Morrison Maierle
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memo

TO:	Spokane Public Schools
FROM:	Morrison-Maierle Transportation Group
DATE:	July 2017
JOB NO.:	5132.009.00
RE:	SPS Downtown High School Stadium, Transportation Conditions Assessment

☐ **Urgent** ☒ **For Review** ☐ **Please Comment** ☐ **Please Reply** ☐ **For Your Use**

This memorandum summarizes the transportation conditions assessment (TCA) performed for the downtown high school stadium project. The TCA was requested by Spokane Public Schools (SPS) to help identify the impact and potential street infrastructure needs associated with developing a 5,000-seat event venue located south of Boone Avenue and west of Washington Street in Spokane. The study was provided to support the Bond Planning process of the District.

The TCA provides "probable" capacity conclusions for streets and intersections located within proximity of the proposed project, as based on analysis methodologies typically employed within the City. However, recommendations should not be considered final until a more formal traffic study can be advanced and accepted through the City of Spokane Transportation Concurrency determination process. City Transportation Engineering staff has not reviewed this study.

SPECTATOR ATTENDANCE

The TCA reviews forecast traffic conditions assuming an 85th percentile attendance condition for the stadium. The 85th percentile condition is used frequently in traffic analyses and design as it examines the travel demands associated with most event conditions expected during the year. It is not standard practice to analyze or design to maximum or 100 percent attendance conditions as this would precipitate the need for costly infrastructure used infrequently throughout the year. In other words, there is a low return or cost benefit-associated with designing transportation infrastructure to the maximum 100-percent level as it is simply not practical due to low utilization.

The 85th percentile attendance condition was based on a review of year 2016 and 2017 event data provided for Joe Albi stadium by SPS staff. Per this data, 69 events occurred on 43 days over two-years between football games and band competitions. Recorded attendance ranged from 270 to 5,335 persons per event with an average of 1,065 attendees and an 85th percentile attendance of 1,425. Peak days included two events with an 85th percentile attendance of 2,375.

To generate a conservative traffic analysis, an 85th percentile attendance, single event condition and an 85th percentile day-attendance condition with two events was reviewed by this study. The first event included 1,425-attendees, the 85th percentile single event attendance, followed by the second event including 950-attendees. Second event attendance is the difference between the single and two-event day, 85th percentile conditions (2,375-1,425). A summary of the 85th percentile event conditions assumed for this study are shown with **Table 1** for the weekday.

Table 1. 85th Percentile Attendance Conditions

Primary Event 85th Percentile Attendance	1,425
Second Event Attendance	950
85th Percentile Day Attendance	*2,375*

A review of the attendance data indicates 5 out of 43 attendance-day conditions and 6 out of 69 single event conditions had attendance that exceeded the 85th percentile conditions shown in Table 1. The conclusion is of the conditions summarized in Table 1 assures an analysis that addresses potential stadium travel demands for most of the year. Mead School District is planning to construct their own stadium, further reducing events and day events that exceed 85th percentile conditions. Mead versus Mt. Spokane was the highest attended event two years running.

TRIP GENERATION FORECASTS

The capacity analysis was developed based on the peak travel demand hour of the stadium, also referred to by this study as the design hour. Per SPS records, the first of a two-event day condition normally starts around 4:30 to 5:00 PM on a weekday, with the second event starting around 7:00 to 7:30 PM. There are attendees leaving the first event in the afternoon/evening while attendees for the second event are approaching the stadium. Thus, the peak demand hour for the stadium occurs during the timeframe of overlap between the two event conditions; sometime between about 6:00 and 7:30 PM. Outbound trips have a higher impact on access operation/capacity. As such, the larger event condition was assumed first as this will generate more outbound traffic during this peak event/design hour.

Land use trip generation is generally forecast using the methodologies outlined in the Institute of Transportation Engineers (ITE) *Trip Generation Manual* (10th Edition, 2017). The Manual provides rates and equations used in predicting traffic for residential, commercial, employment, and entertainment land uses, and is the most widely applied and accepted resource for trip predictions throughout the Unities States. However, ITE trip generation regarding this type of sports land use is incomplete and was not considered directly applicable to the downtown sports stadium. As such, an attendance-based approach was performed as the method for reviewing trip generation potentials for this project.

The traditional approach relies on travel mode assumption and vehicle occupancy as the basis of estimation. Person trips are calculated and distributed between travel modes as based on data provided by SPS staff. Vehicle occupancy rates are assumed, and trip generation is forecast, followed by directional distribution assumptions. Methodology calculations/steps are as follows.

