-system" of care in California's prisons. This is not mere hindsight; rather, it has been the foreseeable and unavoidable result of the State's failure to use the full extent of its powers to meet its constitutional obligations. *See, e.g., Palmigiano v. Garrahy*, 448 F.Supp. 659, 671(D. R.I. 1978 (governor's efforts did not constitute "'all reasonable steps' toward achieving compliance" and "none of the reasons offered for delay by defendants related to an inability to comply"); *Bracco v. Lackner*, 462 F.Supp. 436, 449 (N.D. Cal. 1978), *quoting Welsch v. Likins*, 550 F.2d 1122, 1132 (8th Cir. 1977) ("'The obligation of defendants to eliminate existing unconstitutionalities does not depend upon what the Legislature may do, or upon what the Governor may do...'").

In all fairness, the Court recognizes that the current administration inherited many of the problems identified above from past administrations, which must bear much of the blame for building California's vast prison system without regard for inmate medical care. As the Court has stated in the past, the Governor has appointed, and the State has hired, a number of

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dedicated individuals to tackle the difficult task of addressing the crisis in the delivery of health care in the CDCR. These leaders have been forthright in conceding their failures,[7] have not attempted to obstruct the Receivership process, and have shown good faith and even enthusiasm in discussions with the Court and plaintiffs' counsel about the prospect of working with a Receiver toward the goal of revamping, and perhaps redesigning, the prison medical delivery system.

When appointing receivers, courts often remove the officials in charge of the entity responsible for the constitutional violations from power and place the receiver in their stead. *See, e.g., Newman*, 466 F.Supp. at 636 (relieving the Board of Corrections of all power and displacing the Board with a receiver); *Morgan*, 540 F.2d 527. As an expression of the Court's trust in the current State leadership, the Court will deviate from this practice and will not displace any State officials. This trust must continue to be earned. This Order shall serve as notice to the current leaders of the prison system and of the State that they must do everything in their power to work cooperatively with the Receiver, to create substantial reform in the executive branch (within CDCR and in all other relevant agencies), to seek legislative reform where necessary, and take all other necessary measures to eradicate the barriers that have led to the current crisis. While these changes will take some time, the Court expects to see continual progress toward these goals. Ultimately, these changes will be essential to the Court's decision to return control to the State.

(5) *Bad Faith*

The question of motive is complicated. As in any case dealing with a governmental institution, circumstances are dictated by a combination of individual effort (or lack thereof) and bureaucratic and political forces. *See* Fiss, *Foreword: The Forms of Justice* at 22 ("In

[7] As discussed in the Findings, Undersecretary Kevin Carruth testified that medical care is not a "core competency" of the State prison leadership. This concession is a double-edged sword. On the one hand, defendants have had the wisdom to recognize and admit their failure, as opposed to many other individuals or institutions who in similar circumstances would pursue indefensible positions to the bitter end. On the other hand, as discussed below, it is an abdication of the public trust for these officials to throw up their hands in surrender, at least prior to exhausting all measures available to them.

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the structural context, there may be individual wrongdoers ... [but] the target of the suit [is] on a social condition ... and also on the bureaucratic dynamics that produce that condition. In a sense, a structural suit is an in rem proceeding where the res is the state bureaucracy."). The Court has discussed above a number of these forces, including the leadership vacuum and the trained incapacity of the bureaucracy. While lack of will thus is a key factor contributing to this crisis, the Court need not ascribe ill will to defendants as a predicate to appointing a Receiver, and the Court declines to do so.

(6) *Wasted Resources*

While the Court has not yet ordered a detailed accounting, all the evidence supports the Court's firm conviction that defendants have engaged in a huge waste of the taxpayer's resources. Certainly, spending over one billion dollars annually on a system that far too often neglects, mistreats, and at times literally kills those it is intended to serve is a massive waste of money and, more importantly, life. *See Palmigiano*, 448 F.Supp. at 674 ("[A]lready the heavy financial costs, which the prison administration imposes by maintaining many prisoners [in unconstitutional conditions], fall on the taxpayers; this cost should soon be diminished. The citizens of this state also bear the human costs of operating a degraded prison system.").

Even focusing just on money, the expert testimony indicates that there are substantial inefficiencies in the system, and the Court's own observations at San Quentin and the California Institute for Men mirrors that evidence. As just one example, from the testimony and the Court's discussion with staff at San Quentin it is clear that large amounts of pharmaceuticals end up being thrown away for no reason other than mismanagement. The Court has little doubt that the degree of waste experienced by the CDCR in the past can be reduced substantially by a Receiver.

(7) *Likelihood of a Quick and Efficient Remedy*

No doubt the reform of the CDCR medical system will be a monumental task. The preparation and execution of an effective plan to bring the prison medical system up to constitutional standards will require intimate knowledge and understanding of the way the

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CDCR operates from both the medical and custodial perspectives, a keen grasp of the reasons for the present crisis, an appreciation of the positions of each interested stakeholder, an understanding of financial and budgetary factors, and an ability to navigate the state bureaucracy and to make it responsive to the plaintiffs' needs. Making an appreciable impact may take many months, and a full remedy will take years. While this may not be "quick" in some contexts, the speed of reform must be judged relative to the scale of the project, which in this case is enormous.[8] The Court believes that steady progress here under the direction of a Receiver is possible, that gains in patient care will be made along the way, and that this is far preferable to the current state of paralysis.

(8) ***Additional Considerations***

a. The Problem of Democratic Debilitation

Looking at the full spectrum of powers typically exercised by the courts, there is no doubt that the imposition of a Receivership is a drastic measure. But it is not a measure that the Court has sought, nor is it one the Court relishes. Rather, the Court is simply at the end of the road with nowhere else to turn. Indeed, it would be fair to say that the Receivership is being imposed on the Court, rather than on the State, for it is the State's abdication of responsibility that has led to the current crisis. *See Judge Rotenberg Educational Center*, 677 N.E.2d at 150 ("[W]hen the executive persists in indifference to, or neglect or disobedience of court orders, necessitating a receivership, it is the executive that could more properly be charged with contemning the separation principle."). Since the Court has jurisdiction over this matter, it has no choice but to step in and fill the void. But this is a disturbing result, not simply because it is a drastic measure for the Court, but because it exhibits a debilitation of the democratic process whereby the State executive branch has effectively turned over its obligations to the federal judicial branch. *See Shaw*, 771 F.Supp.

[8] The Court has referred to this case, and the task at hand, as humongous, and indeed it is. Nevertheless, judicial control of state-wide prison systems is nothing new. In fact, the Court is aware of ten other states in which court orders involving the totality of conditions in the entire prison systems were issued. *See* JUDICIAL POLICY MAKING at 41, 81.

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at 763 ("In essence, it is the Court's view that the Defendants are, at least in part, 'passing the buck' to it. Well, if it may appropriately be said, the 'buck stops here' for the Court is constitutionally bound to 'pick up the gauntlet.'"). This dual problem implicating concerns of separation of powers and comity unfortunately will remain until the State proves itself ready to regain control of the prison medical system.

b. The Lack of Political Will

The Court also recognizes the inherently political nature of this matter. To a significant extent, this case presents a textbook example of how majoritarian political institutions sometimes fail to muster the will to protect a disenfranchised, stigmatized, and unpopular subgroup of the population. This failure of political will, combined with a massive escalation in the rate of incarceration over the past few decades, has led to a serious and chronic abnegation of State responsibility for the basic medical needs of prisoners. This is a case where "the failure of the political bodies is so egregious and the demands for protection of constitutional rights [is] so importunate that there is no practical alternative to federal court intervention." *Discretionary Constitution* at 697; *see also Shaw v. Allen*, 771 F.Supp. 760, 763 (S.D.W.Va. 1990) ("[T]he Court is ... not so naive as to fail to recognize ... that factors of a 'political' nature are also guiding the Defendants. Certainly, it may be said without a great deal of reservation that the expenditure of a significant portion of a limited budget so as to protect the constitutional rights of prisoners is not a paramount concern in the minds of many citizens. In fact, many may inappropriately consider it both an unnecessary and unwarranted expenditure of public funds."); *see also* JOHN IRWIN, THE WAREHOUSE PRISON: DISPOSAL OF THE NEW DANGEROUS CLASS 150 (Roxbury Publishing Company 2005) (explaining that state governments are unwilling to allocate resources to prisoners because their "needs rank at the bottom of the state's priorities."). The legal response to this political issue, however, is quite clear: When the state deprives individuals of their liberty, for whatever reason, it takes upon itself the obligation to provide those persons with certain services basic to their humanity, including medical care. *See Estelle*, 429 U.S. at 103 (citations omitted) (adopting "common-law view that '[i]t is but just that the public be

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required to care for the prisoner, who cannot by reason of the deprivation of his liberty, care for himself.'").

c. The Importance of Qualified and Dedicated Medical Staff

The Court does not wish to give the impression that all doctors working within the CDCR are incompetent or uncaring. For those who have violated their Hippocratic oath, they must take personal responsibility for their failures, even in light of the leadership failures discussed above. But the Court is personally aware of a number of doctors, nurses, and other medical staff members who have been struggling to provide quality care in dire circumstances. For these individuals the Court has nothing but praise. The Court wishes to encourage all of these medical professionals to continue their good work in the knowledge that California is about to embark on a dramatic transformation of its prison medical system. This message is intended as well for those medical professionals who have left CDCR employment in frustration, or who may consider applying for work in CDCR in the future.

On a related point, the Court is encouraged by the role that the unions representing medical staff have played in this process by submitting an amicus brief in support of the Receivership. The Court looks forward to working with the unions toward the commonly shared goal of saving lives and improving health care in the CDCR.

C. Conclusion

In light of all of the above, the Court concludes that the relevant factors and considerations weigh heavily in favor of the imposition of a Receivership in this case. While this is a step that no court takes lightly, this Court concludes that the record in this case compels this result and offers no realistic alternative. The Court further finds that the establishment of a Receivership, along with those actions necessary to effectuate its establishment, are narrowly drawn to remedy the constitutional violations at issue, extend no further than necessary to correct a current and ongoing violation of a federal right, and are the least intrusive means necessary to correct these violations. The Court is amply satisfied that this relief will impose no unnecessary burden on defendants and will have no adverse

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impact on either the safety of the public or the operation of the criminal justice system.

It bears emphasizing that establishment of the Receivership, while absolutely necessary, is intended as a temporary, not permanent, measure. The Court looks forward to the day, hopefully sooner rather than later, when responsible officials of the State will assume their legal obligations to run the CDCR in a manner that provides constitutionally adequate health care to all prisoners. As the Supreme Court has instructed, "[a] receivership is only a means to reach some legitimate end sought through the exercise of the power of a court of equity. It is not an end in itself." *Gordon*, 295 U.S. at 37. Once the Court is confident that defendants have the capacity and will to provide such care, the Court will relinquish control from the Receiver back to the State.

Lastly, the Court wishes to make clear that it intends to remain actively involved in the Receivership phase of this case, working in tandem with the Receiver to ensure the design and implementation of a constitutionally adequate remedy, and the return of control to the defendants, in the shortest time possible. While the Receiver will be imbued with the power and authority to act in the name of the Court as the Court's officer, ultimate authority, as well as responsibility, lies with the Court alone.

II. The Court Will Hold the Remedy of Contempt in Abeyance

A contempt finding is not a prerequisite to the appointment of a receiver. *See, e.g.*, *LaShawn A.*, 887 F.Supp. at 300 ("The Court, not eager to engender resentment among the defendants and their employees, declined to grant the plaintiff's motion for a finding of contempt and held it in abeyance, even though 'contempt may well [have been] justified.'"); *Gary W.*, 1990 WL 17537 at *30; *Newman*, 466 F.Supp. at 635; *Morgan*, 540 F.2d at 533. In the discussion above, the Court has made explicit its expectations of defendants in terms of facilitating the Receivership and eradicating bureaucratic barriers to future success. While the Court has confidence that these expectations will be met, the contempt remedy remains an available tool to address any failures in this regard.

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FURTHER PROCEEDINGS

During the course of the evidentiary hearing pertaining to the Order to Show Cause, plaintiffs filed an *ex parte* motion with the Court requesting the immediate appointment of a temporary receiver. Plaintiffs proposed that the Court's medical experts be appointed as temporary receivers and that they be given the limited role of improving physician staffing. There is support for the proposition that courts may appoint temporary receivers in appropriate circumstances. *See e.g.*, *Morgan*, 540 F.2d at 533 (approving temporary receivership of South Boston High School to ensure immediate transfer of certain staff who were impeding desegregation goal); *cf. LaShawn A.*, 887 F.Supp. at 300 (court imposed two "limited receiverships" in child welfare system at time consent agreement was entered; after subsequent non-compliance, court imposed a full receivership); TREATISE ON RECEIVERS at 21.

Plaintiffs' motion was based on their understandable concern that class members were suffering continued harm as the legal proceedings progressed. The Court has openly shared this concern, as expressed in the oral ruling on June 30, 2005. In fact, the Court initially was strongly inclined to appoint a temporary receiver pending a more thorough, systematic search for a Receiver. Thus, in July 2005, the Court began the process for the selection of a temporary receiver by consulting with the parties and sending a request for proposals to potential candidates recommended by counsel.

It became clear to the Court, however, during the process of reviewing proposals for a temporary receivership and interviewing candidates, that appointment of a temporary receiver would not be appropriate in this instance. The Receiver necessarily will have to engage in wholesale systemic reform given the polycentric and pervasive nature of the problems afflicting the CDCR. Such wholesale reform cannot effectively be initiated by a receiver with only very temporary authority. Furthermore, piecemeal reform that focuses on a limited aspect of the problem may actually prove counter-productive in the long run. Rather, the only effective approach to reforming the state prison medical system, and reducing harm to plaintiffs in a sustainable fashion, must be comprehensive and systemic

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from the outset. As such, the Plaintiffs' request for appointment of a temporary receiver shall be denied.[9]

Accordingly, the Court is presently engaged in the process of appointing a full Receiver with the leadership, commitment, experience, and vision to take on the monumental and critical task of bringing the level of medical care provided to California's 165,000 inmates up to constitutional standards. In undertaking this task, the Court is committed to discharging its obligation to ensure that it has appointed the best possible person to undertake this unusually complex and critically important challenge. To this end, the Court has concluded, based on its experience to date in this process, that it is essential to undertake a professionally organized national search for a Receiver. While the Court has initiated this process, and intends to proceed as expeditiously as possible, while also consulting counsel, it recognizes that this undertaking necessarily will take some time to conduct in a responsible manner. The Court concludes that any limited delay will be far outweighed by the benefit of ensuring the superiority of the Court's ultimate appointment.

During the current interim period prior to the appointment of the Receiver, the Court wishes, of course, to minimize the ongoing injury to the plaintiff class, given the life threatening impact of the ongoing constitutional violations. To this end, and by a separate order filed contemporaneously herewith, the Court is appointing a Corrections Expert, experienced in prison medical care reform and with extensive knowledge of CDCR operations, to make recommendations to the Court as to discrete remedial measures that can be undertaken immediately without interfering with the comprehensive and systemic reform that the Receiver necessarily will undertake. The Court emphasizes that the Corrections Expert will not be a temporary receiver and will not have the powers, authority, or responsibilities of a temporary receiver. Rather, the Corrections Expert will be limited to

[9] Although Plaintiffs never formally withdrew their request for appointment of a temporary receiver they have informally indicated to the Court that, in light of information learned during the process of interviewing candidates for a temporary receiver, they concur in the conclusion that appointment of a temporary receiver is not a practical approach in this instance.

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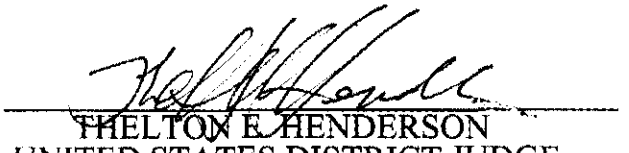
preparing recommendations to the Court regarding potential remedial orders that will not interfere with any systemic reform efforts that the Receiver may undertake. Once the Court selects a Receiver, the Court will issue a separate order of appointment outlining the responsibilities and powers of the Receiver.

IT IS SO ORDERED.

DATED October 3, 2005



THELTON E. HENDERSON
UNITED STATES DISTRICT JUDGE

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APPENDIX C

List of Sites Visited

URS Bovis Lend Lease Joint Venture

California Department of Corrections and Rehabilitation

Adult Institutions	City	County	Potential Use for CHFC
Pelican Bay State Prison	Crescent City	Del Norte	Stable staffing, but too remote for additional medical staff recruitment.
CA Correctional Center	Susanville	Lassen	Too remote for medical staff recruitment – not attractive for physicians; closest city and university is Reno, different medical licensing.
High Desert State Prison	Susanville	Lassen	See CA Correctional Center, above.
Folsom State Prison	Folsom	Sacramento	Suitable for medical staff recruitment; available space; available infrastructure.
CA State Prison, Sacramento	Folsom	Sacramento	See Folsom State Prison, above.
CA Medical Facility	Vacaville	Solano	Suitable for medical staff recruitment; available space; available infrastructure.
CA State Prison, Solano	Vacaville	Solano	See Ca Medical Facility, above.
Mule Creek State Prison	Ione	Amador	Stable staff as desirable location, but too remote for extensive recruitment. Significant issues with sewage disposal; some terrain issues.
CA State Prison, San Quentin	San Quentin	Marin	Insufficient space.
Kern Valley State Prison	Delano	Kern	Too remote for medical staff recruitment; three facilities in vicinity (No. Kern, Kern Valley, Wasco). Employment pool not deep enough to supply all.
Sierra Conservation Center	Jamestown	Tuolumne	Too remote for medical staff recruitment. No universities nearby. Small site.. Insufficient electricity, water and communication infrastructure. Sewage disposal would need to be on-site.
Deuel Vocational Institution	Tracy	San Joaquin	Substantial available space; suitable for medical staff recruitment; significant flood control issue that is costly to overcome.
Central CA Womens Facility	Chowchilla	Madera	Too remote for medical staff recruitment.
Valley State Prison for Women	Chowchilla	Madera	Too remote for medical staff recruitment.
Correctional Training Facility	Soledad	Monterey	Cost of living too high for all but physicians.
Salinas Valley State Prison	Soledad	Monterey	See Salinas Valley, above.
Pleasant Valley State Prison	Coalinga	Fresno	Cannot recruit for existing facilities. Unattractive for potential residents, remote location; valley fever hampers recruitment.
CA State Prison, Corcoran	Corcoran	Kings	Cannot recruit for existing facilities. Unattractive for potential residents, remote location; valley fever hampers recruitment.
Avenal State Prison	Avenal	Kings	Cannot recruit for existing facilities. Unattractive for potential residents, remote location; valley fever hampers recruitment.
North Kern State Prison	Delano	Kern	See Kern Valley, above.
Wasco State Prison	Wasco	Kern	See Kern Valley, above.

URS Bovis Lend Lease Joint Venture

California Department of Corrections and Rehabilitation

Adult Institutions	City	County	Potential Use for CHFC
CA Men's Colony	San Luis Obispo	San Luis Obispo	Land not owned by state; insufficient water rights (water rights have been sold to other agencies). Endangered species.
CA Correctional Institution	Tehachapi	Kern	Site too remote for recruitment of medical staff.
CA State Prison, Los Angeles County	Lancaster	Los Angeles	Insufficient space – adjacent land owned by County of LA.
CA Institution for Men	Chino	San Bernardino	Suitable location for recruitment of medical staff; sufficient land; no significant infrastructure issues. Under consideration.
CA Institution for Women	Corona	Riverside	Close to CIM. More space available at CIM.
CA Rehabilitation Center	Norco	Riverside	Not sufficient space. Site currently proposed for historic designation and under renovation for historic preservation .
Chuckawala Valley State Prison	Blythe	Riverside	Site too remote for recruitment of medical staff.
Ironwood State Prison	Blythe	Riverside	Site too remote for recruitment of medical staff.
Calipatria State Prison	Calipatria	Imperial	Site too remote for recruitment of medical staff.
Centinela State Prison	Imperial	Imperial	Site too remote for recruitment of medical staff.
RJD Donovan Correctional Facility	San Diego	San Diego	Suitable location for recruitment of medical staff; sufficient land; no significant infrastructure issues. Under consideration.
Substance Abuse Treatment Facility & State Prison at Corcoran CA	Corcoran	Kings	Site too remote for recruitment of medical staff.
Juvenile Institutions			
Ventura County YCF	Ventura	Camarillo	Desirable location; good area for recruitment; high cost of living in Camarillo but affordable surrounding communities. Under consideration.
Karl Holton YCF	Stockton (adjacent)	San Joaquin	Youth facility is closed. Suitable for medical staff recruitment; available space; no significant infrastructure issues. Under consideration.
Nelles YCF	Whittier	Los Angeles	Youth facility is closed. Suitable for medical staff recruitment; available space; no significant infrastructure issues; some historic building issues; neighborhood close by. Under consideration.
Norwalk YCF	Norwalk	Los Angeles	Insufficient space.
Paso Robles	Paso Robles	San Luis Obispo	Youth facility is closed. Site planned for CDCR re-entry facility.
Preston	Ione	Amador County	Located at Mule Creek site. Open portions site utilized by the above grade sewer sprinklers – substantial revision to the sewage disposal system required to provide enough level land for construction of a CHCF installation. Deed restriction limits use of the property to boy's school. Irregular topography for CHCF installation. Recruitment per Mule Creek, above.

APPENDIX D

Revised Traffic Data

DKS Associates
TRANSPORTATION SOLUTIONS

MEMORANDUM

TO: Mike Parker, EDAW
FROM: Mark Spencer, DKS
DATE: March 13, 2009
SUBJECT: Mitigation Measures P 07278-001
SR 99 Northbound Off-Ramp intersection at Arch Road
SR 99 Southbound Off-Ramp to Arch Road

The addition of a traffic signal at the SR 99 northbound off-ramp would allow queues to clear the ramp in a more efficient manner and reduce the size of the queues on the off-ramp. The signal timing at this intersection would be coordinated with that of the signalized intersections at Kingsley Road/Arch Road, andthe SR 99 SPUI/Arch Road. Configurations such as these are used in many places throughout California, including many freeway interchange ramp intersections that are closely spaced together. An example of this configuration is the I-680 SPUI interchange at Monument Boulevard in Concord, CA. With a high volume northbound off-ramp and without a free right turn from the off-ramp onto Monument Boulevard, the northbound off-ramp would be controlled by a traffic signal that is coordinated with the SPUI intersection and the next intersection to the east (Buskirk Avenue-Romona Drive). There appears to be sufficient space within the off-ramp right of way at Arch Road to accommodate the traffic signal installation without affecting adjacent land uses.

Because the deficient level of service and extended queue on the off-ramp is projected to occur under Cumulative Baseline conditions, the need for this mitigation measure will exist regardless of the proposed project. With the traffic signal mitigation measure in place, the LOS at the northbound off-ramp intersection would be improved and the impact reduced to a level of insignificance. Also, the queue on the off-ramp would be reduced so that it does not extend past the available storage capacity on the northbound off-ramp or extend as far back as the SR 99 northbound mainline lanes.

Widening of an off-ramp (here the SR 99 southbound off-ramp to Arch Road) to add storage capacity is also a common mitigation measure to avoid queues backing up onto the freeway mainline segments. An example of multi-lane off-ramps can be seen on the I-5

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off-ramps to March Lane in Stockton. Preliminary review of the SR 99 southbound off-ramp to Arch Road indicates there is sufficient available right-of-way (roughly 30 – 50 feet) just north of the transition to the three lane segment approaching Arch Road to add 131 feet of storage capacity and keep the queue from backing up into the SR 99 southbound freeway mainline. Because there is a bridge structure on part of the off-ramp, it would be desirable to begin the widening south of the bridge structure. Alternatively, Caltrans may decide to use part of the roadway shoulder in combination with extending the added lane into the existing right-of-way. There appears to be about 30 feet of right-of-way to the west of the off-ramp and about 50 feet or right of way on the east side of the off-ramp, which gives some latitude to whether the widening would occur towards the east, west or both sides of the off-ramp (the ramp widening would occur to east or west side of the off-ramp in order to provide an additional southbound lane or extend an existing southbound lane).

Ultimately Caltrans would decide the final design and desired location for the widening, in combination with the traffic signal design at the northbound off-ramp and the revised signal timing plan. We anticipate that this improvement would take roughly [NUMBER] months to complete. The EIR analysis in support of the mitigation measures is provided as an attachment.

ATTACHMENT

5-1, TRAF-4 and Traffic Master Response

Off-Peak Hour Analysis – Synchro/Traffix Level of Service Sheets

EPAP CONDITION

Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	83	363	148	80	437	135
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	395	161	87	475	147
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	90	395	161	87	475	147
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	15.7	13.2	6.5	4.0	13.8	13.8
Effective Green, g (s)	18.7	16.2	9.5	7.0	16.8	16.8
Actuated g/C Ratio	0.34	0.30	0.17	0.13	0.31	0.31
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1155	941	531	429	931	955
v/s Ratio Prot	0.03	c0.12	c0.05	0.03		
v/s Ratio Perm					c0.16	0.05
v/c Ratio	0.08	0.42	0.30	0.20	0.51	0.15
Uniform Delay, d1	12.1	15.4	19.6	21.3	15.5	13.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.0	0.3	0.3	0.2	0.5	0.1
Delay (s)	12.1	15.7	19.9	21.5	15.9	13.8
Level of Service	B	B	B	C	B	B
Approach Delay (s)		15.0		20.5		
Approach LOS		B		C		

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	36.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3118		1641	3844		1703	1735		1289	1619	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	3118		1641	3844		1703	1735		1289	1619	
Volume (vph)	70	1035	69	23	414	19	87	35	29	17	29	58
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	1125	75	25	450	21	95	38	32	18	32	63
RTOR Reduction (vph)	0	7	0	0	7	0	0	25	0	0	52	0
Lane Group Flow (vph)	76	1193	0	25	464	0	95	45	0	18	43	0
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	3.6	25.1		1.3	22.8		3.7	12.8		0.6	9.7	
Effective Green, g (s)	3.6	25.1		1.3	22.8		3.7	12.8		0.6	9.7	
Actuated g/C Ratio	0.06	0.45		0.02	0.41		0.07	0.23		0.01	0.17	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	108	1403		38	1571		113	398		14	281	
v/s Ratio Prot	c0.05	c0.38		0.02	0.12		c0.06	c0.03		0.01	c0.03	
v/s Ratio Perm												
v/c Ratio	0.70	0.85		0.66	0.30		0.84	0.11		1.29	0.15	
Uniform Delay, d1	25.6	13.7		27.0	11.1		25.8	17.0		27.6	19.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	18.7	5.2		34.3	0.1		40.1	0.1		344.5	0.3	
Delay (s)	44.3	18.8		61.3	11.2		65.9	17.1		372.1	19.8	
Level of Service	D	B		E	B		E	B		F	B	
Approach Delay (s)		20.4			13.7			45.2			75.9	
Approach LOS		C			B			D			E	

Intersection Summary			
HCM Average Control Delay	23.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	800	0	0	228	0	375
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	870	0	0	248	0	408
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.81		0.81	0.81
vC, conflicting volume			870		932	435
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			607		683	71
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	45
cM capacity (veh/h)			785		311	736

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	435	435	62	62	62	62	408
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	408
cSH	1700	1700	1700	1700	1700	1700	736
Volume to Capacity	0.26	0.26	0.04	0.04	0.04	0.04	0.55
Queue Length 95th (ft)	0	0	0	0	0	0	86
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	15.8
Lane LOS							C
Approach Delay (s)	0.0		0.0				15.8
Approach LOS							C

Intersection Summary			
Average Delay	4.2		
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Arch / Newcastle

Cycle (sec):	120	Critical Vol./Cap.(X):	0.431
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	5.3
Optimal Cycle:	37	Level Of Service:	A

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	- T	- R		L	- T	- R		L	- T	- R		L	- T	- R	
Control:	Permitted				Permitted				Protected				Protected			
Rights:	Include				Include				Include				Include			
Min. Green:	0	0	0		0	0	0		0	0	0		0	0	0	
Lanes:	0	0	1!	0	0	0	0	1!	0	0	1	0	0	1	0	0	1	0
Volume Module:																		
Base Vol:	11	6	4		6	6	6		5	630	59		14	330	6	
Growth Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Initial Bse:	11	6	4		6	6	6		5	630	59		14	330	6	
Added Vol:	0	0	0		0	0	0		0	0	0		0	0	0	
PasserByVol:	0	0	0		0	0	0		0	0	0		0	0	0	
Initial Fut:	11	6	4		6	6	6		5	630	59		14	330	6	
User Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Volume:	11	6	4		6	6	6		5	630	59		14	330	6	
Reduct Vol:	0	0	0		0	0	0		0	0	0		0	0	0	
Reduced Vol:	11	6	4		6	6	6		5	630	59		14	330	6	
PCE Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
MLF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
FinalVolume:	11	6	4		6	6	6		5	630	59		14	330	6	
Saturation Flow Module:																		
Sat/Lane:	1900	1900	1900		1900	1900	1900		1900	1900	1900		1900	1900	1900	
Adjustment:	0.86	0.86	0.86		0.84	0.84	0.84		0.95	0.99	0.99		0.95	1.00	1.00	
Lanes:	0.52	0.29	0.19		0.34	0.33	0.33		1.00	0.91	0.09		1.00	0.98	0.02	
Final Sat.:	856	467	311		529	529	529		1805	1715	161		1805	1860	34	
Capacity Analysis Module:																		
Vol/Sat:	0.01	0.01	0.01		0.01	0.01	0.01		0.00	0.37	0.37		0.01	0.18	0.18	
Crit Moves:		****								****			****			
Green/Cycle:	0.03	0.03	0.03		0.03	0.03	0.03		0.01	0.85	0.85		0.02	0.86	0.86	
Volume/Cap:	0.43	0.43	0.43		0.38	0.38	0.38		0.21	0.43	0.43		0.43	0.21	0.21	
Uniform Del:	57.2	57.2	57.2		57.1	57.1	57.1		58.6	2.1	2.1		58.3	1.5	1.5	
IncremntDel:	6.0	6.0	6.0		5.1	5.1	5.1		4.2	0.2	0.2		8.9	0.1	0.1	
InitQueuDel:	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
Delay Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Delay/Veh:	63.2	63.2	63.2		62.2	62.2	62.2		62.8	2.3	2.3		67.2	1.6	1.6	
User DelAdj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
AdjDel/Veh:	63.2	63.2	63.2		62.2	62.2	62.2		62.8	2.3	2.3		67.2	1.6	1.6	
LOS by Move:	E	E	E		E	E	E		E	A	A		E	A	A	
HCM2kAvgQ:	1	1	1		1	1	1		0	6	6		1	2	2	

Note: Queue reported is the number of cars per lane.

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Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3343	3045	3167	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3343	3045	3167	3019	3099
Volume (vph)	172	337	345	633	426	230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	366	375	688	463	250
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	187	366	375	688	463	250
Heavy Vehicles (%)	4%	8%	15%	14%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	7.0	11.6	14.5	19.6	13.2	13.2
Effective Green, g (s)	10.0	14.6	18.0	22.6	16.2	16.2
Actuated g/C Ratio	0.16	0.24	0.30	0.37	0.27	0.27
Clearance Time (s)	7.0	7.0	7.5	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	554	803	901	1177	804	826
v/s Ratio Prot	0.06	c0.11	0.12	c0.22		
v/s Ratio Perm					c0.15	0.08
v/c Ratio	0.34	0.46	0.42	0.58	0.58	0.30
Uniform Delay, d1	22.5	19.7	17.2	15.3	19.3	17.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4	0.3	0.7	1.0	0.2
Delay (s)	22.8	20.1	17.5	16.1	20.3	18.0
Level of Service	C	C	B	B	C	B
Approach Delay (s)		21.0		16.6		
Approach LOS		C		B		

Intersection Summary			
HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	2681		1641	4500		1703	1759		1289	1587	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	2681		1641	4500		1703	1759		1289	1587	
Volume (vph)	93	887	73	23	1313	23	94	98	58	6	17	118
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	964	79	25	1427	25	102	107	63	7	18	128
RTOR Reduction (vph)	0	7	0	0	2	0	0	30	0	0	107	0
Lane Group Flow (vph)	101	1036	0	25	1450	0	102	140	0	7	39	0
Heavy Vehicles (%)	8%	35%	10%	10%	15%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.4	30.7		1.3	25.6		4.3	13.9		0.6	10.2	
Effective Green, g (s)	6.4	30.7		1.3	25.6		4.3	13.9		0.6	10.2	
Actuated g/C Ratio	0.10	0.49		0.02	0.41		0.07	0.22		0.01	0.16	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	1317		34	1843		117	391		12	259	
v/s Ratio Prot	0.06	c0.39		0.02	c0.32		c0.06	c0.08		0.01	0.02	
v/s Ratio Perm												
v/c Ratio	0.59	0.79		0.74	0.79		0.87	0.36		0.58	0.15	
Uniform Delay, d1	26.8	13.2		30.4	16.1		28.8	20.5		30.8	22.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	3.2		57.7	2.3		46.1	0.6		56.2	0.3	
Delay (s)	32.2	16.4		88.1	18.4		74.9	21.1		87.0	22.7	
Level of Service	C	B		F	B		E	C		F	C	
Approach Delay (s)		17.8			19.5			41.3			25.6	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM Average Control Delay	21.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	763	0	0	978	0	286
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	829	0	0	1063	0	311
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.81		0.81	0.81
vC, conflicting volume			829		1095	415
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			546		876	31
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	60
cM capacity (veh/h)			821		232	778

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	415	415	266	266	266	266	311
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	311
cSH	1700	1700	1700	1700	1700	1700	778
Volume to Capacity	0.24	0.24	0.16	0.16	0.16	0.16	0.40
Queue Length 95th (ft)	0	0	0	0	0	0	48
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	12.7
Lane LOS							B
Approach Delay (s)	0.0		0.0				12.7
Approach LOS							B

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Arch / Newcastle

Cycle (sec):	120	Critical Vol./Cap.(X):	0.554
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	7.1
Optimal Cycle:	45	Level Of Service:	A

Approach:	North Bound						South Bound						East Bound						West Bound					
Movement:	L	-	T	-	R		L	-	T	-	R		L	-	T	-	R		L	-	T	-	R	
Control:	Permitted						Permitted						Protected						Protected					
Rights:	Include						Include						Include						Include					
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0	1	0	0	0		0	0	1!	0	0		1	0	0	1	0		1	0	0	1	0	
Volume Module:																								
Base Vol:	50	6	0	6	6	6	6	512	18	7	857	6												
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
Initial Bse:	50	6	0	6	6	6	6	512	18	7	857	6												
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0												
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0												
Initial Fut:	50	6	0	6	6	6	6	512	18	7	857	6												
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
PHF Volume:	50	6	0	6	6	6	6	512	18	7	857	6												
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0												
Reduced Vol:	50	6	0	6	6	6	6	512	18	7	857	6												
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
FinalVolume:	50	6	0	6	6	6	6	512	18	7	857	6												
Saturation Flow Module:																								
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900												
Adjustment:	0.72	0.72	1.00	0.87	0.87	0.87	0.95	1.00	1.00	0.95	1.00	1.00												
Lanes:	0.89	0.11	0.00	0.34	0.33	0.33	1.00	0.97	0.03	1.00	0.99	0.01												
Final Sat.:	1228	147	0	553	553	553	1805	1826	64	1805	1885	13												
Capacity Analysis Module:																								
Vol/Sat:	0.04	0.04	0.00	0.01	0.01	0.01	0.00	0.28	0.28	0.00	0.45	0.45												
Crit Moves:		****					****				****													
Green/Cycle:	0.07	0.07	0.00	0.07	0.07	0.07	0.01	0.82	0.82	0.01	0.82	0.82												
Volume/Cap:	0.55	0.55	0.00	0.15	0.15	0.15	0.55	0.34	0.34	0.34	0.55	0.55												
Uniform Del:	53.7	53.7	0.0	52.1	52.1	52.1	59.5	2.8	2.8	58.9	3.5	3.5												
IncremntDel:	6.6	6.6	0.0	0.6	0.6	0.6	50.6	0.1	0.1	9.9	0.4	0.4												
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0												
Delay Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
Delay/Veh:	60.3	60.3	0.0	52.6	52.6	52.6	110.1	3.0	3.0	68.7	4.0	4.0												
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00												
AdjDel/Veh:	60.3	60.3	0.0	52.6	52.6	52.6	110.1	3.0	3.0	68.7	4.0	4.0												
LOS by Move:	E	E	A	D	D	D	F	A	A	E	A	A												
HCM2kAvgQ:	3	3	0	1	1	1	1	5	5	1	11	11												

Note: Queue reported is the number of cars per lane.

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EPAP PLUS PROJECT CONDITION

Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	83	490	158	91	595	135
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	90	533	172	99	647	147
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	90	533	172	99	647	147
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	5.3	13.8	6.7	15.2	14.7	14.7
Effective Green, g (s)	8.3	16.8	9.7	18.2	17.7	17.7
Actuated g/C Ratio	0.15	0.30	0.17	0.32	0.31	0.31
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	497	947	526	1083	951	976
v/s Ratio Prot	0.03	c0.17	c0.06	0.03		
v/s Ratio Perm					c0.21	0.05
v/c Ratio	0.18	0.56	0.33	0.09	0.68	0.15
Uniform Delay, d1	21.0	16.6	20.4	13.2	16.8	13.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.8	0.4	0.0	2.0	0.1
Delay (s)	21.1	17.4	20.8	13.3	18.8	13.9
Level of Service	C	B	C	B	B	B
Approach Delay (s)		17.9		18.0		
Approach LOS		B		B		

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	56.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.93		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3124		1641	3844		1703	1735		1289	1619	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	3124		1641	3844		1703	1735		1289	1619	
Volume (vph)	70	1437	69	23	450	19	87	35	29	17	29	58
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	76	1562	75	25	489	21	95	38	32	18	32	63
RTOR Reduction (vph)	0	3	0	0	5	0	0	27	0	0	55	0
Lane Group Flow (vph)	76	1634	0	25	505	0	95	43	0	18	40	0
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	6.1	43.7		1.3	38.9		4.4	12.3		1.3	9.2	
Effective Green, g (s)	6.1	43.7		1.3	38.9		4.4	12.3		1.3	9.2	
Actuated g/C Ratio	0.08	0.59		0.02	0.52		0.06	0.16		0.02	0.12	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	137	1830		29	2004		100	286		22	200	
v/s Ratio Prot	c0.05	c0.52		0.02	0.13		c0.06	c0.02		0.01	c0.02	
v/s Ratio Perm												
v/c Ratio	0.55	0.89		0.86	0.25		0.95	0.15		0.82	0.20	
Uniform Delay, d1	32.9	13.4		36.6	9.8		35.0	26.7		36.5	29.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.8	6.0		109.1	0.1		73.6	0.2		109.6	0.5	
Delay (s)	37.7	19.4		145.7	9.9		108.6	26.9		146.1	29.9	
Level of Service	D	B		F	A		F	C		F	C	
Approach Delay (s)		20.2			16.2			74.0			48.4	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM Average Control Delay	24.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	74.6	Sum of lost time (s)	20.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1085	0	0	249	0	493
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1179	0	0	271	0	536
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.71		0.71	0.71
vC, conflicting volume			1179		1247	590
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			836		932	0
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	25
cM capacity (veh/h)			559		187	715

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	590	590	68	68	68	68	536
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	536
cSH	1700	1700	1700	1700	1700	1700	715
Volume to Capacity	0.35	0.35	0.04	0.04	0.04	0.04	0.75
Queue Length 95th (ft)	0	0	0	0	0	0	172
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	23.5
Lane LOS							C
Approach Delay (s)	0.0		0.0				23.5
Approach LOS							C

Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

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Intersection #3 Arch / Newcastle

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Cycle (sec):	120	Critical Vol./Cap.(X):	0.664
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	6.4
Optimal Cycle:	57	Level Of Service:	A

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Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	1! 0	0	0 0	1! 0	0	1 0	0 1	0	1 0	0 1	0
Volume Module:												
Base Vol:	11	6	4	6	6	6	5	630	59	14	330	6
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	11	6	4	6	6	6	5	630	59	14	330	6
Added Vol:	0	0	0	0	0	0	0	402	0	0	36	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	11	6	4	6	6	6	5	1032	59	14	366	6
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	11	6	4	6	6	6	5	1032	59	14	366	6
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	11	6	4	6	6	6	5	1032	59	14	366	6
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	11	6	4	6	6	6	5	1032	59	14	366	6
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.97	0.97	0.97	0.96	0.96	0.96	0.95	0.99	0.99	0.95	1.00	1.00
Lanes:	0.52	0.29	0.19	0.34	0.33	0.33	1.00	0.95	0.05	1.00	0.98	0.02
Final Sat.:	969	529	352	605	605	605	1805	1783	102	1805	1866	31
Capacity Analysis Module:												
Vol/Sat:	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.58	0.58	0.01	0.20	0.20
Crit Moves:		****						****		****		
Green/Cycle:	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.87	0.87	0.01	0.87	0.87
Volume/Cap:	0.66	0.66	0.66	0.58	0.58	0.58	0.23	0.66	0.66	0.66	0.23	0.23
Uniform Del:	58.6	58.6	58.6	58.5	58.5	58.5	58.7	2.4	2.4	59.1	1.2	1.2
IncremntDel:	42.5	42.5	42.5	24.8	24.8	24.8	5.1	1.0	1.0	58.8	0.1	0.1
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	101.1	101	101.1	83.4	83.4	83.4	63.8	3.4	3.4	117.9	1.3	1.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	101.1	101	101.1	83.4	83.4	83.4	63.8	3.4	3.4	117.9	1.3	1.3
LOS by Move:	F	F	F	F	F	F	E	A	A	F	A	A
HCM2kAvgQ:	2	2	2	1	1	1	0	13	13	1	2	2

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Note: Queue reported is the number of cars per lane.