- **Attendance.** This study reviews 85th percentile attendances for the weekday design hour. An attendance potential of up to 1,425 spectators for the first event and 950 spectators for the second event was assumed based on gate data provided by SPS officials. In addition, 250 additional "set" attendees were assumed per event as comprised of teams, coaches, bands, cheer squads, and event staff. These latter set attendees are identified separately due to varying travel mode use. Thus, a total of 1,675 persons for the first event and 1,200 attendees for the second event.
- **Person Trips.** Forecasts were being developed for the peak/design hour only, so a ratio of 1-person trip per attendee was assumed. This results in the assumption of 1,675-person trips for the first event and 1,200-person trips for the second event of the stadium.
- **Travel Mode.** The primary travel modes will be personal automobile for spectators and SPS officials indicate school buses will likely be used to support the downtown stadium to reduce travel demand. As such, spectators were assumed to have an 80-percent personal automobile and 20-percent school bus travel mode split. Conversely, SPS staff indicate most additional attendees (teams, coaches, cheer, etc.) will primarily arrive via bus with some arriving via automobile. As such, 80-percent of these attendees were assumed to arrive by bus with remaining 20-percent by personal automobile. Thus, 1,190-person trips for the first event and 810-person trips for the second event should arrive by automobile, with the balance of 485 first event and 390 second event attendees arriving by school bus.

  Spokane Transit Authority has a major stop adjacent to the site on Boone Avenue. One high school is nearby with remote parking located within the vicinity of the proposed

stadium, as is parents that work downtown. Thus, transit use and walking are additional travel modes which are likely to occur with some frequency for the project. However, this study is conservative by assuming personal automobile and school bus travel modes only, as it does result in higher trip generation potentials for the peak/design hour.

- **Vehicle Occupancy.** Resources indicate a typical range of 2 to 4 persons per auto when it comes to special events. This was confirmed based on discussions with SPS staff. Thus, to assure a conservative analysis of trip generation, an assumption of 2.5 persons per auto was assumed; representing the lower end of occupancies resulting in higher trip generation potentials. SPS staff indicate vehicle occupancy in the range of 35-persons per bus is typical with events; thus, this assumption was used for school bus users. This results in 476 automobile trips and 13 school bus trips for the first event peak/design hour of the first event, for a total of 489 trips. There would be a total of 324 automobile trips and 11 school bus trips for the second event peak/design hour, for a total of 335 trips.
- **Directional Distribution.** After person trips are calculated, travel demand is then thought of in terms of inbound and outbound vehicle trips. Events have heavy inbound distribution prior to the event with heavy outbound distribution following the spectator activity. In this case, a 95 to 5-percent directional split was assumed prior and 5 to 95 percent following special event activities. Thus, a directional split of 24 entering and 465 exiting trips would be calculated for the first event, with 318 entering and 17 exiting trips for the second event.
- **Peak/Design Hour Volumes.** The last step is to combine event volumes noted above, with the result of 342 entering trips and 482 exiting trips forecast for the peak/design hour for a total of 824 trips.

Summary calculations are shown in **Table 2** for the design hour. These are trips approaching and departing the stadium between two consecutive events on the 85th percentile attendance day.

Table 5. Pipeline Project Trips, Weekday and Peak Hours

Calculation/Step	First Event		Second Event	
Attendees				
- Spectators	1,425		950	
- Set	250		250	
Total Attendees	1,675		1,200	
Person Trips (1 trip per person)	1,675		1,275	
Travel Mode, Spectators				
- Automobile (80%)	1,140		760	
- School Bus (20%)	285		190	
Travel Mode, Set				
- Automobile (20%)	50		50	
- School Bus (80%)	200		200	
Travel Mode, Total				
- Automobile (20%)	1,190		810	
- School Bus (80%)	485		390	
Vehicle Occupancy				
- Automobile (2.5 persons/veh)	476		324	
- School Bus (35 persons/bus)	13		11	
Trip Totals	489		335	
Vehicle Distribution	In (5%)	Out (95%)	In (95%)	Out (5%)
- Trips	24	465	318	17
Peak/Design Hour Trips	342		482	
	824 Total Design Hour Trips			

TRAFFIC FORECASTS

Turning movement counts were obtained from the Riverfront Park Master Plan, Traffic Impact Analysis & Design Study (MMI, 2015). This study provides PM peak hour counts for intersections located in reasonable proximity of the proposed stadium. Counts are somewhat dated, but traffic growth has been moderate within the study area. Thus, these counts should be appropriate for use with this TCA.

Counts for this study were performed between 4 to 6 PM during the weekday, from which the PM peak hour of commute traffic activity is identified for capacity analysis. This is the peak hour of weekday traffic within the City CBD. The peak hour of commute traffic occurs prior to the design hour of the stadium (between 6 and 7:30). Thus, this study presents a conservative (higher end) analysis by reviewing the stadium peak generator hour versus the peak hour of commute traffic.

Baseline Traffic Forecasts. A trend-line analysis was performed for streets located within the vicinity of the project - Washington Street, Boone Avenue, Lincoln/Post Street, and Howard Street, as based on historical average daily traffic (ADT) counts available from the City. Trendlines indicate traffic growth has been minimal within the area between 2001 and 2017. Despite this, a 10 percent growth rate was used to forecast baseline year 2021 traffic volumes for the design hour. The growth was assumed given the redevelopment and revitalization that has been occurring along the north bank of the Spokane River, with continued development forecast over the next few years. This suggests some traffic growth is likely to occur and further assures a conservative analysis of forecast traffic volumes. Examples of development growth included continued expansion of Kendall Yards and the "Wonderbread" site being developed with condominiums and commercial space south of the Spokane Arena.

Trip Assignments. Trip distribution and assignment is the process of identifying the probable destinations, directions, and travel routes development related traffic will likely take in relation to the project. The distribution of traffic for the stadium may vary somewhat between events as the draw will be from different high schools located throughout the greater Spokane region. However, there are a set number of routes to/from the project area which are essentially fed by the same, regional arterials (Division Street and Maple/Ash, etc.). Thus, an "typical" trip distribution and assignment condition could be developed for this study, which was based on a review of existing travel patterns noted through current City ADT counts. A summary of trip distribution assumptions for this the project is as follows:

- **Monroe Street.** 16-percent of project trips are anticipated to/from the north of Boone Avenue and 17-percent to/from south of Broadway Avenue on Monroe Street.
- **Post Street.** 3-percent of project trips are anticipated to/from the north of Boone Avenue and 2-percent to/from the south of Broadway Avenue on Post Street.
- **Washington Street.** 16-percent of project trips are anticipated to/from the north of Boone Avenue and 20-percent to/from the south of North River Drive on Washington Street.
- **Howard Street.** 2-percent of project trips are anticipated to/from the north of Boone Avenue on Howard Street.
- **Boone Avenue.** 8-percent of project trips are anticipated to/from the west of Monroe Street and 7-percent to/from east of Washington Street on Boone Avenue.
- **Broadway Avenue.** 3-percent of project trips are anticipated to/from the west of Monroe Street on Broadway Avenue.
- **North River Drive.** 6-percent of project trips are anticipated to/from the east of Washington Street on North River Drive.

As indicated, the stadium is proposed south of Boone Avenue and west of Washington Street. The project also includes construction of a parking garage. Facilities would partially occupy an existing Spokane Public Facilities District (PFD) parking lot. Access to the lot is primarily achieved

through an approach located off Howard Street, two approaches off Boone Avenue, and an approach off Washington Street. This study assumes these access points would be maintained with the project.

Overall, about 20-percent of project trips are initially forecast to access the site through the Howard Street approach and 25-percent through the Washington Street approach. The remaining 55-percent are forecast equally between the two access points on Boone Avenue.

SPS Traffic Forecasts. The project trips shown in Table 2 were assigned to streets based on the distribution patterns identified above. Project trip assignments were then combined with baseline forecasts (again developed from counts using a 10 percent growth rate) to generate year 2021 traffic volumes. The resulting forecasts that address SPS stadium development only are shown via capacity analyses worksheets provided with this memorandum, discussed in further detail with a subsequent section. They are also available for review via Excel spreadsheets that can be provided upon request.

****Combined Event Traffic Forecasts**** There are two other major event venues/projects being advanced within the area surrounding the proposed stadium;

1) The redevelopment of Riverfront Park (RFP) with a 3,000-person outdoor auditorium, picnic areas, improved/additional playgrounds, a new plaza, and other recreational areas.
2) A proposed 5,000 seat downtown sports complex adjacent to Cataldo Avenue (south of the SPS stadium), as proposed by the PFD.

An additional analysis was performed to help establish the impact of a combined event condition reflecting approximate 85th percentile attendances of the stadium, RFP auditorium, and the sports complex. This “tri” event condition is possible during the year, but the analysis was performed more as a means of “stressing” intersection and street capacities to help assess whether facilities may be approaching limitations just beyond SPS stadium impacts alone. In other words, the analysis was performed to help identify potential system failures in the few situations where SPS attendance may exceed 85th percentile conditions.

85th percentile trip forecasts for RFP were obtained from the Riverfront Park Master Plan, Traffic Impact Analysis & Design Study. There are trip assignment figures available for application to year 2021 forecasts. The PFD is working to perform traffic due-diligence for the Sports Complex with no traffic data currently available from which to base traffic forecasts. As such, the trip generation and assignment forecasts developed for the SPS stadium (noted previous sections) were simply duplicated and added to forecasts to represent an 85th percentile condition for the sports complex; assuming some shared access to the parking surrounding the SPS stadium, use of the large parking lot across Howards Street adjacent to the Arena, and some parking within the vicinity of the Sports Complex itself. This was the best approximation given available data.

Forecasts were developed for year 2021 for the design hour of the weekday, also assuming 10-percent baseline growth to address other area developments. Again, the intent of this analysis was to provide a litmus test for stressing capacities, and the numbers could be updated after PDF development plans advance for the Sports Complex, if needed. The resulting year 2021 forecasts are again provided via capacity analyses worksheets attached to this memorandum. Excel spreadsheets are available upon request.

Note a comparable forecast condition would be an event occurring concurrently at the Spokane Arena, in combination with a SPS stadium event, as opposed to RFP activities and the Sports Complex. The forecast trips generated for these additional uses would be roughly equivalent to the 85th percentile capacity/attendance of a Spokane Chiefs hockey game (8,000 persons +/-) with the most of these trips impacting roadways similar to that of the proposed SPS stadium.