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Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3343	3045	3167	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3343	3045	3167	3019	3099
Volume (vph)	172	348	447	743	440	230
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	187	378	486	808	478	250
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	187	378	486	808	478	250
Heavy Vehicles (%)	4%	8%	15%	14%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	7.1	12.0	15.6	21.0	13.6	13.6
Effective Green, g (s)	10.1	15.0	19.1	24.0	16.6	16.6
Actuated g/C Ratio	0.16	0.24	0.30	0.38	0.26	0.26
Clearance Time (s)	7.0	7.0	7.5	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	542	800	928	1212	799	820
v/s Ratio Prot	0.06	c0.11	0.16	c0.26		
v/s Ratio Perm					c0.16	0.08
v/c Ratio	0.35	0.47	0.52	0.67	0.60	0.30
Uniform Delay, d1	23.4	20.5	18.0	16.0	20.1	18.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.4	0.5	1.4	1.2	0.2
Delay (s)	23.7	20.9	18.6	17.4	21.3	18.6
Level of Service	C	C	B	B	C	B
Approach Delay (s)		21.8		17.9		
Approach LOS		C		B		

Intersection Summary			
HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	2681		1641	4502		1703	1759		1289	1587	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	2681		1641	4502		1703	1759		1289	1587	
Volume (vph)	93	923	73	23	1663	23	94	98	58	6	17	118
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	1003	79	25	1808	25	102	107	63	7	18	128
RTOR Reduction (vph)	0	6	0	0	2	0	0	28	0	0	109	0
Lane Group Flow (vph)	101	1076	0	25	1831	0	102	142	0	7	37	0
Heavy Vehicles (%)	8%	35%	10%	10%	15%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	5.8	36.6		1.4	32.2		4.3	14.0		0.7	10.4	
Effective Green, g (s)	5.8	36.6		1.4	32.2		4.3	14.0		0.7	10.4	
Actuated g/C Ratio	0.08	0.53		0.02	0.47		0.06	0.20		0.01	0.15	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	141	1428		33	2110		107	358		13	240	
v/s Ratio Prot	0.06	c0.40		0.02	c0.41		c0.06	c0.08		0.01	0.02	
v/s Ratio Perm												
v/c Ratio	0.72	0.75		0.76	0.87		0.95	0.40		0.54	0.16	
Uniform Delay, d1	30.6	12.5		33.5	16.3		32.1	23.7		33.8	25.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	15.9	2.3		65.1	4.1		71.6	0.7		36.8	0.3	
Delay (s)	46.5	14.8		98.6	20.4		103.7	24.4		70.6	25.6	
Level of Service	D	B		F	C		F	C		E	C	
Approach Delay (s)		17.5			21.5			54.2			27.7	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	788	0	0	1190	0	296
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	857	0	0	1293	0	322
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.79		0.79	0.79
vC, conflicting volume			857		1180	428
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			560		968	21
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	59
cM capacity (veh/h)			800		200	779

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	428	428	323	323	323	323	322
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	322
cSH	1700	1700	1700	1700	1700	1700	779
Volume to Capacity	0.25	0.25	0.19	0.19	0.19	0.19	0.41
Queue Length 95th (ft)	0	0	0	0	0	0	51
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	12.8
Lane LOS							B
Approach Delay (s)	0.0		0.0				12.8
Approach LOS							B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #3 Arch / Newcastle

Cycle (sec):	120	Critical Vol./Cap.(X):	0.759
Loss Time (sec):	12 (Y+R=4.0 sec)	Average Delay (sec/veh):	9.2
Optimal Cycle:	72	Level Of Service:	A

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Permitted			Permitted			Protected			Protected		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1 0 0 0			0 0 1! 0 0			1 0 0 1 0			1 0 0 1 0		
Volume Module:												
Base Vol:	50	6	0	6	6	6	6	512	18	7	857	6
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	50	6	0	6	6	6	6	512	18	7	857	6
Added Vol:	0	0	0	0	0	0	0	36	0	0	350	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	50	6	0	6	6	6	6	548	18	7	1207	6
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	50	6	0	6	6	6	6	548	18	7	1207	6
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	50	6	0	6	6	6	6	548	18	7	1207	6
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	50	6	0	6	6	6	6	548	18	7	1207	6
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.72	0.72	1.00	0.89	0.89	0.89	0.95	1.00	1.00	0.95	1.00	1.00
Lanes:	0.89	0.11	0.00	0.34	0.33	0.33	1.00	0.97	0.03	1.00	0.99	0.01
Final Sat.:	1228	147	0	561	561	561	1805	1830	60	1805	1889	9
Capacity Analysis Module:												
Vol/Sat:	0.04	0.04	0.00	0.01	0.01	0.01	0.00	0.30	0.30	0.00	0.64	0.64
Crit Moves:		****					****				****	
Green/Cycle:	0.05	0.05	0.00	0.05	0.05	0.05	0.00	0.84	0.84	0.01	0.84	0.84
Volume/Cap:	0.76	0.76	0.00	0.20	0.20	0.20	0.76	0.36	0.36	0.36	0.76	0.76
Uniform Del:	56.0	56.0	0.0	54.3	54.3	54.3	59.7	2.3	2.3	58.9	4.2	4.2
IncremntDel:	35.9	35.9	0.0	1.1	1.1	1.1	172.4	0.1	0.1	10.9	2.2	2.2
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	91.9	91.9	0.0	55.4	55.4	55.4	232.1	2.5	2.5	69.8	6.3	6.3
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	91.9	91.9	0.0	55.4	55.4	55.4	232.1	2.5	2.5	69.8	6.3	6.3
LOS by Move:	F	F	A	E	E	E	F	A	A	E	A	A
HCM2kAvgQ:	4	4	0	1	1	1	1	5	5	1	21	21

Note: Queue reported is the number of cars per lane.

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2035 CONDITION

Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	155	1137	273	350	486	121
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	1236	297	380	528	132
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	168	1236	297	380	528	132
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	16.6	34.8	13.4	31.6	15.8	15.8
Effective Green, g (s)	19.6	37.8	16.4	34.6	18.8	18.8
Actuated g/C Ratio	0.23	0.44	0.19	0.41	0.22	0.22
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	776	1408	588	1361	668	685
v/s Ratio Prot	0.05	c0.39	c0.10	0.11		
v/s Ratio Perm					c0.17	0.04
v/c Ratio	0.22	0.88	0.51	0.28	0.79	0.19
Uniform Delay, d1	26.5	21.5	30.7	16.9	31.2	26.9
Progression Factor	1.00	1.00	0.76	0.37	1.00	1.00
Incremental Delay, d2	0.1	8.0	0.7	0.5	6.3	0.1
Delay (s)	26.6	29.5	24.1	6.7	37.6	27.1
Level of Service	C	C	C	A	D	C
Approach Delay (s)		29.2		14.3		
Approach LOS		C		B		

Intersection Summary			
HCM Average Control Delay	27.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.86		0.97	1.00		1.00	0.91	0.91
Frt	1.00	0.98		1.00	1.00		1.00	0.96		1.00	0.86	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3242	4457		1641	4842		3303	1792		1289	1433	2854
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3242	4457		1641	4842		3303	1792		1289	1433	2854
Volume (vph)	504	1259	157	2	760	1	27	35	12	12	1	64
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	548	1368	171	2	826	1	29	38	13	13	1	70
RTOR Reduction (vph)	0	11	0	0	0	0	0	12	0	0	21	43
Lane Group Flow (vph)	548	1528	0	2	827	0	29	39	0	13	3	4
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	19.9	57.5		1.2	38.8		3.8	9.1		1.2	6.5	6.5
Effective Green, g (s)	19.9	57.5		1.2	38.8		3.8	9.1		1.2	6.5	6.5
Actuated g/C Ratio	0.23	0.68		0.01	0.46		0.04	0.11		0.01	0.08	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	759	3015		23	2210		148	192		18	110	218
v/s Ratio Prot	c0.17	c0.34		0.00	c0.17		0.01	c0.02		c0.01	0.00	
v/s Ratio Perm												0.00
v/c Ratio	0.72	0.51		0.09	0.37		0.20	0.21		0.72	0.03	0.02
Uniform Delay, d1	30.0	6.8		41.4	15.1		39.1	34.6		41.7	36.3	36.3
Progression Factor	0.93	0.32		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.3	0.4		1.6	0.5		0.7	0.5		87.1	0.1	0.0
Delay (s)	30.3	2.6		43.0	15.6		39.8	35.2		128.8	36.4	36.3
Level of Service	C	A		D	B		D	D		F	D	D
Approach Delay (s)		9.9			15.7			36.8			50.7	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1623	0	0	623	0	297
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1764	0	0	677	0	323
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.49		0.49	0.49
vC, conflicting volume			1764		1933	882
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1523		1865	0
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	36
cM capacity (veh/h)			214		32	501

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	882	882	169	169	169	169	323
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	323
cSH	1700	1700	1700	1700	1700	1700	501
Volume to Capacity	0.52	0.52	0.10	0.10	0.10	0.10	0.64
Queue Length 95th (ft)	0	0	0	0	0	0	113
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	24.3
Lane LOS							C
Approach Delay (s)	0.0		0.0				24.3
Approach LOS							C

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #6 Arch / Austin

Cycle (sec):	120	Critical Vol./Cap.(X):	0.459
Loss Time (sec):	16 (Y+R=4.0 sec)	Average Delay (sec/veh):	19.0
Optimal Cycle:	47	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Ovl			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 1	1 0		1 0 2	0 2		2 0 0	1 0		0 1 0	0 1	
Volume Module:												
Base Vol:	55	229	12	12	435	705	377	10	108	12	9	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	55	229	12	12	435	705	377	10	108	12	9	12
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	55	229	12	12	435	705	377	10	108	12	9	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	55	229	12	12	435	705	377	10	108	12	9	12
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	55	229	12	12	435	705	377	10	108	12	9	12
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	55	229	12	12	435	705	377	10	108	12	9	12
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.94	0.94	0.95	0.95	0.75	0.92	0.86	0.86	0.95	0.95	0.85
Lanes:	1.00	1.90	0.10	1.00	2.00	2.00	2.00	0.08	0.92	0.57	0.43	1.00
Final Sat.:	1805	3406	178	1805	3610	2842	3502	139	1501	1026	770	1615
Capacity Analysis Module:												
Vol/Sat:	0.03	0.07	0.07	0.01	0.12	0.25	0.11	0.07	0.07	0.01	0.01	0.01
Crit Moves:	****					****	****				****	
Green/Cycle:	0.07	0.55	0.55	0.05	0.54	0.77	0.23	0.26	0.26	0.03	0.03	0.03
Volume/Cap:	0.46	0.12	0.12	0.12	0.22	0.32	0.46	0.28	0.28	0.43	0.43	0.27
Uniform Del:	54.0	13.0	13.0	54.0	14.5	4.1	39.4	35.3	35.3	57.5	57.5	57.2
IncremntDel:	2.8	0.0	0.0	0.6	0.1	0.1	0.4	0.4	0.4	6.0	6.0	3.4
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	56.8	13.0	13.0	54.6	14.5	4.2	39.9	35.6	35.6	63.4	63.4	60.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	56.8	13.0	13.0	54.6	14.5	4.2	39.9	35.6	35.6	63.4	63.4	60.6
LOS by Move:	E	B	B	D	B	A	D	D	D	E	E	E
HCM2kAvgQ:	3	2	2	1	4	4	6	1	3	1	1	1

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #8 Project Driveway
******************************************************************************
Average Delay (sec/veh):      0.0       Worst Case Level Of Service: A[  9.0]
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  1  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  296     0     0  555     0     0    0     0     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  296     0     0  555     0     0    0     0     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  296     0     0  555     0     0    0     0     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  296     0     0  555     0     0    0     0     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0  296     0     0  555     0     0    0     0     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx   703  851   278  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx   376  299   726  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   376  299   726  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:   *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx    0 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  9.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:    A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        *                *                *                *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
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Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	300	1251	319	1959	422	281
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	1360	347	2129	459	305
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	326	1360	347	2129	459	305
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	15.9	63.7	32.2	80.0	18.1	18.1
Effective Green, g (s)	18.9	66.7	35.2	83.0	21.1	21.1
Actuated g/C Ratio	0.14	0.49	0.26	0.61	0.16	0.16
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	471	1565	794	2055	472	484
v/s Ratio Prot	c0.10	0.43	0.11	c0.64		
v/s Ratio Perm					c0.15	0.10
v/c Ratio	0.69	0.87	0.44	1.04	0.97	0.63
Uniform Delay, d1	55.3	30.3	41.6	26.0	56.7	53.3
Progression Factor	1.00	1.00	1.02	0.30	1.00	1.00
Incremental Delay, d2	4.4	5.4	0.2	24.7	35.1	6.1
Delay (s)	59.6	35.7	42.8	32.4	91.8	59.4
Level of Service	E	D	D	C	F	E
Approach Delay (s)		40.3		33.8		
Approach LOS		D		C		

Intersection Summary			
HCM Average Control Delay	43.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.86		0.97	1.00		1.00	0.91	0.91
Frt	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.85	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3242	4478		1641	4842		3303	1759		1289	1430	2854
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3242	4478		1641	4842		3303	1759		1289	1430	2854
Volume (vph)	470	1396	102	2	2074	2	312	100	59	12	1	132
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	511	1517	111	2	2254	2	339	109	64	13	1	143
RTOR Reduction (vph)	0	4	0	0	0	0	0	17	0	0	46	92
Lane Group Flow (vph)	511	1624	0	2	2256	0	339	156	0	13	3	3
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	26.1	97.9		1.3	73.1		15.2	18.2		1.6	4.6	4.6
Effective Green, g (s)	26.1	97.9		1.3	73.1		15.2	18.2		1.6	4.6	4.6
Actuated g/C Ratio	0.19	0.73		0.01	0.54		0.11	0.13		0.01	0.03	0.03
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	627	3247		16	2622		372	237		15	49	97
v/s Ratio Prot	c0.16	0.36		0.00	c0.47		c0.10	c0.09		0.01	0.00	
v/s Ratio Perm												0.00
v/c Ratio	0.81	0.50		0.12	0.86		0.91	0.66		0.87	0.05	0.03
Uniform Delay, d1	52.1	8.0		66.3	26.6		59.2	55.4		66.6	63.1	63.1
Progression Factor	0.90	0.27		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.2	0.1		3.5	3.1		25.8	13.4		162.9	2.1	0.6
Delay (s)	52.0	2.3		69.8	29.7		85.1	68.8		229.5	65.2	63.7
Level of Service	D	A		E	C		F	E		F	E	E
Approach Delay (s)		14.2			29.7			79.6			77.9	
Approach LOS		B			C			E			E	

Intersection Summary			
HCM Average Control Delay	29.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1673	0	0	2278	0	295
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1818	0	0	2476	0	321
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.48		0.64	0.48
vC, conflicting volume			1818		2438	909
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1619		113	0
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	34
cM capacity (veh/h)			190		558	483

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	909	909	619	619	619	619	321
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	321
cSH	1700	1700	1700	1700	1700	1700	483
Volume to Capacity	0.53	0.53	0.36	0.36	0.36	0.36	0.66
Queue Length 95th (ft)	0	0	0	0	0	0	120
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	26.0
Lane LOS							D
Approach Delay (s)	0.0		0.0				26.0
Approach LOS							D

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #6 Arch / Austin

Cycle (sec):	120	Critical Vol./Cap.(X):	0.854
Loss Time (sec):	16 (Y+R=4.0 sec)	Average Delay (sec/veh):	29.6
Optimal Cycle:	109	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Ovl			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 1	1 0		1 0 2	0 2		2 0 0	1 0		0 1 0	0 1	
Volume Module:												
Base Vol:	233	627	12	12	474	912	962	12	175	12	16	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	233	627	12	12	474	912	962	12	175	12	16	12
Added Vol:	0	0	0	0	0	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	233	627	12	12	474	912	962	12	175	12	16	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	233	627	12	12	474	912	962	12	175	12	16	12
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	233	627	12	12	474	912	962	12	175	12	16	12
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	233	627	12	12	474	912	962	12	175	12	16	12
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.95	0.95	0.95	0.95	0.75	0.92	0.86	0.86	0.96	0.96	0.85
Lanes:	1.00	1.96	0.04	1.00	2.00	2.00	2.00	0.06	0.94	0.43	0.57	1.00
Final Sat.:	1805	3532	68	1805	3610	2842	3502	105	1529	778	1037	1615
Capacity Analysis Module:												
Vol/Sat:	0.13	0.18	0.18	0.01	0.13	0.32	0.27	0.11	0.11	0.02	0.02	0.01
Crit Moves:	****					****	****				****	
Green/Cycle:	0.15	0.51	0.51	0.02	0.38	0.70	0.32	0.34	0.34	0.02	0.02	0.02
Volume/Cap:	0.85	0.35	0.35	0.35	0.35	0.46	0.86	0.34	0.34	0.80	0.80	0.39
Uniform Del:	49.7	17.7	17.7	58.1	27.0	8.1	38.1	29.5	29.5	58.6	58.6	58.2
IncremntDel:	22.3	0.1	0.1	6.1	0.2	0.2	6.6	0.4	0.4	77.4	77.4	7.8
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	71.9	17.8	17.8	64.2	27.1	8.3	44.7	29.8	29.8	136.0	136	66.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	71.9	17.8	17.8	64.2	27.1	8.3	44.7	29.8	29.8	136.0	136	66.0
LOS by Move:	E	B	B	E	C	A	D	C	C	F	F	E
HCM2kAvgQ:	11	7	7	1	7	9	20	1	5	2	2	1

Note: Queue reported is the number of cars per lane.

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------------------------------------------------------------------------------
                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #8 Project Driveway
******************************************************************************
Average Delay (sec/veh):      0.0       Worst Case Level Of Service: A[  9.0]
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  1  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  872     0     0  660     0     0    0     0     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  872     0     0  660     0     0    0     0     0    0     0
Added Vol:      0    0     0     0    0     0     0    0     0     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    0  872     0     0  660     0     0    0     0     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     0  872     0     0  660     0     0    0     0     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    0  872     0     0  660     0     0    0     0     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  1096 1532   330  xxxx xxxx xxxxx
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx   211  118   672  xxxx xxxx xxxxx
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx   211  118   672  xxxx xxxx xxxxx
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  0.00 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:   *    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx    0 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  9.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:    A    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx           xxxxxx           xxxxxx
ApproachLOS:        *                *                *                *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
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2035 PLUS PROJECT CONDITION

Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	155	1264	283	361	644	121
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	1374	308	392	700	132
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	168	1374	308	392	700	132
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	16.5	43.6	14.4	41.5	21.0	21.0
Effective Green, g (s)	19.5	46.6	17.4	44.5	24.0	24.0
Actuated g/C Ratio	0.20	0.47	0.17	0.44	0.24	0.24
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	657	1476	530	1488	725	744
v/s Ratio Prot	0.05	c0.43	c0.10	0.12		
v/s Ratio Perm					c0.23	0.04
v/c Ratio	0.26	0.93	0.58	0.26	0.97	0.18
Uniform Delay, d1	34.1	25.2	38.0	17.4	37.6	30.2
Progression Factor	1.00	1.00	0.65	0.50	1.00	1.00
Incremental Delay, d2	0.2	11.9	1.6	0.4	25.0	0.1
Delay (s)	34.3	37.1	26.1	9.1	62.5	30.3
Level of Service	C	D	C	A	E	C
Approach Delay (s)		36.8		16.6		
Approach LOS		D		B		

Intersection Summary			
HCM Average Control Delay	37.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.86		0.97	1.00		1.00	0.91	0.91
Frt	1.00	0.99		1.00	1.00		1.00	0.96		1.00	0.86	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3242	4469		1641	4842		3303	1792		1289	1433	2854
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3242	4469		1641	4842		3303	1792		1289	1433	2854
Volume (vph)	504	1661	157	2	796	1	27	35	12	12	1	64
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	548	1805	171	2	865	1	29	38	13	13	1	70
RTOR Reduction (vph)	0	7	0	0	0	0	0	12	0	0	21	43
Lane Group Flow (vph)	548	1969	0	2	866	0	29	39	0	13	3	4
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	22.3	71.6		1.0	50.3		3.0	10.4		1.0	8.4	8.4
Effective Green, g (s)	22.3	71.6		1.0	50.3		3.0	10.4		1.0	8.4	8.4
Actuated g/C Ratio	0.22	0.72		0.01	0.50		0.03	0.10		0.01	0.08	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	723	3200		16	2436		99	186		13	120	240
v/s Ratio Prot	c0.17	c0.44		0.00	c0.18		0.01	c0.02		c0.01	0.00	
v/s Ratio Perm												0.00
v/c Ratio	0.76	0.62		0.12	0.36		0.29	0.21		1.00	0.02	0.02
Uniform Delay, d1	36.3	7.2		49.1	15.0		47.5	41.0		49.5	42.0	42.0
Progression Factor	1.00	0.28		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.8	0.5		3.5	0.4		1.6	0.6		249.6	0.1	0.0
Delay (s)	39.1	2.6		52.6	15.4		49.1	41.6		299.1	42.1	42.0
Level of Service	D	A		D	B		D	D		F	D	D
Approach Delay (s)		10.5			15.5			44.3			81.8	
Approach LOS		B			B			D			F	

Intersection Summary			
HCM Average Control Delay	14.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1908	0	0	644	0	415
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2074	0	0	700	0	451
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.37		0.37	0.37
vC, conflicting volume			2074		2249	1037
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			2199		2672	0
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	0
cM capacity (veh/h)			87		7	376

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	1037	1037	175	175	175	175	451
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	451
cSH	1700	1700	1700	1700	1700	1700	376
Volume to Capacity	0.61	0.61	0.10	0.10	0.10	0.10	1.20
Queue Length 95th (ft)	0	0	0	0	0	0	464
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	144.6
Lane LOS							F
Approach Delay (s)	0.0		0.0				144.6
Approach LOS							F

Intersection Summary			
Average Delay	20.2		
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #6 Arch / Austin

Cycle (sec):	120	Critical Vol./Cap.(X):	0.715
Loss Time (sec):	16 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.9
Optimal Cycle:	77	Level Of Service:	C

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	T	R		L	T	R		L	T	R		L	T	R	
Control:	Protected				Protected				Protected				Permitted			
Rights:	Include				Ovl				Include				Include			
Min. Green:	0	0	0		0	0	0		0	0	0		0	0	0	
Lanes:	1 0	1	1 0		1 0	2	0 2		2 0	0	1 0		0 1	0	0 1	
Volume Module:																
Base Vol:	55	229	12		12	435	705		377	10	108		12	9	12	
Growth Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Initial Bse:	55	229	12		12	435	705		377	10	108		12	9	12	
Added Vol:	36	3	0		0	32	0		0	0	402		0	0	0	
PasserByVol:	0	0	0		0	0	0		0	0	0		0	0	0	
Initial Fut:	91	232	12		12	467	705		377	10	510		12	9	12	
User Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Volume:	91	232	12		12	467	705		377	10	510		12	9	12	
Reduct Vol:	0	0	0		0	0	0		0	0	0		0	0	0	
Reduced Vol:	91	232	12		12	467	705		377	10	510		12	9	12	
PCE Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
MLF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
FinalVolume:	91	232	12		12	467	705		377	10	510		12	9	12	
Saturation Flow Module:																
Sat/Lane:	1900	1900	1900		1900	1900	1900		1900	1900	1900		1900	1900	1900	
Adjustment:	0.95	0.94	0.94		0.95	0.95	0.75		0.92	0.85	0.85		1.00	1.00	0.85	
Lanes:	1.00	1.90	0.10		1.00	2.00	2.00		2.00	0.02	0.98		0.57	0.43	1.00	
Final Sat.:	1805	3408	176		1805	3610	2842		3502	31	1590		1086	814	1615	
Capacity Analysis Module:																
Vol/Sat:	0.05	0.07	0.07		0.01	0.13	0.25		0.11	0.32	0.32		0.01	0.01	0.01	
Crit Moves:	****						****			****						
Green/Cycle:	0.07	0.37	0.37		0.04	0.34	0.78		0.44	0.46	0.46		0.02	0.02	0.02	
Volume/Cap:	0.73	0.18	0.18		0.18	0.38	0.32		0.25	0.70	0.70		0.59	0.59	0.40	
Uniform Del:	54.8	25.4	25.4		56.1	30.1	3.9		21.1	25.9	25.9		58.4	58.4	58.2	
IncremntDel:	19.7	0.1	0.1		1.3	0.2	0.1		0.1	3.0	3.0		23.1	23.1	8.3	
InitQueuDel:	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
Delay Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Delay/Veh:	74.4	25.4	25.4		57.4	30.3	4.0		21.2	28.9	28.9		81.5	81.5	66.5	
User DelAdj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
AdjDel/Veh:	74.4	25.4	25.4		57.4	30.3	4.0		21.2	28.9	28.9		81.5	81.5	66.5	
LOS by Move:	E	C	C		E	C	A		C	C	C		F	F	E	
HCM2kAvgQ:	5	3	3		1	7	4		4	16	16		2	2	1	

Note: Queue reported is the number of cars per lane.

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #8 Project Driveway
******************************************************************************
Average Delay (sec/veh):      0.8       Worst Case Level Of Service: C[ 21.3]
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  1  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  296     0     0  555     0     0    0     0     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  296     0     0  555     0     0    0     0     0    0     0
Added Vol:     18    0     0     0    0   434    38    0     2     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:   18  296     0     0  555   434    38    0     2     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:    18  296     0     0  555   434    38    0     2     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:   18  296     0     0  555   434    38    0     2     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  989 xxxx xxxxx  xxxx xxxx xxxxx   956 1104   495  xxxx xxxx xxxxx
Potent Cap.:  707 xxxx xxxxx  xxxx xxxx xxxxx   260  213   526  xxxx xxxx xxxxx
Move Cap.:    707 xxxx xxxxx  xxxx xxxx xxxxx   255  207   526  xxxx xxxx xxxxx
Volume/Cap:  0.03 xxxx  xxxx  xxxx xxxx  xxxx  0.15 0.00  0.00  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.1 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del: 10.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:   B    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  261 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.1 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  0.5 xxxxx xxxxx xxxx xxxxx
Shrd ConDel: 10.2 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 21.3 xxxxx xxxxx xxxx xxxxx
Shared LOS:    B    *     *     *    *     *     *    C     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             21.3           xxxxxx
ApproachLOS:        *                *               C                *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
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Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	300	1262	421	2069	436	281
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	326	1372	458	2249	474	305
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	326	1372	458	2249	474	305
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	18.0	81.1	28.9	92.0	19.0	19.0
Effective Green, g (s)	21.0	84.1	31.9	95.0	22.0	22.0
Actuated g/C Ratio	0.14	0.56	0.21	0.63	0.15	0.15
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	471	1776	648	2117	443	455
v/s Ratio Prot	0.10	0.43	c0.15	c0.67		
v/s Ratio Perm					c0.16	0.10
v/c Ratio	0.69	0.77	0.71	1.06	1.07	0.67
Uniform Delay, d1	61.4	25.5	54.7	27.5	64.0	60.6
Progression Factor	1.00	1.00	1.02	0.29	1.00	1.00
Incremental Delay, d2	8.1	3.3	1.3	32.5	62.7	3.9
Delay (s)	69.5	28.9	56.8	40.4	126.7	64.4
Level of Service	E	C	E	D	F	E
Approach Delay (s)		36.7		43.2		
Approach LOS		D		D		

Intersection Summary			
HCM Average Control Delay	49.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.91		1.00	0.86		0.97	1.00		1.00	0.91	0.91
Frt	1.00	0.99		1.00	1.00		1.00	0.94		1.00	0.85	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3242	4478		1641	4842		3303	1759		1289	1430	2854
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3242	4478		1641	4842		3303	1759		1289	1430	2854
Volume (vph)	470	1432	102	2	2424	2	312	100	59	12	1	132
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	511	1557	111	2	2635	2	339	109	64	13	1	143
RTOR Reduction (vph)	0	5	0	0	0	0	0	14	0	0	44	88
Lane Group Flow (vph)	511	1663	0	2	2637	0	339	159	0	13	5	7
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	21.6	106.5		0.8	85.7		15.0	23.9		2.8	11.7	11.7
Effective Green, g (s)	21.6	106.5		0.8	85.7		15.0	23.9		2.8	11.7	11.7
Actuated g/C Ratio	0.14	0.71		0.01	0.57		0.10	0.16		0.02	0.08	0.08
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	467	3179		9	2766		330	280		24	112	223
v/s Ratio Prot	c0.16	0.37		0.00	c0.54		c0.10	c0.09		c0.01	0.00	
v/s Ratio Perm												0.00
v/c Ratio	1.09	0.52		0.22	0.95		1.03	0.57		0.54	0.04	0.03
Uniform Delay, d1	64.2	10.0		74.3	30.3		67.5	58.3		73.0	64.0	63.9
Progression Factor	0.95	0.23		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	62.9	0.4		12.1	8.7		56.7	2.6		22.7	0.2	0.1
Delay (s)	123.8	2.8		86.4	38.9		124.2	60.9		95.6	64.1	64.0
Level of Service	F	A		F	D		F	E		F	E	E
Approach Delay (s)		31.2			39.0			102.8			66.6	
Approach LOS		C			D			F			E	

Intersection Summary			
HCM Average Control Delay	42.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1698	0	0	2490	0	305
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1846	0	0	2707	0	332
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.53		0.74	0.53
vC, conflicting volume			1846		2522	923
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1706		0	0
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	38
cM capacity (veh/h)			194		758	533

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	923	923	677	677	677	677	332
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	332
cSH	1700	1700	1700	1700	1700	1700	533
Volume to Capacity	0.54	0.54	0.40	0.40	0.40	0.40	0.62
Queue Length 95th (ft)	0	0	0	0	0	0	106
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	22.2
Lane LOS							C
Approach Delay (s)	0.0		0.0				22.2
Approach LOS							C

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #6 Arch / Austin

Cycle (sec):	120	Critical Vol./Cap.(X):	1.078
Loss Time (sec):	16 (Y+R=4.0 sec)	Average Delay (sec/veh):	55.2
Optimal Cycle:	180	Level Of Service:	E

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Ovl			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 1	1 0		1 0 2	0 2		2 0 0	1 0		0 1 0	0 1	
Volume Module:												
Base Vol:	233	627	12	12	474	912	962	12	175	12	16	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	233	627	12	12	474	912	962	12	175	12	16	12
Added Vol:	350	28	0	0	3	0	0	0	36	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	583	655	12	12	477	912	962	12	211	12	16	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	583	655	12	12	477	912	962	12	211	12	16	12
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	583	655	12	12	477	912	962	12	211	12	16	12
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	583	655	12	12	477	912	962	12	211	12	16	12
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.95	0.95	0.95	0.95	0.75	0.92	0.86	0.86	0.96	0.96	0.85
Lanes:	1.00	1.96	0.04	1.00	2.00	2.00	2.00	0.05	0.95	0.43	0.57	1.00
Final Sat.:	1805	3534	65	1805	3610	2842	3502	88	1542	778	1037	1615
Capacity Analysis Module:												
Vol/Sat:	0.32	0.19	0.19	0.01	0.13	0.32	0.27	0.14	0.14	0.02	0.02	0.01
Crit Moves:	****					****	****				****	
Green/Cycle:	0.30	0.58	0.58	0.02	0.30	0.55	0.25	0.27	0.27	0.02	0.02	0.02
Volume/Cap:	1.08	0.32	0.32	0.32	0.44	0.58	1.08	0.51	0.51	1.00	1.00	0.48
Uniform Del:	42.0	13.2	13.2	57.9	34.1	17.7	44.7	37.0	37.0	59.1	59.1	58.6
IncremntDel:	61.8	0.1	0.1	4.9	0.3	0.6	53.8	1.0	1.0	170.9	171	14.0
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	103.8	13.3	13.3	62.9	34.4	18.3	98.5	38.0	38.0	230.0	230	72.6
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	103.8	13.3	13.3	62.9	34.4	18.3	98.5	38.0	38.0	230.0	230	72.6
LOS by Move:	F	B	B	E	C	B	F	D	D	F	F	E
HCM2kAvgQ:	31	7	7	1	8	13	27	1	7	3	3	1

Note: Queue reported is the number of cars per lane.

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                      Level Of Service Computation Report
           2000 HCM Unsignalized Method (Future Volume Alternative)
******************************************************************************
Intersection #8 Project Driveway
******************************************************************************
Average Delay (sec/veh):     90.2       Worst Case Level Of Service: F[450.7]
******************************************************************************
Approach:      North Bound      South Bound       East Bound       West Bound
Movement:     L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:       Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:           Include          Include          Include          Include
Lanes:        0  1  1  0  0    0  0  1  1  0    0  0  1! 0  0    0  0  0  0  0
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:       0  872     0     0  660     0     0    0     0     0    0     0
Growth Adj:  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
Initial Bse:    0  872     0     0  660     0     0    0     0     0    0     0
Added Vol:      2    0     0     0    0    38   377    0    16     0    0     0
PasserByVol:    0    0     0     0    0     0     0    0     0     0    0     0
Initial Fut:    2  872     0     0  660    38   377    0    16     0    0     0
User Adj:    1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Adj:     1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00  1.00 1.00  1.00
PHF Volume:     2  872     0     0  660    38   377    0    16     0    0     0
Reduct Vol:     0    0     0     0    0     0     0    0     0     0    0     0
FinalVolume:    2  872     0     0  660    38   377    0    16     0    0     0
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:  4.1 xxxx xxxxx xxxxx xxxx xxxxx   6.8  6.5   6.9 xxxxx xxxx xxxxx
FollowUpTim:  2.2 xxxx xxxxx xxxxx xxxx xxxxx   3.5  4.0   3.3 xxxxx xxxx xxxxx
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol:  698 xxxx xxxxx  xxxx xxxx xxxxx  1119 1555   349  xxxx xxxx xxxxx
Potent Cap.:  908 xxxx xxxxx  xxxx xxxx xxxxx   204  114   653  xxxx xxxx xxxxx
Move Cap.:    908 xxxx xxxxx  xxxx xxxx xxxxx   204  114   653  xxxx xxxx xxxxx
Volume/Cap:  0.00 xxxx  xxxx  xxxx xxxx  xxxx  1.85 0.00  0.02  xxxx xxxx  xxxx
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:    0.0 xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx
Control Del:  9.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
LOS by Move:   A    *     *     *    *     *     *    *     *     *    *     *
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx  209 xxxxx  xxxx xxxx xxxxx
SharedQueue:  0.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx 28.2 xxxxx xxxxx xxxx xxxxx
Shrd ConDel:  9.0 xxxx xxxxx xxxxx xxxx xxxxx xxxxx  451 xxxxx xxxxx xxxx xxxxx
Shared LOS:    A    *     *     *    *     *     *    F     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx            450.7           xxxxxx
ApproachLOS:        *                *               F                *
******************************************************************************
Note: Queue reported is the number of cars per lane.
******************************************************************************
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2035 PLUS PROJECT MITIGATED

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0		4.0
Lane Util. Factor	0.95			0.86		1.00
Frt	1.00			1.00		0.86
Flt Protected	1.00			1.00		1.00
Satd. Flow (prot)	3167			6052		1315
Flt Permitted	1.00			1.00		1.00
Satd. Flow (perm)	3167			6052		1315
Volume (vph)	1908	0	0	644	0	415
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2074	0	0	700	0	451
RTOR Reduction (vph)	0	0	0	0	0	8
Lane Group Flow (vph)	2074	0	0	700	0	443
Heavy Vehicles (%)	14%	2%	2%	8%	2%	25%
Turn Type						custom
Protected Phases	4			8		
Permitted Phases						2
Actuated Green, G (s)	59.0			59.0		28.0
Effective Green, g (s)	59.0			59.0		28.0
Actuated g/C Ratio	0.62			0.62		0.29
Clearance Time (s)	4.0			4.0		4.0
Vehicle Extension (s)	3.0			3.0		3.0
Lane Grp Cap (vph)	1967			3759		388
v/s Ratio Prot	c0.65			0.12		
v/s Ratio Perm						c0.34
v/c Ratio	1.05			0.19		1.14
Uniform Delay, d1	18.0			7.7		33.5
Progression Factor	0.56			0.10		1.00
Incremental Delay, d2	28.9			0.1		90.4
Delay (s)	38.9			0.9		123.9
Level of Service	D			A		F
Approach Delay (s)	38.9			0.9	123.9	
Approach LOS	D			A	F	

Intersection Summary			
HCM Average Control Delay	42.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #6 Arch / Austin

Cycle (sec):	120	Critical Vol./Cap.(X):	0.715
Loss Time (sec):	16 (Y+R=4.0 sec)	Average Delay (sec/veh):	22.8
Optimal Cycle:	77	Level Of Service:	C

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	T	R		L	T	R		L	T	R		L	T	R	
Control:	Protected				Protected				Protected				Permitted			
Rights:	Include				Ovl				Include				Include			
Min. Green:	0	0	0		0	0	0		0	0	0		0	0	0	
Lanes:	1 0	1	1 0		1 0	2	0 2		3 0	0	1 0		0 1	0	0 1	
Volume Module:																
Base Vol:	55	229	12		12	435	705		377	10	108		12	9	12	
Growth Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Initial Bse:	55	229	12		12	435	705		377	10	108		12	9	12	
Added Vol:	36	3	0		0	32	0		0	0	402		0	0	0	
PasserByVol:	0	0	0		0	0	0		0	0	0		0	0	0	
Initial Fut:	91	232	12		12	467	705		377	10	510		12	9	12	
User Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Volume:	91	232	12		12	467	705		377	10	510		12	9	12	
Reduct Vol:	0	0	0		0	0	0		0	0	0		0	0	0	
Reduced Vol:	91	232	12		12	467	705		377	10	510		12	9	12	
PCE Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
MLF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
FinalVolume:	91	232	12		12	467	705		377	10	510		12	9	12	
Saturation Flow Module:																
Sat/Lane:	1900	1900	1900		1900	1900	1900		1900	1900	1900		1900	1900	1900	
Adjustment:	0.95	0.94	0.94		0.95	0.95	0.75		0.92	0.85	0.85		1.00	1.00	0.85	
Lanes:	1.00	1.90	0.10		1.00	2.00	2.00		3.00	0.02	0.98		0.57	0.43	1.00	
Final Sat.:	1805	3408	176		1805	3610	2842		5253	31	1590		1086	814	1615	
Capacity Analysis Module:																
Vol/Sat:	0.05	0.07	0.07		0.01	0.13	0.25		0.07	0.32	0.32		0.01	0.01	0.01	
Crit Moves:	****						****			****						
Green/Cycle:	0.07	0.37	0.37		0.04	0.34	0.78		0.44	0.46	0.46		0.02	0.02	0.02	
Volume/Cap:	0.73	0.18	0.18		0.18	0.38	0.32		0.16	0.70	0.70		0.59	0.59	0.40	
Uniform Del:	54.8	25.4	25.4		56.1	30.1	3.9		20.3	25.9	25.9		58.4	58.4	58.2	
IncremntDel:	19.7	0.1	0.1		1.3	0.2	0.1		0.0	3.0	3.0		23.1	23.1	8.3	
InitQueuDel:	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
Delay Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Delay/Veh:	74.4	25.4	25.4		57.4	30.3	4.0		20.4	28.9	28.9		81.5	81.5	66.5	
User DelAdj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
AdjDel/Veh:	74.4	25.4	25.4		57.4	30.3	4.0		20.4	28.9	28.9		81.5	81.5	66.5	
LOS by Move:	E	C	C		E	C	A		C	C	C		F	F	E	
HCM2kAvgQ:	5	3	3		1	7	4		3	16	16		2	2	1	

Note: Queue reported is the number of cars per lane.

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Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #8 Project Driveway

Cycle (sec): 100 Critical Vol./Cap.(X): 0.320
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 1.8
Optimal Cycle: 21 Level Of Service: A

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	- T	- R		L	- T	- R		L	- T	- R		L	- T	- R	
Control:	Permitted				Permitted				Permitted				Permitted			
Rights:	Include				Include				Include				Include			
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 1	1	0	0	0	0 1	1	0	0	0 1!	0	0	0	0	0	0
Volume Module:																
Base Vol:	0	296	0	0	555	0	0	0	0	0	0	0	0	0	0	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	296	0	0	555	0	0	0	0	0	0	0	0	0	0	0
Added Vol:	18	0	0	0	0	434	38	0	2	0	0	0	0	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	18	296	0	0	555	434	38	0	2	0	0	0	0	0	0	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	18	296	0	0	555	434	38	0	2	0	0	0	0	0	0	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	18	296	0	0	555	434	38	0	2	0	0	0	0	0	0	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	18	296	0	0	555	434	38	0	2	0	0	0	0	0	0	0
Saturation Flow Module:																
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.85	0.85	1.00	1.00	0.89	0.89	0.78	1.00	0.78	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.11	1.89	0.00	0.00	1.12	0.88	0.95	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Final Sat.:	185	3036	0	0	1892	1480	1405	0	74	0	0	0	0	0	0	0
Capacity Analysis Module:																
Vol/Sat:	0.10	0.10	0.00	0.00	0.29	0.29	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crit Moves:					****		****									
Green/Cycle:	0.92	0.92	0.00	0.00	0.92	0.92	0.08	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Volume/Cap:	0.11	0.11	0.00	0.00	0.32	0.32	0.32	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Uniform Del:	0.4	0.4	0.0	0.0	0.5	0.5	43.1	0.0	43.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IncremntDel:	0.0	0.0	0.0	0.0	0.1	0.1	1.5	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
InitQueuDel:	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
Delay Adj:	1.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Delay/Veh:	0.4	0.4	0.0	0.0	0.6	0.6	44.6	0.0	44.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.4	0.4	0.0	0.0	0.6	0.6	44.6	0.0	44.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOS by Move:	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	A
HCM2kAvgQ:	1	1	0	0	2	2	1	0	1	0	0	0	0	0	0	0

Note: Queue reported is the number of cars per lane.

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0		4.0
Lane Util. Factor	0.95			0.86		1.00
Frt	1.00			1.00		0.86
Flt Protected	1.00			1.00		1.00
Satd. Flow (prot)	3167			6052		1315
Flt Permitted	1.00			1.00		1.00
Satd. Flow (perm)	3167			6052		1315
Volume (vph)	1698	0	0	2490	0	305
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1846	0	0	2707	0	332
RTOR Reduction (vph)	0	0	0	0	0	16
Lane Group Flow (vph)	1846	0	0	2707	0	316
Heavy Vehicles (%)	14%	2%	2%	8%	2%	25%
Turn Type						custom
Protected Phases	4			8		
Permitted Phases						2
Actuated Green, G (s)	76.9			76.9		30.1
Effective Green, g (s)	76.9			76.9		30.1
Actuated g/C Ratio	0.67			0.67		0.26
Clearance Time (s)	4.0			4.0		4.0
Vehicle Extension (s)	3.0			3.0		3.0
Lane Grp Cap (vph)	2118			4047		344
v/s Ratio Prot	c0.58			0.45		
v/s Ratio Perm						c0.24
v/c Ratio	0.87			0.67		0.92
Uniform Delay, d1	15.1			11.4		41.2
Progression Factor	0.71			0.15		1.00
Incremental Delay, d2	2.9			0.2		28.3
Delay (s)	13.7			1.9		69.6
Level of Service	B			A		E
Approach Delay (s)	13.7			1.9	69.6	
Approach LOS	B			A	E	

Intersection Summary			
HCM Average Control Delay	11.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #6 Arch / Austin

Cycle (sec):	120	Critical Vol./Cap.(X):	0.972
Loss Time (sec):	16 (Y+R=4.0 sec)	Average Delay (sec/veh):	43.1
Optimal Cycle:	180	Level Of Service:	D

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Protected			Protected			Protected			Permitted		
Rights:	Include			Ovl			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0	1 1	0	1 0	2 0	2	3 0	0 1	0	0 1	0 0	1
Volume Module:												
Base Vol:	233	627	12	12	474	912	962	12	175	12	16	12
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	233	627	12	12	474	912	962	12	175	12	16	12
Added Vol:	350	28	0	0	3	0	0	0	36	0	0	0
PasserByVol:	0	0	0	0	0	0	0	0	0	0	0	0
Initial Fut:	583	655	12	12	477	912	962	12	211	12	16	12
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	583	655	12	12	477	912	962	12	211	12	16	12
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	583	655	12	12	477	912	962	12	211	12	16	12
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	583	655	12	12	477	912	962	12	211	12	16	12
Saturation Flow Module:												
Sat/Lane:	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Adjustment:	0.95	0.95	0.95	0.95	0.95	0.75	0.92	0.86	0.86	0.96	0.96	0.85
Lanes:	1.00	1.96	0.04	1.00	2.00	2.00	3.00	0.05	0.95	0.43	0.57	1.00
Final Sat.:	1805	3534	65	1805	3610	2842	5253	88	1542	778	1037	1615
Capacity Analysis Module:												
Vol/Sat:	0.32	0.19	0.19	0.01	0.13	0.32	0.18	0.14	0.14	0.02	0.02	0.01
Crit Moves:	****					****	****				****	
Green/Cycle:	0.33	0.64	0.64	0.02	0.33	0.52	0.19	0.21	0.21	0.02	0.02	0.02
Volume/Cap:	0.97	0.29	0.29	0.29	0.40	0.62	0.97	0.67	0.67	0.90	0.90	0.43
Uniform Del:	39.6	9.6	9.6	57.7	31.1	20.5	48.4	43.9	43.9	58.9	58.9	58.4
IncremntDel:	30.0	0.1	0.1	3.9	0.2	0.8	22.4	5.1	5.1	120.7	121	10.6
InitQueuDel:	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Delay/Veh:	69.6	9.7	9.7	61.5	31.3	21.4	70.8	48.9	48.9	179.6	180	69.0
User DelAdj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	69.6	9.7	9.7	61.5	31.3	21.4	70.8	48.9	48.9	179.6	180	69.0
LOS by Move:	E	A	A	E	C	C	E	D	D	F	F	E
HCM2kAvgQ:	27	6	6	1	7	14	17	1	8	3	3	1

Note: Queue reported is the number of cars per lane.