Peak Forecasts. This statement has again been provided to recognize there are peak or 100-percent attendance activities, either by the SPS stadium alone or through some combination of area events, that result in trip generation potentials and traffic forecasts that well exceed those provided with this TCA. They are not addressed because they would precipitate infrastructure needs that well exceed what is needed for most of the year. For instance, a sold-out event at the Spokane arena represents a peak/100-percent attendance event that occurs a few times per year within the vicinity of the project. However, the City does not provide the infrastructure needed to accommodate these maximum travel demands as it represents a condition predicated only a handful of times per year. Instead, traffic control measures/enforcement are the measures used to address such trip generation conditions; a strategy that would be employed with the proposed stadium or other area venues, as needed.

CAPACITY ANALYSIS

Traffic studies primarily review street capacity through an examination of intersection operations. Congestion and increased vehicle delays are experienced more rapidly at intersections versus road segments (between intersections) due to the number and frequency of conflicts (i.e. turning vehicles and stopping or slowing movements).

Capacity evaluations were primarily evaluated using the level-of-service (LOS) procedures of the *Highway Capacity Manual* (Transportation Research Board, 2016). The *Highway Capacity Manual* (HCM) is a nationally recognized and locally accepted method of measuring traffic flow and congestion. Criteria range from LOS A, indicating free-flow conditions with minimal vehicle delay, to LOS F, indicating congestion with significant vehicle delays.

LOS thresholds for the City of Spokane are highlighted by "Transportation Concurrency Level of Service Standards", which is an administrative policy and procedure document available from the City clerk's office. Section 5.2.1 indicates LOS F with control delay not to exceed 90 seconds is the threshold for signalized intersections within the Spokane CBD. LOS E is the threshold for unsignalized intersections within the CBD.

LOS were determined using Synchro Version 10.0, (Trafficware). This software tool can apply the analysis methodologies of HCM 2016 and is a standard industry software application.

Study Area and Capacity. The primary capacity analysis addresses parking lot driveways and signalized intersections located nearest the development along primary stadium approach and departure routes. A summary of signalized intersections addressed for this study include:

- Howard Street/Boone Avenue
- Washington Street/Boone Avenue
- Washington Street/North River Drive
- Monroe Street/Boone Avenue
- Monroe Street/Mallon Avenue

The LOS analysis was prepared using Synchro files originally provided by City staff for the RFP traffic study. This analysis was again prepared for a design hour condition that assumes SPS traffic forecasts only, and then for an "approximate" condition that assumes 85th percentile attendances for the SPS stadium, the RFP auditorium, and the PDF sports complex. A summary of resulting intersection and approach LOS and control delay are provided with **Table 3**.

Table 3. Future SPS and Combine Event LOS, 85th Percentile Peak/Design Hour

	SPS Condition Only		Combined Events	
Signalized Intersection	LOS	Delay	LOS	Delay
Howard St/Boone Ave	B	11.2	B	13.6
Washington St/Boone Ave	B	17.9	C	25.7
Washington St/North River Dr	D	41.1	D	52.3
Monroe St/Broadway Ave	B	11.4	B	11.8
Monroe St/Mallon Ave	A	8.8	B	12.1
	Weekday AM Peak		Weekday PM Peak	
One or Two-Way Stop	LOS	Delay	LOS	Delay
Howard Approach	B	12.4	D	25.4
Boone West Approach	D	29.0	E	49.7
Boone East Approach	D	25.5	D	34.2
Washington Approach	F	>250	F	>250

As shown, no signalized intersection is forecast to function below City LOS tolerances during the design hour. All intersections are forecast to function at LOS D or better, with the worse control delay noted at 52.3 seconds, under the 90-second mark noted with City Concurrency Standards.

The proposed site approaches on Howard Street and Boone Avenue are also forecast to function within acceptable LOS tolerances during the peak/design hours. However, the Washington Street approach is forecast to function at LOS F during the SPS only and combined events conditions. This is unacceptable per City standard.

The conclusion from this analysis is no capacity improvements would be warranted at study intersections to accommodate 85th percentile demand conditions; either with SPS traffic activities occurring only or with a potential combined event scenario. Similarly, no access improvements or changes are warranted along Howard Street or Boone Avenue. However, the analysis suggests any access to Washington Street should be limited to restrictions such as right-in and right-out movements only, as this promotes safer and more efficient traffic operations/capacity. This restriction could be enforced with permeant improvements, such as signage, striping, and/or hardscapes (islands, raised curbs, etc.), or via traffic control personnel during events.

Despite overall intersection and approach capacity conclusions for the design hour, there may be times where it is advantageous to have temporary traffic control to help facilitate the safe and efficient approach and departure of traffic. This is because travel demand can be condensed at for short timeframes within the design hour leading up to and following special events, even though infrastructure improvements may not be necessitated through intersection capacity analyses. The conclusions above should not limit the use of temporary traffic controls at events.