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Level Of Service Computation Report
2000 HCM Operations Method (Future Volume Alternative)

Intersection #8 Project Driveway

Cycle (sec): 100 Critical Vol./Cap.(X): 0.539
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): 18.0
Optimal Cycle: 31 Level Of Service: B

Approach:	North Bound				South Bound				East Bound				West Bound			
Movement:	L	- T	- R		L	- T	- R		L	- T	- R		L	- T	- R	
Control:	Permitted				Permitted				Permitted				Permitted			
Rights:	Include				Include				Include				Include			
Min. Green:	0	0	0		0	0	0		0	0	0		0	0	0	
Lanes:	0 1	1	0	0	0 0	1	1	0	0 0	1!	0	0	0 0	0	0	0
Volume Module:																
Base Vol:	0	872	0		0	660	0		0	0	0		0	0	0	
Growth Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
Initial Bse:	0	872	0		0	660	0		0	0	0		0	0	0	
Added Vol:	2	0	0		0	0	38		377	0	16		0	0	0	
PasserByVol:	0	0	0		0	0	0		0	0	0		0	0	0	
Initial Fut:	2	872	0		0	660	38		377	0	16		0	0	0	
User Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
PHF Volume:	2	872	0		0	660	38		377	0	16		0	0	0	
Reduct Vol:	0	0	0		0	0	0		0	0	0		0	0	0	
Reduced Vol:	2	872	0		0	660	38		377	0	16		0	0	0	
PCE Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
MLF Adj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
FinalVolume:	2	872	0		0	660	38		377	0	16		0	0	0	
Saturation Flow Module:																
Sat/Lane:	1900	1900	1900		1900	1900	1900		1900	1900	1900		1900	1900	1900	
Adjustment:	0.91	0.91	1.00		1.00	0.94	0.94		0.72	1.00	0.72		1.00	1.00	1.00	
Lanes:	0.01	1.99	0.00		0.00	1.89	0.11		0.96	0.00	0.04		0.00	0.00	0.00	
Final Sat.:	8	3440	0		0	3386	195		1321	0	56		0	0	0	
Capacity Analysis Module:																
Vol/Sat:	0.25	0.25	0.00		0.00	0.19	0.19		0.29	0.00	0.29		0.00	0.00	0.00	
Crit Moves:		****							****							
Green/Cycle:	0.47	0.47	0.00		0.00	0.47	0.47		0.53	0.00	0.53		0.00	0.00	0.00	
Volume/Cap:	0.54	0.54	0.00		0.00	0.41	0.41		0.54	0.00	0.54		0.00	0.00	0.00	
Uniform Del:	18.8	18.8	0.0		0.0	17.4	17.4		15.5	0.0	15.5		0.0	0.0	0.0	
IncremntDel:	0.4	0.4	0.0		0.0	0.2	0.2		0.8	0.0	0.8		0.0	0.0	0.0	
InitQueuDel:	0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0		0.0	0.0	0.0	
Delay Adj:	1.00	1.00	0.00		0.00	1.00	1.00		1.00	0.00	1.00		0.00	0.00	0.00	
Delay/Veh:	19.2	19.2	0.0		0.0	17.6	17.6		16.3	0.0	16.3		0.0	0.0	0.0	
User DelAdj:	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00	1.00	
AdjDel/Veh:	19.2	19.2	0.0		0.0	17.6	17.6		16.3	0.0	16.3		0.0	0.0	0.0	
LOS by Move:	B	B	A		A	B	B		B	A	B		A	A	A	
HCM2kAvgQ:	10	10	0		0	7	7		8	0	8		0	0	0	

Note: Queue reported is the number of cars per lane.

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ATTACHMENT B

5-1, TRAF-4 and Traffic Master Response

Roadway Level of Service Analysis

Arch Road Roadway Analysis using HCM

3C

	EPAP w/o M + Proj AM		EPAP w/o M + Proj PM		2035 + Proj AM		2035 + Proj PM	
Input Parameters	EB	WB	EB	WB	EB	WB	EB	WB
Directional Volume	**612**	**199**	**342**	**630**	**897**	**805**	**1185**	**1511**
Saturation s	1700	1700	1700	1700	1700	1700	1700	1700
Lanes	2	1	2	1	2	2	2	2
PF	5.6615385	5.6615385	4.6	4.6	2.3	2.3	2.3	2.3
Cycle length C (s)	120	120	120	120	120	120	120	120
g/C	**0.87**	**0.87**	**0.84**	**0.84**	**0.68**	**0.68**	**0.68**	**0.68**
X (v/c)	0.36	0.1170588	0.2011765	0.3705882	0.5276471	0.4735294	0.6970588	0.8888235
capacity c (veh/h)	2958	1479	2856	1428	2312	2312	2312	2312
Arrival Type, AT	4	4	4	4	4	4	4	4
length L (mi)	1	1	1	1	1	1	1	1
Urban Class	1	1	1	1	1	1	1	1
FFS (mi/h)	50	50	50	50	50	50	50	50
Running Time T_R	72	72	72	72	72	72	72	72
Analysis Period T (hr)	1	1	1	1	1	1	1	1
I	0.9411248	0.9971002	0.9876226	0.9363687	0.8359705	0.8772642	0.6540579	0.3364601
k (from table 15-6)	0.11	0.11	0.11	0.11	0.5	0.5	0.5	0.5
Delay Computation								
Uniform Delay	1.4764123	1.1289763	1.8483493	2.2302699	9.5820337	9.0619469	11.680608	15.530839
Incremental delay	0.0708663	0.0353939	0.0344861	0.1528664	0.7264097	0.6139128	1.1691811	2.0727445
Control delay	8.4296316	6.4271365	8.5368928	10.412108	22.765087	21.456391	28.03458	37.793675
Segment LOS								
ST	80.429632	78.427136	80.536893	82.412108	94.765087	93.456391	100.03458	109.79367
S_A	45	46	45	44	38	39	36	33
LOS	A	A	A	A	B	B	B	C

Austin Road Roadway Analysis using Florida Tables

EPAP w/o Mariposa + Proj AM				EPAP w/o Mariposa + Proj PM			
NB		SB		NB		SB	
Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS
86	C	463	D	409	D	73	C
2035 + Proj AM				**2035 + Proj PM**			
NB		SB		NB		SB	
Vol	LOS	Vol	LOS	Vol	LOS	Vol	LOS
334	C	989	D	1249	D	698	C

ATTACHMENT

5-1, TRAF-4 and Traffic Master Response

Off-Peak Hour - SimTraffic Queuing Analysis Sheets

EPAP AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	20	135	148	145	98	130	86	110	177	169	98	83
Average Queue (ft)	2	27	72	60	31	59	30	29	96	96	39	25
95th Queue (ft)	12	69	127	118	77	110	72	77	162	153	77	65
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			0	0	0	2		0				
Queuing Penalty (veh)			0	0	0	1		0				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	296	324	69	185	126	133	195	92	126	110
Average Queue (ft)	56	162	184	25	84	61	69	80	36	25	40
95th Queue (ft)	133	290	305	58	157	121	123	166	76	79	80
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	7	13								
Queuing Penalty (veh)	0	40	76								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	0	9			0			1			
Queuing Penalty (veh)	0	6			0			1			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	48	89
Average Queue (ft)	2	6
95th Queue (ft)	18	34
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	29	65	309
Average Queue (ft)	2	8	134
95th Queue (ft)	14	37	222
Link Distance (ft)	107	107	252
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	90	162
Average Queue (ft)	6	11
95th Queue (ft)	39	64
Link Distance (ft)	137	137
Upstream Blk Time (%)		0
Queuing Penalty (veh)		3
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	72	244	203	26	30	130	152	32	41	46	53	24
Average Queue (ft)	20	97	73	1	16	73	58	6	7	10	3	4
95th Queue (ft)	53	168	145	9	39	118	112	26	24	31	24	19
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		1	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	41
Average Queue (ft)	11	5
95th Queue (ft)	31	22
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	113
Average Queue (ft)	49
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	20	22
Average Queue (ft)	1	3
95th Queue (ft)	7	15
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served		T
Maximum Queue (ft)	553	541
Average Queue (ft)	18	18
95th Queue (ft)	182	178
Link Distance (ft)	438	438
Upstream Blk Time (%)		0
Queuing Penalty (veh)		1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 131

EPAP AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	20	135	148	145	98	130	86	110	177	169	98	83
Average Queue (ft)	2	27	72	60	31	59	30	29	96	96	39	25
95th Queue (ft)	12	69	127	118	77	110	72	77	162	153	77	65
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			0	0	0	2		0				
Queuing Penalty (veh)			0	0	0	1		0				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	296	324	69	185	126	133	195	92	126	110
Average Queue (ft)	56	162	184	25	84	61	69	80	36	25	40
95th Queue (ft)	133	290	305	58	157	121	123	166	76	79	80
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	7	13								
Queuing Penalty (veh)	0	40	76								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	0	9			0			1			
Queuing Penalty (veh)	0	6			0			1			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	48	89
Average Queue (ft)	2	6
95th Queue (ft)	18	34
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	29	65	309
Average Queue (ft)	2	8	134
95th Queue (ft)	14	37	222
Link Distance (ft)	107	107	252
Upstream Blk Time (%)			0
Queuing Penalty (veh)			1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	90	162
Average Queue (ft)	6	11
95th Queue (ft)	39	64
Link Distance (ft)	137	137
Upstream Blk Time (%)		0
Queuing Penalty (veh)		3
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	72	244	203	26	30	130	152	32	41	46	53	24
Average Queue (ft)	20	97	73	1	16	73	58	6	7	10	3	4
95th Queue (ft)	53	168	145	9	39	118	112	26	24	31	24	19
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		1	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	41
Average Queue (ft)	11	5
95th Queue (ft)	31	22
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	113
Average Queue (ft)	49
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	20	22
Average Queue (ft)	1	3
95th Queue (ft)	7	15
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served		T
Maximum Queue (ft)	553	541
Average Queue (ft)	18	18
95th Queue (ft)	182	178
Link Distance (ft)	438	438
Upstream Blk Time (%)		0
Queuing Penalty (veh)		1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 131

EPAP AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	57	46	249	168	88	125	88	65	146	147	83	90
Average Queue (ft)	5	23	79	57	22	62	26	22	86	89	38	27
95th Queue (ft)	27	46	148	115	62	108	67	50	133	132	72	60
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			1	0	0	1	0					
Queuing Penalty (veh)			1	0	0	1	0					
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	290	287	69	205	205	133	224	365	126	110
Average Queue (ft)	54	175	212	23	85	60	70	107	48	28	35
95th Queue (ft)	128	283	329	56	176	144	131	201	154	82	74
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	8	18								
Queuing Penalty (veh)	0	46	105								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	0	11			0			4			
Queuing Penalty (veh)	0	8			0			2			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	22	22
Average Queue (ft)	1	1
95th Queue (ft)	7	9
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	27	92	310
Average Queue (ft)	2	8	144
95th Queue (ft)	13	47	243
Link Distance (ft)	107	107	252
Upstream Blk Time (%)		0	0
Queuing Penalty (veh)		0	2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	56	138
Average Queue (ft)	7	14
95th Queue (ft)	33	67
Link Distance (ft)	137	137
Upstream Blk Time (%)		0
Queuing Penalty (veh)		1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	73	155	145	27	49	134	113	32	41	46	53	24
Average Queue (ft)	17	88	70	1	19	73	61	9	7	9	3	4
95th Queue (ft)	52	142	130	9	45	126	107	31	24	31	24	19
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		1	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	41
Average Queue (ft)	10	5
95th Queue (ft)	30	20
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	93
Average Queue (ft)	53
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	50	22
Average Queue (ft)	2	6
95th Queue (ft)	16	22
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	
Maximum Queue (ft)	522
Average Queue (ft)	32
95th Queue (ft)	228
Link Distance (ft)	438
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 167

EPAP PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	135	149	340	173	124	169	175	177	250	251	83	166
Average Queue (ft)	36	65	112	74	77	102	128	139	156	122	49	53
95th Queue (ft)	84	116	214	148	123	160	198	190	231	218	80	110
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	3	0	4	11	17	22	0	1		
Queuing Penalty (veh)		0	4	0	10	27	42	55	1	1		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	306	51	404	345	305	216	133	31	142
Average Queue (ft)	122	290	240	18	170	152	136	108	67	6	53
95th Queue (ft)	212	337	313	48	285	264	239	189	116	24	104
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	55	21								
Queuing Penalty (veh)	0	288	109								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	0	50						1			
Queuing Penalty (veh)	1	47						2			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	20	66
Average Queue (ft)	1	23
95th Queue (ft)	7	59
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	140	132	90	244	201	387
Average Queue (ft)	53	18	6	33	35	156
95th Queue (ft)	142	79	40	138	126	303
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	3	1		1	1	5
Queuing Penalty (veh)	10	2		3	7	16
Storage Bay Dist (ft)			240			
Storage Blk Time (%)				1		
Queuing Penalty (veh)				3		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	233	200
Average Queue (ft)	149	77
95th Queue (ft)	260	201
Link Distance (ft)	137	137
Upstream Blk Time (%)	18	6
Queuing Penalty (veh)	92	29
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	R	L	LT
Maximum Queue (ft)	53	235	165	30	251	210	116	20	25	56	24	44
Average Queue (ft)	17	99	77	10	79	82	9	7	9	2	4	15
95th Queue (ft)	47	170	144	31	157	161	47	22	28	18	19	38
Link Distance (ft)		311	311		1417	1417			248			284
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250			100	250		200	200	
Storage Blk Time (%)		1	1		0	3	0					
Queuing Penalty (veh)		0	0		0	1	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	7
95th Queue (ft)	21
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	54
Average Queue (ft)	23
95th Queue (ft)	49
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	70	50
Average Queue (ft)	17	8
95th Queue (ft)	54	28
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	539	424
Average Queue (ft)	68	14
95th Queue (ft)	356	140
Link Distance (ft)	436	436
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	1	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	120	48
Average Queue (ft)	4	2
95th Queue (ft)	40	16
Link Distance (ft)	42	1169
Upstream Blk Time (%)	1	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 750

EPAP PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	135	147	319	155	132	170	174	177	348	302	98	103
Average Queue (ft)	38	55	135	81	70	88	127	133	175	127	48	47
95th Queue (ft)	97	96	244	147	117	148	189	201	278	236	80	86
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	8	0	2	7	19	22	5	1		
Queuing Penalty (veh)		0	11	0	4	18	47	55	11	3		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	317	54	506	289	341	217	117	31	97
Average Queue (ft)	128	296	255	18	193	166	155	113	64	6	49
95th Queue (ft)	216	320	330	47	318	248	261	195	111	24	92
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	64	24		0						
Queuing Penalty (veh)	0	336	125		0						
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	0	62						2			
Queuing Penalty (veh)	1	57						4			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	48	75
Average Queue (ft)	2	25
95th Queue (ft)	18	64
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	156	155	129	258	242	386
Average Queue (ft)	77	35	8	25	31	193
95th Queue (ft)	172	117	53	123	115	354
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	7	1	0	1	1	11
Queuing Penalty (veh)	27	4	0	7	4	30
Storage Bay Dist (ft)			240			
Storage Blk Time (%)			0	1		
Queuing Penalty (veh)			0	7		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB
Directions Served	T	T	T
Maximum Queue (ft)	238	214	27
Average Queue (ft)	175	132	1
95th Queue (ft)	248	252	9
Link Distance (ft)	137	137	173
Upstream Blk Time (%)	26	10	
Queuing Penalty (veh)	137	54	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	53	154	156	27	30	242	226	31	20	25	56	24
Average Queue (ft)	16	92	74	1	10	112	114	7	4	12	2	5
95th Queue (ft)	43	145	139	9	31	209	214	27	18	31	18	21
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		0	1			0	3					
Queuing Penalty (veh)		0	0			0	1					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	20
Average Queue (ft)	17	6
95th Queue (ft)	40	20
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	29
Average Queue (ft)	1
95th Queue (ft)	10
Link Distance (ft)	-5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	52
Average Queue (ft)	22
95th Queue (ft)	48
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	69	52
Average Queue (ft)	15	9
95th Queue (ft)	45	34
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	T
Maximum Queue (ft)	523
Average Queue (ft)	94
95th Queue (ft)	407
Link Distance (ft)	436
Upstream Blk Time (%)	0
Queuing Penalty (veh)	2
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	97
Average Queue (ft)	8
95th Queue (ft)	46
Link Distance (ft)	42
Upstream Blk Time (%)	2
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Nework Summary

Network wide Queuing Penalty: 944

EPAP PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	97	125	319	154	132	170	188	213	316	267	97	122
Average Queue (ft)	34	56	122	85	71	101	139	146	176	136	44	50
95th Queue (ft)	70	96	242	140	125	156	192	198	281	250	75	90
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			7	0	2	11	21	23	2	0		
Queuing Penalty (veh)			9	0	5	27	51	56	4	1		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	287	51	382	337	261	162	135	51	111
Average Queue (ft)	117	294	244	19	190	159	149	85	65	6	55
95th Queue (ft)	222	323	321	48	290	269	243	145	120	28	98
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	1	57	20								
Queuing Penalty (veh)	0	302	105								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	1	53									
Queuing Penalty (veh)	5	49									

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	SW
Directions Served	T	R
Maximum Queue (ft)	49	88
Average Queue (ft)	2	27
95th Queue (ft)	16	70
Link Distance (ft)	-5	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	140	172	92	129	198	159	387
Average Queue (ft)	60	40	6	13	34	29	191
95th Queue (ft)	149	128	43	64	131	113	361
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	5	3		0	1	2	12
Queuing Penalty (veh)	20	11		0	6	8	33
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	1		
Queuing Penalty (veh)				0	6		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB
Directions Served	T	T	T	R
Maximum Queue (ft)	208	230	280	182
Average Queue (ft)	150	129	18	6
95th Queue (ft)	257	252	129	60
Link Distance (ft)	137	137	173	173
Upstream Blk Time (%)	23	9	0	0
Queuing Penalty (veh)	123	49	0	1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	L	LT	R
Maximum Queue (ft)	53	213	185	30	172	230	32	40	25	24	44	20
Average Queue (ft)	18	99	86	10	78	81	9	8	9	4	12	7
95th Queue (ft)	50	165	160	32	144	158	31	25	28	19	35	21
Link Distance (ft)		311	311		1417	1417			248		284	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250			100	250		200		200
Storage Blk Time (%)		1	2			2						
Queuing Penalty (veh)		0	0			0						

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	51
Average Queue (ft)	22
95th Queue (ft)	48
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	108	52
Average Queue (ft)	23	8
95th Queue (ft)	68	30
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	T
Maximum Queue (ft)	520
Average Queue (ft)	123
95th Queue (ft)	459
Link Distance (ft)	436
Upstream Blk Time (%)	1
Queuing Penalty (veh)	5
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	112
Average Queue (ft)	7
95th Queue (ft)	51
Link Distance (ft)	42
Upstream Blk Time (%)	2
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Nework Summary

Network wide Queuing Penalty: 876

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	128	718
Average Queue (ft)	14	62
95th Queue (ft)	75	373
Link Distance (ft)	42	1169
Upstream Blk Time (%)	7	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 906

EPAP PLUS PROJECT AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	78	66	380	339	95	146	71	71	348	259	114	107
Average Queue (ft)	9	32	211	137	42	66	25	17	202	177	46	36
95th Queue (ft)	34	54	365	231	78	123	58	55	305	272	92	80
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			23	2	0	4			5	1		
Queuing Penalty (veh)			32	3	0	3			14	4		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	326	320	54	212	117	313	262	1161	206	175
Average Queue (ft)	119	297	256	22	89	56	123	226	855	40	49
95th Queue (ft)	224	318	319	48	169	107	222	239	1313	132	111
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	69	23						24		
Queuing Penalty (veh)	0	375	126						0		
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	0	62						94	0	2	
Queuing Penalty (veh)	1	43						60	0	2	

Intersection: 3: Arch Road &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	158	122
Average Queue (ft)	6	4
95th Queue (ft)	54	40
Link Distance (ft)	1417	1417
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	SW
Directions Served	T	T	R
Maximum Queue (ft)	118	115	22
Average Queue (ft)	10	4	1
95th Queue (ft)	59	38	10
Link Distance (ft)	-5	-5	269
Upstream Blk Time (%)	1	1	
Queuing Penalty (veh)	2	1	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	185	181	406
Average Queue (ft)	94	62	326
95th Queue (ft)	187	157	445
Link Distance (ft)	107	107	252
Upstream Blk Time (%)	14	4	39
Queuing Penalty (veh)	73	24	193
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	226	214
Average Queue (ft)	178	116
95th Queue (ft)	257	251
Link Distance (ft)	137	137
Upstream Blk Time (%)	35	8
Queuing Penalty (veh)	222	48
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	73	238	284	28	52	149	190	32	20	24	28	56
Average Queue (ft)	18	88	68	2	16	85	71	7	6	2	1	4
95th Queue (ft)	54	155	146	14	44	132	129	27	20	14	9	26
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		1	0				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	47	47	20
Average Queue (ft)	5	16	9
95th Queue (ft)	24	37	22
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	50
Average Queue (ft)	2
95th Queue (ft)	17
Link Distance (ft)	-5
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	91
Average Queue (ft)	52
95th Queue (ft)	82
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	51	22
Average Queue (ft)	2	2
95th Queue (ft)	18	12
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	527
Average Queue (ft)	211	62
95th Queue (ft)	612	326
Link Distance (ft)	436	436
Upstream Blk Time (%)	2	0
Queuing Penalty (veh)	17	3
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	114	121	691
Average Queue (ft)	4	42	135
95th Queue (ft)	38	130	505
Link Distance (ft)	42	42	1169
Upstream Blk Time (%)		21	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1247

EPAP PLUS PROJECT AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	127	89	343	341	90	161	71	69	348	259	155	85
Average Queue (ft)	12	30	215	126	39	58	29	25	183	153	51	29
95th Queue (ft)	55	61	364	241	83	119	65	61	287	248	106	64
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			24	3	0	2			3	0		
Queuing Penalty (veh)			34	4	0	1			10	1		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	296	54	217	133	313	244	1181	206	115
Average Queue (ft)	100	299	245	23	83	59	121	224	1147	37	39
95th Queue (ft)	217	327	316	50	164	116	228	236	1181	124	77
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	66	21						81		
Queuing Penalty (veh)	0	357	114						0		
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	0	58						92	6	2	
Queuing Penalty (veh)	0	41						59	6	2	

Intersection: 3: Arch Road &

Movement	EB
Directions Served	T
Maximum Queue (ft)	31
Average Queue (ft)	1
95th Queue (ft)	10
Link Distance (ft)	1417
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	115	117	58	22
Average Queue (ft)	15	7	3	3
95th Queue (ft)	73	50	21	15
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	1	1		
Queuing Penalty (veh)	1	1		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	144	204	387
Average Queue (ft)	84	71	309
95th Queue (ft)	163	181	438
Link Distance (ft)	107	107	252
Upstream Blk Time (%)	9	3	33
Queuing Penalty (veh)	49	17	161
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	216	237
Average Queue (ft)	187	138
95th Queue (ft)	245	249
Link Distance (ft)	137	137
Upstream Blk Time (%)	32	8
Queuing Penalty (veh)	203	51
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	89	184	154	29	49	133	133	126	20	24	28	56
Average Queue (ft)	22	88	64	3	14	84	69	8	6	3	1	4
95th Queue (ft)	64	147	112	17	40	135	111	48	22	15	10	26
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		0	0				1	0				
Queuing Penalty (veh)		0	0				0	0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	47	20
Average Queue (ft)	6	17	9
95th Queue (ft)	23	41	23
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	50
Average Queue (ft)	2
95th Queue (ft)	16
Link Distance (ft)	-5
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	98
Average Queue (ft)	55
95th Queue (ft)	90
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	68	22
Average Queue (ft)	4	3
95th Queue (ft)	26	14
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	499
Average Queue (ft)	254	58
95th Queue (ft)	674	305
Link Distance (ft)	436	436
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	28	2
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	114	121	335
Average Queue (ft)	4	33	38
95th Queue (ft)	38	114	187
Link Distance (ft)	42	42	1169
Upstream Blk Time (%)		10	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1141

EPAP PLUS PROJECT AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	98	150	343	341	98	164	87	89	348	241	116	98
Average Queue (ft)	13	37	210	136	40	66	28	28	197	164	44	34
95th Queue (ft)	54	79	369	244	85	131	63	66	290	255	89	77
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	29	4	0	4	0	0	3	0		
Queuing Penalty (veh)		0	42	5	0	3	0	0	8	0		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	287	71	236	148	259	263	1155	224	260
Average Queue (ft)	100	300	240	24	79	56	112	226	940	42	58
95th Queue (ft)	219	324	306	55	163	109	217	242	1299	137	157
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	69	21						20		
Queuing Penalty (veh)	0	374	112						0		
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	0	62						95	3	0	3
Queuing Penalty (veh)	0	43						61	2	0	0

Intersection: 3: Arch Road &

Movement	EB
Directions Served	T
Maximum Queue (ft)	92
Average Queue (ft)	7
95th Queue (ft)	43
Link Distance (ft)	1417
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	118	112	22	59
Average Queue (ft)	20	9	1	6
95th Queue (ft)	88	53	7	28
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	3	0		
Queuing Penalty (veh)	4	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	185	176	50	387
Average Queue (ft)	79	38	2	288
95th Queue (ft)	178	125	17	410
Link Distance (ft)	107	107		252
Upstream Blk Time (%)	10	2		23
Queuing Penalty (veh)	56	10		114
Storage Bay Dist (ft)			240	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	226	200
Average Queue (ft)	177	108
95th Queue (ft)	239	230
Link Distance (ft)	137	137
Upstream Blk Time (%)	26	8
Queuing Penalty (veh)	167	50
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	118	326	307	29	50	291	152	32	20	25	28	56
Average Queue (ft)	21	89	78	3	14	85	67	5	6	3	1	7
95th Queue (ft)	71	181	171	18	40	164	130	23	21	15	10	38
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)		0	0									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		1	1			0	1					
Queuing Penalty (veh)		0	0			0	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	47	20
Average Queue (ft)	5	13	8
95th Queue (ft)	21	33	23
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	50
Average Queue (ft)	2
95th Queue (ft)	16
Link Distance (ft)	-5
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	94
Average Queue (ft)	50
95th Queue (ft)	82
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	97	22
Average Queue (ft)	11	3
95th Queue (ft)	46	16
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	518
Average Queue (ft)	219	79
95th Queue (ft)	635	372
Link Distance (ft)	436	436
Upstream Blk Time (%)	2	1
Queuing Penalty (veh)	16	5
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	112	121	567
Average Queue (ft)	4	19	49
95th Queue (ft)	37	88	264
Link Distance (ft)	42	42	1169
Upstream Blk Time (%)		7	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1075

EPAP PLUS PROJECT PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	78	142	190	148	150	172	176	180	348	242	113	146
Average Queue (ft)	33	57	120	84	88	121	146	152	170	126	62	59
95th Queue (ft)	65	100	177	149	133	184	197	212	257	217	98	111
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	1	0	4	16	20	25	2	0		
Queuing Penalty (veh)		0	1	0	12	48	61	75	5	0		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	287	74	296	271	302	225	308	70	171
Average Queue (ft)	140	292	239	21	209	188	162	132	88	16	59
95th Queue (ft)	221	320	326	65	289	251	246	228	174	53	113
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	5	64	21								
Queuing Penalty (veh)	0	348	114								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	6	56						14			
Queuing Penalty (veh)	26	52						22			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	54	72
Average Queue (ft)	4	26
95th Queue (ft)	23	64
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	146	154	118	121	170	387
Average Queue (ft)	65	45	17	39	53	163
95th Queue (ft)	141	124	74	109	153	314
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	5	1	0	0	3	5
Queuing Penalty (veh)	18	6	0	0	16	16
Storage Bay Dist (ft)			240			
Storage Blk Time (%)			0	0		
Queuing Penalty (veh)			0	0		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	228	200
Average Queue (ft)	172	110
95th Queue (ft)	265	226
Link Distance (ft)	137	137
Upstream Blk Time (%)	26	5
Queuing Penalty (veh)	143	29
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	L
Maximum Queue (ft)	53	256	240	29	30	242	230	32	43	47	29	25
Average Queue (ft)	19	92	70	2	17	85	93	7	9	13	2	5
95th Queue (ft)	50	169	148	14	38	169	183	28	27	36	14	21
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		1	1			0	2					
Queuing Penalty (veh)		0	0			0	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	42	20
Average Queue (ft)	12	6
95th Queue (ft)	33	21
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	50
Average Queue (ft)	2
95th Queue (ft)	17
Link Distance (ft)	-5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	90
Average Queue (ft)	30
95th Queue (ft)	59
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	129	56
Average Queue (ft)	25	17
95th Queue (ft)	83	48
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	T
Maximum Queue (ft)	557
Average Queue (ft)	150
95th Queue (ft)	531
Link Distance (ft)	436
Upstream Blk Time (%)	1
Queuing Penalty (veh)	7
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	70
Average Queue (ft)	2
95th Queue (ft)	23
Link Distance (ft)	42
Upstream Blk Time (%)	1
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Nework Summary

Network wide Queuing Penalty: 999

EPAP PLUS PROJECT PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	81	140	315	173	143	173	174	177	279	242	180	176
Average Queue (ft)	25	52	135	80	70	107	136	125	154	131	64	61
95th Queue (ft)	57	89	235	145	127	173	187	183	240	240	123	112
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			6	0	4	13	17	15	0	0		
Queuing Penalty (veh)			7	1	11	32	41	36	1	0		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	303	70	280	245	260	202	114	50	115
Average Queue (ft)	101	299	243	23	164	144	136	87	66	8	53
95th Queue (ft)	207	320	322	56	232	221	226	170	107	32	98
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	55	21								
Queuing Penalty (veh)	0	291	113								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	1	53						1			
Queuing Penalty (veh)	6	50						1			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	52	111
Average Queue (ft)	3	24
95th Queue (ft)	21	75
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	162	135	69	89	112	387
Average Queue (ft)	59	43	5	13	12	214
95th Queue (ft)	148	117	33	50	56	373
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	6	1				15
Queuing Penalty (veh)	22	5				42
Storage Bay Dist (ft)			240			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	232	200
Average Queue (ft)	157	109
95th Queue (ft)	251	235
Link Distance (ft)	137	137
Upstream Blk Time (%)	22	5
Queuing Penalty (veh)	117	28
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	31	221	158	29	52	234	209	32	40	25	25	44
Average Queue (ft)	14	106	86	1	19	83	80	7	8	10	5	14
95th Queue (ft)	37	175	144	10	44	160	158	29	26	30	21	39
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		1	1			0	2					
Queuing Penalty (veh)		0	0			0	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	5
95th Queue (ft)	19
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	47
Average Queue (ft)	22
95th Queue (ft)	45
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	94	59
Average Queue (ft)	21	16
95th Queue (ft)	67	47
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	520	429
Average Queue (ft)	66	14
95th Queue (ft)	343	141
Link Distance (ft)	436	436
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	1	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	113	121	474
Average Queue (ft)	8	16	38
95th Queue (ft)	54	78	234
Link Distance (ft)	42	42	1169
Upstream Blk Time (%)		7	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 805

EPAP PLUS PROJECT PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	95	135	343	276	146	185	176	177	348	299	193	203
Average Queue (ft)	36	57	214	105	86	118	125	146	197	153	78	69
95th Queue (ft)	69	98	380	194	123	185	196	200	295	268	152	140
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			31	1	3	19	15	21	5	2		
Queuing Penalty (veh)			40	1	10	56	44	63	10	3		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	308	74	319	282	350	225	305	70	158
Average Queue (ft)	147	300	270	18	214	186	167	99	76	17	57
95th Queue (ft)	220	326	322	54	291	251	264	181	160	54	106
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	4	68	30								
Queuing Penalty (veh)	0	370	161								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	6	60						4			
Queuing Penalty (veh)	27	56						7			

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	133	119	89
Average Queue (ft)	12	7	28
95th Queue (ft)	59	51	69
Link Distance (ft)	-5	162	269
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	0		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	157	190	82	104	131	387
Average Queue (ft)	109	81	6	21	31	278
95th Queue (ft)	177	176	34	77	102	391
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	19	8			0	24
Queuing Penalty (veh)	76	33			0	71
Storage Bay Dist (ft)			240			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	238	200
Average Queue (ft)	188	144
95th Queue (ft)	232	252
Link Distance (ft)	137	137
Upstream Blk Time (%)	38	15
Queuing Penalty (veh)	207	81
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	L
Maximum Queue (ft)	50	252	271	29	53	156	177	124	43	47	28	25
Average Queue (ft)	18	109	88	1	16	79	82	13	8	13	1	2
95th Queue (ft)	45	186	179	10	41	137	152	54	26	35	9	14
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		2	1				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	20
Average Queue (ft)	11	6
95th Queue (ft)	32	20
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	29
Average Queue (ft)	1
95th Queue (ft)	10
Link Distance (ft)	-5
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	91
Average Queue (ft)	30
95th Queue (ft)	59
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	152	51
Average Queue (ft)	23	9
95th Queue (ft)	85	33
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	534
Average Queue (ft)	152	18
95th Queue (ft)	536	176
Link Distance (ft)	436	436
Upstream Blk Time (%)	2	0
Queuing Penalty (veh)	9	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	114	119	159
Average Queue (ft)	4	13	7
95th Queue (ft)	38	69	57
Link Distance (ft)	42	42	1169
Upstream Blk Time (%)		7	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1326

2035 BASELINE AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	134	148	346	380	122	164	123	110	314	277	120	107
Average Queue (ft)	23	51	341	334	69	116	44	37	211	211	43	36
95th Queue (ft)	65	94	349	408	119	156	91	82	299	283	82	74
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	64	55	2	27	0	0	4	3		
Queuing Penalty (veh)		0	205	177	3	41	0	0	10	6		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	TR	T	T	T	TR	L	L	TR
Maximum Queue (ft)	132	141	266	106	121	332	384	226	169	74	67	107
Average Queue (ft)	108	123	144	28	58	211	159	98	69	22	15	29
95th Queue (ft)	153	162	326	78	112	317	274	185	134	56	47	66
Link Distance (ft)			146	146	146	421	421	421	421			1121
Upstream Blk Time (%)	0	7	8									
Queuing Penalty (veh)	0	0	54									
Storage Bay Dist (ft)	150	150								200	200	
Storage Blk Time (%)	0	7	8			9						
Queuing Penalty (veh)	1	30	43			0						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	SB	SB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	112	89	30
Average Queue (ft)	28	33	12
95th Queue (ft)	79	71	34
Link Distance (ft)		938	938
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	724	800	813	678
Average Queue (ft)	271	410	374	133
95th Queue (ft)	680	760	743	487
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	137	154	56	53
Average Queue (ft)	117	111	4	13
95th Queue (ft)	144	176	28	38
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	44	32		
Queuing Penalty (veh)	141	102		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	NB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	132	153	78	69	262
Average Queue (ft)	17	14	3	13	148
95th Queue (ft)	71	68	26	57	238
Link Distance (ft)	107	107			240
Upstream Blk Time (%)	1	1			1
Queuing Penalty (veh)	5	8			3
Storage Bay Dist (ft)			240	240	
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	120
Average Queue (ft)	44	15
95th Queue (ft)	163	80
Link Distance (ft)	136	136
Upstream Blk Time (%)	2	0
Queuing Penalty (veh)	14	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	71	169	194	29	30	146	115	32	20	44	25	44
Average Queue (ft)	20	91	77	2	15	75	54	6	4	8	4	11
95th Queue (ft)	51	151	160	14	38	130	100	26	17	28	19	34
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		1	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	10
95th Queue (ft)	25
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	94
Average Queue (ft)	49
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB
Directions Served	R	R	T
Maximum Queue (ft)	28	24	54
Average Queue (ft)	4	1	5
95th Queue (ft)	19	10	28
Link Distance (ft)	265	265	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 845

2035 BASELINE AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	81	269	361	380	123	164	91	110	340	274	120	107
Average Queue (ft)	24	56	342	343	70	109	45	41	205	199	44	36
95th Queue (ft)	57	131	352	363	121	152	86	87	290	268	82	75
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	68	62	2	17	0	0	4	1		
Queuing Penalty (veh)		1	220	201	4	27	0	0	10	3		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	TR	T	T	T	TR	L	L	TR
Maximum Queue (ft)	132	141	271	248	150	332	272	209	127	74	67	107
Average Queue (ft)	109	128	190	30	52	205	152	81	61	22	14	29
95th Queue (ft)	155	160	359	109	115	306	241	149	125	56	46	66
Link Distance (ft)			146	146	146	421	421	421	421			1121
Upstream Blk Time (%)	0	14	17	0	0							
Queuing Penalty (veh)	0	0	112	3	1							
Storage Bay Dist (ft)	150	150								200	200	
Storage Blk Time (%)	0	14	17			8						
Queuing Penalty (veh)	1	59	88			0						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	SB	SB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	112	89	30
Average Queue (ft)	28	33	12
95th Queue (ft)	79	71	34
Link Distance (ft)		938	938
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	724	800	813	678
Average Queue (ft)	391	526	498	165
95th Queue (ft)	760	746	715	542
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	137	154	56	59
Average Queue (ft)	119	126	5	15
95th Queue (ft)	129	153	32	43
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	52	43		
Queuing Penalty (veh)	167	140		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	171	270	69	294
Average Queue (ft)	42	23	6	147
95th Queue (ft)	134	111	38	238
Link Distance (ft)	107	107		240
Upstream Blk Time (%)	3	1		0
Queuing Penalty (veh)	25	4		1
Storage Bay Dist (ft)			240	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	127
Average Queue (ft)	71	15
95th Queue (ft)	217	77
Link Distance (ft)	136	136
Upstream Blk Time (%)	5	0
Queuing Penalty (veh)	34	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	L
Maximum Queue (ft)	71	173	194	29	30	175	160	32	20	25	30	45
Average Queue (ft)	18	104	94	2	15	74	63	3	5	4	1	7
95th Queue (ft)	48	166	176	14	38	134	112	18	18	19	10	28
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		1	2				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	20
Average Queue (ft)	10	8
95th Queue (ft)	32	22
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	
Directions Served	
Maximum Queue (ft)	
Average Queue (ft)	
95th Queue (ft)	
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	94
Average Queue (ft)	48
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	28	24	22	53
Average Queue (ft)	5	2	1	2
95th Queue (ft)	20	11	7	19
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 1102

2035 BASELINE AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	134	148	346	380	106	170	123	110	348	274	120	107
Average Queue (ft)	24	51	341	333	64	117	45	37	216	208	43	36
95th Queue (ft)	65	93	349	404	114	160	93	82	316	280	82	74
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	64	55	2	25	0	0	6	2		
Queuing Penalty (veh)		0	206	179	2	39	0	0	15	6		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	TR	T	T	T	TR	L	L	TR
Maximum Queue (ft)	132	141	266	106	221	332	384	226	169	74	67	107
Average Queue (ft)	103	120	150	27	62	211	160	96	69	21	15	29
95th Queue (ft)	153	160	327	76	135	319	273	183	134	55	47	66
Link Distance (ft)			146	146	146	421	421	421	421			1121
Upstream Blk Time (%)	0	7	9		0							
Queuing Penalty (veh)	0	0	55		3							
Storage Bay Dist (ft)	150	150								200	200	
Storage Blk Time (%)	0	7	9			9						
Queuing Penalty (veh)	1	29	43			0						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	SB	SB	SB
Directions Served	L	TR	R
Maximum Queue (ft)	112	89	30
Average Queue (ft)	28	33	12
95th Queue (ft)	79	71	34
Link Distance (ft)		938	938
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	724	800	813	678
Average Queue (ft)	271	411	379	133
95th Queue (ft)	680	760	737	487
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	137	154	56	53
Average Queue (ft)	118	111	4	13
95th Queue (ft)	139	179	28	38
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	44	32		
Queuing Penalty (veh)	142	103		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	132	70	69	336
Average Queue (ft)	20	8	10	162
95th Queue (ft)	81	38	47	276
Link Distance (ft)	107	107		240
Upstream Blk Time (%)	1			2
Queuing Penalty (veh)	6			6
Storage Bay Dist (ft)			240	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	120
Average Queue (ft)	47	12
95th Queue (ft)	172	69
Link Distance (ft)	136	136
Upstream Blk Time (%)	3	0
Queuing Penalty (veh)	17	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	71	169	194	29	30	146	115	32	20	44	25	44
Average Queue (ft)	20	91	77	2	15	75	56	6	4	8	4	12
95th Queue (ft)	51	153	160	14	38	130	99	26	16	28	19	34
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		1	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	10
95th Queue (ft)	25
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement	SB
Directions Served	L
Maximum Queue (ft)	51
Average Queue (ft)	3
95th Queue (ft)	21
Link Distance (ft)	-5
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	94
Average Queue (ft)	49
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB
Directions Served	R	R	T
Maximum Queue (ft)	28	24	54
Average Queue (ft)	4	1	5
95th Queue (ft)	19	10	28
Link Distance (ft)	265	265	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 854

2035 BASELINE PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	153	248	343	380	174	176	177	179	348	349	371	338
Average Queue (ft)	70	103	339	352	99	141	170	173	333	302	167	157
95th Queue (ft)	141	206	356	375	179	188	184	188	383	385	344	317
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	2	83	31	17	37	33	37	59	38	5	2
Queuing Penalty (veh)	0	8	321	122	94	213	186	211	125	81	7	3
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	266	264	145	27	528	528	506	488	1755	1755
Average Queue (ft)	117	138	262	52	40	2	490	489	456	268	1742	1737
95th Queue (ft)	148	145	272	163	117	14	506	532	551	455	1765	1781
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	56	66	3	0		54	57	31	1	60	54
Queuing Penalty (veh)	0	0	436	22	1		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	56	66				52					
Queuing Penalty (veh)	2	260	312				1					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	252	272	1153	107	181	49	23
Average Queue (ft)	1734	219	240	1135	22	92	10	1
95th Queue (ft)	1779	235	259	1145	69	156	34	8
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	47			71				
Queuing Penalty (veh)	0			0				
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		78	49			0		
Queuing Penalty (veh)		124	78			0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1529	1491	1474	1478
Average Queue (ft)	1452	1448	1403	1196
95th Queue (ft)	1502	1494	1474	1579
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	48	42	19	6
Queuing Penalty (veh)	134	117	53	16
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	155	154	268	139
Average Queue (ft)	122	122	9	57
95th Queue (ft)	138	149	88	115
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	70	27	0	
Queuing Penalty (veh)	272	104	4	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	146	270	113	128	299	266	375
Average Queue (ft)	126	93	15	48	223	222	369
95th Queue (ft)	141	247	76	134	330	315	386
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	45	7		1	22	20	86
Queuing Penalty (veh)	376	58		0	247	223	255
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				1	22		
Queuing Penalty (veh)				7	246		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	208	178	109	261	226	49
Average Queue (ft)	198	52	10	99	106	2
95th Queue (ft)	208	161	60	240	228	16
Link Distance (ft)	136	136	136	146	146	146
Upstream Blk Time (%)	54	1		9	10	
Queuing Penalty (veh)	352	5		56	63	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	176	363	363	29	52	260	262	32	41	45	30	56
Average Queue (ft)	40	329	336	2	11	83	73	5	15	15	3	7
95th Queue (ft)	143	350	363	13	35	191	181	23	37	37	18	37
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)		61	56									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		64	58			0	3					
Queuing Penalty (veh)		13	12			0	1					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	66	87	39
Average Queue (ft)	19	18	10
95th Queue (ft)	52	53	28
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23
Directions Served	L	L	T	T	T
Maximum Queue (ft)	92	71	55	75	99
Average Queue (ft)	34	20	2	21	12
95th Queue (ft)	77	63	18	65	54
Link Distance (ft)	-5	-5	-5	855	855
Upstream Blk Time (%)	10	4			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	81
Average Queue (ft)	40
95th Queue (ft)	65
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	50	25	53	50
Average Queue (ft)	10	1	6	4
95th Queue (ft)	32	10	27	21
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	121	1239	639
Average Queue (ft)	4	94	974	390
95th Queue (ft)	38	153	1714	856
Link Distance (ft)	42	42	1168	587
Upstream Blk Time (%)		68	50	45
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Nework Summary

Network wide Queuing Penalty: 5222

2035 BASELINE PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	153	248	343	363	174	176	177	179	348	349	371	338
Average Queue (ft)	35	54	311	333	64	90	125	109	333	276	96	79
95th Queue (ft)	117	182	355	353	166	195	207	216	370	446	283	246
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	2	93	20	13	25	18	19	83	41	3	1
Queuing Penalty (veh)	0	7	362	77	76	143	103	110	174	86	4	1
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	266	170	183	27	528	528	492	388	1755	1755
Average Queue (ft)	93	137	261	67	68	2	486	474	452	116	1722	1727
95th Queue (ft)	136	141	266	140	158	14	503	515	481	361	1757	1757
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	83	85	0	1		80	81	73		82	80
Queuing Penalty (veh)	0	0	559	3	6		0	0	0		0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	83	85				79					
Queuing Penalty (veh)	1	387	401				2					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	236	245	1153	244	943	537	395
Average Queue (ft)	1732	206	231	1126	62	485	276	200
95th Queue (ft)	1755	227	240	1143	152	1127	686	509
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	76			87		35		
Queuing Penalty (veh)	0			0		0		
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		90	75			56		
Queuing Penalty (veh)		143	120			7		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1529	1491	1453	1519
Average Queue (ft)	1418	1434	1377	1238
95th Queue (ft)	1491	1476	1444	1607
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	23	73	12	3
Queuing Penalty (veh)	65	202	33	7
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	137	154	85	97	134
Average Queue (ft)	107	132	4	6	26
95th Queue (ft)	129	159	29	39	80
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	89	18			
Queuing Penalty (veh)	346	69			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	139	270	113	128	299	266	375
Average Queue (ft)	122	61	15	30	100	95	359
95th Queue (ft)	132	219	76	107	292	277	376
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	76	6		1	12	9	93
Queuing Penalty (veh)	634	49		0	136	100	275
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				1	12		
Queuing Penalty (veh)				6	136		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	208	178	266	272	128	91
Average Queue (ft)	187	29	194	196	37	41
95th Queue (ft)	205	124	345	344	88	113
Link Distance (ft)	136	136	146	146	146	146
Upstream Blk Time (%)	80	0	32	63	0	
Queuing Penalty (veh)	527	2	203	400	0	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	L	T	T	R	L	T	T	R	L
Maximum Queue (ft)	175	363	363	30	681	674	32	257	88	89	188	171
Average Queue (ft)	22	321	322	9	150	135	3	99	35	27	58	45
95th Queue (ft)	109	343	354	27	459	426	18	260	78	73	184	124
Link Distance (ft)		311	311		1417	1417			248	248		
Upstream Blk Time (%)		81	80					14				
Queuing Penalty (veh)		0	0					0				
Storage Bay Dist (ft)	150			250			100	250			200	200
Storage Blk Time (%)		83	80		19	23		14			0	
Queuing Penalty (veh)		17	16		4	5		1			0	

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	39
Average Queue (ft)	16	10
95th Queue (ft)	43	31
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	70	56	906	843	436
Average Queue (ft)	37	31	5	224	183	17
95th Queue (ft)	71	81	32	656	584	148
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	59	14	0	5	0	0
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	68
Average Queue (ft)	35
95th Queue (ft)	52
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	29	25	29	22
Average Queue (ft)	3	1	4	2
95th Queue (ft)	15	8	19	13
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	639
Average Queue (ft)	80	961	387
95th Queue (ft)	134	1688	849
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	83	66	61
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 6005

2035 BASELINE PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	153	248	343	363	174	176	177	179	348	349	371	338
Average Queue (ft)	35	54	311	333	64	90	125	109	333	276	96	79
95th Queue (ft)	117	182	355	353	166	195	207	216	370	446	283	246
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	2	93	20	13	25	18	19	83	41	3	1
Queuing Penalty (veh)	0	7	362	77	76	143	103	110	174	86	4	1
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	266	170	183	27	528	528	492	388	1755	1755
Average Queue (ft)	93	137	261	67	68	2	486	474	452	116	1722	1727
95th Queue (ft)	136	141	266	140	158	14	503	515	481	361	1757	1757
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	83	85	0	1		80	81	73		82	80
Queuing Penalty (veh)	0	0	559	3	6		0	0	0		0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	83	85				79					
Queuing Penalty (veh)	1	387	401				2					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	236	245	1153	244	943	537	395
Average Queue (ft)	1732	206	231	1126	62	485	276	200
95th Queue (ft)	1755	227	240	1143	152	1127	686	509
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	76			87		35		
Queuing Penalty (veh)	0			0		0		
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		90	75			56		
Queuing Penalty (veh)		143	120			7		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1529	1491	1453	1519
Average Queue (ft)	1418	1434	1377	1238
95th Queue (ft)	1491	1476	1444	1607
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	23	73	12	3
Queuing Penalty (veh)	65	202	33	7
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	137	154	85	97	134
Average Queue (ft)	107	132	4	6	26
95th Queue (ft)	129	159	29	39	80
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	89	18			
Queuing Penalty (veh)	346	69			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	139	270	113	128	299	266	375
Average Queue (ft)	122	61	15	30	100	95	359
95th Queue (ft)	132	219	76	107	292	277	376
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	76	6		1	12	9	93
Queuing Penalty (veh)	634	49		0	136	100	275
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				1	12		
Queuing Penalty (veh)				6	136		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	208	178	266	272	128	91
Average Queue (ft)	187	29	194	196	37	41
95th Queue (ft)	205	124	345	344	88	113
Link Distance (ft)	136	136	146	146	146	146
Upstream Blk Time (%)	80	0	32	63	0	
Queuing Penalty (veh)	527	2	203	400	0	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	L	T	T	R	L	T	T	R	L
Maximum Queue (ft)	175	363	363	30	681	674	32	257	88	89	188	171
Average Queue (ft)	22	321	322	9	150	135	3	99	35	27	58	45
95th Queue (ft)	109	343	354	27	459	426	18	260	78	73	184	124
Link Distance (ft)		311	311		1417	1417			248	248		
Upstream Blk Time (%)		81	80					14				
Queuing Penalty (veh)		0	0					0				
Storage Bay Dist (ft)	150			250			100	250			200	200
Storage Blk Time (%)		83	80		19	23		14			0	
Queuing Penalty (veh)		17	16		4	5		1			0	

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	39
Average Queue (ft)	16	10
95th Queue (ft)	43	31
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	70	56	906	843	436
Average Queue (ft)	37	31	5	224	183	17
95th Queue (ft)	71	81	32	656	584	148
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	59	14	0	5	0	0
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	68
Average Queue (ft)	35
95th Queue (ft)	52
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	29	25	29	22
Average Queue (ft)	3	1	4	2
95th Queue (ft)	15	8	19	13
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	639
Average Queue (ft)	80	961	387
95th Queue (ft)	134	1688	849
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	83	66	61
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 6005

2035 PLUS PROJECT AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	146	191	356	380	148	180	151	176	348	349	98	105
Average Queue (ft)	50	75	341	344	81	125	64	85	320	304	46	40
95th Queue (ft)	102	139	351	363	125	182	121	166	368	363	83	90
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	1	64	58	6	26	1	3	39	32		
Queuing Penalty (veh)	0	2	229	205	9	41	2	5	126	104		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	TR	L	T	T	T	TR	L	L
Maximum Queue (ft)	132	141	266	140	141	26	353	278	174	166	64	30
Average Queue (ft)	111	131	183	28	60	1	186	131	76	44	15	6
95th Queue (ft)	152	154	357	85	119	9	313	234	140	108	45	25
Link Distance (ft)			146	146	146		421	421	421	421		
Upstream Blk Time (%)	0	10	14	0	0							
Queuing Penalty (veh)	0	0	108	0	2							
Storage Bay Dist (ft)	150	150				200					200	200
Storage Blk Time (%)	0	10	14				9					
Queuing Penalty (veh)	1	56	70				0					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB
Directions Served	TR	L	TR	R
Maximum Queue (ft)	72	68	88	67
Average Queue (ft)	27	22	25	14
95th Queue (ft)	60	66	59	43
Link Distance (ft)	1121		938	938
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		200		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	975	983	968	874
Average Queue (ft)	690	750	724	555
95th Queue (ft)	1078	1069	1022	1062
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	155	154	96	90	61
Average Queue (ft)	127	118	6	12	11
95th Queue (ft)	149	133	46	56	41
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	45	46			
Queuing Penalty (veh)	160	162			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	135	109	113	121	206	60	411
Average Queue (ft)	30	10	11	17	18	2	338
95th Queue (ft)	108	53	63	77	106	20	439
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	2	0		0	0		53
Queuing Penalty (veh)	18	0		0	1		219
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	0		
Queuing Penalty (veh)				0	1		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	136
Average Queue (ft)	62	25
95th Queue (ft)	191	98
Link Distance (ft)	136	136
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	30	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	73	149	173	28	30	150	172	32	41	25	27	55
Average Queue (ft)	19	98	72	1	10	78	78	5	9	10	1	2
95th Queue (ft)	51	147	142	9	32	127	149	24	26	29	9	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		0	1				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	44	20
Average Queue (ft)	4	9	9
95th Queue (ft)	19	29	24
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	B23	B23
Directions Served	L	L	T	T
Maximum Queue (ft)	92	70	92	88
Average Queue (ft)	21	13	10	6
95th Queue (ft)	67	54	49	38
Link Distance (ft)	-5	-5	855	855
Upstream Blk Time (%)	4	1		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	77
Average Queue (ft)	45
95th Queue (ft)	73
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	29	24	20	31
Average Queue (ft)	7	1	1	2
95th Queue (ft)	27	8	7	14
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	114	121	182
Average Queue (ft)	4	56	24
95th Queue (ft)	38	135	104
Link Distance (ft)	42	42	1168
Upstream Blk Time (%)		16	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1552

2035 PLUS PROJECT AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	146	191	356	380	148	180	151	176	348	349	98	105
Average Queue (ft)	50	75	341	344	81	125	64	85	320	304	46	40
95th Queue (ft)	102	139	351	363	125	182	121	166	368	363	83	90
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	1	64	58	6	26	1	3	39	32		
Queuing Penalty (veh)	0	2	229	205	9	41	2	5	126	104		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	TR	L	T	T	T	TR	L	L
Maximum Queue (ft)	132	141	266	140	141	26	353	278	174	166	64	30
Average Queue (ft)	111	131	183	28	60	1	186	131	76	44	15	6
95th Queue (ft)	152	154	357	85	119	9	313	234	140	108	45	25
Link Distance (ft)			146	146	146		421	421	421	421		
Upstream Blk Time (%)	0	10	14	0	0							
Queuing Penalty (veh)	0	0	108	0	2							
Storage Bay Dist (ft)	150	150				200					200	200
Storage Blk Time (%)	0	10	14				9					
Queuing Penalty (veh)	1	56	70				0					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB
Directions Served	TR	L	TR	R
Maximum Queue (ft)	72	68	88	67
Average Queue (ft)	27	22	25	14
95th Queue (ft)	60	66	59	43
Link Distance (ft)	1121		938	938
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		200		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	975	983	968	874
Average Queue (ft)	690	750	724	555
95th Queue (ft)	1078	1069	1022	1062
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	155	154	96	90	61
Average Queue (ft)	127	118	6	12	11
95th Queue (ft)	149	133	46	56	41
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	45	46			
Queuing Penalty (veh)	160	162			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	135	109	113	121	206	60	411
Average Queue (ft)	30	10	11	17	18	2	338
95th Queue (ft)	108	53	63	77	106	20	439
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	2	0		0	0		53
Queuing Penalty (veh)	18	0		0	1		219
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	0		
Queuing Penalty (veh)				0	1		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	136
Average Queue (ft)	62	25
95th Queue (ft)	191	98
Link Distance (ft)	136	136
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	30	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	73	149	173	28	30	150	172	32	41	25	27	55
Average Queue (ft)	19	98	72	1	10	78	78	5	9	10	1	2
95th Queue (ft)	51	147	142	9	32	127	149	24	26	29	9	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		0	1				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	44	20
Average Queue (ft)	4	9	9
95th Queue (ft)	19	29	24
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	B23	B23
Directions Served	L	L	T	T
Maximum Queue (ft)	92	70	92	88
Average Queue (ft)	21	13	10	6
95th Queue (ft)	67	54	49	38
Link Distance (ft)	-5	-5	855	855
Upstream Blk Time (%)	4	1		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	77
Average Queue (ft)	45
95th Queue (ft)	73
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	29	24	20	31
Average Queue (ft)	7	1	1	2
95th Queue (ft)	27	8	7	14
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	114	121	182
Average Queue (ft)	4	56	24
95th Queue (ft)	38	135	104
Link Distance (ft)	42	42	1168
Upstream Blk Time (%)		16	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1552

2035 PLUS PROJECT AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	192	359	380	164	175	106	177	348	349	98	105
Average Queue (ft)	48	69	343	342	73	113	57	66	316	300	46	44
95th Queue (ft)	108	127	349	361	125	180	108	160	369	369	84	95
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	0	66	62	3	24	1	3	38	29		
Queuing Penalty (veh)	0	1	235	221	4	39	1	4	121	93		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	TR	L	T	T	T	TR	L	L
Maximum Queue (ft)	132	141	272	55	116	26	373	381	316	146	64	30
Average Queue (ft)	107	124	184	16	51	1	223	157	78	46	15	6
95th Queue (ft)	155	166	357	44	108	9	365	286	169	98	45	25
Link Distance (ft)			146	146	146		421	421	421	421		
Upstream Blk Time (%)	0	12	14									
Queuing Penalty (veh)	0	0	112									
Storage Bay Dist (ft)	150	150				200					200	200
Storage Blk Time (%)	0	12	14				10					
Queuing Penalty (veh)	2	67	73				0					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB
Directions Served	TR	L	TR	R
Maximum Queue (ft)	72	68	88	67
Average Queue (ft)	27	22	25	14
95th Queue (ft)	60	66	59	43
Link Distance (ft)	1121		938	938
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		200		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1004	1038	1014	836
Average Queue (ft)	824	876	827	734
95th Queue (ft)	972	1008	944	870
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	154	154	76	89
Average Queue (ft)	124	121	9	12
95th Queue (ft)	144	141	45	45
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	50	39		
Queuing Penalty (veh)	179	138		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	136	154	105	106	194	94	375
Average Queue (ft)	34	20	7	16	10	3	335
95th Queue (ft)	120	94	47	68	77	31	429
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	2	0			0		49
Queuing Penalty (veh)	22	3			0		204
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)					0		
Queuing Penalty (veh)					0		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB
Directions Served	T	T	T
Maximum Queue (ft)	202	120	111
Average Queue (ft)	70	11	4
95th Queue (ft)	207	65	37
Link Distance (ft)	136	136	136
Upstream Blk Time (%)	5	0	
Queuing Penalty (veh)	41	0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	73	154	153	28	30	254	156	32	41	25	27	54
Average Queue (ft)	18	92	67	1	11	79	78	8	9	9	1	2
95th Queue (ft)	52	146	125	9	32	148	141	30	26	28	9	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		0	0			0	2					
Queuing Penalty (veh)		0	0			0	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	22	41
Average Queue (ft)	4	7	10
95th Queue (ft)	19	23	28
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	B23	B23
Directions Served	L	L	T	T
Maximum Queue (ft)	68	70	80	102
Average Queue (ft)	19	14	9	6
95th Queue (ft)	64	55	40	39
Link Distance (ft)	-5	-5	855	855
Upstream Blk Time (%)	4	2		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	114
Average Queue (ft)	52
95th Queue (ft)	97
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	29	24	29	53
Average Queue (ft)	5	1	2	3
95th Queue (ft)	23	8	12	20
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24
Directions Served	L	T	T
Maximum Queue (ft)	114	136	324
Average Queue (ft)	4	51	46
95th Queue (ft)	38	135	181
Link Distance (ft)	42	42	1168
Upstream Blk Time (%)		17	
Queuing Penalty (veh)		0	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 1560

2035 PLUS PROJECT PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	292	355	100	100	105	105	348	349	113	64
Average Queue (ft)	292	355	20	7	46	7	324	328	37	12
95th Queue (ft)	292	355	68	44	97	46	339	345	95	53
Link Distance (ft)	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	100		1	0	3	2	100	99		
Queuing Penalty (veh)	391		7	0	18	12	218	216		
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	WB	WB	WB	B15	B15	B15	NB	NB
Directions Served	L	L	T	T	T	T	T	T	T	T	L	L
Maximum Queue (ft)	85	88	256	61	463	461	443	1702	1696	1693	222	202
Average Queue (ft)	66	88	256	6	463	461	443	1702	1696	1693	222	202
95th Queue (ft)	84	88	256	31	463	461	443	1702	1696	1693	222	202
Link Distance (ft)			146	146	421	421	421	1703	1703	1703		
Upstream Blk Time (%)			100		100	100		100	100	100		
Queuing Penalty (veh)			668		0	0		0	0	0		
Storage Bay Dist (ft)	150	150									200	200
Storage Blk Time (%)			100		100						100	100
Queuing Penalty (veh)			470		2						159	159

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB
Directions Served	TR	TR	R	R
Maximum Queue (ft)	1112	944	793	50
Average Queue (ft)	1112	908	650	34
95th Queue (ft)	1112	1019	734	45
Link Distance (ft)	1121	938	938	938
Upstream Blk Time (%)	100	84		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)		100		
Queuing Penalty (veh)		12		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1422	1414	1417	1494
Average Queue (ft)	1422	1414	1415	1464
95th Queue (ft)	1422	1414	1416	1610
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	100	100	100	1
Queuing Penalty (veh)	277	277	277	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	98	110
Average Queue (ft)	98	110
95th Queue (ft)	98	110
Link Distance (ft)	-5	-5
Upstream Blk Time (%)	100	
Queuing Penalty (veh)	391	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	107	355
Average Queue (ft)	107	355
95th Queue (ft)	107	355
Link Distance (ft)	107	240
Upstream Blk Time (%)	100	100
Queuing Penalty (veh)	849	295
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	WB	WB	WB
Directions Served	T	T	T	R
Maximum Queue (ft)	174	254	166	144
Average Queue (ft)	174	254	166	144
95th Queue (ft)	174	254	166	144
Link Distance (ft)	136	146	146	146
Upstream Blk Time (%)	100	52	87	100
Queuing Penalty (veh)	668	374	620	717
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	L	T	T	R	L	LT	R
Maximum Queue (ft)	348	318	546	450	193	86	256	225	156	297	224
Average Queue (ft)	348	318	229	186	141	62	165	181	104	167	26
95th Queue (ft)	348	318	528	438	246	98	347	300	195	348	132
Link Distance (ft)	311	311	1417	1417		248	248			284	
Upstream Blk Time (%)	100	100					64			31	
Queuing Penalty (veh)	0	0					0			0	
Storage Bay Dist (ft)					250			200	200		200
Storage Blk Time (%)	100	100	50	63				68		42	0
Queuing Penalty (veh)	20	20	10	13				7		12	0

Intersection: 8: 99 SB offramp &

Movement	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T
Maximum Queue (ft)	92	70	926	912	435
Average Queue (ft)	41	59	880	834	378
95th Queue (ft)	60	66	917	892	515
Link Distance (ft)	-5	-5	855	855	400
Upstream Blk Time (%)	100	98	93	10	89
Queuing Penalty (veh)	0	0	0	0	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	66
Average Queue (ft)	25
95th Queue (ft)	51
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	29
Average Queue (ft)	1
95th Queue (ft)	9
Link Distance (ft)	159
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	103	1222	591
Average Queue (ft)	103	1222	591
95th Queue (ft)	103	1222	591
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	100	100	100
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 7162

2035 PLUS PROJECT PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	291	328	100	142	177	155	348	349	113	64
Average Queue (ft)	291	328	27	29	81	42	330	266	37	12
95th Queue (ft)	291	328	77	104	166	135	339	490	95	53
Link Distance (ft)	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	100	100	1	3	20	14	100	65		
Queuing Penalty (veh)	391	391	7	19	123	84	218	141		
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	86	64	248	81	9	497	477	415	460	1755	1755	1755
Average Queue (ft)	68	64	248	22	0	130	477	415	460	1747	1741	1713
95th Queue (ft)	86	64	248	55	3	484	477	415	460	1758	1754	1737
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)			100			12	100	100	100	94	97	99
Queuing Penalty (veh)			668			0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)			100			16						
Queuing Penalty (veh)			470			0						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	34	94	1119	14	950	796	193
Average Queue (ft)	34	94	1119	14	925	765	178
95th Queue (ft)	34	94	1119	14	988	860	193
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)			100		91		
Queuing Penalty (veh)			0		0		
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)			100		100		
Queuing Penalty (veh)			312		12		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1420	1424	1422	1488
Average Queue (ft)	1420	1424	1422	1488
95th Queue (ft)	1420	1424	1422	1488
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	100	100	100	6
Queuing Penalty (veh)	277	277	277	17
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	SW
Directions Served	T	T	R
Maximum Queue (ft)	116	77	72
Average Queue (ft)	116	77	3
95th Queue (ft)	116	77	26
Link Distance (ft)	-5	-5	269
Upstream Blk Time (%)	100	100	
Queuing Penalty (veh)	391	391	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	WB	WB	NB
Directions Served	T	T	T	R
Maximum Queue (ft)	107	262	117	359
Average Queue (ft)	107	38	12	359
95th Queue (ft)	107	177	62	359
Link Distance (ft)	107	136	136	240
Upstream Blk Time (%)	100	4	0	100
Queuing Penalty (veh)	849	54	0	295
Storage Bay Dist (ft)				
Storage Blk Time (%)		4		
Queuing Penalty (veh)		54		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	WB	WB	WB	WB
Directions Served	T	T	T	R	R
Maximum Queue (ft)	172	68	159	146	259
Average Queue (ft)	172	2	159	146	259
95th Queue (ft)	172	22	159	146	259
Link Distance (ft)	136	146	146	146	146
Upstream Blk Time (%)	100		100	100	10
Queuing Penalty (veh)	668		717	717	69
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	L	T	T	R	L	LT	R
Maximum Queue (ft)	303	342	125	91	41	171	261	261	222	299	215
Average Queue (ft)	303	342	22	9	4	151	213	236	179	223	9
95th Queue (ft)	303	342	76	46	22	177	329	306	262	379	73
Link Distance (ft)	311	311	1417	1417		248	248			284	
Upstream Blk Time (%)	100	100					77	73		60	
Queuing Penalty (veh)	0	0					0	0		0	
Storage Bay Dist (ft)					250			200	200		200
Storage Blk Time (%)	100	100		0				85	72	63	0
Queuing Penalty (veh)	20	20		0				9	36	19	0

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	66	97	56	927	928	452
Average Queue (ft)	37	46	2	892	911	410
95th Queue (ft)	49	98	18	928	946	436
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	100	55		85	50	89
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	66
Average Queue (ft)	25
95th Queue (ft)	51
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	29
Average Queue (ft)	1
95th Queue (ft)	9
Link Distance (ft)	159
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	85	1218	587
Average Queue (ft)	85	1218	587
95th Queue (ft)	85	1218	587
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	100	100	100
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 7995

2035 PLUS PROJECT PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	292	355	100	100	105	105	348	349	113	64
Average Queue (ft)	292	355	20	7	46	7	324	328	37	12
95th Queue (ft)	292	355	68	44	97	46	339	345	95	53
Link Distance (ft)	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	100		1	0	3	2	100	99		
Queuing Penalty (veh)	391		7	0	18	12	218	216		
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	WB	WB	WB	B15	B15	B15	NB	NB
Directions Served	L	L	T	T	T	T	T	T	T	T	L	L
Maximum Queue (ft)	85	88	256	61	463	461	443	1702	1696	1693	222	202
Average Queue (ft)	66	88	256	6	463	461	443	1702	1696	1693	222	202
95th Queue (ft)	84	88	256	31	463	461	443	1702	1696	1693	222	202
Link Distance (ft)			146	146	421	421	421	1703	1703	1703		
Upstream Blk Time (%)			100		100	100		100	100	100		
Queuing Penalty (veh)			668		0	0		0	0	0		
Storage Bay Dist (ft)	150	150									200	200
Storage Blk Time (%)			100		100						100	100
Queuing Penalty (veh)			470		2						159	159

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB
Directions Served	TR	TR	R	R
Maximum Queue (ft)	1112	944	793	50
Average Queue (ft)	1112	908	650	34
95th Queue (ft)	1112	1019	734	45
Link Distance (ft)	1121	938	938	938
Upstream Blk Time (%)	100	84		
Queuing Penalty (veh)	0	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)		100		
Queuing Penalty (veh)		12		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1422	1414	1417	1494
Average Queue (ft)	1422	1414	1415	1464
95th Queue (ft)	1422	1414	1416	1610
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	100	100	100	1
Queuing Penalty (veh)	277	277	277	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	98	110
Average Queue (ft)	98	110
95th Queue (ft)	98	110
Link Distance (ft)	-5	-5
Upstream Blk Time (%)	100	
Queuing Penalty (veh)	391	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	107	355
Average Queue (ft)	107	355
95th Queue (ft)	107	355
Link Distance (ft)	107	240
Upstream Blk Time (%)	100	100
Queuing Penalty (veh)	849	295
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	WB	WB	WB
Directions Served	T	T	T	R
Maximum Queue (ft)	174	254	166	144
Average Queue (ft)	174	254	166	144
95th Queue (ft)	174	254	166	144
Link Distance (ft)	136	146	146	146
Upstream Blk Time (%)	100	52	87	100
Queuing Penalty (veh)	668	374	620	717
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	T	T	T	T	L	T	T	R	L	LT	R
Maximum Queue (ft)	348	318	546	450	193	86	256	225	156	297	224
Average Queue (ft)	348	318	229	186	141	62	165	181	104	167	26
95th Queue (ft)	348	318	528	438	246	98	347	300	195	348	132
Link Distance (ft)	311	311	1417	1417		248	248			284	
Upstream Blk Time (%)	100	100					64			31	
Queuing Penalty (veh)	0	0					0			0	
Storage Bay Dist (ft)					250			200	200		200
Storage Blk Time (%)	100	100	50	63				68		42	0
Queuing Penalty (veh)	20	20	10	13				7		12	0

Intersection: 8: 99 SB offramp &

Movement	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T
Maximum Queue (ft)	92	70	926	912	435
Average Queue (ft)	41	59	880	834	378
95th Queue (ft)	60	66	917	892	515
Link Distance (ft)	-5	-5	855	855	400
Upstream Blk Time (%)	100	98	93	10	89
Queuing Penalty (veh)	0	0	0	0	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	66
Average Queue (ft)	25
95th Queue (ft)	51
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	NB
Directions Served	T
Maximum Queue (ft)	29
Average Queue (ft)	1
95th Queue (ft)	9
Link Distance (ft)	159
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	103	1222	591
Average Queue (ft)	103	1222	591
95th Queue (ft)	103	1222	591
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	100	100	100
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 7162

MITIGATED 2035 PLUS PROJECT AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	105	128	347	380	131	174	170	108	348	349	94	107
Average Queue (ft)	29	55	343	344	88	137	72	52	329	319	43	50
95th Queue (ft)	74	103	345	358	124	190	140	92	375	385	76	104
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			74	73	5	31	4	0	56	42		
Queuing Penalty (veh)			261	257	9	50	6	0	180	135		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	TR	L	T	T	T	TR	L	L
Maximum Queue (ft)	132	141	278	115	136	26	305	204	171	116	85	30
Average Queue (ft)	109	126	187	27	46	1	160	109	79	40	15	7
95th Queue (ft)	153	157	370	78	104	9	288	204	145	102	48	26
Link Distance (ft)			146	146	146		421	421	421	421		
Upstream Blk Time (%)	0	11	16		0							
Queuing Penalty (veh)	0	0	122		0							
Storage Bay Dist (ft)	150	150				200					200	200
Storage Blk Time (%)	0	11	16				4					
Queuing Penalty (veh)	1	63	79				0					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB	SB
Directions Served	TR	L	TR	R	R
Maximum Queue (ft)	72	68	68	67	29
Average Queue (ft)	27	24	27	16	1
95th Queue (ft)	60	68	58	48	10
Link Distance (ft)	1121		938	938	938
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		200			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1528	1470	1441	1483
Average Queue (ft)	1093	1125	1086	917
95th Queue (ft)	1353	1364	1317	1253
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	2	1	1	1
Queuing Penalty (veh)	6	2	4	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	155	154	115	88
Average Queue (ft)	128	125	11	12
95th Queue (ft)	150	149	55	45
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	52	54		
Queuing Penalty (veh)	185	190		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	154	271	109	110	171	66	375
Average Queue (ft)	120	129	32	40	28	22	268
95th Queue (ft)	142	189	86	89	82	50	407
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	26	22			1		20
Queuing Penalty (veh)	251	211			4		82
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)					1		
Queuing Penalty (veh)					4		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	206	128
Average Queue (ft)	86	36
95th Queue (ft)	226	126
Link Distance (ft)	136	136
Upstream Blk Time (%)	8	0
Queuing Penalty (veh)	65	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	73	199	206	151	52	185	150	31	42	25	54	25
Average Queue (ft)	20	107	78	5	12	75	66	4	10	11	2	6
95th Queue (ft)	54	173	166	50	37	128	117	21	30	30	18	22
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250			100	250		200	200
Storage Blk Time (%)		1	2				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	45	20
Average Queue (ft)	10	10
95th Queue (ft)	32	25
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23
Directions Served	L	L	T	T	T
Maximum Queue (ft)	68	71	54	207	186
Average Queue (ft)	35	29	2	58	39
95th Queue (ft)	81	77	18	170	132
Link Distance (ft)	-5	-5	-5	855	855
Upstream Blk Time (%)	23	13			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	114
Average Queue (ft)	40
95th Queue (ft)	80
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	29	27	31
Average Queue (ft)	2	1	1
95th Queue (ft)	12	9	10
Link Distance (ft)	265	159	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	121	102
Average Queue (ft)	28	14
95th Queue (ft)	105	67
Link Distance (ft)	42	1168
Upstream Blk Time (%)	5	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 2173

MITIGATED 2035 PLUS PROJECT AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	105	128	347	380	131	174	170	108	348	349	94	107
Average Queue (ft)	29	55	343	344	88	137	72	52	329	319	43	50
95th Queue (ft)	74	103	345	358	124	190	140	92	375	385	76	104
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			74	73	5	31	4	0	56	42		
Queuing Penalty (veh)			261	257	9	50	6	0	180	135		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	TR	L	T	T	T	TR	L	L
Maximum Queue (ft)	132	141	278	115	136	26	305	204	171	116	85	30
Average Queue (ft)	109	126	187	27	46	1	160	109	79	40	15	7
95th Queue (ft)	153	157	370	78	104	9	288	204	145	102	48	26
Link Distance (ft)			146	146	146		421	421	421	421		
Upstream Blk Time (%)	0	11	16		0							
Queuing Penalty (veh)	0	0	122		0							
Storage Bay Dist (ft)	150	150				200					200	200
Storage Blk Time (%)	0	11	16				4					
Queuing Penalty (veh)	1	63	79				0					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB	SB
Directions Served	TR	L	TR	R	R
Maximum Queue (ft)	72	68	68	67	29
Average Queue (ft)	27	24	27	16	1
95th Queue (ft)	60	68	58	48	10
Link Distance (ft)	1121		938	938	938
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		200			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1528	1470	1441	1483
Average Queue (ft)	1093	1125	1086	917
95th Queue (ft)	1353	1364	1317	1253
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	2	1	1	1
Queuing Penalty (veh)	6	2	4	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	155	154	115	88
Average Queue (ft)	128	125	11	12
95th Queue (ft)	150	149	55	45
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	52	54		
Queuing Penalty (veh)	185	190		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	154	271	109	110	171	66	375
Average Queue (ft)	120	129	32	40	28	22	268
95th Queue (ft)	142	189	86	89	82	50	407
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	26	22			1		20
Queuing Penalty (veh)	251	211			4		82
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)					1		
Queuing Penalty (veh)					4		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	206	128
Average Queue (ft)	86	36
95th Queue (ft)	226	126
Link Distance (ft)	136	136
Upstream Blk Time (%)	8	0
Queuing Penalty (veh)	65	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	R	L
Maximum Queue (ft)	73	199	206	151	52	185	150	31	42	25	54	25
Average Queue (ft)	20	107	78	5	12	75	66	4	10	11	2	6
95th Queue (ft)	54	173	166	50	37	128	117	21	30	30	18	22
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250			100	250		200	200
Storage Blk Time (%)		1	2				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	45	20
Average Queue (ft)	10	10
95th Queue (ft)	32	25
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23
Directions Served	L	L	T	T	T
Maximum Queue (ft)	68	71	54	207	186
Average Queue (ft)	35	29	2	58	39
95th Queue (ft)	81	77	18	170	132
Link Distance (ft)	-5	-5	-5	855	855
Upstream Blk Time (%)	23	13			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	114
Average Queue (ft)	40
95th Queue (ft)	80
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	29	27	31
Average Queue (ft)	2	1	1
95th Queue (ft)	12	9	10
Link Distance (ft)	265	159	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	121	102
Average Queue (ft)	28	14
95th Queue (ft)	105	67
Link Distance (ft)	42	1168
Upstream Blk Time (%)	5	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 2173

MITIGATED 2035 PLUS PROJECT AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	76	125	379	380	131	171	165	108	348	349	76	129
Average Queue (ft)	27	56	343	345	87	134	68	51	320	312	42	50
95th Queue (ft)	57	95	355	361	122	187	130	91	383	379	69	110
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			73	74	5	30	3	0	49	37		
Queuing Penalty (veh)			259	261	8	49	5	1	158	118		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB
Directions Served	L	L	T	T	TR	L	T	T	T	TR	L	L
Maximum Queue (ft)	133	141	298	113	257	26	347	204	171	125	85	30
Average Queue (ft)	115	132	208	34	57	1	162	111	79	42	15	7
95th Queue (ft)	155	157	379	84	146	9	294	209	145	108	50	26
Link Distance (ft)			146	146	146		421	421	421	421		
Upstream Blk Time (%)	1	14	17		1							
Queuing Penalty (veh)	0	0	132		4							
Storage Bay Dist (ft)	150	150				200					200	200
Storage Blk Time (%)	1	14	17				4					
Queuing Penalty (veh)	3	75	86				0					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	SB	SB	SB	SB
Directions Served	TR	L	TR	R	R
Maximum Queue (ft)	72	68	68	67	29
Average Queue (ft)	27	22	27	16	1
95th Queue (ft)	60	66	59	48	10
Link Distance (ft)	1121		938	938	938
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		200			
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1528	1470	1441	1483
Average Queue (ft)	1123	1171	1131	940
95th Queue (ft)	1405	1417	1382	1277
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	2	1	1	1
Queuing Penalty (veh)	6	2	4	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	155	154	80	115	88
Average Queue (ft)	128	123	3	11	14
95th Queue (ft)	150	140	26	57	50
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	50	59			
Queuing Penalty (veh)	178	208			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	142	156	108	109	171	66	375
Average Queue (ft)	119	123	31	42	27	22	253
95th Queue (ft)	141	146	86	91	80	50	388
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	26	27			1		15
Queuing Penalty (veh)	246	253			4		62
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)					1		
Queuing Penalty (veh)					4		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB
Directions Served	T	T	T
Maximum Queue (ft)	208	158	127
Average Queue (ft)	109	50	5
95th Queue (ft)	256	148	44
Link Distance (ft)	136	136	136
Upstream Blk Time (%)	7	1	0
Queuing Penalty (veh)	55	4	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	74	227	206	151	52	131	152	32	42	25	23	54
Average Queue (ft)	22	103	84	5	12	66	70	5	10	9	1	2
95th Queue (ft)	55	175	161	50	37	115	124	23	30	28	7	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250			100	250			200
Storage Blk Time (%)		1	2				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	45	22
Average Queue (ft)	5	11	10
95th Queue (ft)	21	33	25
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23
Directions Served	L	L	T	T	T
Maximum Queue (ft)	68	71	54	142	139
Average Queue (ft)	24	19	2	29	13
95th Queue (ft)	68	64	18	103	65
Link Distance (ft)	-5	-5	-5	855	855
Upstream Blk Time (%)	10	5			
Queuing Penalty (veh)	0	0			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	113
Average Queue (ft)	43
95th Queue (ft)	82
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	20	27	31
Average Queue (ft)	2	1	2
95th Queue (ft)	12	9	13
Link Distance (ft)	265	159	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	121	99
Average Queue (ft)	21	7
95th Queue (ft)	88	46
Link Distance (ft)	42	1168
Upstream Blk Time (%)	4	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 2188

MITIGATED 2035 PLUS PROJECT PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	334	351	380	171	173	205	180	348	349	221	241
Average Queue (ft)	71	107	340	350	119	150	145	168	330	284	127	123
95th Queue (ft)	157	222	353	380	163	187	198	193	347	486	207	216
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	3	79	39	29	51	29	41	100	64		
Queuing Penalty (veh)	0	13	309	154	180	316	179	253	218	140		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	292	157	116	26	510	528	511	530	1755	1755
Average Queue (ft)	118	135	264	29	31	1	488	497	469	299	1743	1741
95th Queue (ft)	150	154	280	84	85	10	512	515	539	459	1766	1763
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	44	62	0			57	55	21	1	59	52
Queuing Penalty (veh)	0	0	414	1			0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	44	62				57					
Queuing Penalty (veh)	2	210	292				1					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R
Maximum Queue (ft)	1755	226	272	1173	107	144	30
Average Queue (ft)	1737	218	242	1137	21	74	10
95th Queue (ft)	1775	229	268	1152	71	133	33
Link Distance (ft)	1703			1121		938	938
Upstream Blk Time (%)	42			74			
Queuing Penalty (veh)	0			0			
Storage Bay Dist (ft)		200	200		200		
Storage Blk Time (%)		74	56				
Queuing Penalty (veh)		118	89				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1477	1483	1510	1501
Average Queue (ft)	1339	1351	1312	1102
95th Queue (ft)	1624	1605	1556	1543
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	36	22	7	1
Queuing Penalty (veh)	100	60	18	2
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	148	154	175	66
Average Queue (ft)	120	123	6	15
95th Queue (ft)	133	144	58	55
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	70	21	0	
Queuing Penalty (veh)	273	82	3	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	180	271	118	128	299	266	374
Average Queue (ft)	129	146	52	90	262	262	295
95th Queue (ft)	152	239	124	158	276	280	392
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	66	29	0	8	38	41	27
Queuing Penalty (veh)	562	250	0	0	470	505	79
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	8	38		
Queuing Penalty (veh)			0	48	470		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	212	136	100	270	216	241
Average Queue (ft)	199	44	3	152	148	14
95th Queue (ft)	209	138	33	224	215	96
Link Distance (ft)	136	136	136	146	146	146
Upstream Blk Time (%)	51	0		17	10	0
Queuing Penalty (veh)	340	1		125	73	3
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	L	T	T	R	L	T	T	R	L
Maximum Queue (ft)	175	363	363	51	367	395	30	60	42	30	56	68
Average Queue (ft)	27	318	320	13	103	101	2	14	10	3	2	7
95th Queue (ft)	111	409	404	38	283	270	14	44	30	17	18	31
Link Distance (ft)		311	311		1417	1417			248	248		
Upstream Blk Time (%)		34	33									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250			100	250			200	200
Storage Blk Time (%)		50	44		1	7						
Queuing Penalty (veh)		10	9		0	1						

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	46	44
Average Queue (ft)	17	7
95th Queue (ft)	43	27
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	66	89	55	927	928	434
Average Queue (ft)	44	50	7	901	901	408
95th Queue (ft)	63	100	38	942	943	424
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	100	45		76	72	90
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	95
Average Queue (ft)	36
95th Queue (ft)	64
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	29	25	153	137
Average Queue (ft)	11	3	10	16
95th Queue (ft)	30	15	59	77
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	119	76
Average Queue (ft)	13	5
95th Queue (ft)	69	34
Link Distance (ft)	42	1168
Upstream Blk Time (%)	2	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 6373

MITIGATED 2035 PLUS PROJECT PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	190	379	380	172	176	177	179	348	368	259	255
Average Queue (ft)	75	101	342	335	128	150	138	160	331	311	138	135
95th Queue (ft)	150	174	362	414	177	178	206	218	347	461	225	228
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	1	81	45	37	59	32	41	100	82	0	0
Queuing Penalty (veh)	1	3	317	175	232	365	197	257	218	179	0	0
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	290	98	270	26	524	529	522	491	1755	1755
Average Queue (ft)	117	139	264	24	41	1	490	496	461	305	1743	1742
95th Queue (ft)	147	144	282	70	130	9	515	525	548	466	1768	1765
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	51	65		0		59	56	29	1	62	56
Queuing Penalty (veh)	0	0	434		3		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	51	65				59					
Queuing Penalty (veh)	1	242	305				1					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R
Maximum Queue (ft)	1755	226	271	1157	107	221	66
Average Queue (ft)	1740	216	238	1134	21	89	11
95th Queue (ft)	1767	230	255	1149	68	175	39
Link Distance (ft)	1703			1121		938	938
Upstream Blk Time (%)	51			78			
Queuing Penalty (veh)	0			0			
Storage Bay Dist (ft)		200	200		200		
Storage Blk Time (%)		82	40			1	
Queuing Penalty (veh)		131	63			0	

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1479	1473	1466	1559
Average Queue (ft)	1226	1233	1208	892
95th Queue (ft)	1570	1536	1496	1316
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	12	6	3	0
Queuing Penalty (veh)	33	16	9	1
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	155	154	164	162	66
Average Queue (ft)	121	124	5	6	16
95th Queue (ft)	139	149	54	54	58
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	67	30	0	0	
Queuing Penalty (veh)	261	116	1	0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	158	271	119	128	268	266	374
Average Queue (ft)	128	140	75	96	239	252	295
95th Queue (ft)	143	275	144	165	334	308	437
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	66	29	0	11	38	38	32
Queuing Penalty (veh)	562	249	0	0	476	477	93
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	11	38		
Queuing Penalty (veh)			1	70	476		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	T	R	R
Maximum Queue (ft)	220	196	147	239	229	150	288
Average Queue (ft)	197	70	5	149	145	10	10
95th Queue (ft)	214	172	48	236	220	70	95
Link Distance (ft)	136	136	136	146	146	146	146
Upstream Blk Time (%)	53	1	0	22	17	1	0
Queuing Penalty (veh)	353	4	1	157	122	5	2
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	175	363	363	149	27	50	398	402	32	59	25	30
Average Queue (ft)	24	275	274	5	2	14	132	141	3	12	7	2
95th Queue (ft)	96	394	399	49	14	39	276	298	18	37	25	14
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)		13	12									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		30	28				0	15				
Queuing Penalty (veh)		6	6				0	3				

Intersection: 7: Arch Road & Qantas Lane

Movement	NB	SB	SB	SB
Directions Served	R	L	LT	R
Maximum Queue (ft)	56	68	44	62
Average Queue (ft)	4	9	9	6
95th Queue (ft)	26	36	29	29
Link Distance (ft)			284	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200	200		200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	71	56	927	928	415
Average Queue (ft)	43	57	9	908	879	407
95th Queue (ft)	61	79	43	934	927	422
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	99	91		86	67	92
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	74
Average Queue (ft)	33
95th Queue (ft)	60
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	52	46	162	168
Average Queue (ft)	11	7	14	15
95th Queue (ft)	40	27	80	86
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)			0	0
Queuing Penalty (veh)			0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	119	579
Average Queue (ft)	28	70
95th Queue (ft)	102	345
Link Distance (ft)	42	1168
Upstream Blk Time (%)	10	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 6625

MITIGATED 2035 PLUS PROJECT PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	342	379	380	172	172	196	198	348	368	232	230
Average Queue (ft)	78	117	343	343	121	153	153	168	327	293	115	116
95th Queue (ft)	147	236	356	366	170	181	199	200	345	482	195	202
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	6	81	45	25	51	32	40	100	71		
Queuing Penalty (veh)	0	23	315	175	158	315	202	250	218	154		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	286	112	192	27	511	522	518	490	1755	1755
Average Queue (ft)	119	137	266	20	45	1	487	498	463	302	1741	1741
95th Queue (ft)	148	149	273	64	122	9	506	515	528	496	1768	1766
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	51	65		0		56	59	25	2	60	54
Queuing Penalty (veh)	0	0	437		3		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	51	65				55					
Queuing Penalty (veh)	2	241	308				1					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R
Maximum Queue (ft)	1755	226	272	1146	107	199	66
Average Queue (ft)	1743	213	239	1135	21	74	14
95th Queue (ft)	1768	234	262	1142	71	146	44
Link Distance (ft)	1703			1121		938	938
Upstream Blk Time (%)	46			72			
Queuing Penalty (veh)	0			0			
Storage Bay Dist (ft)		200	200		200		
Storage Blk Time (%)		68	50			0	
Queuing Penalty (veh)		108	80			0	