Roadway Capacity

Intersection LOS/operations is the primary metric used for street capacity per City of Spokane methodologies. However, there is value in reviewing capacity as measured/based on a review of forecast average daily traffic (ADT) volumes to determine whether streets holistically have the capacity needed to accommodate travel demands beyond the peak/design hour. To that end, ADT capacity analyses were performed for different areas of Washington Street, Boone Avenue, Lincoln Street, Mallon Avenue, and Howard Street as based on traffic forecasts derived from City of Spokane ADT counts available via Street Department traffic flow maps for year 2017.

ADT capacities were reviewed according to guidelines provided with the *Quality/Level of Service Handbook* (Florida DOT, 2018). The methodology predicts ADT capacity thresholds for various

LOS categories, as based on peak hour arterial volume thresholds versus roadway cross sections (i.e. number of lanes). The methods are adapted from methodologies outlined via the Highway Capacity Manual, adapted to urban City streets using adjustment factors provided with the Florida guideline. A summary of resulting arterial capacity ADT thresholds are provided for the LOS D service threshold appropriate for downtown City of Spokane streets, as shown with **Table 4**.

Table 4. Street LOS D ADT Thresholds

LOS	2-Lane	3-Lane	4-Lane	5-Lane
D	12,500	13,800	32,600	35,900

Source: Adapted from Quality/Level of Service Handbook (Florida DOT, 2018)

The volume-to-capacity (v/c) ratio was also calculated for street segments. An intersection with a V/C in excess of 0.75 was highlighted to denote roadways approaching the LOS D standard. V/C in excess of 1.0 indicates an issue as the capacity standard has been exceeded.

Forecast ADT and Capacity Results. ADT forecasts were developed for study street segments as based on growth rates derived from peak/design hour forecasts. Existing intersection traffic volumes and year 2021 intersection forecasts for the SPS only and combined event conditions were compared to derive the following growth factors for study roadways.

- Washington Street and Lincoln Street, 1.2 SPS Only & 1.35 Combined Event
- Boone Avenue, 1.4 SPS Only & 1.55 Combined Event
- Howard Street and Mallon Avenue, 1.5 SPS Only & 3.5 Combined Event

A summary of resulting SPS ADT forecasts and combined event ADT forecasts for year 2021 are shown with **Table 5**. This table shows the capacity evaluation provided for both event conditions, as based on the number of lanes, with the threshold indicating "yes" if forecasts exceed capacity thresholds or "no" if forecasts are less than thresholds. Also provided is the calculated V/C ratio for the SPS only and combined event forecast conditions.

Table 5. Street LOC D ADT Thresholds

Street Section	Cross Section	LOS D Threshold	Existing ADT	SPS Forecasts	Threshold Pass / V/C	Tri-Event Forecasts	Threshold Pass / V/C
Washington N/of Boone	5-Lanes	35,900	16,000	19,200	No / 0.53	21,600	No / 0.60
Washington S/of Boone	5-Lanes	35,900	18,300	22,000	No / 0.61	24,700	No / 0.69
Washington N/of North River	4-Lanes	32,600	21,200	25,400	No / 0.78	28,600	No / 0.88
Washington S/of North River	4-Lanes	32,600	23,600	28,300	No / 0.87	31,900	No / 0.98
Boone W/of Monroe	4-Lanes	32,600	9,200	12,900	No / 0.40	14,300	No / 0.44
Boone E/of Howard	5-Lanes	35,900	10,500	14,700	No / 0.41	16,300	No / 0.45
Boone W/of Washington	5-Lanes	35,900	11,200	15,700	No / 0.44	17,400	No / 0.48
Boone E/of Washington	4-Lanes	32,600	8,100	11,300	No / 0.35	12,600	No / 0.39
Lincoln N/of Boone	4-Lanes	32,600	3,600	4,300	No / 0.13	4,900	No / 0.15
Lincoln S/of Boone	4-Lanes	32,600	3,300	4,000	No / 0.12	4,500	No / 0.14
Lincoln S/of Mallon	3-Lanes	13,800	2,400	2,900	No / 0.21	3,200	No / 0.23
Mallon E/of Monroe	3-Lanes	13,800	2,000	3,000	No / 0.22	7,000	No / 0.51
Howard N/of Boone	3-Lanes	13,800	2,200	3,300	No / 0.24	7,700	No / 0.56
Howard S/of Boone	2-Lanes	12,500	2,200	3,300	No / 0.26	7,700	No / 0.62

As shown, forecasts volumes to not exceed LOS D thresholds for the street segments addressed by this study. Forecasts V/C are less than 0.75 for as based on review of SPS forecasts only. Most street sections have calculated V/C of less than 0.75 as based combined event forecasts with exception of Washington Street segments located north and south of North River Drive. These sections are forecast to function with higher V/C, but calculated results still do not exceed 1.0 for the weekday. This indicates capacity should be sufficient to accommodate ADT forecasts, confirming no capacity improvements are warranted along study roadways.

SUMMARY AND CONCLUSIONS

This TCA reviews transportation conditions assuming development of a 5,000-seat capacity stadium proposed south of Boone Avenue and west of Washington Street. The study indicates the project would generate 824 PM peak/design hour trips in the overlap that occurs between an 85th percentile event and a second event on an 85th percentile attendance day. Traffic forecasts were developed for this study assuming baseline growth plus project development for a year 2021 horizon year. The 85th percentile analysis condition addresses all but a few event occurrences throughout a typical year. The relocation of Mead events to another location even further reduces the number of events above the 85th percentile threshold, as Mead versus Mt. Spokane has been the highest attended SPS event for the last few years at Joe Albi.

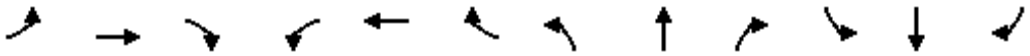
The study concludes no street or intersection improvements are warranted to accommodate forecast 85th percentile peak/design hour and ADT travel demands, assuming development of the proposed stadium. The conclusion was confirmed assuming an "approximate" combined event condition that assumes 85th percentile attendances of the stadium, the Riverfront Park auditorium, and activities associated with a proposed PDF sports complex. Conclusions were derived based on review of intersection and arterial capacity conditions, forecast to function within acceptable City LOS tolerances under both the SPS only and combined event conditions.

The only capacity conclusion from this study is any access to Washington Street should be limited to restrictions such as right-in and right-out movements only, as this promotes safer and more efficient traffic operations/capacity in comparison with higher Washington Street traffic forecasts. This restriction could be enforced with permeant improvements, such as signage, striping, and/or hardscapes, or via traffic control technicians during events.

This study acknowledges there are event conditions, either exclusive to the stadium or combined with other facilities, that would result in travel demands that exceed 85th percentile attendance conditions. However, these forecast conditions precipitate the need for costly infrastructure that is used only a few times per year and it is not standard practice to build roadways and intersections to accommodate these needs. The best example is the City would not build roadway capacity to accommodate a sold-out Chiefs game or concert at the arena, as this occurs only a couple of times each year. The same conclusion can be made for this 5,000-seat stadium.

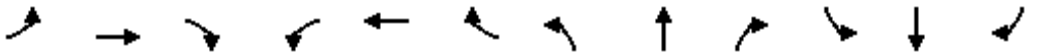
The study also acknowledges that, despite capacity evaluations, there may be times temporary traffic control may be needed to promote safe access to/from events because travel demand can condense for short timeframes within the design hour as vehicles approach and depart events. Traffic controls should not be precluded despite the conclusion that no street or infrastructure improvements are needed.

Again, this study was provided to support the SPS Bond Planning process. This TCA provides "probable" capacity conclusions for streets and intersections based on conservative traffic forecasts and typical City methodology. However, recommendations and conclusions should not be considered final until a more formal traffic study can be advanced and accepted through the COS Transportation Concurrency determination process.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	465	56	27	665	29	96	107	61	36	27	36
Future Volume (vph)	26	465	56	27	665	29	96	107	61	36	27	36
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.95		1.00	0.91	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1692	3278		1523	3229		1685	1540		1686	1563	
Flt Permitted	0.23	1.00		0.33	1.00		0.70	1.00		0.55	1.00	
Satd. Flow (perm)	412	3278		530	3229		1246	1540		971	1563	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	35	620	75	36	887	39	128	143	81	48	36	48
RTOR Reduction (vph)	0	13	0	0	4	0	0	29	0	0	29	0
Lane Group Flow (vph)	35	682	0	36	922	0	128	195	0	48	55	0
Confl. Peds. (#/hr)	28		4	4		28	15		19	19		15
Confl. Bikes (#/hr)			1			1			24			5
Heavy Vehicles (%)	0%	2%	5%	12%	5%	3%	0%	0%	24%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	35.4	35.4		35.4	35.4		25.4	25.4		25.4	25.4	
Effective Green, g (s)	37.0	37.0		37.0	37.0		27.0	27.0		27.0	27.0	
Actuated g/C Ratio	0.53	0.53		0.53	0.53		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Grp Cap (vph)	217	1732		280	1706		480	594		374	602	
v/s Ratio Prot		0.21			c0.29			c0.13			0.03	
v/s Ratio Perm	0.08			0.07			0.10			0.05		
v/c Ratio	0.16	0.39		0.13	0.54		0.27	0.33		0.13	0.09	
Uniform Delay, d1	8.5	9.8		8.3	10.9		14.7	15.1		13.9	13.7	
Progression Factor	1.00	1.00		0.88	0.90		0.95	0.94		1.00	1.00	
Incremental Delay, d2	1.6	0.7		0.9	1.1		1.4	1.5		0.7	0.3	
Delay (s)	10.1	10.5		8.2	10.9		15.3	15.6		14.6	14.0	
Level of Service	B	B		A	B		B	B		B	B	
Approach Delay (s)		10.5			10.8			15.5			14.2	
Approach LOS		B			B			B			B	