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1526	1472	1455	1367
Average Queue (ft)	1259	1257	1226	869
95th Queue (ft)	1524	1499	1469	1340
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	10	5	3	
Queuing Penalty (veh)	27	15	9	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	29	146	154	38	22	66
Average Queue (ft)	1	120	123	1	1	16
95th Queue (ft)	11	132	148	13	7	56
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)		70	29			
Queuing Penalty (veh)		274	115			
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	172	242	119	128	262	266	375
Average Queue (ft)	128	126	63	96	260	258	291
95th Queue (ft)	147	193	134	170	267	296	407
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	65	31	0	7	39	40	26
Queuing Penalty (veh)	554	267	0	0	480	493	77
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	7	39		
Queuing Penalty (veh)			1	42	479		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	208	178	224	175	156
Average Queue (ft)	197	66	143	133	12
95th Queue (ft)	209	171	224	216	73
Link Distance (ft)	136	136	146	146	146
Upstream Blk Time (%)	51	0	13	10	0
Queuing Penalty (veh)	338	3	96	73	1
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	175	363	344	27	30	341	309	117	59	42	30	56
Average Queue (ft)	32	285	277	2	16	158	153	8	11	8	2	2
95th Queue (ft)	115	393	403	13	38	308	294	46	36	29	14	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)		14	14									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		31	28			2	17	0				
Queuing Penalty (veh)		6	6			0	3	0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	90	44	41
Average Queue (ft)	6	12	4
95th Queue (ft)	36	36	20
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	66	71	56	927	942	452
Average Queue (ft)	42	52	11	870	912	414
95th Queue (ft)	58	100	48	944	939	430
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	99	56	0	54	79	90
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	66
Average Queue (ft)	36
95th Queue (ft)	58
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	25	95	113
Average Queue (ft)	11	4	16	15
95th Queue (ft)	34	16	61	63
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24
Directions Served	T	T
Maximum Queue (ft)	119	76
Average Queue (ft)	13	6
95th Queue (ft)	69	38
Link Distance (ft)	42	1168
Upstream Blk Time (%)	2	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 6349

ATTACHMENT 13-59

Construct Syncho Level of Service Sheets

Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3167	3045	3343	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3167	3045	3343	3019	3099
Volume (vph)	174	490	141	185	668	231
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	189	533	153	201	726	251
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	189	533	153	201	726	251
Heavy Vehicles (%)	4%	14%	15%	8%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	6.7	13.7	6.5	13.5	15.2	15.2
Effective Green, g (s)	9.7	16.7	9.5	16.5	18.2	18.2
Actuated g/C Ratio	0.17	0.30	0.17	0.29	0.32	0.32
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	579	938	513	978	974	1000
v/s Ratio Prot	c0.06	c0.17	0.05	0.06		
v/s Ratio Perm					c0.24	0.08
v/c Ratio	0.33	0.57	0.30	0.21	0.75	0.25
Uniform Delay, d1	20.5	16.8	20.5	15.0	17.0	14.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.8	0.3	0.1	3.1	0.1
Delay (s)	20.8	17.6	20.9	15.1	20.2	14.2
Level of Service	C	B	C	B	C	B
Approach Delay (s)		18.4		17.6		
Approach LOS		B		B		

Intersection Summary			
HCM Average Control Delay	18.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	56.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.93		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	3107		1641	3848		1703	1735		1289	1599	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	3107		1641	3848		1703	1735		1289	1599	
Volume (vph)	140	1332	141	39	244	32	143	59	50	29	26	100
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	1448	153	42	265	35	155	64	54	32	28	109
RTOR Reduction (vph)	0	8	0	0	16	0	0	34	0	0	95	0
Lane Group Flow (vph)	152	1593	0	42	284	0	155	84	0	32	42	0
Heavy Vehicles (%)	8%	15%	10%	10%	35%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	11.8	45.3		2.3	35.8		8.1	15.9		2.6	10.4	
Effective Green, g (s)	11.8	45.3		2.3	35.8		8.1	15.9		2.6	10.4	
Actuated g/C Ratio	0.14	0.55		0.03	0.44		0.10	0.19		0.03	0.13	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	1714		46	1678		168	336		41	203	
v/s Ratio Prot	c0.09	c0.51		0.03	0.07		c0.09	c0.05		0.02	0.03	
v/s Ratio Perm												
v/c Ratio	0.63	0.93		0.91	0.17		0.92	0.25		0.78	0.21	
Uniform Delay, d1	33.1	16.9		39.8	14.1		36.7	28.0		39.5	32.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.4	9.3		99.4	0.0		47.3	0.4		62.4	0.5	
Delay (s)	38.5	26.2		139.2	14.1		83.9	28.4		101.8	32.7	
Level of Service	D	C		F	B		F	C		F	C	
Approach Delay (s)		27.3			29.5			60.0			45.8	
Approach LOS		C			C			E			D	

Intersection Summary			
HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	1158	0	0	326	0	455
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1259	0	0	354	0	495
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.68		0.68	0.68
vC, conflicting volume			1259		1347	629
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			903		1034	0
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	28
cM capacity (veh/h)			506		154	685

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	629	629	89	89	89	89	495
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	495
cSH	1700	1700	1700	1700	1700	1700	685
Volume to Capacity	0.37	0.37	0.05	0.05	0.05	0.05	0.72
Queue Length 95th (ft)	0	0	0	0	0	0	155
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	22.7
Lane LOS							C
Approach Delay (s)	0.0		0.0				22.7
Approach LOS							C

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBL	WBT	SEL	NWL
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	0.97	0.95	0.97	0.97
Frt	1.00	1.00	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (prot)	3367	3343	3045	3167	3019	3099
Flt Permitted	0.95	1.00	0.95	1.00	0.95	0.95
Satd. Flow (perm)	3367	3343	3045	3167	3019	3099
Volume (vph)	285	275	587	442	180	99
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	310	299	638	480	196	108
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	310	299	638	480	196	108
Heavy Vehicles (%)	4%	8%	15%	14%	16%	13%
Turn Type	Prot		Prot		custom	custom
Protected Phases	7	4	3	8		
Permitted Phases					6	2
Actuated Green, G (s)	10.3	10.1	14.6	14.9	8.9	8.9
Effective Green, g (s)	13.3	13.1	18.1	17.9	11.9	11.9
Actuated g/C Ratio	0.24	0.24	0.33	0.32	0.22	0.22
Clearance Time (s)	7.0	7.0	7.5	7.0	7.0	7.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	813	795	1000	1029	652	669
v/s Ratio Prot	c0.09	0.09	c0.21	0.15		
v/s Ratio Perm					c0.06	0.03
v/c Ratio	0.38	0.38	0.64	0.47	0.30	0.16
Uniform Delay, d1	17.5	17.6	15.7	14.8	18.1	17.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.3	1.3	0.3	0.3	0.1
Delay (s)	17.8	17.9	17.1	15.1	18.4	17.7
Level of Service	B	B	B	B	B	B
Approach Delay (s)		17.8		16.2		
Approach LOS		B		B		

Intersection Summary			
HCM Average Control Delay	17.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	39.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.91		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00		1.00	0.94		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	2698		1641	4496		1703	1759		1289	1586	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1671	2698		1641	4496		1703	1759		1289	1586	
Volume (vph)	144	345	113	35	1468	36	158	169	100	8	26	199
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	375	123	38	1596	39	172	184	109	9	28	216
RTOR Reduction (vph)	0	32	0	0	3	0	0	24	0	0	185	0
Lane Group Flow (vph)	157	466	0	38	1632	0	172	269	0	9	59	0
Heavy Vehicles (%)	8%	35%	10%	10%	15%	13%	6%	2%	2%	40%	11%	3%
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	12.1	42.2		3.4	33.5		10.5	22.0		0.7	12.2	
Effective Green, g (s)	12.1	42.2		3.4	33.5		10.5	22.0		0.7	12.2	
Actuated g/C Ratio	0.14	0.50		0.04	0.40		0.12	0.26		0.01	0.14	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	240	1351		66	1787		212	459		11	230	
v/s Ratio Prot	c0.09	0.17		0.02	c0.36		c0.10	c0.15		0.01	0.04	
v/s Ratio Perm												
v/c Ratio	0.65	0.34		0.58	0.91		0.81	0.59		0.82	0.26	
Uniform Delay, d1	34.1	12.7		39.7	24.0		35.9	27.2		41.7	32.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.3	0.2		11.6	7.6		20.5	1.9		167.9	0.6	
Delay (s)	40.4	12.9		51.3	31.6		56.4	29.1		209.6	32.6	
Level of Service	D	B		D	C		E	C		F	C	
Approach Delay (s)		19.5			32.1			39.2			38.9	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	31.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	84.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	455	0	0	1029	0	147
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	495	0	0	1118	0	160
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	196			487		
pX, platoon unblocked			0.92		0.92	0.92
vC, conflicting volume			495		774	247
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			363		667	94
tC, single (s)			4.1		6.8	7.4
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.6
p0 queue free %			100		100	80
cM capacity (veh/h)			1096		361	805

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	WB 4	NB 1
Volume Total	247	247	280	280	280	280	160
Volume Left	0	0	0	0	0	0	0
Volume Right	0	0	0	0	0	0	160
cSH	1700	1700	1700	1700	1700	1700	805
Volume to Capacity	0.15	0.15	0.16	0.16	0.16	0.16	0.20
Queue Length 95th (ft)	0	0	0	0	0	0	18
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	10.6
Lane LOS							B
Approach Delay (s)	0.0		0.0				10.6
Approach LOS							B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

ATTACHMENT 26-3

2035 Freeway Mainline Analysis

TABLE XV (CONT): FREEWAY LEVELS OF SERVICE – ALL SCENARIOS

Scenario	ID	SR 99 Freeway Segment Location	2-Way Total Lanes	Dir.	A.M. Peak Hour			P.M. Peak Hour		
					Volume	V/C	LOS	Volume	V/C	LOS
2035 General Plan Buildout No Project Conditions	2	N. of Mariposa Road	6	SB	9,466	**1.71**	F	7,524	**1.36**	F
				NB	6,159	**1.11**	F	9,963	**1.80**	F
			10	SB	9,466	**1.02**	F	7,524	0.81	D
				NB	6,159	0.67	C	9,963	**1.08**	F
	3	N. of Arch Road	6	SB	7,832	**1.41**	F	6,165	**1.11**	F
				NB	5,072	**0.91**	E	8,191	**1.48**	F
			10	SB	7,832	0.85	D	6,165	0.67	C
				NB	5,072	0.55	C	8,191	0.89	D
	4	S. of Arch Road	6	SB	5,753	**1.04**	F	5,542	**1.00**	E
				NB	5,219	**0.94**	E	6,571	**1.18**	F
			10	SB	5,753	0.62	C	5,542	0.60	C
				NB	5,219	0.56	C	6,571	0.71	C
2035 General Plan plus Project Conditions	2	N. of Mariposa Road	6	SB	9,443	**1.70**	F	7,375	**1.33**	F
				NB	6,320	**1.14**	F	10,097	**1.82**	F
			10	SB	9,443	**1.02**	F	7,375	0.80	D
				NB	6,320	0.68	C	10,097	**1.09**	F
	3	N. of Arch Road	6	SB	7,957	**1.43**	F	6,121	**1.10**	F
				NB	5,198	**0.94**	E	8,339	**1.50**	F
			10	SB	7,957	0.86	D	6,121	0.66	C
				NB	5,198	0.56	C	8,339	**0.90**	E
	4	S. of Arch Road	6	SB	5,985	**1.08**	F	5,627	**1.01**	F
				NB	5,437	**0.98**	E	6,784	**1.22**	F
			10	SB	5,985	0.65	C	5,627	0.61	C
				NB	5,437	0.59	C	6,784	0.73	D

Source: *Highway Capacity Manual 2000, Chapters 23 (Basic Freeway Segments) and 24 (Freeway Weaving).*

Notes: *1) **Bold** values indicate unacceptable LOS conditions.*

2) Boxed entries signify unacceptable LOS conditions under 10 lane conditions.

3) V / C = volume-to-capacity ratio; density = passenger cars / mile / lane; LOS = level of service

[1] Segment 2 analyzed as weaving section (Farmington Road to E. Mariposa Road) through EPAP plus Phase 1 scenario, using density relationship to LOS. It is analyzed as a weaving section since the section distance is less than 2,500 feet. After the Phase 1 scenario, the SR 99 / Farmington Road Interchange will be removed, thereby eliminating the weaving section. All other freeway segments analyzed as basic freeway segments with capacity of 1,850 vehicles / hour / lane, using v / c relationship to LOS.

2035 Conditions No Project (8 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		7975	1.08	F	6125	0.83	D
	NB	8	5207	0.70	C	8350	1.13	F
South of Arch Road	SB		5992	0.81	D	5635	0.76	D
	NB	8	5450	0.74	C	6787	0.92	E

NCWF Project Volumes

		AM Peak	PM Peak
North of Arch Road	SB	18	4
	NB	9	11
South of Arch Road	SB	7	8
	NB	13	3

2035 Conditions Plus Project (8 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		8133	1.10	F	6135	0.83	D
	NB	8	5221	0.71	C	8488	1.15	F
South of Arch Road	SB		6002	0.81	D	5737	0.78	D
	NB	8	5568	0.75	D	6797	0.92	E

ATTACHMENT 26-6

Existing and EPAP Freeway Mainline Analysis

District	Route	Rte Suf	County	PM Pre	Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT	
10	99		SJ		8.829	NORTH MANTECA INTERCHANGE	7600	74000	71000	8400	86000	73000	
10	99		SJ		11.468	TURNER STATION/ FRENCH CAMP ROAD	8400	86000	73000	5900	75000	71000	
10	99		SJ		16.698	STOCKTON, MARIPOSA ROAD	8000	82000	78000	11100	98000	93000	

** 2006 AADT Caltrans Data

District	Route	Rte Suf	County	PM Pre	Postmile	Description	Back Peak Hour	Back Peak Month	Back AADT	Ahead Peak Hour	Ahead Peak Month	Ahead AADT
10	99		SJ		8.829	NORTH MANTECA INTERCHANGE	7600	74000	70000	8400	86000	72000
10	99		SJ		11.468	TURNER STATION/FRENCH CAMP ROAD	8400	86000	72000	5900	75000	70000
10	99		SJ		16.698	STOCKTON, MARIPOSA ROAD	8000	82000	76000	11100	98000	91000

** 2007 AADT Caltrans Data

TABLE XVI: FREEWAY LEVELS OF SERVICE – ALL SCENARIOS

Scenario	ID	SR 99 Freeway Segment Location	2-Way Total Lanes	Dir.	A.M. Peak Hour				P.M. Peak Hour			
					Volume	V / C	Density	LOS	Volume	V / C	Density	LOS
Existing Conditions [1]	2	N. of Mariposa Road	4	SB	4,180	-	34.8	D	4,000	-	33.2	D
				NB	3,370	-	32.1	D	3,490	-	34.7	D
	3	N. of Arch Road	4	SB	3,219	0.87	-	D	3,080	0.83	-	D
				NB	2,595	0.70	-	C	2,687	0.73	-	D
	4	S. of Arch Road	4	SB	2,189	0.59	-	C	3,499	**0.95**	-	**E**
				NB	2,995	0.81	-	D	2,671	0.72	-	D
Existing plus Approved Projects Conditions [1]	2	N. of Mariposa Road	4	SB	4,844	-	**41.9**	**E**	4,312	-	**35.9**	**E**
				NB	3,899	-	34.1	D	5,241	-	**> 45**	**F**
			6	SB	4,844	-	29.1	D	4,312	-	25.1	D
				NB	3,899	-	23.5	C	5,241	-	**38.4**	**E**
	3	N. of Arch Road	4	SB	3,942	**1.07**	-	**F**	3,592	**0.97**	-	**E**
				NB	3,251	0.88	-	D	3,912	**1.06**	-	**F**
			6	SB	3,942	0.71	-	C	3,592	0.65	-	C
				NB	3,251	0.59	-	C	3,912	0.70	-	C
	4	S. of Arch Road	4	SB	2,400	0.65	-	C	3,190	0.86	-	D
				NB	3,414	**0.92**	-	**E**	2,671	0.72	-	D
			6	SB	2,400	0.43	-	B	3,190	0.57	-	C
				NB	3,414	0.62	-	C	2,671	0.48	-	B
Existing plus Approved Projects plus Project Phase I Conditions [1]	2	N. of Mariposa Road	4	SB	4,923	-	**38.9**	**E**	4,532	-	33.8	D
				NB	4,377	-	34.4	D	5,325	-	**> 45**	**F**
			6	SB	4,923	-	27.3	C	4,532	-	23.9	C
				NB	4,377	-	23.8	C	5,325	-	34.8	D
	3	N. of Arch Road	4	SB	3,914	**1.06**	-	**F**	3,722	**1.01**	-	**F**
				NB	3,529	**0.95**	-	**E**	3,912	**1.06**	-	**F**
			6	SB	3,914	0.71	-	C	3,722	0.67	-	C
				NB	3,529	0.64	-	C	3,912	0.70	-	C
	4	S. of Arch Road	4	SB	2,403	0.65	-	C	3,144	0.85	-	D
				NB	3,409	**0.92**	-	**E**	2,684	0.73	-	D
			6	SB	2,403	0.43	-	B	3,144	0.57	-	C
				NB	3,409	0.61	-	C	2,684	0.48	-	B
Existing plus Approved Projects plus Project Conditions	2	N. of Mariposa Road	4	SB	4,738	**1.28**	-	**F**	4,504	**1.22**	-	**F**
				NB	4,574	**1.24**	-	**F**	5,287	**1.43**	-	**F**
			6	SB	4,738	0.85	-	D	4,504	0.81	-	D
				NB	4,574	0.82	-	D	5,287	**0.95**	-	**E**
	3	N. of Arch Road	4	SB	3,995	**1.08**	-	**F**	3,809	**1.03**	-	**F**
				NB	3,691	**1.00**	-	**E**	4,114	**1.11**	-	**F**
			6	SB	3,995	0.72	-	D	3,809	0.69	-	C
				NB	3,691	0.67	-	C	4,114	0.74	-	D
	4	S. of Arch Road	4	SB	2,469	0.67	-	C	3,221	0.87	-	D
				NB	3,476	**0.94**	-	**E**	2,809	0.76	-	D
			6	SB	2,469	0.44	-	B	3,221	0.58	-	C
				NB	3,476	0.63	-	C	2,809	0.51	-	C

TABLE XV (CONT): FREEWAY LEVELS OF SERVICE – ALL SCENARIOS

Scenario	ID	SR 99 Freeway Segment Location	2-Way Total Lanes	Dir.	A.M. Peak Hour			P.M. Peak Hour		
					Volume	V/C	LOS	Volume	V/C	LOS
1990 General Plan No Project Conditions	2	N. of Mariposa Road	6	SB	8,323	**1.50**	F	4,701	0.85	D
				NB	3,542	0.64	C	8,736	**1.57**	F
			10	SB	8,323	**0.90**	E	4,701	0.51	C
				NB	3,542	0.38	B	8,736	**0.94**	E
	3	N. of Arch Road	6	SB	6,924	**1.25**	F	4,083	0.74	D
				NB	3,074	0.55	C	7,086	**1.28**	F
			10	SB	6,924	0.75	D	4,083	0.44	B
				NB	3,074	0.33	B	7,086	0.77	D
	4	S. of Arch Road	6	SB	3,255	0.59	C	3,105	0.56	C
				NB	2,572	0.46	B	2,615	0.47	B
			10	SB	3,255	0.35	B	3,105	0.34	B
				NB	2,572	0.28	A	2,615	0.28	A
1990 General Plan plus Project Conditions	2	N. of Mariposa Road	6	SB	7,990	**1.44**	F	5,519	**0.99**	E
				NB	4,325	0.78	D	8,277	**1.49**	F
			10	SB	7,990	0.86	D	5,519	0.60	C
				NB	4,325	0.47	B	8,277	**0.89**	E
	3	N. of Arch Road	6	SB	6,754	**1.22**	F	3,885	0.70	C
				NB	2,752	0.50	B	6,813	**1.23**	F
			10	SB	6,754	0.73	D	3,885	0.42	B
				NB	2,752	0.30	A	6,813	0.74	D
	4	S. of Arch Road	6	SB	3,278	0.59	C	2,740	0.49	B
				NB	2,086	0.38	B	2,593	0.47	B
			10	SB	3,278	0.35	B	2,740	0.30	A
				NB	2,086	0.23	A	2,593	0.28	A

Freeway Mainline Analysis

Old Volumes (DKS)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3335	0.90	E	3104	0.84	D
	NB	4	2600	0.70	C	2806	0.76	D
South of Arch Road	SB		2294	0.62	C	3623	0.98	E
	NB	4	2997	0.81	D	2692	0.73	C

Project Only (Existing + Project - Existing) (DKS)

EX + Proj AM	Proj Only AM	EX + Proj PM	Proj Only PM
	158		10
	14		138
	10		102
	118		10

EPAP Only Volumes (DKS)

EPAP Volumes	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3942			3592		
	NB	4	3251			3912		
South of Arch Road	SB		2400			3190		
	NB	4	3414			2671		

hand entered volum
volume calculation
LOS calculation

EPAP Project Volumes (EPAP - Existing)

EPAP - Existing Volume	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		607			488		
	NB	4	651			1106		
South of Arch Road	SB		106			-433		
	NB	4	417			-21		

Updated Existing Volumes (Based on 2007 AADT)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3140	0.85	D	3679	0.99	E
	NB	4	4860	1.31	F	4321	1.17	F
South of Arch Road	SB		2316	0.63	C	3187	0.86	D
	NB	4	3584	0.97	E	2713	0.73	C

Updated EPAP Volumes (4 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3747	1.01	F	4167	1.13	F
	NB	4	5511	1.49	F	5427	1.47	F
South of Arch Road	SB		2422	0.65	C	2754	0.74	D
	NB	4	4001	1.08	F	2692	0.73	C

Updated EPAP Volumes (6 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3747	0.68	C	4167	0.75	D
	NB	6	5511	0.99	E	5427	0.98	E
South of Arch Road	SB		2422	0.44	B	2754	0.50	B
	NB	6	4001	0.72	C	2692	0.49	B

Updated Existing plus Project (4 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3298	0.89	D	3689	1.00	E
	NB	4	4874	1.32	F	4459	1.21	F
South of Arch Road	SB		2326	0.63	C	3289	0.89	D
	NB	4	3702	1.00	F	2723	0.74	C

Updated EPAP plus Project Volumes (4 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3905	1.06	F	4177	1.13	F
	NB	4	5525	1.49	F	5565	1.50	F
South of Arch Road	SB		2432	0.66	C	2856	0.77	D
	NB	4	4119	1.11	F	2702	0.73	C

Updated EPAP plus Project Volumes (6 Lanes)

Existing Conditions	Dir.	No. Lanes	AM Peak	V/C	LOS	PM Peak	V/C	LOS
North of Arch Road	SB		3905	0.70	C	4177	0.75	D
	NB	6	5525	1.00	E	5565	1.00	F
South of Arch Road	SB		2432	0.44	B	2856	0.51	B
	NB	6	4119	0.74	D	2702	0.49	B

ATTACHMENT 26-15

SimTraffic Queuing Analysis Sheets

EXISTING AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	43	83	141	135	98	166	108	108	142	90	135	130
Average Queue (ft)	20	46	66	42	26	57	48	49	68	56	48	56
95th Queue (ft)	44	76	123	87	69	111	97	97	125	92	98	116
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)					0	2	1	1				
Queuing Penalty (veh)					0	1	0	0				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	167	155	161	76	216	108	114	160	125	108	175
Average Queue (ft)	89	78	99	27	87	42	48	68	45	36	56
95th Queue (ft)	152	135	151	59	166	88	97	126	90	90	127
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	0	0								
Queuing Penalty (veh)	0	0	0								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	2	0			0						
Queuing Penalty (veh)	3	1			0						

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	55	53	140
Average Queue (ft)	2	16	50
95th Queue (ft)	20	45	123
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	22	178
Average Queue (ft)	1	76
95th Queue (ft)	7	133
Link Distance (ft)	107	252
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement	WB
Directions Served	R
Maximum Queue (ft)	22
Average Queue (ft)	1
95th Queue (ft)	7
Link Distance (ft)	173
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	52	250	177	29	30	131	116	112	20	25	56	25
Average Queue (ft)	17	93	71	2	18	60	71	6	7	10	4	3
95th Queue (ft)	43	156	131	14	41	119	106	40	22	30	25	17
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		0	1				1	0				
Queuing Penalty (veh)		0	0				0	0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	42	42
Average Queue (ft)	14	8
95th Queue (ft)	33	26
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	69
Average Queue (ft)	41
95th Queue (ft)	62
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	46	22
Average Queue (ft)	5	2
95th Queue (ft)	22	13
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 7

EXISTING AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	58	101	202	144	82	126	108	111	142	168	160	171
Average Queue (ft)	22	50	72	49	24	54	50	49	76	70	59	57
95th Queue (ft)	54	82	141	107	64	104	93	92	120	130	123	128
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			0	0		1	0	1				
Queuing Penalty (veh)			0	0		1	0	1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	163	152	177	68	191	110	134	160	92	108	179
Average Queue (ft)	78	71	100	27	76	46	44	75	40	31	58
95th Queue (ft)	136	127	167	57	134	94	103	127	85	81	119
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0		0								
Queuing Penalty (veh)	0		1								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	1	0			0						
Queuing Penalty (veh)	2	0			0						

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	27	68	136
Average Queue (ft)	2	17	49
95th Queue (ft)	11	55	120
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	NB
Directions Served	R
Maximum Queue (ft)	178
Average Queue (ft)	75
95th Queue (ft)	136
Link Distance (ft)	252
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Arch Road & 99 NB onramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	52	250	177	29	30	134	110	32	20	25	56	25
Average Queue (ft)	17	102	80	2	18	55	62	5	6	9	4	4
95th Queue (ft)	47	187	147	14	40	103	98	23	21	28	25	19
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		1	1				0					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	42	40
Average Queue (ft)	14	7
95th Queue (ft)	33	23
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	94
Average Queue (ft)	44
95th Queue (ft)	74
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	28	22
Average Queue (ft)	4	1
95th Queue (ft)	18	11
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 6

EXISTING AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	43	83	141	135	98	166	108	108	142	90	135	130
Average Queue (ft)	20	46	66	42	26	57	48	49	68	56	48	56
95th Queue (ft)	44	76	123	87	69	111	97	97	125	92	98	116
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)					0	2	1	1				
Queuing Penalty (veh)					0	1	0	0				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	167	155	161	76	216	108	114	160	125	108	175
Average Queue (ft)	89	78	99	27	87	42	48	68	45	36	56
95th Queue (ft)	152	135	151	59	166	88	97	126	90	90	127
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	0	0								
Queuing Penalty (veh)	0	0	0								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	2	0			0						
Queuing Penalty (veh)	3	1			0						

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	55	53	140
Average Queue (ft)	2	16	50
95th Queue (ft)	20	45	123
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	22	178
Average Queue (ft)	1	76
95th Queue (ft)	7	133
Link Distance (ft)	107	252
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement	WB
Directions Served	R
Maximum Queue (ft)	22
Average Queue (ft)	1
95th Queue (ft)	7
Link Distance (ft)	173
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	52	250	177	29	30	131	116	112	20	25	56	25
Average Queue (ft)	17	93	71	2	18	60	71	6	7	10	4	3
95th Queue (ft)	43	156	131	14	41	119	106	40	22	30	25	17
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		0	1				1	0				
Queuing Penalty (veh)		0	0				0	0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	42	42
Average Queue (ft)	14	8
95th Queue (ft)	33	26
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	69
Average Queue (ft)	41
95th Queue (ft)	62
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	46	22
Average Queue (ft)	5	2
95th Queue (ft)	22	13
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 7

EXISTING PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	151	223	164	155	106	152	110	118	225	86	75	64
Average Queue (ft)	51	81	80	47	54	81	47	47	72	35	32	20
95th Queue (ft)	112	151	133	97	101	137	87	88	146	71	64	50
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	0	0	0	1	4	0	1				
Queuing Penalty (veh)	0	0	0	0	1	5	0	1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	168	252	169	71	173	148	193	209	137	68	264
Average Queue (ft)	94	130	83	28	91	64	98	84	73	7	71
95th Queue (ft)	176	221	157	62	155	122	166	149	126	34	148
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	2	0								
Queuing Penalty (veh)	0	7	0								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	3	6						0			0
Queuing Penalty (veh)	5	8						1			0

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	59	88
Average Queue (ft)	4	13
95th Queue (ft)	24	48
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	WB	NB
Directions Served	T	R
Maximum Queue (ft)	89	135
Average Queue (ft)	8	61
95th Queue (ft)	47	109
Link Distance (ft)		252
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	240	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	R
Maximum Queue (ft)	74	149	171	51	29	48	201	332	53	42	25	56
Average Queue (ft)	18	87	73	2	2	12	84	80	8	9	7	2
95th Queue (ft)	49	137	137	17	14	37	148	177	33	27	25	18
Link Distance (ft)		311	311				1417	1417			248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250	250			100	250		200
Storage Blk Time (%)		0	1					2				
Queuing Penalty (veh)		0	0					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	44	20
Average Queue (ft)	5	18	7
95th Queue (ft)	21	38	20
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	96
Average Queue (ft)	54
95th Queue (ft)	82
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	214	32
Average Queue (ft)	40	5
95th Queue (ft)	122	20
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 30

EXISTING AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	139	195	144	146	106	171	88	118	225	110	77	64
Average Queue (ft)	43	66	75	44	55	87	46	50	68	37	34	19
95th Queue (ft)	95	117	115	93	108	151	83	95	147	80	69	48
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	0	0	1	7	0	1				
Queuing Penalty (veh)		0	0	0	1	8	0	1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	254	169	71	172	148	193	209	137	68	201
Average Queue (ft)	85	127	90	28	94	60	95	92	76	7	66
95th Queue (ft)	165	212	157	61	159	120	170	158	124	34	132
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	2	0								
Queuing Penalty (veh)	0	5	0								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	2	6						1			0
Queuing Penalty (veh)	4	9						1			0

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	50	52
Average Queue (ft)	4	9
95th Queue (ft)	23	33
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	WB	NB
Directions Served	T	R
Maximum Queue (ft)	89	125
Average Queue (ft)	7	61
95th Queue (ft)	44	107
Link Distance (ft)		252
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	240	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	L
Maximum Queue (ft)	73	215	201	51	29	48	224	216	30	20	25	25
Average Queue (ft)	19	92	81	2	2	12	86	72	5	7	9	6
95th Queue (ft)	51	158	152	17	14	36	152	140	22	23	28	22
Link Distance (ft)		311	311				1417	1417			248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250	250			100	250		200
Storage Blk Time (%)		1	1					1				
Queuing Penalty (veh)		0	0					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	20
Average Queue (ft)	16	7
95th Queue (ft)	38	21
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	97
Average Queue (ft)	52
95th Queue (ft)	83
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	126	51
Average Queue (ft)	34	6
95th Queue (ft)	90	27
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 30

EXISTING AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	151	223	164	155	106	152	110	118	225	86	75	64
Average Queue (ft)	51	81	80	47	54	81	47	47	72	35	32	20
95th Queue (ft)	112	151	133	97	101	137	87	88	146	71	64	50
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	0	0	0	1	4	0	1				
Queuing Penalty (veh)	0	0	0	0	1	5	0	1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	168	252	169	71	173	148	193	209	137	68	264
Average Queue (ft)	94	130	83	28	91	64	98	84	73	7	71
95th Queue (ft)	176	221	157	62	155	122	166	149	126	34	148
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	0	2	0								
Queuing Penalty (veh)	0	7	0								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	3	6						0			0
Queuing Penalty (veh)	5	8						1			0

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	SW
Directions Served	T	R
Maximum Queue (ft)	59	88
Average Queue (ft)	4	13
95th Queue (ft)	24	48
Link Distance (ft)	162	269
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Arch Road & 99 NB off ramp

Movement	WB	NB
Directions Served	T	R
Maximum Queue (ft)	89	135
Average Queue (ft)	8	61
95th Queue (ft)	47	109
Link Distance (ft)		252
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	240	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	R
Maximum Queue (ft)	74	149	171	51	29	48	201	332	53	42	25	56
Average Queue (ft)	18	87	73	2	2	12	84	80	8	9	7	2
95th Queue (ft)	49	137	137	17	14	37	148	177	33	27	25	18
Link Distance (ft)		311	311				1417	1417			248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250	250			100	250		200
Storage Blk Time (%)		0	1					2				
Queuing Penalty (veh)		0	0					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	44	20
Average Queue (ft)	5	18	7
95th Queue (ft)	21	38	20
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	96
Average Queue (ft)	54
95th Queue (ft)	82
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	214	32
Average Queue (ft)	40	5
95th Queue (ft)	122	20
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 30

EXISTING PLUS PROJECT AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	63	167	150	151	86	167	167	115	177	177	116	153
Average Queue (ft)	25	51	86	65	25	58	55	53	108	99	53	55
95th Queue (ft)	51	98	146	115	71	108	112	103	166	164	101	104
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	0	0		1	2	1				
Queuing Penalty (veh)		0	0	0		1	2	1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	290	287	69	170	112	112	167	96	168	94
Average Queue (ft)	110	190	199	36	90	63	47	89	41	43	51
95th Queue (ft)	196	316	317	71	141	118	89	142	80	103	84
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	11	22								
Queuing Penalty (veh)	0	62	117								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	1	13									
Queuing Penalty (veh)	3	18									

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	53	72	215
Average Queue (ft)	4	20	57
95th Queue (ft)	23	56	143
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	68	126	197
Average Queue (ft)	3	13	109
95th Queue (ft)	24	70	170
Link Distance (ft)	107	107	252
Upstream Blk Time (%)		1	
Queuing Penalty (veh)		3	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	199	192
Average Queue (ft)	28	37
95th Queue (ft)	124	146
Link Distance (ft)	137	137
Upstream Blk Time (%)	1	2
Queuing Penalty (veh)	4	12
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	71	148	133	29	30	127	155	32	42	47	25	42
Average Queue (ft)	19	82	60	3	18	66	76	4	7	9	6	12
95th Queue (ft)	49	128	112	17	40	111	129	21	26	30	22	31
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		0	0				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	37
Average Queue (ft)	11
95th Queue (ft)	28
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	76
Average Queue (ft)	39
95th Queue (ft)	59
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	49	20
Average Queue (ft)	5	1
95th Queue (ft)	23	9
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	T
Maximum Queue (ft)	521
Average Queue (ft)	17
95th Queue (ft)	172
Link Distance (ft)	438
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 225

EXISTING PLUS PROJECT AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	100	86	202	153	99	124	85	114	183	213	155	153
Average Queue (ft)	29	50	79	58	25	59	45	53	108	102	57	56
95th Queue (ft)	66	80	143	109	66	109	72	103	177	172	105	107
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			0	0	0	2		1				
Queuing Penalty (veh)			0	0	0	1		1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	326	301	68	170	145	116	202	94	190	130
Average Queue (ft)	99	192	205	36	86	63	48	108	42	49	56
95th Queue (ft)	172	325	327	72	142	119	99	187	78	118	99
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	11	24								
Queuing Penalty (veh)	0	59	129								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	0	12						0		0	
Queuing Penalty (veh)	1	17						0		0	

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	55	59	193
Average Queue (ft)	2	17	58
95th Queue (ft)	18	47	136
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	90	110	251
Average Queue (ft)	6	9	112
95th Queue (ft)	38	53	183
Link Distance (ft)	107	107	252
Upstream Blk Time (%)	0	0	0
Queuing Penalty (veh)	0	0	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	188
Average Queue (ft)	40	34
95th Queue (ft)	152	127
Link Distance (ft)	137	137
Upstream Blk Time (%)	1	1
Queuing Penalty (veh)	8	7
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	53	307	308	29	30	136	139	32	40	47	25	44
Average Queue (ft)	19	92	78	3	18	72	78	5	8	7	7	10
95th Queue (ft)	48	180	172	17	41	128	130	24	27	27	24	32
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)		0	0									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		1	1				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	40
Average Queue (ft)	11
95th Queue (ft)	30
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	40
95th Queue (ft)	61
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	48	22
Average Queue (ft)	7	1
95th Queue (ft)	27	10
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	T
Maximum Queue (ft)	497
Average Queue (ft)	32
95th Queue (ft)	233
Link Distance (ft)	438
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 226

EXISTING PLUS PROJECT AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	100	86	202	153	99	124	85	114	183	213	155	153
Average Queue (ft)	29	50	79	58	25	59	45	53	108	102	57	56
95th Queue (ft)	66	80	143	109	66	109	72	103	177	172	105	107
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			0	0	0	2		1				
Queuing Penalty (veh)			0	0	0	1		1				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	326	301	68	170	145	116	202	94	190	130
Average Queue (ft)	99	192	205	36	86	63	48	108	42	49	56
95th Queue (ft)	172	325	327	72	142	119	99	187	78	118	99
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	0	11	24								
Queuing Penalty (veh)	0	59	129								
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	0	12						0		0	
Queuing Penalty (veh)	1	17						0		0	

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	55	59	193
Average Queue (ft)	2	17	58
95th Queue (ft)	18	47	136
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	NB
Directions Served	T	T	R
Maximum Queue (ft)	90	110	251
Average Queue (ft)	6	9	112
95th Queue (ft)	38	53	183
Link Distance (ft)	107	107	252
Upstream Blk Time (%)	0	0	0
Queuing Penalty (veh)	0	0	1
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	188
Average Queue (ft)	40	34
95th Queue (ft)	152	127
Link Distance (ft)	137	137
Upstream Blk Time (%)	1	1
Queuing Penalty (veh)	8	7
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	53	307	308	29	30	136	139	32	40	47	25	44
Average Queue (ft)	19	92	78	3	18	72	78	5	8	7	7	10
95th Queue (ft)	48	180	172	17	41	128	130	24	27	27	24	32
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)		0	0									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		1	1				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	40
Average Queue (ft)	11
95th Queue (ft)	30
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	40
95th Queue (ft)	61
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	48	22
Average Queue (ft)	7	1
95th Queue (ft)	27	10
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB
Directions Served	T
Maximum Queue (ft)	497
Average Queue (ft)	32
95th Queue (ft)	233
Link Distance (ft)	438
Upstream Blk Time (%)	0
Queuing Penalty (veh)	1
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 226

EXISTING PLUS PROJECT PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	135	160	196	148	149	162	131	171	179	166	81	64
Average Queue (ft)	47	68	82	46	71	105	71	81	76	38	30	22
95th Queue (ft)	92	115	147	94	120	155	119	142	132	102	62	53
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	1	0	3	10	3	4				
Queuing Penalty (veh)		0	1	0	5	18	5	7				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	313	213	148	260	192	251	199	223	31	179
Average Queue (ft)	116	160	98	30	152	118	138	105	96	2	66
95th Queue (ft)	193	288	187	82	233	187	227	185	164	15	125
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	2	7	1								
Queuing Penalty (veh)	0	21	4								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	3	9						1	0		
Queuing Penalty (veh)	7	13						2	0		

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	22	74	66
Average Queue (ft)	1	4	14
95th Queue (ft)	7	27	45
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	NB
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	67
95th Queue (ft)	105
Link Distance (ft)	252
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB
Directions Served	T
Maximum Queue (ft)	69
Average Queue (ft)	3
95th Queue (ft)	26
Link Distance (ft)	137
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	53	173	173	29	52	196	218	32	42	25	49	39
Average Queue (ft)	18	79	65	1	15	87	87	8	9	8	2	8
95th Queue (ft)	46	127	116	10	40	152	162	30	27	26	16	29
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		0	0				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	42	20
Average Queue (ft)	15	9
95th Queue (ft)	33	23
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	59
95th Queue (ft)	91
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	94	72	51
Average Queue (ft)	25	2	13
95th Queue (ft)	68	24	42
Link Distance (ft)	265	159	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 83

EXISTING PLUS PROJECT PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	135	160	196	148	149	162	131	171	179	166	81	64
Average Queue (ft)	47	68	82	46	71	105	71	81	76	38	30	22
95th Queue (ft)	92	115	147	94	120	155	119	142	132	102	62	53
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	1	0	3	10	3	4				
Queuing Penalty (veh)		0	1	0	5	18	5	7				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	313	213	148	260	192	251	199	223	31	179
Average Queue (ft)	116	160	98	30	152	118	138	105	96	2	66
95th Queue (ft)	193	288	187	82	233	187	227	185	164	15	125
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	2	7	1								
Queuing Penalty (veh)	0	21	4								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	3	9						1	0		
Queuing Penalty (veh)	7	13						2	0		

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	22	74	66
Average Queue (ft)	1	4	14
95th Queue (ft)	7	27	45
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	NB
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	67
95th Queue (ft)	105
Link Distance (ft)	252
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB
Directions Served	T
Maximum Queue (ft)	69
Average Queue (ft)	3
95th Queue (ft)	26
Link Distance (ft)	137
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	53	173	173	29	52	196	218	32	42	25	49	39
Average Queue (ft)	18	79	65	1	15	87	87	8	9	8	2	8
95th Queue (ft)	46	127	116	10	40	152	162	30	27	26	16	29
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		0	0				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	42	20
Average Queue (ft)	15	9
95th Queue (ft)	33	23
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	59
95th Queue (ft)	91
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	78	72	52
Average Queue (ft)	21	2	14
95th Queue (ft)	60	24	45
Link Distance (ft)	265	159	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 83

EXISTING PLUS PROJECT PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	135	160	218	147	149	162	131	171	179	166	81	64
Average Queue (ft)	42	65	87	50	69	105	74	83	73	38	31	21
95th Queue (ft)	88	115	164	107	117	154	123	142	130	99	62	51
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	1	0	3	12	4	3				
Queuing Penalty (veh)		0	1	0	6	21	7	6				
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	288	186	148	260	192	217	202	223	31	179
Average Queue (ft)	101	156	87	29	152	120	134	99	94	2	67
95th Queue (ft)	182	257	175	81	237	186	210	171	158	15	129
Link Distance (ft)		173	173	436	436	436	436		1140		955
Upstream Blk Time (%)	2	4	0								
Queuing Penalty (veh)	0	12	1								
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	2	6						1	0		
Queuing Penalty (veh)	4	9						2	0		

Intersection: 3: Arch Road &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 4: Arch Road & 99 SB offramp

Movement	WB	WB	SW
Directions Served	T	T	R
Maximum Queue (ft)	22	74	74
Average Queue (ft)	1	5	17
95th Queue (ft)	7	29	50
Link Distance (ft)	162	162	269
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	NB
Directions Served	T	R
Maximum Queue (ft)	66	110
Average Queue (ft)	3	67
95th Queue (ft)	25	105
Link Distance (ft)	107	252
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB
Directions Served	T
Maximum Queue (ft)	62
Average Queue (ft)	2
95th Queue (ft)	21
Link Distance (ft)	137
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	L	LT	R
Maximum Queue (ft)	53	173	173	53	196	218	32	42	25	39	42	20
Average Queue (ft)	19	78	66	15	86	86	9	9	8	8	15	9
95th Queue (ft)	49	124	117	40	154	160	31	27	26	29	33	23
Link Distance (ft)		311	311		1417	1417			248		284	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250			100	250		200		200
Storage Blk Time (%)		0	0			2						
Queuing Penalty (veh)		0	0			0						

Intersection: 8: 99 SB offramp &

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	107
Average Queue (ft)	57
95th Queue (ft)	88
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	93	72	52
Average Queue (ft)	36	2	10
95th Queue (ft)	78	24	36
Link Distance (ft)	265	159	159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Nework Summary