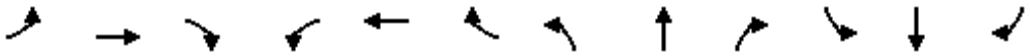
Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		
Description: Northwest TSA			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	121	304	191	83	317	41	195	1214	51	29	567	89
Future Volume (vph)	121	304	191	83	317	41	195	1214	51	29	567	89
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.99		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1708	3036		1706	3213		1626	3334		1710	3259	
Flt Permitted	0.39	1.00		0.27	1.00		0.27	1.00		0.10	1.00	
Satd. Flow (perm)	700	3036		480	3213		454	3334		180	3259	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	161	405	255	111	423	55	260	1619	68	39	756	119
RTOR Reduction (vph)	0	123	0	0	14	0	0	4	0	0	18	0
Lane Group Flow (vph)	161	537	0	111	464	0	260	1683	0	39	857	0
Confl. Peds. (#/hr)	3		7	7		3	6		5	5		6
Confl. Bikes (#/hr)			1			1			1			1
Heavy Vehicles (%)	0%	3%	9%	0%	5%	0%	5%	1%	3%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	22.4	22.4		22.4	22.4		38.4	38.4		38.4	38.4	
Effective Green, g (s)	24.0	24.0		24.0	24.0		40.0	40.0		40.0	40.0	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.57	0.57		0.57	0.57	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Grp Cap (vph)	240	1040		164	1101		259	1905		102	1862	
v/s Ratio Prot		0.18			0.14			0.50			0.26	
v/s Ratio Perm	0.23			c0.23			c0.57			0.22		
v/c Ratio	0.67	0.52		0.68	0.42		1.00	0.88		0.38	0.46	
Uniform Delay, d1	19.6	18.4		19.7	17.7		15.0	13.0		8.2	8.7	
Progression Factor	1.00	1.00		1.00	1.00		0.73	0.71		1.00	1.00	
Incremental Delay, d2	14.0	1.8		20.2	1.2		39.5	3.2		10.5	0.8	
Delay (s)	33.6	20.2		39.9	18.8		50.4	12.5		18.8	9.5	
Level of Service	C	C		D	B		D	B		B	A	
Approach Delay (s)		22.8			22.8			17.5			9.9	
Approach LOS		C			C			B			A	

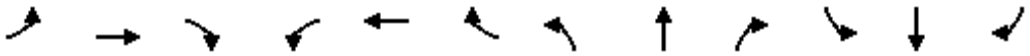
Intersection Summary			
HCM 2000 Control Delay	17.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	99.7%	ICU Level of Service	F
Analysis Period (min)	15		
Description: Northwest TSA			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	1	1	224	1	236	1	1301	108	99	1006	1
Future Volume (vph)	1	1	1	224	1	236	1	1301	108	99	1006	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.6			4.6	3.0		3.0	3.0	3.0	3.0	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.92	1.00	1.00	
Flpb, ped/bikes		1.00			0.98	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1492			1504	1332		3023	1274	1539	2993	
Flt Permitted		0.93			0.73	1.00		0.95	1.00	0.10	1.00	
Satd. Flow (perm)		1418			1145	1332		2886	1274	157	2993	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	1	1	1	299	1	315	1	1735	144	132	1341	1
RTOR Reduction (vph)	0	1	0	0	0	17	0	0	57	0	0	0
Lane Group Flow (vph)	0	2	0	0	300	298	0	1736	87	132	1342	0
Confl. Peds. (#/hr)				16		9			27	15		
Confl. Bikes (#/hr)						3			1			
Heavy Vehicles (%)	2%	2%	2%	1%	2%	1%	2%	1%	0%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	0	0	4	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2		2	2		
Actuated Green, G (s)		21.2			21.2	21.2		39.6	39.6	39.6	39.6	
Effective Green, g (s)		21.2			21.2	22.8		41.2	41.2	41.2	41.2	
Actuated g/C Ratio		0.30			0.30	0.33		0.59	0.59	0.59	0.59	
Clearance Time (s)		4.6			4.6	4.6		4.6	4.6	4.6	4.6	
Vehicle Extension (s)		3.0			3.0	3.0		0.2	0.2	0.2	0.2	
Lane Grp Cap (vph)		429			346	433		1698	749	92	1761	
v/s Ratio Prot											0.45	
v/s Ratio Perm		0.00			c0.26	0.22		0.60	0.07	c0.84		
v/c Ratio		0.01			0.87	0.69		1.02	0.12	1.43	0.76	
Uniform Delay, d1		17.0			23.1	20.5		14.4	6.4	14.4	10.7	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.32	1.33	
Incremental Delay, d2		0.0			19.8	4.5		27.7	0.3	244.9	3.0	
Delay (s)		17.0			42.9	25.0		42.1	6.7	263.9	17.3	
Level of Service		B			D	C		D	A	F	B	
Approach Delay (s)		17.0			33.7			39.4			39.4	
Approach LOS		B			C			D			D	