Network wide Queuing Penalty: 70

EPAP AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	83	88	379	380	109	168	175	177	364	367	172	167
Average Queue (ft)	25	47	346	343	42	87	97	107	348	349	39	20
95th Queue (ft)	66	90	362	360	88	147	162	169	353	355	106	82
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)			89	89	0	8	9	10	70	66		
Queuing Penalty (veh)			178	179	0	10	11	14	456	431		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	306	225	289	237	354	262	1177	147	216
Average Queue (ft)	146	289	288	64	152	124	143	227	1153	57	95
95th Queue (ft)	211	318	293	159	256	219	262	246	1165	133	186
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	6	51	78						87		
Queuing Penalty (veh)	0	612	941						0		
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	8	44			3			91	4		2
Queuing Penalty (veh)	84	63			1			101	5		1

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1503	1484	1431	1526
Average Queue (ft)	1356	1331	1327	1266
95th Queue (ft)	1598	1581	1562	1750
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	38	9	20	3
Queuing Penalty (veh)	104	25	56	8
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	154	140	131	151	121
Average Queue (ft)	120	118	7	17	37
95th Queue (ft)	134	132	48	78	99
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	71	80		0	
Queuing Penalty (veh)	143	161		0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	167	178	92	169	71	387
Average Queue (ft)	127	128	3	10	10	377
95th Queue (ft)	149	153	30	65	45	396
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	25	24		1		99
Queuing Penalty (veh)	240	235		1		478
Storage Bay Dist (ft)			240			
Storage Blk Time (%)				1		
Queuing Penalty (veh)				1		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	230
Average Queue (ft)	199	200
95th Queue (ft)	207	210
Link Distance (ft)	137	137
Upstream Blk Time (%)	39	51
Queuing Penalty (veh)	474	617
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	175	363	363	142	28	49	209	164	124	40	25	29
Average Queue (ft)	23	249	246	14	1	13	80	80	14	5	7	2
95th Queue (ft)	109	454	466	83	9	39	162	141	74	21	26	14
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)		45	43									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		50	42	0				3	0			
Queuing Penalty (veh)		10	8	0				1	0			

Intersection: 7: Arch Road & Qantas Lane

Movement	NB	SB	SB	SB
Directions Served	R	L	LT	R
Maximum Queue (ft)	55	45	48	20
Average Queue (ft)	4	8	19	6
95th Queue (ft)	26	30	47	20
Link Distance (ft)			284	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200	200		200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	69	71	73	927	928	415
Average Queue (ft)	67	66	31	889	888	372
95th Queue (ft)	69	77	78	946	940	577
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	64	44	0	25	27	29
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	548
Average Queue (ft)	131
95th Queue (ft)	341
Link Distance (ft)	437
Upstream Blk Time (%)	2
Queuing Penalty (veh)	5
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	53	55
Average Queue (ft)	7	6
95th Queue (ft)	29	27
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served		T
Maximum Queue (ft)	521	522
Average Queue (ft)	47	94
95th Queue (ft)	282	407
Link Distance (ft)	438	438
Upstream Blk Time (%)	0	1
Queuing Penalty (veh)	5	14
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	639
Average Queue (ft)	106	1233	603
95th Queue (ft)	130	1247	621
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	97	95	95
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 5675

EPAP AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	80	205	379	380	133	174	174	177	348	349	154	104
Average Queue (ft)	27	54	344	343	45	89	105	108	347	349	36	22
95th Queue (ft)	65	118	362	368	101	159	171	181	349	349	93	76
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		0	87	85	1	12	11	13	71	69		
Queuing Penalty (veh)		0	176	171	1	15	14	16	462	450		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	326	324	96	316	227	222	261	1192	224	284
Average Queue (ft)	143	291	289	50	160	130	121	229	1155	61	124
95th Queue (ft)	205	304	303	103	257	215	211	249	1170	147	235
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	7	51	77						87		
Queuing Penalty (veh)	0	611	928						0		
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	9	45			2			92	0		7
Queuing Penalty (veh)	97	64			1			102	0		2

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1529	1494	1465	1440
Average Queue (ft)	1414	1386	1358	1312
95th Queue (ft)	1561	1527	1513	1530
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	39	25	13	4
Queuing Penalty (veh)	107	68	37	12
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	151	153	114	94	206
Average Queue (ft)	120	117	8	13	34
95th Queue (ft)	135	134	51	60	121
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	80	65			
Queuing Penalty (veh)	161	131			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	197	146	88	90	102	96	387
Average Queue (ft)	132	128	3	4	3	6	374
95th Queue (ft)	163	145	29	32	34	40	392
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	25	27					99
Queuing Penalty (veh)	244	256					476
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	202	206
Average Queue (ft)	198	200
95th Queue (ft)	217	203
Link Distance (ft)	137	137
Upstream Blk Time (%)	41	48
Queuing Penalty (veh)	495	583
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB	SB
Directions Served	L	T	T	L	T	T	R	L	T	T	R	L
Maximum Queue (ft)	52	363	363	30	179	199	32	44	42	29	56	45
Average Queue (ft)	9	263	263	12	67	72	3	7	11	3	7	10
95th Queue (ft)	32	441	465	34	126	144	18	26	33	16	38	32
Link Distance (ft)		311	311		1417	1417			248	248		
Upstream Blk Time (%)		38	45									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250			100	250			200	200
Storage Blk Time (%)		53	43			1						
Queuing Penalty (veh)		11	9			0						

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	85	20
Average Queue (ft)	21	5
95th Queue (ft)	55	19
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	75	56	927	928	415
Average Queue (ft)	66	65	20	877	880	385
95th Queue (ft)	75	77	64	965	966	555
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	65	40	0	20	21	31
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	404
Average Queue (ft)	130
95th Queue (ft)	282
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	74	53
Average Queue (ft)	14	7
95th Queue (ft)	50	31
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served		T
Maximum Queue (ft)	541	488
Average Queue (ft)	85	46
95th Queue (ft)	399	273
Link Distance (ft)	438	438
Upstream Blk Time (%)	0	0
Queuing Penalty (veh)	3	4
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	133	1239	639
Average Queue (ft)	108	1230	596
95th Queue (ft)	135	1249	615
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	95	94	94
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 5707

EPAP AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	137	250	379	380	105	164	193	177	348	349	172	163
Average Queue (ft)	29	55	344	344	42	89	96	98	347	348	49	22
95th Queue (ft)	87	145	360	363	89	153	165	159	348	354	129	81
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		1	88	88	0	13	8	10	72	71		
Queuing Penalty (veh)		1	178	177	1	17	10	13	469	462		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	327	295	96	331	324	272	262	1192	224	302
Average Queue (ft)	139	290	288	49	171	150	131	228	1155	64	132
95th Queue (ft)	216	302	291	103	303	270	232	245	1175	143	250
Link Distance (ft)		173	173		438	438	438		1140		955
Upstream Blk Time (%)	8	47	80						89		
Queuing Penalty (veh)	0	572	961						0		
Storage Bay Dist (ft)	150			200				200		200	
Storage Blk Time (%)	10	41			4			94			8
Queuing Penalty (veh)	105	59			2			104			2

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1549	1529	1449	1468
Average Queue (ft)	1453	1425	1395	1345
95th Queue (ft)	1521	1483	1458	1467
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	45	23	12	5
Queuing Penalty (veh)	123	64	34	14
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	153	153	92	96	97
Average Queue (ft)	123	118	5	18	35
95th Queue (ft)	142	131	34	64	85
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	76	67			
Queuing Penalty (veh)	153	135			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	168	179	88	90	56	34	395
Average Queue (ft)	129	134	3	5	3	3	380
95th Queue (ft)	152	155	29	38	22	19	395
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	25	29					98
Queuing Penalty (veh)	237	278					473
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	220	200
Average Queue (ft)	191	198
95th Queue (ft)	230	208
Link Distance (ft)	137	137
Upstream Blk Time (%)	35	49
Queuing Penalty (veh)	423	587
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	54	363	363	151	30	137	159	124	44	25	44	129
Average Queue (ft)	11	328	325	15	11	61	65	7	9	11	8	29
95th Queue (ft)	41	397	402	89	32	113	130	46	30	30	28	81
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)		56	57									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250			100	250		200	
Storage Blk Time (%)		68	57	0			2					
Queuing Penalty (veh)		14	11	0			0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	6
95th Queue (ft)	19
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	90	71	75	927	928	452
Average Queue (ft)	67	64	29	893	882	400
95th Queue (ft)	76	76	79	962	949	530
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	65	45		23	21	31
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	548
Average Queue (ft)	126
95th Queue (ft)	340
Link Distance (ft)	437
Upstream Blk Time (%)	1
Queuing Penalty (veh)	4
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	51	53
Average Queue (ft)	10	11
95th Queue (ft)	38	42
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 15: Bend

Movement	EB	EB
Directions Served		T
Maximum Queue (ft)	458	559
Average Queue (ft)	30	131
95th Queue (ft)	219	492
Link Distance (ft)	438	438
Upstream Blk Time (%)	0	1
Queuing Penalty (veh)	2	10
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	112	121	1239	639
Average Queue (ft)	4	107	1235	600
95th Queue (ft)	37	131	1249	617
Link Distance (ft)	42	42	1168	587
Upstream Blk Time (%)		95	93	93
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Nework Summary

Network wide Queuing Penalty: 5695

EPAP PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	346	343	313	170	172	176	177	348	349	184	165
Average Queue (ft)	117	221	304	156	77	111	123	117	347	348	77	77
95th Queue (ft)	177	392	394	252	131	170	192	191	349	354	152	152
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	22	59	4	4	14	17	13	89	79		
Queuing Penalty (veh)	1	60	160	10	10	37	46	36	315	280		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	B15	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	T	L	TR	L	TR
Maximum Queue (ft)	170	296	306	111	465	512	518	630	252	1192	170	384
Average Queue (ft)	151	290	279	29	267	286	426	224	218	1157	33	162
95th Queue (ft)	199	292	321	77	402	457	551	702	263	1176	111	299
Link Distance (ft)		173	173	436	436	436	436	578		1140		955
Upstream Blk Time (%)	4	54	31		0	0	12	9		73		
Queuing Penalty (veh)	0	440	256		0	0	0	0		0		
Storage Bay Dist (ft)	150								200		200	
Storage Blk Time (%)	6	44							70	25		7
Queuing Penalty (veh)	43	63							188	40		1

Intersection: 3: Arch Road &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	106	140
Average Queue (ft)	13	25
95th Queue (ft)	67	96
Link Distance (ft)	1417	1417
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	1	
Queuing Penalty (veh)	2	

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	145	155	67	73	162
Average Queue (ft)	24	54	2	15	45
95th Queue (ft)	101	144	22	56	126
Link Distance (ft)	-5	-5	-5	162	269
Upstream Blk Time (%)	2	9			
Queuing Penalty (veh)	5	24			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	166	138	120	128	158	87	404
Average Queue (ft)	124	90	4	4	15	15	386
95th Queue (ft)	173	162	40	42	74	58	393
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	19	6	0	1	0		93
Queuing Penalty (veh)	124	40	0	0	1		327
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	1	0		
Queuing Penalty (veh)			0	2	1		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB
Directions Served	T	T	T	R
Maximum Queue (ft)	222	219	280	289
Average Queue (ft)	194	180	39	70
95th Queue (ft)	222	231	185	229
Link Distance (ft)	137	137	173	173
Upstream Blk Time (%)	36	18	0	2
Queuing Penalty (veh)	296	145	4	13
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	31	168	168	28	30	184	201	32	41	25	28	54
Average Queue (ft)	12	92	68	1	10	81	71	4	9	5	1	2
95th Queue (ft)	35	146	124	9	33	158	145	21	27	21	9	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		1	0				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	44	22	20
Average Queue (ft)	7	8	5
95th Queue (ft)	27	25	18
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	93	107	93	931	927	414
Average Queue (ft)	66	69	29	843	862	245
95th Queue (ft)	81	85	77	1028	1031	566
Link Distance (ft)	-5	-5	-5	854	854	399
Upstream Blk Time (%)	82	44		24	27	26
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	55
Average Queue (ft)	36
95th Queue (ft)	55
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	415	156	186
Average Queue (ft)	233	43	69
95th Queue (ft)	490	147	162
Link Distance (ft)	265	159	159
Upstream Blk Time (%)	8	0	1
Queuing Penalty (veh)	113	1	2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	514
Average Queue (ft)	238	32
95th Queue (ft)	659	228
Link Distance (ft)	436	436
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	33	2
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	121	1240	621
Average Queue (ft)	4	118	999	183
95th Queue (ft)	37	127	1381	619
Link Distance (ft)	42	42	1169	587
Upstream Blk Time (%)		81	25	17
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Nework Summary

Network wide Queuing Penalty: 3122

EPAP PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	379	379	337	171	176	174	177	348	349	183	184
Average Queue (ft)	122	228	309	161	78	107	122	124	347	347	64	61
95th Queue (ft)	182	393	375	272	143	176	189	199	350	357	138	138
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	23	59	5	5	13	24	19	90	77		
Queuing Penalty (veh)	1	62	161	13	12	35	64	50	318	271		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	B15	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	T	L	TR	L	TR
Maximum Queue (ft)	170	326	298	89	453	407	518	630	262	1192	126	384
Average Queue (ft)	132	291	276	31	273	266	442	210	225	1158	22	168
95th Queue (ft)	206	312	310	73	391	404	566	670	257	1180	77	303
Link Distance (ft)		173	173	436	436	436	436	578		1140		955
Upstream Blk Time (%)	2	56	29		0		14	8		73		
Queuing Penalty (veh)	0	459	238		0		0	0		0		
Storage Bay Dist (ft)	150								200		200	
Storage Blk Time (%)	3	50							75	17		9
Queuing Penalty (veh)	19	72							202	27		1

Intersection: 3: Arch Road &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	150	140
Average Queue (ft)	10	26
95th Queue (ft)	68	93
Link Distance (ft)	1417	1417
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	117	129	73	162	217
Average Queue (ft)	21	53	2	13	60
95th Queue (ft)	85	142	24	65	159
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	1	7		0	
Queuing Penalty (veh)	3	19		0	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	153	144	34	128	255	261	387
Average Queue (ft)	122	88	1	10	15	24	385
95th Queue (ft)	161	170	11	60	101	118	393
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	19	6		0	2	2	94
Queuing Penalty (veh)	123	36		0	10	12	331
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	2		
Queuing Penalty (veh)				0	10		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	218	200	132	260	258
Average Queue (ft)	197	160	4	20	59
95th Queue (ft)	214	264	44	129	201
Link Distance (ft)	137	137	173	173	173
Upstream Blk Time (%)	38	17		0	2
Queuing Penalty (veh)	314	140		2	15
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	31	174	173	28	51	208	191	32	20	25	26	54
Average Queue (ft)	9	99	79	1	13	66	78	7	8	5	1	2
95th Queue (ft)	31	155	150	9	38	130	163	27	23	21	8	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		1	1				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	44	44	20
Average Queue (ft)	8	10	5
95th Queue (ft)	28	29	19
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	70	56	926	927	414
Average Queue (ft)	69	67	37	673	676	152
95th Queue (ft)	82	76	79	999	1016	481
Link Distance (ft)	-5	-5	-5	854	854	399
Upstream Blk Time (%)	83	41	0	15	15	21
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	72
Average Queue (ft)	35
95th Queue (ft)	55
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	391	158	219
Average Queue (ft)	163	63	106
95th Queue (ft)	422	178	210
Link Distance (ft)	265	159	159
Upstream Blk Time (%)	3	1	4
Queuing Penalty (veh)	51	2	11
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	460
Average Queue (ft)	204	15
95th Queue (ft)	618	152
Link Distance (ft)	436	436
Upstream Blk Time (%)	3	0
Queuing Penalty (veh)	25	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	NB	B24	B19
Directions Served	L	L	T	T	T
Maximum Queue (ft)	111	117	124	1240	602
Average Queue (ft)	4	4	115	740	125
95th Queue (ft)	37	38	130	1397	512
Link Distance (ft)	42	42	42	1169	587
Upstream Blk Time (%)			80	21	14
Queuing Penalty (veh)			0	0	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Nework Summary

Network wide Queuing Penalty: 3110

EPAP PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	379	353	310	125	172	175	175	348	349	169	174
Average Queue (ft)	128	267	293	161	72	103	122	124	346	346	69	75
95th Queue (ft)	183	423	413	241	114	161	171	168	353	358	160	156
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	1	35	58	5	2	13	15	19	90	74		
Queuing Penalty (veh)	2	95	160	14	4	33	41	49	319	262		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	B15	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	T	L	TR	L	TR
Maximum Queue (ft)	170	309	306	89	504	510	520	630	262	1155	170	283
Average Queue (ft)	140	292	280	32	268	272	436	222	220	1152	38	157
95th Queue (ft)	205	302	320	75	387	424	550	681	261	1160	119	251
Link Distance (ft)		173	173	436	436	436	436	578		1140		955
Upstream Blk Time (%)	7	57	30			0	12	6		76		
Queuing Penalty (veh)	0	461	245			0	0	0		0		
Storage Bay Dist (ft)	150								200		200	
Storage Blk Time (%)	10	46							72	20		5
Queuing Penalty (veh)	67	66							196	32		1

Intersection: 3: Arch Road &

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	355	153
Average Queue (ft)	96	19
95th Queue (ft)	300	95
Link Distance (ft)	1417	1417
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)	7	
Queuing Penalty (veh)	20	

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	156	129	73	200
Average Queue (ft)	53	53	5	53
95th Queue (ft)	155	131	29	150
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	12	7		
Queuing Penalty (veh)	33	19		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	146	210	128	259	217	391
Average Queue (ft)	123	99	10	19	16	385
95th Queue (ft)	156	182	57	111	105	396
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	24	11	0	0	2	94
Queuing Penalty (veh)	154	72	0	2	9	330
Storage Bay Dist (ft)			240			
Storage Blk Time (%)			0	0		
Queuing Penalty (veh)			0	2		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	238	236	16	261	260
Average Queue (ft)	199	163	1	9	60
95th Queue (ft)	222	245	5	86	210
Link Distance (ft)	137	137	173	173	173
Upstream Blk Time (%)	40	16		0	2
Queuing Penalty (veh)	326	131		1	16
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	30	211	133	29	51	175	159	55	20	25	47	44
Average Queue (ft)	13	109	66	1	10	71	75	6	8	6	9	11
95th Queue (ft)	36	180	115	9	34	141	135	27	24	23	31	30
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		2	0				2					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	4
95th Queue (ft)	16
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	107	72	925	916	414
Average Queue (ft)	67	60	25	642	625	106
95th Queue (ft)	87	98	71	1111	1106	395
Link Distance (ft)	-5	-5	-5	854	854	399
Upstream Blk Time (%)	82	44	0	15	14	16
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	55
Average Queue (ft)	38
95th Queue (ft)	58
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	408	168	182
Average Queue (ft)	170	79	95
95th Queue (ft)	436	187	184
Link Distance (ft)	265	159	159
Upstream Blk Time (%)	5	0	1
Queuing Penalty (veh)	68	1	3
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 15: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	557	542
Average Queue (ft)	296	63
95th Queue (ft)	724	330
Link Distance (ft)	436	436
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	28	2
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	NB	B24	B19
Directions Served	L	L	T	T	T
Maximum Queue (ft)	111	114	121	1240	607
Average Queue (ft)	4	4	117	964	175
95th Queue (ft)	37	38	130	1420	584
Link Distance (ft)	42	42	42	1169	587
Upstream Blk Time (%)			82	27	19
Queuing Penalty (veh)			0	0	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Nework Summary

Network wide Queuing Penalty: 3266

EPAP PLUS PROJECT AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	153	235	361	380	130	172	173	177	348	349	113	129
Average Queue (ft)	38	50	336	336	69	109	122	128	346	347	52	38
95th Queue (ft)	119	150	357	367	120	171	177	191	353	354	103	106
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	1	96	84	1	19	22	23	79	48		
Queuing Penalty (veh)	0	3	224	196	2	26	30	31	575	350		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	326	296	154	326	264	308	243	1192	129	276
Average Queue (ft)	121	291	280	45	156	147	113	223	1154	50	147
95th Queue (ft)	208	302	315	112	255	253	224	236	1175	117	249
Link Distance (ft)		173	173	440	440	440	440		1140		954
Upstream Blk Time (%)	3	59	32						85		
Queuing Penalty (veh)	0	829	444						0		
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	3	49						92	3		6
Queuing Penalty (veh)	40	70						102	4		2

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1512	1522	1510	1559
Average Queue (ft)	1450	1418	1384	1282
95th Queue (ft)	1496	1541	1492	1541
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	76	36	17	2
Queuing Penalty (veh)	235	111	54	7
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	118	154	100	117	96
Average Queue (ft)	115	120	6	7	28
95th Queue (ft)	125	154	43	45	80
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	89	71			
Queuing Penalty (veh)	208	165			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	214	228	71	75	111	387
Average Queue (ft)	142	121	8	4	6	382
95th Queue (ft)	179	210	43	31	40	391
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	38	15				97
Queuing Penalty (veh)	418	165				583
Storage Bay Dist (ft)			240			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	216	204
Average Queue (ft)	201	191
95th Queue (ft)	208	216
Link Distance (ft)	137	137
Upstream Blk Time (%)	57	25
Queuing Penalty (veh)	804	356
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	175	363	363	151	28	51	197	241	32	104	67	52
Average Queue (ft)	17	330	329	5	1	12	75	88	2	19	18	10
95th Queue (ft)	89	365	353	50	9	40	159	161	14	62	55	38
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)		85	84									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		88	79					2				
Queuing Penalty (veh)		18	16					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	NB	SB	SB	SB
Directions Served	R	L	LT	R
Maximum Queue (ft)	53	24	149	20
Average Queue (ft)	2	8	33	7
95th Queue (ft)	17	24	96	21
Link Distance (ft)			284	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200	200		200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	70	56	938	927	450
Average Queue (ft)	61	64	17	907	879	414
95th Queue (ft)	72	78	58	943	927	429
Link Distance (ft)	-5	-5	-5	855	855	398
Upstream Blk Time (%)	72	31		27	17	27
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	170
Average Queue (ft)	41
95th Queue (ft)	93
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	74	76
Average Queue (ft)	9	4
95th Queue (ft)	41	27
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	121	1240	639
Average Queue (ft)	4	106	1234	601
95th Queue (ft)	38	134	1248	614
Link Distance (ft)	42	42	1168	587
Upstream Blk Time (%)		92	89	88
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 27: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	550	525
Average Queue (ft)	408	254
95th Queue (ft)	747	648
Link Distance (ft)	440	440
Upstream Blk Time (%)	8	1
Queuing Penalty (veh)	99	15
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 6182

EPAP PLUS PROJECT AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	195	362	380	123	170	175	177	348	349	140	128
Average Queue (ft)	42	66	341	338	72	105	126	132	347	346	62	43
95th Queue (ft)	120	148	355	362	123	160	189	193	348	358	117	106
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	1	89	83	5	13	20	22	86	64		
Queuing Penalty (veh)	0	2	207	194	7	18	28	30	625	465		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	169	326	322	138	218	236	210	262	1192	225	243
Average Queue (ft)	115	291	276	44	126	108	114	225	1156	58	137
95th Queue (ft)	197	304	323	109	220	210	205	242	1175	143	233
Link Distance (ft)		173	173	440	440	440	440		1140		954
Upstream Blk Time (%)	0	60	30						84		
Queuing Penalty (veh)	0	839	421						0		
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	3	54						90	4		2
Queuing Penalty (veh)	32	77						100	6		1

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1528	1505	1442	1470
Average Queue (ft)	1452	1436	1408	1360
95th Queue (ft)	1509	1481	1461	1502
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	61	40	24	11
Queuing Penalty (veh)	188	122	72	33
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	140	154	120	95	66
Average Queue (ft)	118	121	4	7	21
95th Queue (ft)	129	151	39	45	60
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	76	61			
Queuing Penalty (veh)	177	142			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	207	234	88	68	156	157	387
Average Queue (ft)	144	147	3	4	15	16	384
95th Queue (ft)	179	197	29	29	74	77	393
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	39	22			1	1	96
Queuing Penalty (veh)	428	241			2	2	576
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)					1		
Queuing Penalty (veh)					2		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB
Directions Served	T	T
Maximum Queue (ft)	239	202
Average Queue (ft)	204	198
95th Queue (ft)	221	204
Link Distance (ft)	137	137
Upstream Blk Time (%)	54	28
Queuing Penalty (veh)	765	394
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	175	363	363	151	29	194	194	31	41	25	30	48
Average Queue (ft)	30	336	336	10	7	81	77	4	12	5	1	2
95th Queue (ft)	126	362	367	72	26	167	165	21	31	20	10	16
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)		77	61									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250			100	250			200
Storage Blk Time (%)		81	68				2					
Queuing Penalty (veh)		16	14				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	63	20
Average Queue (ft)	8	16	7
95th Queue (ft)	26	41	21
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	78	70	56	926	928	432
Average Queue (ft)	62	66	11	897	881	412
95th Queue (ft)	75	76	48	952	952	422
Link Distance (ft)	-5	-5	-5	855	855	398
Upstream Blk Time (%)	81	47		40	30	45
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	127
Average Queue (ft)	59
95th Queue (ft)	105
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	29	50
Average Queue (ft)	3	3
95th Queue (ft)	17	20
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1240	639
Average Queue (ft)	117	1238	605
95th Queue (ft)	129	1246	623
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	91	86	86
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 27: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	562	555
Average Queue (ft)	413	120
95th Queue (ft)	756	479
Link Distance (ft)	440	440
Upstream Blk Time (%)	8	1
Queuing Penalty (veh)	107	15
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 6348

EPAP PLUS PROJECT AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	150	148	351	362	106	172	175	177	348	349	157	156
Average Queue (ft)	37	47	341	341	64	106	131	131	347	348	52	49
95th Queue (ft)	104	121	347	352	111	171	190	198	348	351	113	125
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	0	93	86	2	12	26	23	82	62		
Queuing Penalty (veh)	0	0	216	199	2	17	36	31	602	451		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	L	TR	L	TR
Maximum Queue (ft)	170	290	306	133	247	249	232	262	1181	225	297
Average Queue (ft)	109	288	258	52	139	118	121	226	1154	61	152
95th Queue (ft)	199	296	333	116	210	227	218	242	1169	159	263
Link Distance (ft)		173	173	440	440	440	440		1140		954
Upstream Blk Time (%)	0	60	31						85		
Queuing Penalty (veh)	0	841	439						0		
Storage Bay Dist (ft)	150							200		200	
Storage Blk Time (%)	2	53						91	0	0	11
Queuing Penalty (veh)	22	76						100	0	0	3

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1487	1490	1434	1480
Average Queue (ft)	1444	1430	1398	1336
95th Queue (ft)	1486	1470	1445	1547
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	69	52	20	14
Queuing Penalty (veh)	213	162	61	43
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	137	153	133	76	118
Average Queue (ft)	120	115	4	7	33
95th Queue (ft)	131	137	44	36	102
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	86	70			
Queuing Penalty (veh)	201	164			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	186	237	70	103	137	387
Average Queue (ft)	142	139	4	13	19	382
95th Queue (ft)	175	177	30	58	77	395
Link Distance (ft)	107	107		137	137	252
Upstream Blk Time (%)	36	20			0	96
Queuing Penalty (veh)	403	224			1	574
Storage Bay Dist (ft)			240			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB
Directions Served	T	T	T	R
Maximum Queue (ft)	238	235	93	88
Average Queue (ft)	199	196	3	3
95th Queue (ft)	222	218	31	29
Link Distance (ft)	137	137	173	173
Upstream Blk Time (%)	57	27		
Queuing Penalty (veh)	795	383		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	175	363	363	151	30	242	257	31	41	25	30	49
Average Queue (ft)	44	334	336	15	3	67	77	1	11	8	2	3
95th Queue (ft)	163	366	366	88	17	175	176	10	31	26	14	23
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)		80	68									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250			100	250			200
Storage Blk Time (%)		85	73	0		0	2					
Queuing Penalty (veh)		17	15	0		0	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	46	42	20
Average Queue (ft)	6	17	7
95th Queue (ft)	25	35	21
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	70	56	926	928	429
Average Queue (ft)	62	67	11	907	875	412
95th Queue (ft)	80	76	47	946	941	422
Link Distance (ft)	-5	-5	-5	855	855	398
Upstream Blk Time (%)	76	48		32	26	41
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SB	SE
Directions Served	T	R
Maximum Queue (ft)	30	215
Average Queue (ft)	1	64
95th Queue (ft)	10	133
Link Distance (ft)	404	437
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	29	32
Average Queue (ft)	5	5
95th Queue (ft)	22	20
Link Distance (ft)	265	159
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	121	1240	639
Average Queue (ft)	8	113	1237	600
95th Queue (ft)	54	135	1247	618
Link Distance (ft)	42	42	1168	587
Upstream Blk Time (%)		90	86	86
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 27: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	548	523
Average Queue (ft)	429	255
95th Queue (ft)	747	652
Link Distance (ft)	440	440
Upstream Blk Time (%)	8	2
Queuing Penalty (veh)	105	22
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 6422

EPAP PLUS PROJECT PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	379	379	371	130	193	175	177	348	349	202	193
Average Queue (ft)	135	295	321	263	91	125	117	125	347	347	67	57
95th Queue (ft)	176	433	415	409	135	180	181	190	353	360	145	132
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	1	41	79	42	7	18	19	18	89	73		
Queuing Penalty (veh)	2	114	218	117	21	57	60	57	322	264		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	B27	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	T	L	TR	L	TR
Maximum Queue (ft)	170	327	287	179	513	515	523	632	245	1192	226	357
Average Queue (ft)	165	289	262	90	275	273	387	143	217	1155	43	194
95th Queue (ft)	183	304	331	184	402	438	545	542	248	1172	114	334
Link Distance (ft)		173	173	441	441	441	441	580		1140		955
Upstream Blk Time (%)	19	56	29				6	4		75		
Queuing Penalty (veh)	0	464	242				0	0		0		
Storage Bay Dist (ft)	150								200		200	
Storage Blk Time (%)	30	41							70	19		15
Queuing Penalty (veh)	210	59							189	30		2

Intersection: 3: Arch Road &

Movement	EB	EB	EB
Directions Served	T	T	T
Maximum Queue (ft)	696	520	518
Average Queue (ft)	160	154	98
95th Queue (ft)	518	414	353
Link Distance (ft)	1417	1417	1417
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)	8		
Queuing Penalty (veh)	22		

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	149	132	119	152	162	132
Average Queue (ft)	69	98	41	13	22	45
95th Queue (ft)	165	165	129	76	94	112
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)	13	39	11	0	0	
Queuing Penalty (veh)	37	107	31	0	1	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	151	161	120	129	258	140	387
Average Queue (ft)	118	98	11	25	34	17	386
95th Queue (ft)	160	169	67	99	151	74	388
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	25	11	0	0	2	0	92
Queuing Penalty (veh)	162	69	0	0	12	1	335
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	0	2		
Queuing Penalty (veh)			0	0	12		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB
Directions Served	T	T	T	R
Maximum Queue (ft)	202	236	290	260
Average Queue (ft)	198	176	18	50
95th Queue (ft)	214	244	132	193
Link Distance (ft)	137	137	173	173
Upstream Blk Time (%)	44	21	0	2
Queuing Penalty (veh)	364	174	4	21
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	L	LT	R
Maximum Queue (ft)	51	197	175	30	161	176	31	40	25	25	22	40
Average Queue (ft)	11	97	72	14	61	78	3	4	12	7	8	9
95th Queue (ft)	37	156	129	37	121	141	18	20	31	25	24	26
Link Distance (ft)		311	311		1417	1417			248		284	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250			100	250		200		200
Storage Blk Time (%)		0	0			2						
Queuing Penalty (veh)		0	0			0						

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	72	70	56	926	918	416
Average Queue (ft)	64	62	24	536	517	55
95th Queue (ft)	73	87	69	861	872	289
Link Distance (ft)	-5	-5	-5	856	856	401
Upstream Blk Time (%)	82	36		8	7	7
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	40
95th Queue (ft)	71
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	389	157	220
Average Queue (ft)	172	87	106
95th Queue (ft)	428	193	210
Link Distance (ft)	265	159	159
Upstream Blk Time (%)	5	1	3
Queuing Penalty (veh)	79	2	8
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	130	1245	631
Average Queue (ft)	19	113	1243	600
95th Queue (ft)	88	134	1250	613
Link Distance (ft)	42	42	1173	585
Upstream Blk Time (%)		80	75	76
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 27: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	562	552
Average Queue (ft)	193	100
95th Queue (ft)	613	430
Link Distance (ft)	441	441
Upstream Blk Time (%)	3	0
Queuing Penalty (veh)	21	1
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 3886

EPAP PLUS PROJECT PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	379	361	380	170	172	175	189	348	349	187	213
Average Queue (ft)	125	304	342	321	88	109	131	137	347	348	68	77
95th Queue (ft)	190	444	351	415	140	157	185	192	353	353	154	161
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	1	55	92	66	6	13	32	30	87	75		
Queuing Penalty (veh)	1	153	255	181	19	40	102	97	314	271		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	B27	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	T	L	TR	L	TR
Maximum Queue (ft)	170	326	324	175	380	360	523	632	237	1192	94	498
Average Queue (ft)	154	293	267	76	257	252	404	165	212	1158	30	235
95th Queue (ft)	199	311	331	158	363	352	552	600	269	1177	79	416
Link Distance (ft)		173	173	441	441	441	441	580		1140		955
Upstream Blk Time (%)	14	58	29				8	5		75		
Queuing Penalty (veh)	0	483	243				0	0		0		
Storage Bay Dist (ft)	150								200		200	
Storage Blk Time (%)	20	48							68	18		29
Queuing Penalty (veh)	140	69							184	29		3

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB	WB
Directions Served	T	T	T	R	T
Maximum Queue (ft)	1497	1439	1043	475	173
Average Queue (ft)	832	596	315	16	6
95th Queue (ft)	1644	1181	878	156	57
Link Distance (ft)	1417	1417	1417	1417	-5
Upstream Blk Time (%)	13	0			0
Queuing Penalty (veh)	40	0			1
Storage Bay Dist (ft)					
Storage Blk Time (%)	32				
Queuing Penalty (veh)	88				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	149	139	117	126	142	184
Average Queue (ft)	94	118	59	9	24	43
95th Queue (ft)	175	130	145	55	85	133
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)	32	75	18		0	
Queuing Penalty (veh)	89	207	50		0	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	163	242	110	129	260	263	387
Average Queue (ft)	126	110	4	24	53	43	382
95th Queue (ft)	158	197	37	96	196	177	410
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	27	14		0	5	6	90
Queuing Penalty (veh)	178	89		0	33	38	327
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	5		
Queuing Penalty (veh)				0	33		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	206	219	178	298	254
Average Queue (ft)	200	178	13	42	77
95th Queue (ft)	206	245	81	187	239
Link Distance (ft)	137	137	173	173	173
Upstream Blk Time (%)	46	20	0	2	3
Queuing Penalty (veh)	382	164	5	16	33
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	L
Maximum Queue (ft)	175	363	361	28	30	137	211	31	42	25	29	46
Average Queue (ft)	22	147	118	2	12	69	79	3	6	11	1	7
95th Queue (ft)	94	294	288	13	35	130	147	17	24	31	10	27
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)		9	3									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		13	4				2					
Queuing Penalty (veh)		3	1				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	22	20
Average Queue (ft)	10	9
95th Queue (ft)	26	24
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	106	56	927	929	416
Average Queue (ft)	66	66	33	898	904	387
95th Queue (ft)	79	87	78	949	943	503
Link Distance (ft)	-5	-5	-5	856	856	401
Upstream Blk Time (%)	80	46	0	37	40	37
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	38
95th Queue (ft)	66
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	390	281	196
Average Queue (ft)	136	84	107
95th Queue (ft)	373	232	215
Link Distance (ft)	265	159	159
Upstream Blk Time (%)	3	2	12
Queuing Penalty (veh)	44	5	33
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	121	1245	637
Average Queue (ft)	19	105	1021	369
95th Queue (ft)	88	147	1699	822
Link Distance (ft)	42	42	1173	585
Upstream Blk Time (%)		77	50	40
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 27: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	544	502
Average Queue (ft)	290	33
95th Queue (ft)	711	238
Link Distance (ft)	441	441
Upstream Blk Time (%)	4	0
Queuing Penalty (veh)	32	2
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 4475

EPAP PLUS PROJECT PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	379	380	380	170	174	176	189	348	349	236	299
Average Queue (ft)	132	280	338	223	101	129	121	122	347	349	69	65
95th Queue (ft)	174	414	372	386	159	183	181	190	353	349	153	168
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	40	85	30	8	23	19	23	89	75		0
Queuing Penalty (veh)	1	111	234	82	26	72	61	74	321	270		1
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	WB	WB	WB	WB	B27	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	TR	T	L	TR	L	TR
Maximum Queue (ft)	170	317	310	213	514	433	521	632	262	1192	115	399
Average Queue (ft)	157	292	269	84	282	267	392	110	219	1155	37	182
95th Queue (ft)	200	305	343	178	437	391	538	486	264	1169	86	308
Link Distance (ft)		173	173	441	441	441	441	580		1140		955
Upstream Blk Time (%)	17	63	24		0	0	7	4		74		
Queuing Penalty (veh)	0	526	199		0	0	0	0		0		
Storage Bay Dist (ft)	150								200		200	
Storage Blk Time (%)	22	46							72	16		13
Queuing Penalty (veh)	155	66							194	25		1

Intersection: 3: Arch Road &

Movement	EB	EB	EB
Directions Served	T	T	T
Maximum Queue (ft)	938	512	512
Average Queue (ft)	175	129	99
95th Queue (ft)	626	427	357
Link Distance (ft)	1417	1417	1417
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)	10		
Queuing Penalty (veh)	28		

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	156	128	117	25	131	207
Average Queue (ft)	60	84	33	1	22	65
95th Queue (ft)	160	156	118	10	73	167
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)	12	31	10			
Queuing Penalty (veh)	33	86	29			
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	186	147	110	128	258	175	387
Average Queue (ft)	129	90	4	20	26	21	385
95th Queue (ft)	162	173	36	83	135	91	393
Link Distance (ft)	107	107			137	137	252
Upstream Blk Time (%)	35	14		0	1	1	93
Queuing Penalty (veh)	224	91		0	6	5	336
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	1		
Queuing Penalty (veh)				0	6		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	234	200	70	261	241
Average Queue (ft)	196	177	2	9	35
95th Queue (ft)	222	256	23	86	154
Link Distance (ft)	137	137	173	173	173
Upstream Blk Time (%)	48	22		0	2
Queuing Penalty (veh)	396	179		1	15
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	31	144	174	29	30	154	208	32	40	25	56	46
Average Queue (ft)	12	92	65	1	15	79	92	4	5	12	2	7
95th Queue (ft)	36	138	123	10	38	151	167	20	22	31	18	27
Link Distance (ft)		311	311			1417	1417			248		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250		200	200
Storage Blk Time (%)		0	1				3					
Queuing Penalty (veh)		0	0				1					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	22	41
Average Queue (ft)	9	8
95th Queue (ft)	26	25
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	70	72	927	929	453
Average Queue (ft)	64	66	35	834	854	322
95th Queue (ft)	78	76	80	1032	1045	614
Link Distance (ft)	-5	-5	-5	856	856	401
Upstream Blk Time (%)	81	42	0	23	28	32
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	110
Average Queue (ft)	40
95th Queue (ft)	72
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	NB	NB
Directions Served	R	T	T
Maximum Queue (ft)	390	203	220
Average Queue (ft)	124	93	118
95th Queue (ft)	379	202	222
Link Distance (ft)	265	159	159
Upstream Blk Time (%)	3	1	5
Queuing Penalty (veh)	56	2	13
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	114	130	1245	637
Average Queue (ft)	15	116	1242	576
95th Queue (ft)	78	130	1252	674
Link Distance (ft)	42	42	1173	585
Upstream Blk Time (%)		80	75	56
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 27: Bend

Movement	EB	EB
Directions Served	T	
Maximum Queue (ft)	562	504
Average Queue (ft)	369	96
95th Queue (ft)	739	411
Link Distance (ft)	441	441
Upstream Blk Time (%)	5	0
Queuing Penalty (veh)	37	4
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Nework Summary

Network wide Queuing Penalty: 3968

2035 BASELINE AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	258	361	380	172	176	177	198	348	361	169	183
Average Queue (ft)	87	121	340	345	103	138	173	174	347	348	63	59
95th Queue (ft)	155	221	354	365	173	194	182	190	348	355	144	146
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	5	67	49	21	44	52	54	95	70		
Queuing Penalty (veh)	1	28	382	281	96	202	235	244	686	505		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	133	141	303	126	162	511	528	528	493	1755	1755	1755
Average Queue (ft)	118	138	266	34	39	489	501	467	316	1746	1732	1730
95th Queue (ft)	148	149	286	85	106	506	524	559	530	1770	1770	1793
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	44	49	0	0	63	62	28	7	68	50	40
Queuing Penalty (veh)	0	0	617	0	3	0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	44	49			63						
Queuing Penalty (veh)	4	368	485			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R
Maximum Queue (ft)	231	272	537	130	179	67
Average Queue (ft)	198	187	243	45	81	18
95th Queue (ft)	263	321	501	103	150	49
Link Distance (ft)			1121		938	938
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	200	200		200		
Storage Blk Time (%)	74	27	4			
Queuing Penalty (veh)	59	21	2			

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1187	1168	1137	1057
Average Queue (ft)	938	976	934	825
95th Queue (ft)	1126	1152	1111	1010
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	154	154	22	66
Average Queue (ft)	120	125	2	20
95th Queue (ft)	136	153	12	63
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	53	39		
Queuing Penalty (veh)	304	224		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	184	271	119	128	262	270	380
Average Queue (ft)	123	38	30	55	238	229	368
95th Queue (ft)	148	165	112	152	321	309	382
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	30	2	0	3	33	33	96
Queuing Penalty (veh)	518	42	0	0	298	298	367
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	3	33		
Queuing Penalty (veh)			0	12	297		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	203	136	224	224	53
Average Queue (ft)	200	58	132	134	3
95th Queue (ft)	205	156	262	238	21
Link Distance (ft)	136	136	146	146	146
Upstream Blk Time (%)	44	0	10	10	
Queuing Penalty (veh)	550	5	55	55	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	L	LT	R
Maximum Queue (ft)	31	191	212	29	155	141	31	41	25	25	42	37
Average Queue (ft)	13	86	75	8	63	59	3	9	10	9	8	11
95th Queue (ft)	37	140	144	28	120	116	16	27	30	28	27	27
Link Distance (ft)		311	311		1417	1417			248		284	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250			100	250		200		200
Storage Blk Time (%)		1	1			1						
Queuing Penalty (veh)		0	0			0						

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	93	56	927	928	415
Average Queue (ft)	61	68	4	898	899	414
95th Queue (ft)	76	80	26	952	945	418
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	88	62		40	51	59
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	116
Average Queue (ft)	39
95th Queue (ft)	84
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	25	53	51
Average Queue (ft)	6	2	4	3
95th Queue (ft)	28	13	24	21
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	639
Average Queue (ft)	100	1229	597
95th Queue (ft)	123	1248	623
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	91	89	89
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 7247

2035 BASELINE AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	139	299	379	380	172	176	198	179	348	349	165	177
Average Queue (ft)	65	91	328	349	82	113	162	156	342	312	57	41
95th Queue (ft)	139	216	362	371	165	192	212	218	355	483	138	118
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		3	78	61	15	35	42	42	96	65		
Queuing Penalty (veh)		19	446	352	70	159	194	192	698	471		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	131	141	285	99	160	506	529	529	455	1755	1755	1755
Average Queue (ft)	96	123	261	20	23	485	489	474	313	1732	1726	1732
95th Queue (ft)	160	161	279	62	88	502	524	531	517	1761	1761	1775
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	34	68		0	72	74	21	25	73	65	60
Queuing Penalty (veh)	0	0	855		5	0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	34	68			72						
Queuing Penalty (veh)	1	277	672			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	211	247	751	152	729	603	554
Average Queue (ft)	142	98	167	63	178	80	44
95th Queue (ft)	213	233	449	151	476	357	217
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	8	3	16		25		
Queuing Penalty (veh)	6	2	11		5		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1434	1412	1410	1396
Average Queue (ft)	1064	1068	1042	937
95th Queue (ft)	1414	1383	1358	1296
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	21	0	0	
Queuing Penalty (veh)	59	0	0	
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	154	137	74	24	66
Average Queue (ft)	119	112	2	1	14
95th Queue (ft)	134	126	24	8	50
Link Distance (ft)	-5	-5	162	162	269
Upstream Blk Time (%)	70	58			
Queuing Penalty (veh)	403	331			
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	183	271	118	127	262	266	381
Average Queue (ft)	123	60	26	53	173	159	365
95th Queue (ft)	151	185	101	148	340	329	377
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	55	3	0	4	21	19	98
Queuing Penalty (veh)	939	51	0	0	194	170	375
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	4	21		
Queuing Penalty (veh)			0	20	194		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	T	R	R
Maximum Queue (ft)	226	136	107	255	269	211	266
Average Queue (ft)	196	44	4	136	126	66	86
95th Queue (ft)	216	139	35	279	258	222	287
Link Distance (ft)	136	136	136	146	146	146	146
Upstream Blk Time (%)	64	0		20	39	31	14
Queuing Penalty (veh)	803	3		107	208	164	73
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	T	L	LT
Maximum Queue (ft)	48	334	363	30	118	140	118	20	25	28	43	22
Average Queue (ft)	11	130	126	6	67	65	6	8	11	1	10	8
95th Queue (ft)	36	299	321	24	128	123	42	23	32	9	31	24
Link Distance (ft)		311	311		1417	1417			248	248		284
Upstream Blk Time (%)		20	19									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250			100	250			200	
Storage Blk Time (%)		20	21			1	0					
Queuing Penalty (veh)		4	4			0	0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	9
95th Queue (ft)	23
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	91	93	55	927	928	452
Average Queue (ft)	54	60	7	913	882	413
95th Queue (ft)	80	95	38	939	937	433
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	92	58		54	54	70
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	89
Average Queue (ft)	29
95th Queue (ft)	70
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	66	15	74	94
Average Queue (ft)	6	1	5	6
95th Queue (ft)	29	9	33	41
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	113	121	1239	639
Average Queue (ft)	4	101	1217	595
95th Queue (ft)	37	119	1251	621
Link Distance (ft)	42	42	1168	587
Upstream Blk Time (%)		95	93	93
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Nework Summary

Network wide Queuing Penalty: 8539

2035 BASELINE AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	258	361	380	172	176	177	198	348	361	135	165
Average Queue (ft)	86	130	343	341	105	137	175	175	346	346	54	48
95th Queue (ft)	155	242	352	371	181	195	181	190	354	361	122	127
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	7	69	47	21	44	51	53	97	63		
Queuing Penalty (veh)	0	42	396	271	96	200	231	243	703	458		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	132	141	303	301	117	509	529	528	530	1755	1755	1755
Average Queue (ft)	116	136	267	44	30	490	503	474	344	1742	1741	1732
95th Queue (ft)	147	152	289	163	83	506	529	558	543	1768	1769	1796
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	44	50	0		64	61	30	6	67	53	37
Queuing Penalty (veh)	0	0	630	3		0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	44	50			64						
Queuing Penalty (veh)	3	368	495			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	231	272	492	130	196	89	67
Average Queue (ft)	197	176	205	41	80	19	4
95th Queue (ft)	260	323	452	99	159	59	25
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	67	19	4		1		
Queuing Penalty (veh)	53	15	2		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1187	1168	1137	1057
Average Queue (ft)	937	974	932	804
95th Queue (ft)	1110	1141	1100	1050
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	WB	SW
Directions Served	T	T	T	R
Maximum Queue (ft)	154	154	22	66
Average Queue (ft)	124	125	1	20
95th Queue (ft)	143	149	10	63
Link Distance (ft)	-5	-5	162	269
Upstream Blk Time (%)	54	40		
Queuing Penalty (veh)	311	227		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	184	271	119	128	262	266	380
Average Queue (ft)	125	43	26	61	238	232	366
95th Queue (ft)	149	177	103	157	308	308	382
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	36	2	0	3	33	31	98
Queuing Penalty (veh)	622	35	0	0	299	283	374
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	3	33		
Queuing Penalty (veh)			0	12	299		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	R
Maximum Queue (ft)	212	188	269	204	146
Average Queue (ft)	198	62	139	127	8
95th Queue (ft)	213	174	257	231	53
Link Distance (ft)	136	136	146	146	146
Upstream Blk Time (%)	50	2	13	12	0
Queuing Penalty (veh)	628	22	68	62	0
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	L	T	T	R	L	T	L	LT	R
Maximum Queue (ft)	31	191	212	29	213	197	32	41	25	25	42	58
Average Queue (ft)	12	90	80	7	70	68	6	8	9	9	7	12
95th Queue (ft)	36	140	152	26	145	138	26	26	28	28	25	32
Link Distance (ft)		311	311		1417	1417			248		284	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250			100	250		200		200
Storage Blk Time (%)		1	2			1						
Queuing Penalty (veh)		0	0			0						

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	108	55	927	928	415
Average Queue (ft)	58	66	4	893	902	414
95th Queue (ft)	74	84	26	948	946	418
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	92	51		44	53	63
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	127
Average Queue (ft)	40
95th Queue (ft)	79
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	66	53	59
Average Queue (ft)	5	4	4	5
95th Queue (ft)	28	26	24	29
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	602
Average Queue (ft)	97	1228	591
95th Queue (ft)	116	1247	611
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	95	93	94
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 7454

2035 BASELINE PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	154	342	352	362	174	176	177	178	348	349	333	272
Average Queue (ft)	113	245	339	327	122	150	168	170	347	340	142	140
95th Queue (ft)	198	453	355	388	172	192	195	202	349	371	258	257
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	3	47	93	42	23	41	44	49	81	76	2	1
Queuing Penalty (veh)	23	356	701	314	137	245	258	289	283	268	3	1
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	266	264	261	24	505	529	523	492	1755	1755
Average Queue (ft)	116	136	264	108	109	1	490	492	469	327	1738	1732
95th Queue (ft)	150	158	270	254	210	9	502	517	517	521	1760	1757
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	56	62	9	3		65	68	29	3	68	55
Queuing Penalty (veh)	0	0	650	95	34		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	56	62				66					
Queuing Penalty (veh)	1	419	465				3					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	225	272	1147	125	259	66	66
Average Queue (ft)	1735	195	219	1125	38	84	23	4
95th Queue (ft)	1765	250	323	1174	98	168	58	27
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	56			26				
Queuing Penalty (veh)	0			0				
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		32	24	44		0		
Queuing Penalty (veh)		86	64	165		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1448	1475	1432	1433
Average Queue (ft)	1307	1300	1157	789
95th Queue (ft)	1656	1668	1533	1502
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	39	12	3	1
Queuing Penalty (veh)	107	33	9	2
Storage Bay Dist (ft)				
Storage Blk Time (%)	9			
Queuing Penalty (veh)	66			

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	137	136	154	165	206	368
Average Queue (ft)	71	117	108	9	15	170
95th Queue (ft)	163	129	174	69	93	311
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)	24	86	20	0	0	6
Queuing Penalty (veh)	179	647	153	1	5	13
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	204	269	109	128	299	284	408
Average Queue (ft)	128	62	13	70	236	233	374
95th Queue (ft)	162	242	65	154	337	347	386
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	43	6		1	24	26	87
Queuing Penalty (veh)	605	84		0	286	307	316
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				1	24		
Queuing Penalty (veh)				9	286		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	202	222	223	264	227	274
Average Queue (ft)	198	77	25	150	147	22
95th Queue (ft)	207	195	125	266	233	136
Link Distance (ft)	136	136	136	146	146	146
Upstream Blk Time (%)	50	2	0	12	11	1
Queuing Penalty (veh)	526	26	2	88	81	4
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	175	363	363	151	48	52	309	309	124	60	47	30
Average Queue (ft)	23	293	287	5	6	16	84	90	5	16	10	2
95th Queue (ft)	80	396	410	50	27	44	224	230	43	43	34	14
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)		24	16									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		48	29	0			0	6				
Queuing Penalty (veh)		10	6	0			0	1				

Intersection: 7: Arch Road & Qantas Lane

Movement	NB	SB	SB	SB
Directions Served	R	L	LT	R
Maximum Queue (ft)	54	44	66	20
Average Queue (ft)	2	10	15	7
95th Queue (ft)	18	32	45	22
Link Distance (ft)			284	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200	200		200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	104	71	73	927	935	452
Average Queue (ft)	70	62	24	894	895	400
95th Queue (ft)	90	78	71	940	944	484
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	72	43	0	41	40	38
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	68
Average Queue (ft)	26
95th Queue (ft)	53
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	89	25	89	83
Average Queue (ft)	14	3	12	18
95th Queue (ft)	53	16	50	58
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	149	1239	602
Average Queue (ft)	107	1235	601
95th Queue (ft)	130	1246	604
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	69	68	69
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8712

2035 BASELINE PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	153	342	349	343	172	153	177	179	348	349	278	276
Average Queue (ft)	78	180	341	316	53	60	119	93	347	340	142	132
95th Queue (ft)	185	401	349	400	130	147	206	208	349	381	265	255
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	22	95	36	4	9	38	27	78	69	1	1
Queuing Penalty (veh)	1	163	713	275	25	52	224	163	273	244	1	2
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	132	141	285	264	261	528	529	476	492	1755	1755	1755
Average Queue (ft)	121	139	264	120	147	339	492	418	425	1725	1737	1723
95th Queue (ft)	143	143	273	256	270	707	554	492	576	1769	1764	1762
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	63	65	4	5	45	78	56	66	88	88	87
Queuing Penalty (veh)	0	0	683	45	50	0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	63	65			45						
Queuing Penalty (veh)	2	472	489			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	225	273	1173	125	942	511	318
Average Queue (ft)	202	232	1124	20	444	243	147
95th Queue (ft)	220	245	1146	78	1068	586	367
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)			86		30		
Queuing Penalty (veh)			0		0		
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	80	84	10		53		
Queuing Penalty (veh)	214	226	37		11		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1456	1529	1429	1570
Average Queue (ft)	1426	1382	1183	840
95th Queue (ft)	1458	1649	1639	1639
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	51	14	4	0
Queuing Penalty (veh)	142	38	12	0
Storage Bay Dist (ft)				
Storage Blk Time (%)	3			
Queuing Penalty (veh)	21			

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	118	131	145	162	183	245
Average Queue (ft)	20	116	94	6	12	86
95th Queue (ft)	90	126	157	55	69	211
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)	3	89	19	0	1	
Queuing Penalty (veh)	25	670	144	0	7	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	136	266	118	128	262	265	402
Average Queue (ft)	122	46	11	21	98	74	371
95th Queue (ft)	138	172	67	87	290	247	386
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	45	5	0	0	15	12	87
Queuing Penalty (veh)	627	74	0	0	175	138	315
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	0	15		
Queuing Penalty (veh)			0	1	175		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	T	R	R
Maximum Queue (ft)	208	183	125	212	210	276	161
Average Queue (ft)	198	67	14	63	153	126	114
95th Queue (ft)	208	169	69	202	177	242	217
Link Distance (ft)	136	136	136	146	146	146	146
Upstream Blk Time (%)	53	1	0	10	74	75	74
Queuing Penalty (veh)	560	8	0	74	562	569	562
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	L	T	T	R
Maximum Queue (ft)	175	363	363	49	29	49	115	171	83	66	30	56
Average Queue (ft)	26	301	312	2	5	12	41	38	22	12	2	2
95th Queue (ft)	109	419	424	16	21	38	112	111	55	40	14	18
Link Distance (ft)		311	311				1417	1417		248	248	
Upstream Blk Time (%)		45	39									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			125	250	250			250			200
Storage Blk Time (%)	0	58	42					2				
Queuing Penalty (veh)	0	12	8					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	45	66	20
Average Queue (ft)	12	16	5
95th Queue (ft)	38	47	19
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	104	93	56	932	938	452
Average Queue (ft)	66	64	22	843	841	332
95th Queue (ft)	84	83	66	1046	1065	605
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	69	46	0	25	24	35
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	68
Average Queue (ft)	24
95th Queue (ft)	49
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	15	20	22
Average Queue (ft)	4	0	1	2
95th Queue (ft)	21	5	6	13
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	123	1239	639
Average Queue (ft)	109	1236	601
95th Queue (ft)	130	1244	616
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	68	66	66
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 9284

2035 BASELINE PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	352	347	343	172	176	177	179	356	349	373	266
Average Queue (ft)	105	192	341	329	121	143	170	172	347	342	144	150
95th Queue (ft)	190	384	347	416	179	191	192	187	350	367	265	236
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	33	94	46	21	37	43	50	80	75	3	2
Queuing Penalty (veh)	1	252	706	349	124	220	255	298	281	262	6	3
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	133	141	266	264	261	25	511	518	497	478	1755	1755
Average Queue (ft)	119	138	264	107	144	1	492	491	455	296	1738	1743
95th Queue (ft)	145	145	270	234	253	9	505	521	537	499	1763	1772
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	3	56	61	3	6		67	68	30	4	66	65
Queuing Penalty (veh)	0	0	643	36	63		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	3	56	61				66					
Queuing Penalty (veh)	22	417	461				3					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	226	272	1173	126	256	66	30
Average Queue (ft)	1728	196	210	1123	40	85	22	3
95th Queue (ft)	1768	256	305	1189	102	167	58	17
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	54			39				
Queuing Penalty (veh)	0			0				
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		34	16	39		1		
Queuing Penalty (veh)		92	43	146		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1438	1422	1254	1231
Average Queue (ft)	1198	1107	1025	781
95th Queue (ft)	1499	1411	1286	1307
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	2	0		
Queuing Penalty (veh)	5	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)	5			
Queuing Penalty (veh)	38			

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	WB	SW
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	155	131	154	220	208	368
Average Queue (ft)	32	115	117	22	32	150
95th Queue (ft)	121	127	160	115	139	270
Link Distance (ft)	-5	-5	-5	162	162	269
Upstream Blk Time (%)	6	86	31	0	1	2
Queuing Penalty (veh)	44	651	237	4	13	4
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	186	300	119	128	292	270	406
Average Queue (ft)	126	55	29	65	229	230	372
95th Queue (ft)	152	210	109	159	348	350	389
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	44	8	0	2	25	28	84
Queuing Penalty (veh)	620	110	0	0	296	331	307
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)			0	2	25		
Queuing Penalty (veh)			0	12	295		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	T	R	R
Maximum Queue (ft)	206	228	116	273	233	232	124
Average Queue (ft)	195	71	11	158	146	17	4
95th Queue (ft)	215	189	58	275	237	106	41
Link Distance (ft)	136	136	136	146	146	146	146
Upstream Blk Time (%)	49	0	0	12	12	1	
Queuing Penalty (veh)	514	4	0	91	90	10	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	L	LT
Maximum Queue (ft)	176	363	363	27	30	348	389	32	41	25	44	22
Average Queue (ft)	25	260	247	2	19	142	167	3	13	4	6	9
95th Queue (ft)	80	405	399	13	39	290	335	19	34	19	28	26
Link Distance (ft)		311	311			1417	1417			248		284
Upstream Blk Time (%)		9	6									
Queuing Penalty (veh)		0	0									
Storage Bay Dist (ft)	150			250	250			100	250		200	
Storage Blk Time (%)		24	23			3	15					
Queuing Penalty (veh)		5	5			1	3					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB
Directions Served	R
Maximum Queue (ft)	20
Average Queue (ft)	5
95th Queue (ft)	18
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	200
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	70	56	926	928	415
Average Queue (ft)	65	59	26	900	882	413
95th Queue (ft)	71	77	71	962	932	420
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	76	44	0	43	39	50
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	68
Average Queue (ft)	25
95th Queue (ft)	55
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	54	15	51	96
Average Queue (ft)	12	1	9	17
95th Queue (ft)	43	8	33	58
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	123	1239	602
Average Queue (ft)	109	1236	599
95th Queue (ft)	136	1248	607
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	65	61	63
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8371

2035 PLUS PROJECT AM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	218	346	380	173	176	177	179	348	349	194	107
Average Queue (ft)	68	100	340	339	111	137	168	171	346	335	49	28
95th Queue (ft)	140	186	356	364	186	205	201	192	353	439	137	84
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	3	71	55	30	59	50	55	92	69		
Queuing Penalty (veh)	1	21	427	335	138	275	230	252	741	557		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	133	141	303	116	199	529	529	529	488	1755	1755	1755
Average Queue (ft)	117	137	266	16	30	493	494	467	279	1740	1743	1742
95th Queue (ft)	152	148	291	56	104	510	516	544	496	1765	1763	1767
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	50	53		0	68	70	19	3	72	64	56
Queuing Penalty (veh)	0	0	745		5	0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	50	53			67						
Queuing Penalty (veh)	3	478	529			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	226	241	730	109	183	67	45
Average Queue (ft)	217	214	382	35	87	22	3
95th Queue (ft)	231	310	682	89	157	57	21
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	93	48	7		0		
Queuing Penalty (veh)	73	38	5		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1056	1115	1060	966
Average Queue (ft)	904	968	930	803
95th Queue (ft)	1068	1071	1042	977
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	SW
Directions Served	T	T	R
Maximum Queue (ft)	155	153	66
Average Queue (ft)	120	123	14
95th Queue (ft)	137	146	53
Link Distance (ft)	-5	-5	269
Upstream Blk Time (%)	60	34	
Queuing Penalty (veh)	365	209	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	157	254	113	128	262	270	375
Average Queue (ft)	122	73	24	73	248	260	365
95th Queue (ft)	165	204	93	160	296	277	382
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	36	5		1	40	46	97
Queuing Penalty (veh)	657	92		0	365	428	487
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				1	40		
Queuing Penalty (veh)				6	365		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	234	155	246	272	271	130
Average Queue (ft)	191	49	170	171	29	4
95th Queue (ft)	253	141	214	220	140	43
Link Distance (ft)	136	136	146	146	146	146
Upstream Blk Time (%)	50	0	19	19	1	0
Queuing Penalty (veh)	697	3	101	105	6	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	52	154	166	140	29	51	254	176	32	40	25	29
Average Queue (ft)	14	92	71	5	2	11	79	71	6	7	6	1
95th Queue (ft)	40	143	122	46	14	38	166	136	26	25	23	10
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		0	1	0			0	1				
Queuing Penalty (veh)		0	0	0			0	0				

Intersection: 7: Arch Road & Qantas Lane

Movement	NB	SB	SB	SB
Directions Served	R	L	LT	R
Maximum Queue (ft)	54	25	44	20
Average Queue (ft)	2	6	9	8
95th Queue (ft)	18	23	34	22
Link Distance (ft)			284	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)	200	200		200
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	92	108	56	927	928	452
Average Queue (ft)	64	66	9	904	892	414
95th Queue (ft)	76	89	43	950	951	431
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	86	65		54	45	63
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	32
95th Queue (ft)	60
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	49	25	70	52
Average Queue (ft)	9	3	5	6
95th Queue (ft)	31	15	30	28
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	602
Average Queue (ft)	100	1230	591
95th Queue (ft)	126	1245	609
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	96	94	94
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8740

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	310	344	380	172	176	177	179	348	349	174	184
Average Queue (ft)	68	105	339	340	100	139	173	173	346	346	56	45
95th Queue (ft)	131	220	353	370	166	200	184	193	354	359	130	136
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	3	72	50	25	53	52	52	95	73		
Queuing Penalty (veh)	0	20	434	303	113	245	238	241	764	583		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	132	141	285	52	60	529	529	528	493	1755	1755	1755
Average Queue (ft)	123	138	263	11	15	491	495	460	303	1741	1743	1739
95th Queue (ft)	138	144	275	32	47	511	522	545	491	1763	1774	1776
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	52	54			66	63	22	3	68	62	54
Queuing Penalty (veh)	0	0	750			0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	52	54			63						
Queuing Penalty (veh)	3	503	533			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	225	256	899	168	184	67	48
Average Queue (ft)	213	223	498	47	88	21	4
95th Queue (ft)	230	288	912	119	150	51	23
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	90	34	7		0		
Queuing Penalty (veh)	71	27	4		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1216	1172	1130	1049
Average Queue (ft)	932	1014	967	830
95th Queue (ft)	1120	1165	1103	1015
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	SW
Directions Served	T	T	R
Maximum Queue (ft)	133	154	90
Average Queue (ft)	117	119	20
95th Queue (ft)	126	137	66
Link Distance (ft)	-5	-5	269
Upstream Blk Time (%)	64	39	
Queuing Penalty (veh)	386	236	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	209	271	110	128	272	266	375
Average Queue (ft)	143	85	11	62	255	258	365
95th Queue (ft)	189	237	63	146	277	279	383
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	44	4		0	37	43	98
Queuing Penalty (veh)	804	70		0	345	399	490
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	37		
Queuing Penalty (veh)				1	344		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	221	136	270	234	271	123
Average Queue (ft)	198	44	188	169	51	4
95th Queue (ft)	216	137	271	215	196	41
Link Distance (ft)	136	136	146	146	146	146
Upstream Blk Time (%)	53	0	20	19	3	
Queuing Penalty (veh)	746	4	108	103	17	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	52	154	188	149	28	30	128	140	55	40	25	29
Average Queue (ft)	17	92	75	5	2	9	62	72	3	6	7	1
95th Queue (ft)	44	133	142	49	14	30	110	132	21	24	25	10
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		0	1					2				
Queuing Penalty (veh)		0	0					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	44	20
Average Queue (ft)	6	10	8
95th Queue (ft)	24	32	23
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	71	56	927	928	434
Average Queue (ft)	58	66	9	909	885	414
95th Queue (ft)	73	77	43	953	944	425
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	89	72		60	33	67
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	32
95th Queue (ft)	63
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	70	47	29	20
Average Queue (ft)	9	6	1	1
95th Queue (ft)	35	28	9	6
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	639
Average Queue (ft)	100	1223	595
95th Queue (ft)	125	1254	618
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	95	93	93
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8893

2035 PLUS PROJECT AM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	310	344	380	172	176	177	179	348	349	174	184
Average Queue (ft)	68	105	339	340	100	139	173	173	346	346	56	45
95th Queue (ft)	131	220	353	370	166	200	184	193	354	359	130	136
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	3	72	50	25	53	52	52	95	73		
Queuing Penalty (veh)	0	20	434	303	113	245	238	241	764	583		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	132	141	285	52	60	529	529	528	493	1755	1755	1755
Average Queue (ft)	123	138	263	11	15	491	495	460	303	1741	1743	1739
95th Queue (ft)	138	144	275	32	47	511	522	545	491	1763	1774	1776
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	0	52	54			66	63	22	3	68	62	54
Queuing Penalty (veh)	0	0	750			0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	0	52	54			63						
Queuing Penalty (veh)	3	503	533			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	225	256	899	168	184	67	48
Average Queue (ft)	213	223	498	47	88	21	4
95th Queue (ft)	230	288	912	119	150	51	23
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	90	34	7		0		
Queuing Penalty (veh)	71	27	4		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1216	1172	1130	1049
Average Queue (ft)	932	1014	967	830
95th Queue (ft)	1120	1165	1103	1015
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	SW
Directions Served	T	T	R
Maximum Queue (ft)	133	154	90
Average Queue (ft)	117	119	20
95th Queue (ft)	126	137	66
Link Distance (ft)	-5	-5	269
Upstream Blk Time (%)	64	39	
Queuing Penalty (veh)	386	236	
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	209	271	110	128	272	266	375
Average Queue (ft)	143	85	11	62	255	258	365
95th Queue (ft)	189	237	63	146	277	279	383
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	44	4		0	37	43	98
Queuing Penalty (veh)	804	70		0	345	399	490
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				0	37		
Queuing Penalty (veh)				1	344		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	221	136	270	234	271	123
Average Queue (ft)	198	44	188	169	51	4
95th Queue (ft)	216	137	271	215	196	41
Link Distance (ft)	136	136	146	146	146	146
Upstream Blk Time (%)	53	0	20	19	3	
Queuing Penalty (veh)	746	4	108	103	17	
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	R	L	L	T	T	R	L	T	T
Maximum Queue (ft)	52	154	188	149	28	30	128	140	55	40	25	29
Average Queue (ft)	17	92	75	5	2	9	62	72	3	6	7	1
95th Queue (ft)	44	133	142	49	14	30	110	132	21	24	25	10
Link Distance (ft)		311	311				1417	1417			248	248
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			125	250	250			100	250		
Storage Blk Time (%)		0	1					2				
Queuing Penalty (veh)		0	0					0				

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	25	44	20
Average Queue (ft)	6	10	8
95th Queue (ft)	24	32	23
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	71	56	927	928	434
Average Queue (ft)	58	66	9	909	885	414
95th Queue (ft)	73	77	43	953	944	425
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	89	72		60	33	67
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	32
95th Queue (ft)	63
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	70	47	29	20
Average Queue (ft)	9	6	1	1
95th Queue (ft)	35	28	9	6
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	639
Average Queue (ft)	100	1223	595
95th Queue (ft)	125	1254	618
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	95	93	93
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8893

2035 PLUS PROJECT AM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	135	342	358	380	172	176	177	179	348	354	154	181
Average Queue (ft)	74	112	338	336	92	131	172	170	347	347	46	44
95th Queue (ft)	143	229	358	397	167	197	183	194	348	353	117	116
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)		2	70	47	14	37	52	53	91	79		
Queuing Penalty (veh)		11	422	283	64	170	241	245	728	631		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	B15	B15	B15
Directions Served	L	L	T	T	TR	T	T	T	TR	T	T	T
Maximum Queue (ft)	132	141	302	273	170	529	529	529	508	1755	1755	1755
Average Queue (ft)	119	137	261	30	28	487	496	484	320	1742	1739	1743
95th Queue (ft)	144	153	289	140	95	519	522	528	532	1765	1760	1768
Link Distance (ft)			146	146	146	421	421	421	421	1703	1703	1703
Upstream Blk Time (%)	1	48	47	0	0	63	68	21	5	69	63	55
Queuing Penalty (veh)	0	0	655	3	2	0	0	0	0	0	0	0
Storage Bay Dist (ft)	150	150										
Storage Blk Time (%)	1	48	47			63						
Queuing Penalty (veh)	7	458	466			2						

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	TR	L	TR	R	R
Maximum Queue (ft)	226	272	931	151	184	67	29
Average Queue (ft)	216	222	446	43	89	23	3
95th Queue (ft)	234	323	714	111	152	55	16
Link Distance (ft)			1121		938	938	938
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	200	200		200			
Storage Blk Time (%)	88	47	4		0		
Queuing Penalty (veh)	69	37	2		0		

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1306	1287	1310	1061
Average Queue (ft)	954	1014	957	826
95th Queue (ft)	1161	1181	1125	1014
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	29	147	154	22	66
Average Queue (ft)	1	120	124	1	16
95th Queue (ft)	10	135	152	7	56
Link Distance (ft)	-5	-5	-5	162	269
Upstream Blk Time (%)		63	32		
Queuing Penalty (veh)		380	195		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	176	308	111	128	262	271	375
Average Queue (ft)	120	89	7	51	256	253	363
95th Queue (ft)	168	244	51	139	278	284	386
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	34	10		3	36	41	96
Queuing Penalty (veh)	629	182		0	334	380	479
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				3	36		
Queuing Penalty (veh)				15	334		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	WB	WB	WB	WB
Directions Served	T	T	T	T	R	R
Maximum Queue (ft)	202	198	246	215	153	146
Average Queue (ft)	189	46	155	139	17	5
95th Queue (ft)	249	161	258	227	89	48
Link Distance (ft)	136	136	146	146	146	146
Upstream Blk Time (%)	44	0	16	17	1	0
Queuing Penalty (veh)	617	4	87	92	3	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	L
Maximum Queue (ft)	50	152	166	29	29	177	138	32	20	25	29	25
Average Queue (ft)	14	96	72	4	9	65	65	7	6	5	1	6
95th Queue (ft)	39	141	131	19	32	130	121	27	21	21	10	22
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		0	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB
Directions Served	LT	R
Maximum Queue (ft)	44	20
Average Queue (ft)	10	8
95th Queue (ft)	32	23
Link Distance (ft)	284	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		200
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	68	107	56	927	937	424
Average Queue (ft)	62	67	7	888	903	414
95th Queue (ft)	72	84	39	948	950	421
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	84	71		41	48	63
Queuing Penalty (veh)	0	0		0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	75
Average Queue (ft)	35
95th Queue (ft)	62
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	30	25	94	156
Average Queue (ft)	7	2	4	9
95th Queue (ft)	28	12	32	58
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				0
Queuing Penalty (veh)				0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	NB	B24	B19
Directions Served	L	T	T	T
Maximum Queue (ft)	112	121	1239	621
Average Queue (ft)	15	101	1229	597
95th Queue (ft)	77	125	1252	612
Link Distance (ft)	42	42	1168	587
Upstream Blk Time (%)		92	89	89
Queuing Penalty (veh)		0	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Nework Summary

Network wide Queuing Penalty: 8230

2035 PLUS PROJECT PM

SIMTRAFFIC RUN 1

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	361	379	380	174	176	177	179	348	386	243	254
Average Queue (ft)	138	338	319	322	95	124	173	175	344	343	114	111
95th Queue (ft)	177	355	416	398	170	195	183	186	356	367	216	223
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	75	49	41	16	37	47	51	92	82	0	0
Queuing Penalty (veh)	3	570	369	309	106	241	305	329	330	295	0	0
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	303	263	261	27	510	522	526	492	1755	1755
Average Queue (ft)	123	137	271	56	85	2	490	489	463	345	1739	1740
95th Queue (ft)	142	148	294	164	221	14	505	514	531	569	1761	1765
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	49	56	3	4		70	68	26	7	72	65
Queuing Penalty (veh)	0	0	595	32	41		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	49	56				71					
Queuing Penalty (veh)	2	372	421				3					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	225	267	1173	174	177	67	67
Average Queue (ft)	1739	207	216	1139	50	70	20	5
95th Queue (ft)	1768	235	307	1158	134	148	54	28
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	52			59				
Queuing Penalty (veh)	0			0				
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		45	44	22				
Queuing Penalty (veh)		121	119	83				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1434	1466	1189	993
Average Queue (ft)	1187	1082	872	411
95th Queue (ft)	1492	1426	1190	1100
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	1	0		
Queuing Penalty (veh)	4	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)	43			
Queuing Penalty (veh)	323			

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	134	148	136	20	74
Average Queue (ft)	117	82	86	1	20
95th Queue (ft)	125	161	159	7	65
Link Distance (ft)	-5	-5	-5	162	269
Upstream Blk Time (%)	47	15	18		
Queuing Penalty (veh)	354	114	139		
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	184	301	112	128	299	266	375
Average Queue (ft)	127	110	17	59	259	259	364
95th Queue (ft)	152	262	82	154	276	278	380
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	30	7		4	39	43	83
Queuing Penalty (veh)	427	101		0	500	551	312
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				4	39		
Queuing Penalty (veh)				25	499		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	239	200	123	225	269	177
Average Queue (ft)	199	55	7	172	151	17
95th Queue (ft)	218	172	47	220	223	95
Link Distance (ft)	136	136	136	146	146	146
Upstream Blk Time (%)	46	3	0	19	15	1
Queuing Penalty (veh)	494	29	0	161	125	11
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	51	222	155	29	52	137	132	32	40	25	30	55
Average Queue (ft)	16	111	88	3	13	55	63	5	10	7	2	2
95th Queue (ft)	44	192	142	16	41	100	114	24	27	24	14	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		2	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	47	44	20
Average Queue (ft)	9	11	5
95th Queue (ft)	31	33	19
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	94	71	56	927	936	452
Average Queue (ft)	63	63	16	889	889	415
95th Queue (ft)	83	76	58	947	945	427
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	88	57	0	62	50	71
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	74
Average Queue (ft)	30
95th Queue (ft)	57
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	46	88	76
Average Queue (ft)	8	5	12	14
95th Queue (ft)	33	25	50	50
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	602
Average Queue (ft)	99	1231	593
95th Queue (ft)	120	1243	610
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	76	74	74
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8819

2035 PLUS PROJECT PM

SIMTRAFFIC RUN 2

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	342	379	380	174	176	177	179	348	386	227	198
Average Queue (ft)	136	338	321	327	98	125	172	174	344	345	96	94
95th Queue (ft)	177	351	409	378	169	193	185	187	356	364	199	191
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	74	48	40	17	37	47	52	93	85		
Queuing Penalty (veh)	3	562	364	306	107	241	302	333	332	304		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	303	263	261	27	510	522	526	491	1755	1755
Average Queue (ft)	120	136	270	52	82	2	490	493	463	342	1742	1744
95th Queue (ft)	147	150	291	162	223	14	506	510	534	545	1762	1767
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	45	60	3	4		67	70	25	4	72	66
Queuing Penalty (veh)	0	0	639	32	41		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	45	60				71					
Queuing Penalty (veh)	3	339	452				3					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	225	270	1173	174	177	67	67
Average Queue (ft)	1741	206	228	1139	50	70	18	5
95th Queue (ft)	1771	238	301	1158	134	147	50	28
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	52			58				
Queuing Penalty (veh)	0			0				
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		48	46	22				
Queuing Penalty (veh)		129	123	83				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1434	1466	1095	985
Average Queue (ft)	1159	1043	836	351
95th Queue (ft)	1465	1369	1147	1023
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	1	0		
Queuing Penalty (veh)	4	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)	43			
Queuing Penalty (veh)	324			

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	137	148	136	202	74
Average Queue (ft)	118	80	80	9	18
95th Queue (ft)	128	161	160	70	63
Link Distance (ft)	-5	-5	-5	162	269
Upstream Blk Time (%)	46	15	16	0	
Queuing Penalty (veh)	346	112	118	1	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	184	301	112	128	299	266	375
Average Queue (ft)	125	92	17	65	259	258	364
95th Queue (ft)	157	244	82	162	276	286	379
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	29	5		4	37	43	86
Queuing Penalty (veh)	404	63		0	475	553	320
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				4	37		
Queuing Penalty (veh)				25	475		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	239	184	123	270	269	146
Average Queue (ft)	201	47	7	180	151	14
95th Queue (ft)	219	151	47	223	223	81
Link Distance (ft)	136	136	136	146	146	146
Upstream Blk Time (%)	48	2	0	19	15	2
Queuing Penalty (veh)	512	26	0	165	126	16
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	51	222	155	29	51	125	132	32	20	45	30	55
Average Queue (ft)	16	112	90	4	13	53	61	6	9	6	1	2
95th Queue (ft)	44	194	142	19	42	94	113	26	25	26	10	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		2	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	47	44	20
Average Queue (ft)	9	11	5
95th Queue (ft)	31	33	19
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	94	71	56	927	936	452
Average Queue (ft)	62	62	18	885	890	415
95th Queue (ft)	83	75	61	945	946	427
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	88	64	0	58	51	71
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	97
Average Queue (ft)	32
95th Queue (ft)	64
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	46	88	76
Average Queue (ft)	9	5	12	15
95th Queue (ft)	33	22	51	52
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	602
Average Queue (ft)	99	1230	593
95th Queue (ft)	121	1243	609
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	80	79	79
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8768

2035 PLUS PROJECT PM

SIMTRAFFIC RUN 3

Intersection: 1: Arch Road & 99 NB on-ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SE	SE	NW	NW
Directions Served	L	L	T	T	L	L	T	T	L	L	L	L
Maximum Queue (ft)	155	342	379	380	174	176	177	179	348	386	227	198
Average Queue (ft)	136	338	321	327	98	125	172	174	344	345	96	94
95th Queue (ft)	177	351	409	378	169	193	185	187	356	364	199	191
Link Distance (ft)	162	162	162	162	107	107	107	107	250	250	263	263
Upstream Blk Time (%)	0	74	48	40	17	37	47	52	93	85		
Queuing Penalty (veh)	3	562	364	306	107	241	302	333	332	304		
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	WB	B15	B15
Directions Served	L	L	T	T	TR	L	T	T	T	TR	T	T
Maximum Queue (ft)	132	141	303	263	261	27	510	522	526	491	1755	1755
Average Queue (ft)	120	136	270	52	82	2	490	493	463	342	1742	1744
95th Queue (ft)	147	150	291	162	223	14	506	510	534	545	1762	1767
Link Distance (ft)			146	146	146		421	421	421	421	1703	1703
Upstream Blk Time (%)	0	45	60	3	4		67	70	25	4	72	66
Queuing Penalty (veh)	0	0	639	32	41		0	0	0	0	0	0
Storage Bay Dist (ft)	150	150				200						
Storage Blk Time (%)	0	45	60				71					
Queuing Penalty (veh)	3	339	452				3					

Intersection: 2: Arch Road & Kingsley Road (Frontage)

Movement	B15	NB	NB	NB	SB	SB	SB	SB
Directions Served	T	L	L	TR	L	TR	R	R
Maximum Queue (ft)	1755	225	270	1173	174	177	67	67
Average Queue (ft)	1741	206	228	1139	50	70	18	5
95th Queue (ft)	1771	238	301	1158	134	147	50	28
Link Distance (ft)	1703			1121		938	938	938
Upstream Blk Time (%)	52			58				
Queuing Penalty (veh)	0			0				
Storage Bay Dist (ft)		200	200		200			
Storage Blk Time (%)		48	46	22				
Queuing Penalty (veh)		129	123	83				

Intersection: 3: Arch Road &

Movement	EB	EB	EB	EB
Directions Served	T	T	T	R
Maximum Queue (ft)	1434	1466	1095	985
Average Queue (ft)	1159	1043	836	351
95th Queue (ft)	1465	1369	1147	1023
Link Distance (ft)	1417	1417	1417	1417
Upstream Blk Time (%)	1	0		
Queuing Penalty (veh)	4	0		
Storage Bay Dist (ft)				
Storage Blk Time (%)	43			
Queuing Penalty (veh)	324			

Intersection: 4: Arch Road & 99 SB offramp

Movement	EB	EB	EB	WB	SW
Directions Served	T	T	T	T	R
Maximum Queue (ft)	137	148	136	202	74
Average Queue (ft)	118	80	80	9	18
95th Queue (ft)	128	161	160	70	63
Link Distance (ft)	-5	-5	-5	162	269
Upstream Blk Time (%)	46	15	16	0	
Queuing Penalty (veh)	346	112	118	1	
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Arch Road & 99 NB off ramp

Movement	EB	EB	WB	WB	WB	WB	NB
Directions Served	T	T	T	T	T	T	R
Maximum Queue (ft)	184	301	112	128	299	266	375
Average Queue (ft)	125	92	17	65	259	258	364
95th Queue (ft)	157	244	82	162	276	286	379
Link Distance (ft)	107	107			136	136	240
Upstream Blk Time (%)	29	5		4	37	43	86
Queuing Penalty (veh)	404	63		0	475	553	320
Storage Bay Dist (ft)			240	240			
Storage Blk Time (%)				4	37		
Queuing Penalty (veh)				25	475		

Intersection: 6: Arch Road & 99 NB onramp

Movement	EB	EB	EB	WB	WB	WB
Directions Served	T	T	T	T	T	R
Maximum Queue (ft)	239	184	123	270	269	146
Average Queue (ft)	201	47	7	180	151	14
95th Queue (ft)	219	151	47	223	223	81
Link Distance (ft)	136	136	136	146	146	146
Upstream Blk Time (%)	48	2	0	19	15	2
Queuing Penalty (veh)	512	26	0	165	126	16
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Arch Road & Qantas Lane

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	L	L	T	T	R	L	T	T	R
Maximum Queue (ft)	51	222	155	29	51	125	132	32	20	45	30	55
Average Queue (ft)	16	112	90	4	13	53	61	6	9	6	1	2
95th Queue (ft)	44	194	142	19	42	94	113	26	25	26	10	18
Link Distance (ft)		311	311			1417	1417			248	248	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	150			250	250			100	250			200
Storage Blk Time (%)		2	1				1					
Queuing Penalty (veh)		0	0				0					

Intersection: 7: Arch Road & Qantas Lane

Movement	SB	SB	SB
Directions Served	L	LT	R
Maximum Queue (ft)	47	44	20
Average Queue (ft)	9	11	5
95th Queue (ft)	31	33	19
Link Distance (ft)		284	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	200		200
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 8: 99 SB offramp &

Movement	SB	SB	SB	B23	B23	B9
Directions Served	L	L	T	T	T	T
Maximum Queue (ft)	94	71	56	927	936	452
Average Queue (ft)	62	62	18	885	890	415
95th Queue (ft)	83	75	61	945	946	427
Link Distance (ft)	-5	-5	-5	855	855	400
Upstream Blk Time (%)	88	64	0	58	51	71
Queuing Penalty (veh)	0	0	0	0	0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 11: 99 NB offramp & 99 SB onramp

Movement	SE
Directions Served	R
Maximum Queue (ft)	97
Average Queue (ft)	32
95th Queue (ft)	64
Link Distance (ft)	437
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 13: 99 NB onramp & 99 NB on-ramp

Movement	WB	WB	NB	NB
Directions Served	R	R	T	T
Maximum Queue (ft)	51	46	88	76
Average Queue (ft)	9	5	12	15
95th Queue (ft)	33	22	51	52
Link Distance (ft)	265	265	159	159
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 18: 99 NB off-ramp & 99 NB off ramp

Movement	NB	B24	B19
Directions Served	T	T	T
Maximum Queue (ft)	121	1239	602
Average Queue (ft)	99	1230	593
95th Queue (ft)	121	1243	609
Link Distance (ft)	42	1168	587
Upstream Blk Time (%)	80	79	79
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary

Network wide Queuing Penalty: 8768

APPENDIX E

RWQCB Cleanup and Abatement Order

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

CLEANUP AND ABATEMENT ORDER R5-2008-0714

FOR
FORWARD INC.
FORWARD LANDFILL, A CLASS II FACILITY
SAN JOAQUIN COUNTY

This Order is issued to the Forward Inc. (hereafter Discharger) based on provisions of California Water Code sections 13304 and 13267, which authorize the Executive Officer of the California Regional Water Quality Control Board, Central Valley Region (hereafter Central Valley Water Board) to issue a Cleanup and Abatement Order (Order) and to require the submittal of technical reports.

The Executive Officer of the Central Valley Water Board finds, with respect to the Discharger's acts, or failure to act, the following:

1. Forward Inc. owns and operates the Forward Landfill near Stockton. The City of Stockton owned and operated the Austin Road Landfill, located just north of Forward Landfill, from 1954 until 2000. In September 2000, Forward, Inc. purchased the Austin Road Landfill from the City of Stockton. Allied combined the two landfill operations into a single facility under the name of Forward Landfill, which is owned operated by its subsidiary, Forward Inc. As a result of this consolidation, the Austin Road Landfill became the north unit of the Forward Landfill. However, in this Order, this waste management unit will continue to be referred to as the Austin Road Landfill.

2. Forward Landfill, including the Austin Road Landfill, is now regulated under Waste Discharge Requirements (WDRs) Order Nos. R5-2003-0049 (for the land application of treated groundwater) and R5-2003-0080 (for the landfill operation). The combined landfill facilities cover approximately 567 acres, including both existing and proposed waste management units. The landfill is located about seven miles southeast of Stockton in Section 3, T1S, R7E, MDB&M. The facility is comprised of Assessor's Parcel Numbers (APN) 181-150-07, 181-150-08, 181-150-09, 181- 150-10, 201-060-01, 201-060-02, 201-060-03, and 201-060-05.

3. Land uses adjacent to the combined landfill include agricultural lands to the east, west, and south. The Northern California Youth Authority, a youth criminal detention facility, is located approximately 1,900 feet north from the Austin Road Landfill. The Stockton Municipal Airport is approximately one mile west of the Austin Road Landfill. One mile northeast of the facility is the Burlington Northern and Santa Fe Railroad Intermodal facility. There is a residence on Austin Road that is 500 feet

from the entrance to Austin Road Landfill. There are also two residences on Lynch Road, approximately 0.5 miles southeast of the site.

4. The Austin Road Landfill was filled by the City of Stockton using the trench method. Trenches were excavated to an approximate depth of 20 feet below ground surface. There is no liner or leachate collection and removal system in the trenches to prevent the downward migration of landfill leachate or gas from the unit to the underlying groundwater.

SURFACE AND GROUND WATER CONDITIONS

5. The landfill is on the floor of the northern San Joaquin Valley. Surface drainage is toward the west to Littlejohns Creek in the Duck-Littlejohns Hydrologic Area (31.40) of the San Joaquin River Basin.

6. The Water Quality Control Plan, Fourth Edition, for the Sacramento River Basin and the San Joaquin River Basin (hereafter Basin Plan), designates beneficial uses, establishes water quality objectives, and contains implementation plans and policies for all waters of the Basin. The designated beneficial uses of Littlejohns Creek, as specified in the Basin Plan, are agricultural supply, industrial service and process supply water, contact and non-contact water, recreation, warm fresh water habitat, preservation of rare, threatened and endangered species, and groundwater recharge.

7. The direction of groundwater flow is to the north-northeast. The measured hydraulic conductivity of the uppermost aquifer underlying the landfill ranges between 2×10^{-2} and 2×10^{-3} cm/sec. The groundwater gradients, based on the Discharger's fourth quarter 2007 groundwater monitoring report measurements, range from 0.0010 to 0.0020 ft/ft. The average groundwater velocity is 195 feet per year (Order No. R5-2003-0049, Finding 26 at p. 6).

8. The first encountered groundwater is about 60 to 80 feet below the native ground surface. Groundwater elevations range from -20 feet mean sea level (MSL) to -30 feet MSL. The groundwater is unconfined. The depth to groundwater fluctuates seasonally by as much as 10 feet.

9. There are an estimated 35 domestic, industrial, or agricultural groundwater supply wells within one mile of the site.

10. The designated beneficial uses of the groundwater, as specified in the Basin Plan, are domestic and municipal supply, agricultural supply, industrial service supply, and industrial process supply.

GROUNDWATER IMPACTS FROM THE AUSTIN ROAD LANDFILL

11. Significant volatile organic compound (VOC) groundwater impacts including, but not limited to, 1,1-dichloroethane, cis-1,2-dichloroethylene, tetrachloroethylene, and trichloroethylene are associated with waste discharged to the Austin Road Landfill. Impacts were initially detected in 1989. By 1991, evaluation monitoring determined that chlorinated hydrocarbon impacts extended as far as 1,000 feet down-gradient from the Austin Road Landfill. A corrective action plan, consisting of a phased approach to remediate the plume, was approved in 1991, but by 1998 it was apparent that the initial corrective actions had failed to remediate the groundwater impacts because detections of 1,1-dichloroethane, cis-1,2-dichloroethylene, tetrachloroethylene, and trichloroethylene were still detected in downgradient monitoring wells.

12. The Discharger stated in its 2002 Joint Technical Document that “the VOC polluted groundwater extends approximately 4,000 feet northeast from the northern border of the existing Austin Road Landfill. The plume appears to have migrated to a lower depth at the leading edge of the plume. The primary contaminants of concern are Tetrachloroethylene and Trichloroethene, with concentrations levels up to 59 and 48 micrograms per liter, respectively. The highest VOC concentrations are present within a sand layer that extends beneath the site between approximately 80 to 104 feet below ground surface.”

13. There are no monitoring wells at the downgradient edge (vertically or laterally) of the plume.

14. In 2003, the Central Valley Water Board adopted WDRs Orders R5-2003-0049 and R5-2003-0080 to implement revised corrective actions to remediate groundwater impacts. The Discharger extracts groundwater from two wells adjacent to the northern boundary of the Austin Road Landfill, and then runs it through an air sparger prior to discharging the effluent to an infiltration area. From 1 October through 31 December 2007, the two wells extracted at an average rate of 209 gallons per minute or 301,000 gallons per day. Based on the continuing detections in the downgradient wells, the current extraction rate is insufficient to control the plume and remediate the release of groundwater pollutants from the landfill.

15. The Austin Road Landfill corrective action monitoring system includes monitoring wells AMW 13 and AMW 14. These wells are approximately 1,600 feet directly downgradient of the two extraction wells EW-1 and EW-2. During the first Quarter 2008 sampling event the following VOCs concentrations were detected in these wells:

VOLATILE ORGANIC COMPOUND	MONITORING WELL	
	AMW 13	**AMW 14**
1,1-dichloroethane	0.51 ug/l	0.25[J]
cis-1,2-dichloroethylene	1.5 ug/l	0.32[J]
dichlorodifluoromethane	1.7 ug/l	1.0 ug/l
tetrachloroethylene	25 ug/l	18 ug/l
trichloroethylene	7.1 ug/l	1.3 ug/l
trichlorofluoromethane	0.79 ug/l	0.28 ug/l [J]

J value: detected above the method detection limit, yet value is below the practical quantitation limit.

16. The Northern California Youth Authority (NCYA) facility is located due north and approximately 1,000 feet downgradient of the Austin Road Landfill monitoring wells AMW 13 and AMW 14. This facility uses three of their four supply wells as their means for supplying drinking water to their facility. The facility wells are sampled on a monthly basis and have consistently shown that the tetrachloroethylene plume extends past the corrective action monitoring wells AMW 13 and AMW 14 as shown in the following table, assuming there are no other sources of such contaminants contributing to contamination of the NCYA wells. Furthermore, the tetrachloroethylene in Well #2 has concentrations which at times which exceed the US EPA Primary MCL of 5 ug/l. Well #1, #2 and #4 all exceed the public health goal of 0.06 ug/l for tetrachloroethylene

	NORTHERN CALIFORNIA YOUTH AUTHORITY WELLS TETRACHLOROETHYLENE CONCENTRATIONS (UG/L)							
	11/ 07	12/07	01/08	02/08	03/08	04/08	05/08	6/08
Well #1	3.2	3.8	3.8	4.0	4.2	3.9	3.8	3.3
Well #2	4.4	4.8	5.4	4.0	5.7	5.4	5.6	6.7
Well #4	1.3	1.5	1.4	1.4	1.5	1.5	1.6	ND

- U.S. EPA Primary MCL = 5 ug/l
- Public Health Goal = 0.06 ug/l

17. On 24 April 2007 the California Department of Health Services, Division of Drinking Water and Environmental Management issued Citation No. 03-10-07C-004 to the North California Youth Authority for failure to comply with Section 116566 of the California health and Safety Code. Specifically, the system failed to comply with the primary drinking water standard for tetrachloroethylene as specified in Section 64444 Maximum Contaminant Levels – Organic Chemicals of Title 22, California Code of Regulations during March 2007. Citation No. 03-10-07C-004 has been attached as Appendix A of this Order.

REGULATORY CONSIDERATIONS

18. To summarize, the Austin Road Landfill VOC plume may have polluted downgradient drinking water supply wells at the Northern California Youth Authority facility. A groundwater extraction and treatment system and a landfill gas extraction system have been installed and are operating at the landfill. The June 2008 groundwater monitoring data from the Northern California Youth Authority supply wells and the landfill's groundwater monitoring wells indicates that pollutants in groundwater are still present. The groundwater extraction system has not contained the entire VOC plume.

19. Groundwater quality data and flow direction measurements provided by the Discharger indicate that the groundwater treatment system is undersized and unable to prevent the migration of the VOC plume.

20. Prohibition A (4) of WDRs Order No. R5-2003-0049 states: "The discharge shall not cause the release of pollutants or waste constituents in a manner which could cause a condition of nuisance, degradation, contamination, or pollution of groundwater to occur." Consequently, the detection of VOCs in any monitoring well is a violation of the WDRs.

21. This Order requires the Discharger to: (a) evaluate the vertical and lateral extent of groundwater impacts; (b) upgrade the corrective action system such that it prevents the constituents of concern associated with the release of waste from the landfill from passing the point of compliance of the waste management unit; (c) restore the water quality of the polluted aquifer; and (d) supply replacement water to any facility and or residence with a water supply that has been affected by the release of waste from the landfill such that concentrations exceed MCLs established by the U.S. EPA, to the extent such exceedances are not naturally-occurring or attributable to other sources.

22. The Discharger's data indicate that the release from the Austin Road Landfill has impacted the beneficial uses of the monitored aquifer downgradient of the landfill property. The data show that all three supply wells at the Northern California Youth Authority have concentrations of tetrachloroethylene that exceed the public health goal of 0.06 ug/l. The highest concentrations of tetrachloroethylene detected in supply well #4 at the NCYA exceed the US EPA Primary MCL of 5 ug/l.

23. The wastes detected at the Austin Road Landfill and NCYA are solvents used in the dry cleaning and other processes and breakdown products that are not naturally occurring, and some are known human carcinogens. The presence of with tetrachloroethylene, trichloroethylene and cis-1,2-dichloroethylene in groundwater has impaired the beneficial uses of the groundwater.

24. The constituents listed in Finding 15 are wastes, as defined in CWC section 13050.

25. The Discharger has caused or permitted waste to be discharged or deposited where it has discharged to waters of the state and has created, and continues to threaten to create, a condition of pollution or nuisance.

26. The State Water Resources Control Board (hereafter State Water Board) has adopted Resolution No. 92-49, the *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304*. This Policy sets forth the policies and procedures to be used during an investigation or cleanup of a polluted site and requires that cleanup levels be consistent with State Water Board Resolution No. 68-16, the *Statement of Policy With Respect to Maintaining High Quality of Waters in California*. Resolution No. 92-49 and the Basin Plan establish the cleanup levels to be achieved. Resolution No. 92-49 requires the groundwater contaminants to be cleaned up to background, or if that is not reasonable, to an alternative level that is the most stringent level that is economically and technologically feasible in accordance with California Code of Regulations, title 23, section 2550.4. Any alternative cleanup level to background must (1) be consistent with the maximum benefit to the people of the state; (2) not unreasonably affect present and anticipated beneficial use of such water; and (3) not result in water quality less than that prescribed in the Basin Plan and applicable Water Quality Control Plans and Policies of the State Board.

27. Chapter IV of the Basin Plan contains the *Policy for Investigation and Cleanup of Contaminated Sites*, which describes the Central Valley Water Board's policy for managing contaminated sites. This policy is based on CWC Sections 13000 and 13304, California Code of Regulations, title 27, division 2, subdivision 1, and State Board Resolution Nos. 68-16 and 92-49. The policy addresses site investigation, source removal or containment, information required to be submitted for consideration in establishing cleanup levels, and the bases for establishment of soil and groundwater cleanup levels.

28. The State Water Board's *Water Quality Enforcement Policy* states in part: "At a minimum, cleanup levels must be sufficiently stringent to fully support beneficial uses, unless the Central Valley Water Board allows a containment zone. In the interim, and if restoration of background water quality cannot be achieved, the Order should require the discharger(s) to abate the effects of the discharge. Abatement activities may include the provision of alternate water supplies." (Enforcement Policy, p. 19)

29. Applicable sections from California Code of Regulations, title 27, are as follows:

- Section 20425(i) states: "*RWQCB-Initiated EMP Changes — Any time the RWQCB determines that the evaluation monitoring program does not satisfy the requirements of this section, the RWQCB shall send written notification of such*

determination to the discharger by certified mail, return receipt requested. The discharger shall, within 90 days of such notification by the RWQCB, submit an amended report of waste discharge to make appropriate changes to the program."

- Section 20430(b) states: **"***The discharger shall take corrective action to achieve the following goals: to remediate releases from the Unit; to ensure that the discharger achieves compliance with the Water Standard adopted under section 20390 for that Unit."*

- Section 20430(c) states: **"***The discharger shall implement corrective action measures that ensure that COCs achieve their respective concentration limits at all Monitoring Points and throughout the zone affected by the release, including any portions thereof that extend beyond the facility boundary, by removing the waste constituents or treating them in place."*

- Section 20430(j) states: *"RWQCB-Initiated CAP Changes — Any time the RWQCB determines that the corrective action program does not satisfy the requirements of this section, the discharger shall, within 90 days of receiving written notification of such determination by the RWQCB, submit an amended report of waste discharge to make appropriate changes to the program."*

30. CWC section 13304(c)(1) provides that: *"Any person who has discharged or discharges waste into waters of this state in violation of any waste discharge requirements or other order or prohibition issued by a Regional Water Board or the state board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance, shall upon order of the Regional Water Board clean up the waste or abate the effects of the waste, or, in the case of threatened pollution or nuisance, take other necessary remedial action, including but not limited to, overseeing cleanup and abatement efforts. <u>A cleanup and abatement order issued by the state board or a Regional Water Board may require the provision of, or payment for, uninterrupted replacement water service, which may include wellhead treatment, to each affected public water supplier or private well owner.</u>* [emphasis added] *Upon failure of any person to comply with the cleanup or abatement order, the Attorney General, at the request of the board, shall petition the superior court for that county for the issuance of an injunction requiring the person to comply with the order. In the suit, the court shall have jurisdiction to grant a prohibitory or mandatory injunction, either preliminary or permanent, as the facts may warrant."*

31. CWC section 13267(b) provides that: "*In conducting an investigation specified in subdivision (a), the Regional Water Board may require that any person who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste within its region, or any citizen or domiciliary, or*

political agency or entity of this state who has discharged, discharges, or is suspected of having discharged or discharging, or who proposes to discharge waste outside of its region that could affect the quality of waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the Regional Water Board requires. The burden, including costs, of these reports shall bear a reasonable relationship to the need for the report and the benefits to be obtained from the reports".

32. The technical reports required by this Order are necessary to assure compliance with this Order and the WDRs, and to protect the waters of the state. Existing data and information about the site indicates that waste has been discharged or may continue to be discharged at the property, which is currently owned and operated by the Discharger named in this Order.

33. The issuance of this Order is an enforcement action taken by a regulatory agency and is exempt from the provisions of the California Environmental Quality Act (CEQA) (Pub. Resources Code, section 21000 et seq.), pursuant to California Code of Regulations, title 14, section 15321(a)(2). The implementation of this Order is also an action to assure the restoration of the environment and is exempt from the provisions of the CEQA in accordance with California Code of Regulations, title 14 sections 15307 and 15308. This Order may also be classified as a minor action to prevent, minimize, stabilize, mitigate or eliminate the release or threat of release of hazardous waste or substances, and is exempt from the provisions of CEQA in accordance with California Code of Regulations, title 14 section 15330.

34. Any person aggrieved by this action of the Central Valley Water Board may petition the State Water Board to review the action in accordance with CWC section 13320 and California Code of Regulations, title 23, sections 2050 and following. The State Water Board must receive the petition by 5:00 p.m., 30 days after the date of this Order, except that if the thirtieth day following the date of this Order falls on a Saturday, Sunday, or state holiday, the petition must be received by the State Water Board by 5:00 p.m. on the next business day. Copies of the law and regulations applicable to filing petitions may be found on the Internet at: http://www.waterboards.ca.gov/public_notices/petitions/water_quality or will be provided upon request.

IT IS HEREBY ORDERED THAT, pursuant to CWC sections 13267 and 13304, Forward Inc. and its agents, successors, and assigns, shall investigate the discharges of waste to groundwater, clean up the waste, and abate the effects of the waste, forthwith, resulting from the Austin Road Landfill (now Forward Landfill), in conformity with State Board Resolution No. 92-49 *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*, California Code of Regulations, Title 27, section 20380 et seq., and the Central Valley Water Board's *Water Quality Control Plan for the Sacramento River and San Joaquin River*

Basins (in particular the Policies and Plans listed within the Control Action Considerations portion of Chapter IV). "Forthwith" means as soon as is reasonably possible. Compliance with this requirement shall include, but not be limited to, completing the tasks listed below.

1. **Water Supply**

   a. By **31 December 2008**, the Discharger shall submit a contingency plan to supply drinking water to the Northern California Youth Authority without any cost to the facility. The contingency plan must include a short-term remedy that could be implemented immediately, such as wellhead treatment or a water line. The plan must be implemented upon the confirmed detection of VOCs above drinking water standards (Maximum Contaminant Levels (MCLs)) in the drinking water faucets fed by the Northern California Youth Authority water storage tank. The Central Valley Water Board must be notified in writing and by phone within 24 hours of implementation of the contingency plan. A copy of the plan shall be provided to Northern California Youth Authority and a second copy shall be placed in the facility's Operating Record.

   b. By **15 January 2009**, the Discharger shall submit a plan to sample all downgradient water wells that are within 4,000-feet of the point of compliance of the Austin Road landfill without any cost to the landowners. The plan must include a sampling and analysis plan that includes a discussion of confirmation sampling and the address of each well. A copy of the plan shall be placed in the facility's Operating Record.

   c. By **1 March 2009**, the Discharger shall sample all downgradient domestic and municipal drinking water wells, subject to the landowners' prior consent, within 4000 feet of the Austin Road Landfill that are currently not being monitored by the Discharger.

      i. **15 days prior to sampling** the Discharger shall provide all identified landowners and/or well users by certified mail with an explanation of the purpose for the sampling and a schedule for the individual's well sampling. A copy of each of the letters shall be submitted to the Central Valley Water Board as well as the San Joaquin County Environmental Health Department. An additional copy shall be placed in the facility's Operating Record.

      ii. If any landowner denies access to a well, the Discharger shall provide a written statement that the landowner/well user elected not to allow access to the property for the required sampling. A copy shall be placed in the facility's Operating Record.

iii. All water sampled from these wells shall be analyzed by EPA Method 8260B for volatile organic compounds.

iv. Any downgradient domestic or municipal drinking water well that has a confirmed VOC detection at a concentration greater than its MCL shall be immediately supplied with replacement drinking water at no cost to the landowner, unless the City of Stockton is already providing such a supply.

d. By **30 April 2009,** the Discharger shall submit a report of sampling results to Central Valley Water Board, the landowner/well user, and to the San Joaquin County Environmental Health Department. This report shall include a description of the sampling activities, an evaluation of each well's water chemistry, the geographic position of each well (latitude and longitude coordinates obtained with a handheld GPS unit is acceptable), the well completion report if available, a recommendation to add the well to the monitoring and reporting program, if appropriate, and documentation that the owners received the data for their well with an explanation of the results.

2. <u>Source Control</u>

a. No later than **15 February 2009**, the Discharger shall submit an initial source control plan to modify the Austin Road Landfill's groundwater and landfill gas extraction systems such that VOC contaminants are prevented from migrating northward past the facility's point of compliance. The plan shall also include a proposed corrective action monitoring plan that meets the requirements in California Code of Regulations, title 27, section 20430(d).

b. No later than **15 May 2009,** the Discharger shall:

i. Continuously operate the corrective action treatment system (24 hours a day, 365 days a year operation) except for periodic and required maintenance or unpreventable equipment failure until the groundwater plume is remediated to comply with concentration limits. The Discharger shall optimize remedial systems as needed to improve system efficiency, operating time, and/or pollutant removal rates

ii. Initiate the approved corrective action monitoring program that meets the requirements in California Code of Regulations, title 27, section 20430(d).

c. No later than **15 September 2009**, the Discharger shall submit technical report demonstrating whether the modified corrective action system is achieving the performance standard listed above in 2(a).

3. Evaluation Monitoring Program

a. No later than **15 April 2009**, the Discharger shall submit an evaluation monitoring work plan to collect and analyze all data necessary to assess the nature and extent of the release from the Austin Road Landfill. Consistent with California Code of Regulations, title 27, section 20425, this assessment shall include a determination of the spatial distribution and concentration of each volatile organic compounds throughout all zones (both vertically and horizontally) affected by the release. The Discharger shall comply with the additional notification and monitoring system requirements incorporated by reference into State Board Resolution No. 92-49, regarding notification and monitoring relative to offsite or potential off-site migration of waste constituents.

b. No later than **15 July 2009,** the Discharger shall commence the investigation.

c. **Seven days** prior to initiating the investigation, the Discharger shall notify the Central Valley Water Board in writing regarding the date on which the fieldwork will begin.

d. No later than **15 November 2009,** the Discharger shall submit a revised engineering feasibility study in the form of a Report of Waste Discharge in compliance with California Code of Regulations, title 27, section 20425(d), that includes:

    i. A well installation completion report for any newly installed monitoring points.

    ii. A complete evaluation of the vertical and lateral extent of all detected volatile organic compounds such that each constituent of concern has been characterized to levels below the lowest applicable water quality protection standard.

    iii. Any proposed improvements of the existing corrective action system such that the system will be capable of achieving compliance with concentration limits for all constituents of concern at all monitoring points throughout the zone(s) affected by the release.

    iv. A description of how wastewater generated by any expanded groundwater pump and treatment system will be discharged. The report shall evaluate different disposal options and identify the selected alternative.

v. A schedule for implementation of the selected remedy from the engineering feasibility study. This schedule shall include milestones and the final completion date for remediation of the entire groundwater plume and a date when groundwater quality will reach applicable concentration limits for all constituents of concern.

e. By **15 February 2010,** the Discharger shall complete all approved modifications to the corrective action system identified in the engineering feasibility study. The Discharger shall document its compliance, or lack thereof, with this requirement in its Quarterly Progress Report.

4. CORRECTIVE ACTION PROGRAM

a. By **15 December 2009,** the Discharger shall maintain a corrective action monitoring system, in compliance with California Code of Regulations, title 27, section 20415(b)(1)(D), and approved by the Executive Officer, to evaluate the operational performance of the entire corrective action remediation system.

b. By **15 March 2010**, the Discharger shall continuously operate the newly upgraded corrective action system until the groundwater plume is remediated to comply with concentration limits. The Discharger shall optimize remedial systems as needed to improve system efficiency, operating time, and/or pollutant removal rates. Upon startup of any remediation system(s), the Discharger shall operate the remediation system(s) continuously (24 hours a day, 365 days a year) operation except for periodic and required maintenance or unpreventable equipment failure.

5. Corrective Action Program Notification:

a. The Discharger shall notify the Central Valley Water Board within 24 hours of any unscheduled shutdown of the remediation system(s) that lasts longer than 48 hours. This notification shall include the cause of the shutdown and the corrective action taken (or proposed to be taken) to restart the system. Any interruptions in the operation of the remediation system(s), other than for maintenance, emergencies, or equipment failure, without prior approval from Central Valley Water Board staff or without notifying the Central Valley Water Board within the specified time is a violation of this Order. A copy of any notifications shall be placed in the facility operating record.

b. The Discharger shall notify Central Valley Water Board staff at least three working days prior to any onsite work, testing, or sampling that pertains to environmental remediation and investigation and is not routine monitoring, maintenance, or inspection.

6. Progress Reports

a. **Beginning with the first quarter of 2009,** the Discharger shall submit a Quarterly Progress Report. These reports shall be submitted by the **15th day of the month following the quarter for which the report is prepared** (e.g., the 2009 first quarter summary report is due on **15 April 2009).** The reports shall describe all work completed during the previous calendar quarter to comply with this Cleanup and Abatement Order and describe any violations of this Order. The report shall include information about the remediation system: total hours of operation of all remediation systems/day (estimated for holidays and weekends); the exact time of any system failure and restart; a description of any repairs; an evaluation of the performance of each individual extraction point (both landfill gas and groundwater); the volume of water discharged from the system; the flow (in gallons) from each well on a daily basis; and the mass of contaminates removed by the gas extraction system and the groundwater extraction system.

The Discharger shall obtain all local and state permits and access agreements necessary to fulfill the requirements of this Order.

The Discharger shall continue any remediation or monitoring activities until such time as the Executive Officer determines that sufficient cleanup has been accomplished to fully comply with this Order and this Order has been rescinded.

In accordance with California Business and Professions Code sections 6735, 7835, and 7835.1, engineering and geologic evaluations and judgments shall be performed by or under the direction of registered professionals competent and proficient in the fields pertinent to the required activities. All technical reports specified herein that contain workplans for, that describe the conduct of investigations and studies, or that contain technical conclusions and recommendations concerning engineering and geology shall be prepared by or under the direction of appropriately qualified professional(s), even if not explicitly stated. Each technical report submitted by the Discharger shall contain the professional's signature and/or stamp of the seal.

Each report submitted to the Central Valley Water Board shall be included in the Discharger's Operating Record. Furthermore, any person signing a document submitted under this Order shall make the following certification:

> "I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my knowledge and on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

If, in the opinion of the Executive Officer, the Discharger fails to comply with the provisions of this Order, the Executive Officer may refer this matter to the Attorney General for judicial enforcement or may issue a complaint for administrative civil liability.

Failure to comply with this Order may result in the assessment of an Administrative Civil Liability of up to $10,000 per violation per day, pursuant to the CWC sections 13268, 13350, and/or 13385. The Central Valley Water Board reserves its right to take any enforcement actions authorized by law.

This Order is effective upon the date of signature.

PAMELA C. CREEDON, Executive Officer

8 December 2008
Date

Appendix A: California Department of Health Services Citation No. 03-10-07C-004

State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services
SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

April 24, 2007

Rick Jaime
Chief of Plant Operations III
Northern California Youth Correctional Center
7650 S. Newcastle Road
P.O. Box 213004
Stockton, CA 95213-9004

TRANSMITTAL OF CITATION NUMBER 03-10-07C-004

Enclosed is a citation issued to the Northern California Youth Correctional Center for violation of the maximum contaminant level for Tetrachloroethylene (PCE) for the month of March 2007. The citation lists the directives that the Northern California Youth Correctional Center must implement to avoid civil penalties.

If you have any questions regarding this matter, contact Dave Remick at 948-3878.

Joseph O. Spano

Joseph O. Spano, P.E.
District Engineer
Stockton District
Drinking Water Field Operations Branch

Enclosure

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Certified Mail, Article # 7004 2890 0002 0058 0955

Flex your POWER
Do your part to help California save energy. To learn more about saving energy, visit the following web site: www.consumerenergycenter.org/flex/index.html

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
DIVISION OF DRINKING WATER AND ENVIRONMENTAL MANAGEMENT

IN RE: Northern California Youth Correctional Center
7650 S. Newcastle Road
P.O. Box 213004
Stockton, CA 95213-9004

TO: Rick Jaime
Chief of Plant Operations III

CITATION No. 03-10-07C-004

CITATION FOR NONCOMPLIANCE: WATER SYSTEM NO. 3910802

Issued on April 24, 2007

Section 116650, Article 9, Chapter 4, Part 12, of Division 104 of the California Health and Safety Code (CHSC), authorizes the issuance of a citation for failure to comply with a requirement of Chapter 4 (California Safe Drinking Water Act), or any regulation, standard, permit, or order issued thereunder.

VIOLATION

The Department of Health Services, Division of Drinking Water and Environmental Management, (hereinafter Department) hereby issues a citation to the Northern California Youth Correctional Center (NCYCC) for failure to comply with Section 116555 of the CHSC. Specifically, the system failed to comply with the primary drinking water

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STD. 113 (REV. 8-72)

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standard for Tetrachloroethylene (PCE) as specified in Section 64444 Maximum Contaminant Levels – Organic Chemicals of Title 22, California Code of Regulations (hereinafter 22CCR) during the month of March 2007.

Section 64444 specifies; The MCLs for the primary drinking water chemicals shown in Table 64444-A shall not be exceeded in the water supplied to the public. NCYCC exceeded the PCE MCL of 0.005 mg/l in two samples collected on March 26, 2007 from an indoor faucet at the institution, which had PCE concentrations of 0.0070 mg/l and 0.0072 mg/l, respectively.

Section 64445.1(c) requires confirmation when organic chemicals are detected. Confirmation of the initial finding shall be shown by the presence of the organic chemical in either the first or second additional sample, and the detected level of the contaminant for compliance purposes shall be the average of the initial and confirmation sample(s).

The Department directed NCYCC to sample all wells and sample from the same indoor faucet where the March 26th samples had been collected. Samples were collected from three of the wells and the indoor faucet on April 12, 2007. The PCE concentration from the indoor faucet sample was 0.0083 mg/l. Well No. 2 had a PCE concentration of 0.0088 mg/l, Well No. 4 had a non-detection of PCE (reporting limit was 0.00050 mg/l), and Standby Well No. 3 had a PCE concentration of 0.016 mg/l. However, Standby Well No. 3 has not been pumped into the system since 2000. Well No. 3 is only turned on and pumped to waste for sample collection. The average of the three indoor faucet samples was 0.0075 mg/l, which confirmed a violation of the PCE MCL of 0.005 mg/l

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In accordance with Section 116650 of the Health and Safety Code, the above violation is classified as a continuing violation.

BACKGROUND

The Northern California Youth Correctional Center (NCYCC) is a state correctional facility located southeast of Stockton. Construction of the NCYCC facilities was initiated in 1966, including drilling of Wells Nos. 1 and 2 and storage Tanks Nos. 1 and 2. Well No. 3 was drilled in 1978 and Well No. 4 was drilled in 1988, along with the addition of storage Tank No. 3.

Water for the facility is produced primarily from Wells Nos. 1, 2, and 4. Well No. 3 was changed to a standby well several years ago due to high iron and manganese. However, the most recent monitoring results from September 2003 showed <30 ug/l for manganese and 67 ug/l for iron. Monitoring has confirmed the presence of Tetrachloroethylene since August 2003. The current high concentrations in excess of the MCL make the maintenance of the well in standby status appropriate despite the decreases in iron and manganese contamination. The well is still maintained as a standby well that can be used only for short-term emergency purposes.

The NCYCC system provides continuous chlorination treatment of the water supply and also furnishes water from its system to the adjacent Northern California Women's Facility (NCWF). The NCWF was closed as a women's prison in 2003 and the inmates were transferred to other locations in the State; however, some employees are still located at the NCWF and the facility is used for various Correctional Officer training purposes. NCYCC continues to supply water to the facility.

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The Department has been aware of the presence of various organic chemicals in NCYCC's active wells at concentrations less than their respective MCLs. In addition to PCE, some wells have had sporadic detections of Trichloroethylene (TCE) and some unregulated organic chemicals.

Subsequent to the most recent August 23, 2006 inspection of the facility by the Department, all four wells were placed on quarterly monitoring for PCE and Vinyl Chloride. However, the monitoring results of March 26, 2007 were the first indication of an exceedence of the PCE MCL in any of the active wells. All Vinyl Chloride results have been non-detect. The following table shows the PCE detections within the past several years:

Historical Tetrachloroethylene (PCE) Detections

Well No. 1	Well No. 2	Well No. 3	Well No. 4
2.0 ug/l (6/8/04)	1.6 ug/l (3/9/04)	**6.3 ug/l (8/6/03)**	0.60 ug/l (6/7/06)
0.60 ug/l (6/7/05)	**5.2 ug/l (6/8/04)**	3.1 ug/l (11/13/03)	1.4 ug/l (9/27/06)
1.2 ug/l (12/6/05)	2.8 ug/l (9/6/05)	3.9 ug/l (9/27/06)	1.4 ug/l (12/13/06)
1.8 ug/l (3/1/06)	1.7 ug/l (12/6/05)	**17 ug/l (2/21/07)**	1.3 (2/21/07)ug/l
2.1 ug/l (6/7/06)	**5.4 ug/l (9/20/06)**	**17 ug/l (3/7/07)**	1.6 ug/l (3/7/07)
**Offline	3.9 ug/l (11/1/06)	**16 ug/l (4/12/07)**	<0.50 ug/l (4/12/07)
**Offline	3.4 ug/l (2/21/07)		
**Offline	2.9 ug/l (3/7/07)		
**Offline	**8.8 ug/l (4/12/07)**		

**Well No. 1 has been offline due to mechanical problems since August 2006.

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As seen from the PCE detections in the table above, Well No. 4 produces the water with the lowest levels of PCE and should be utilized as the system's lead well. Well No. 1 has the second lowest PCE concentrations and should have mechanical repairs completed as soon as possible so that the well can be monitored and utilized to supplement the lead Well No. 4 if Well No. 1 remains in compliance with all MCLs. Well No. 2 should be used as little as possible until treatment has been installed, and Standby Well No. 3 is to be used only for short term emergencies with public notification.

DIRECTIVES

Due to the violation of the Tetrachloroethylene MCL during the month of March 2007, NCYCC is hereby directed to take the following actions:

1. In accordance with Section 64463 of Title 22, California Code of Regulations (22CCR), NCYCC is required to notify the consumers of the institution of the Tetrachloroethylene MCL exceedence. Exceeding chemical MCLs is a Tier 2 violation (22CCR Section 64463.4), which requires providing public notice to persons served as soon as practical but within 30 days after the water system is made aware of the violation.

   a. This notification shall be given in English. In addition, each notice must contain information in Spanish regarding (1) the importance of the notice or (2) contain a telephone number or address where Spanish speaking consumers may contact the water system to obtain a translated copy of the public notice or assistance in Spanish.

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NCYCC shall maintain posted notices in a large enough number of conspicuous locations throughout the facility to assure that all wards, employees, and visitors are aware of the notice for as long as the violation or occurrence continues. In addition to posting, notification shall be provided over public address systems in the institution to assure universal awareness of the violation and to bring attention to the posted notices.

b. The contents of the notice, including the mandatory language, shall be approved by the Department prior to publication/delivery. A copy of the CDHS Instructions for Tier 2 Chemical or Radiological MCLs Notice Template is attached and has been provided to NCYCC electronically.

c. Within ten (10) days of publication/delivery of the notice, NCYCC shall submit to the Department a copy of the notification including certification of its publication/delivery.

2. By May 30, 2007, submit a plan and schedule to install treatment for the water from Well No.2 to correct the MCL violation. NCYCC should consider designing the treatment facilities to facilitate the removal of organic chemical contaminants in a central facility that can provide treatment for any or several of the wells since it appears the contamination is likely to impact more wells in the near future. The plan should also address the actions that NCYCC will take in the event other active wells exceed an organic chemical MCL at some point in the future, since it is apparent that the organic chemical contamination has the potential to increase in the facility's other wells. Although Well No. 3 is standby and only permitted for short term emergency use, NCYCC should also address

the long term use of this well since monitoring has shown a fairly rapid increase in PCE concentration.

3. By May 30, 2007, submit a plan and schedule for completing repairs to Well No. 1 and returning the well to service.

4. Based on the results of the most recent monitoring, Well No. 4 shall be utilized as the system's lead well. Well No. 1 has the second lowest PCE concentration and shall be utilized as the system's lag well if current monitoring verifies compliance. Well No. 2 shall be used as little as possible until treatment has been installed and Standby Well No. 3 is to be used only for short term emergencies. If subsequent chemical monitoring indicates changes in the organic chemical concentrations in the wells, the well with the lowest organic chemical concentration shall be utilized as the lead well, the well with the next lowest organic chemical concentration shall be utilized as lag well.

5. Active Wells Nos. 1 (when returned to service), 2, and 4 shall continue to be monitored for VOCs on a monthly basis and the results shall be submitted to the Department via electronic data transfer (EDT). Since the organic chemical contamination in the NCYCC wells appears to be changing rapidly, also provide the Stockton District office with printed summaries of the monitoring results each month.

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Responses to the above-required directives shall be submitted to:

Joseph O. Spano, P.E.
District Engineer
Drinking Water Field Operations Branch
31 E. Channel St., Room 270
Stockton, CA 95202

CIVIL PENALTIES

Section 116650(d) and Section 116650(e) of the California Health and Safety Code (CHSC) allow for the assessment of a civil penalty for failure to comply with the requirements of Chapter 4 of the California Safe Drinking Water Act. Failure to comply with any provision of the Citation may result in the Department imposing an administrative penalty of not less than $200 (two hundred dollars) per day as of the date of violation of any provision of this Citation.

4/24/07
Date

Joseph O. Spano
Joseph O. Spano, P.E.
Stockton District Engineer
Drinking Water Field Operations Branch

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Certified Mail: Article #7004 2890 0002 0058 0955

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APPENDIX F

Impact of California Health Care Facilities (CHCF) on Community Hospitals

Impact of California Health Care Facilities (CHCF) on Community Hospitals

Introduction

During the California Environmental Quality Act (CEQA) process, comments have been received from the public that raise numerous questions related to community hospitals. This white paper answers some of these questions by exploring the potential effects CHCFs will have on local community hospitals. The paper summarizes:

- The Receiver's Turnaround Plan of Action, which includes, but is not limited to:
    - Major health care initiatives underway at existing adult institutions
    - Construction upgrade program of existing adult institutions
    - New health care facilities projects (CHCF)
- The effect of the types of treatment that the CHCF will address versus acute care needs on the number of community hospital admissions
- The effect of the construction upgrade project on the need for community hospital admissions using San Quentin State Prison as an example
- The estimated number of community hospital admissions the CHCF will generate

Receiver's Turnaround Plan of Action

There are three pillars to the Receiver's Turnaround Plan of Action, which will together improve health care and reduce the number of incidents, unpredicted diseases and conditions. These pillars are:

- Major health care initiatives e.g.,
    - Access to Care: a program to increase oversight of patient medical care, instituting preventative care practices designed to prevent illness instead of simply reacting to them.
    - Chronic Care Initiative: anticipating the needs and crises related to chronic disease to reduce the number and severity of crises that will occur in older, sicker patients.
    - Health Record Standardization: having medical information available upon a patient's arrival prevents the surprise of unexpected ill admissions which frequently are referred to the emergency room.
- Major renovation of existing adult institutions to provide public safety and cost efficiency by providing services on-site instead of off-site e.g.,
    - Expand clinical space
    - Improve and expand other health-related space
    - Expand health services
    - Improve level of health care services
- Health care facilities to be constructed.

The Receiver is committed to creating a health care system that provides patient-inmates with a constitutional level of health care. This will occur when the patient-inmates are given:

- timely access to competent medical and clinical personnel who provide effective care informed by accurate patient records and supported by appropriate housing, medical facilities, equipment and processes

- timely access to prescribed medications, treatment modalities, specialists and appropriate levels of care

The elements listed above have not routinely existed within the California Department of Corrections and Rehabilitation's (CDCR) medical delivery system. Access has not been timely. The number of medical personnel has been inadequate, and competence has not been assured. Accurate and complete patient records are often not available when needed. Adequate housing for the disabled and aged does not exist. The medical facilities, when they exist at all, were designed to accommodate approximately 33% of the patient load they now are expected to serve and are in an abysmal state of disrepair. Basic medical equipment is often not available. Medications and other treatment options are too often not available when needed – to be meaningful, access must be timely. The Receiver's strategic plan establishes a three- to five-year framework for addressing all of these problems.

As a core component of the plan to bring the level of prison health care services up to constitutional standards as quickly as practicable, the Receiver will supervise the creation of expanded prison health care facilities and housing for approximately 6% of CDCR's existing inmate population (i.e., approximately 10,000 patients) whose medical and/or mental condition requires separate housing to facilitate appropriate, cost-effective access to necessary health care services.

Medical Services - Approximately 5,000 beds will be for medical services, of which approximately three-quarters will consist of open-space dormitories or single or double rooms for "specialized general population" patients who have functional impairments and chronic conditions requiring ready access to health care services (e.g., advanced chronic obstructive lung disease, or wheel chair bound patients with spinal cord injuries). Approximately 18% will consist of assisted-living-quality housing for "low acuity" patients who have nursing needs (e.g., wheel chair with wounds that need routine dressing, or stroke patients who need help dressing), and less than 10% will consist of nursing-home-quality housing for "high acuity" patients (e.g., patients with complicated wounds that need nursing attention daily, pre/post transplant, patients undergoing chemotherapy, and patients who are completely bed bound).

Mental Health Services - The other 5,000 beds will be for mental health services. Approximately 70% of this housing will consist of open-space dormitories or rooms for an "enhanced outpatient program," 18% will be for high-custody enhanced outpatients, and less than 15% will be for a mix of mental health crisis beds, acute beds, an intermediate care facility and a high-custody intermediate care facility.

Effect of the types of treatment that the CHCF will be able to address versus acute care needs on the need for community hospital admissions

Most of the CHCFs will be constructed adjacent to existing adult institutions freeing up the adult institutions' Correctional Treatment Center beds and lessening the demand on the adult institutions' health care services. This will result in fewer patients from the adult institutions being admitted to community hospitals. This reduction will more than offset the number of community hospital admissions required by the patients housed in the CHCF.

Medical interaction with the community comes in the form of consultations with local practicing physicians, hospitals for emergency room visits and inpatient care, emergency transport services and utilization of outpatient services such as CT and MRI scanners. Regional medical service use is inevitable with a collection of patients selected out for their medical problems. Local hospitals will be reimbursed for these services similar to CDCR's current practice.

The CHCF design will include laboratory services, radiology services and other diagnostic modalities allowing for effective and efficient care on-site. Palliative care and end-of-life programs will concentrate efforts on documenting whether patients want extreme measures when further care is deemed futile. Additionally, one of the CHCF will have dementia and hospice units for appropriate patients, and thusly, fewer community hospital admissions.

The benefits to the local medical community hospitals will be immediate and sustained. Availability of timely information, applied preventative services, improved care of chronic disease, availability of diagnosis services, on-site medical professionals and equipment will:

- Significantly reduce community hospital and emergency room admissions.
- Improve the quality of community hospital referrals when they do occur. Medical information from the standardized health record, and the results of initial diagnostic evaluation performed within the CHCF will be sent to consulting physicians with referrals.
- Reduce use of local medical community hospital resources.

Effect of the construction upgrade program (Vanir improvements) on the need for community hospital admissions using San Quentin as an example

There are a number of essential construction projects already underway at San Quentin State Prison, including establishing new and improved sick call units in facility rotundas, building a temporary medical building to provide clinical offices and space, constructing a medical supply warehouse, and constructing the San Quentin Central Health Services Facility, a constitutionally adequate correctional health care center.

- The number of off-site community hospital visits has decreased while the number of on-site institution visits has increased:
    - November 2008: 247 off-site visits 449 on-site visits
    - December 2008: 209 off-site visits 778 on-site visits
    - January 2009: 186 off-site visits 631 on-site visits

Estimated number of community hospital admissions the CHCF will generate

Based on available data, CPHCS estimates the average number of admits per 1,000 inmates per month is as follows:

- Statewide population - 4 community hospital admissions per month
- 55-and-older - 12 community hospital admissions per month
- California Medical Facility, Vacaville (highly concentrated patient population) - 15 community hospital admissions per month

- Mule Creek State Prison and California State Prison, Sacramento (more mental health) - 5 community hospital admissions per month

Based on the above rates:

- The atypical CHCF (between 1700-2100 beds) will see approximately 16 community hospital admissions per month
- The typical CHCF (1500 beds) will see approximately 14 or less community hospital admissions per month

Conclusion

The CHCFs are being designed to be responsible and collegial in the usage of community hospitals. New and enhanced medical programs will ensure effective and efficient interactions with existing medical practitioners and the community hospitals.

The most valuable commodity for any locale is its people. A CHCF will add at least 1,600 well-paying jobs. A number of those jobs will come from the community, as well as from across the nation and could potentially include international candidates. The effect of these jobs includes expanding the local job market, enhancing the local tax base, providing clientele for current restaurants and retail merchants as well as providing a customer base for an influx of new businesses. The “multiplier effect” of an influx on new jobs to a market is well known by economists.

Communities have also expressed the concern that local medical personnel will be pulled into the CHCF to the detriment of existing community facilities. Although qualified health care personnel will never be turned away, CPHCS will primarily be recruiting doctors and nurses on a state, national and international basis rather than locally. Physicians newly completing residency programs and newly graduated nurses are the most coveted sources for CHCF staffs.

Additionally, CPHCS is not only planning to expand nursing training programs from which to recruit, but has already entered into discussions with nursing training programs to engage in contract education to expand the size of classes of nurses training as well as assist in on-site training for the additional nursing students. CPHCS has taken steps to partner with California community colleges and other organizations to help support or increase the workforce in key areas. Currently, efforts are underway to contract with Southwestern Community College in San Diego to allow students access to Richard J. Donovan Correctional Facility, as a clinical training site. CPHCS hopes that once this contract is in place, it can be used it as a template in other areas across the state to allow more schools clinical training access to the institutions. CPHCS understands that in order to truly be a community partner, it has to take an active role in developing and educating the workforce.

While released inmates do not typically stay in the area of their incarceration, effective patient care bears a major public health benefit on all Californians. The average length of stay for California inmates is between two and three years. When these inmates return to their communities, diseases they bring with them become a financial and health care burden. Illness not treated within the correctional system will become the responsibility of the community hospitals, and often these patients do not have health insurance of any type. Untreated or undiagnosed infectious disease, such as tuberculosis and hepatitis, not only shift costs of care to the private sector, but poses the threat of spread to the public population.

In summary, the mission of the CHCF will reduce the burden on community hospital resources, provide an effective and efficient interaction when it occurs, and improve public safety while delivering a constitutional level of care to patient-inmates. The result: a win-win scenario for community hospital resources, patient-inmates and all Californians.

Additional Information

For further information, along with more detailed explanations of the contents of this paper, visit http://www.cprinc.org/