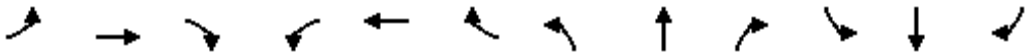
Intersection Summary			
HCM 2000 Control Delay	38.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.24		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.6
Intersection Capacity Utilization	106.6%	ICU Level of Service	G
Analysis Period (min)	15		
Description: Downtown TSA			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	66	6	4	47	6	68	221	43	4	46	58
Future Volume (vph)	66	66	6	4	47	6	68	221	43	4	46	58
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	14	12	12	14	14	12	12	12	10	12	10
Total Lost time (s)	4.0	4.0			4.0		4.3	4.3		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00			1.00		0.97	1.00		0.98	1.00	
Frt	1.00	0.99			0.99		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1613	1636			1843		1634	1726		1567	1560	
Flt Permitted	0.71	1.00			0.99		0.67	1.00		0.48	1.00	
Satd. Flow (perm)	1201	1636			1828		1151	1726		797	1560	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	88	88	8	5	63	8	91	295	57	5	61	77
RTOR Reduction (vph)	0	5	0	0	5	0	0	10	0	0	39	0
Lane Group Flow (vph)	88	91	0	0	71	0	91	342	0	5	100	0
Confl. Peds. (#/hr)	5		4	4		5	14		18	18		14
Confl. Bikes (#/hr)			7			1			6			3
Heavy Vehicles (%)	2%	17%	0%	0%	0%	20%	2%	1%	0%	0%	1%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		D.Pm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	26.4	26.4			26.4		34.7	34.7		34.7	35.0	
Effective Green, g (s)	27.0	27.0			27.0		34.7	34.7		35.0	35.0	
Actuated g/C Ratio	0.39	0.39			0.39		0.50	0.50		0.50	0.50	
Clearance Time (s)	4.6	4.6			4.6		4.3	4.3		4.3	4.0	
Lane Grp Cap (vph)	463	631			705		570	855		398	780	
v/s Ratio Prot		0.06						c0.20			0.06	
v/s Ratio Perm	c0.07				0.04		0.08			0.01		
v/c Ratio	0.19	0.14			0.10		0.16	0.40		0.01	0.13	
Uniform Delay, d1	14.3	14.0			13.7		9.7	11.1		8.8	9.3	
Progression Factor	1.00	1.00			1.03		1.00	1.00		0.88	0.75	
Incremental Delay, d2	0.9	0.5			0.3		0.6	1.4		0.1	0.3	
Delay (s)	15.2	14.5			14.5		10.3	12.5		7.8	7.4	
Level of Service	B	B			B		B	B		A	A	
Approach Delay (s)		14.8			14.5			12.0			7.4	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.3
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		
Description: Downtown TSA			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	65	1	19	85	24	12	253	30	44	85	70
Future Volume (vph)	34	65	1	19	85	24	12	253	30	44	85	70
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	12	12	12	12	10	10	10	11	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			0.98	
Flpb, ped/bikes	1.00	1.00		0.98	1.00		0.98	1.00			1.00	
Frt	1.00	1.00		1.00	0.97		1.00	0.98			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1707	1742		1672	1721		1561	3103			3036	
Flt Permitted	0.65	1.00		0.70	1.00		0.59	1.00			0.83	
Satd. Flow (perm)	1165	1742		1232	1721		967	3103			2533	
Peak-hour factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Adj. Flow (vph)	45	87	1	25	113	32	16	337	40	59	113	93
RTOR Reduction (vph)	0	1	0	0	14	0	0	13	0	0	45	0
Lane Group Flow (vph)	45	87	0	25	131	0	16	364	0	0	220	0
Confl. Peds. (#/hr)	2		26	26		2	19		6	6		19
Confl. Bikes (#/hr)			1			1			4			3
Heavy Vehicles (%)	0%	3%	11%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	26.4	26.4		26.4	26.4		34.4	34.4			34.4	
Effective Green, g (s)	28.0	28.0		28.0	28.0		36.0	36.0			36.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.51	0.51			0.51	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6			4.6	
Lane Grp Cap (vph)	466	696		492	688		497	1595			1302	
v/s Ratio Prot		0.05			c0.08			c0.12				
v/s Ratio Perm	0.04			0.02			0.02				0.09	
v/c Ratio	0.10	0.13		0.05	0.19		0.03	0.23			0.17	
Uniform Delay, d1	13.1	13.3		12.9	13.6		8.4	9.4			9.0	
Progression Factor	1.00	1.00		1.13	1.15		0.77	0.70			1.00	
Incremental Delay, d2	0.4	0.4		0.2	0.6		0.1	0.3			0.3	
Delay (s)	13.5	13.6		14.7	16.3		6.5	6.8			9.3	
Level of Service	B	B		B	B		A	A			A	
Approach Delay (s)		13.6			16.1			6.8			9.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	10.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.21		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		
Description: Count Date 6/4/09			
Downtown TSA			
c Critical Lane Group			

Intersection	
Int Delay, s/veh	3.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	43	52	211	31	37	72
Future Vol, veh/h	43	52	211	31	37	72
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	40	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	57	69	281	41	49	96

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	496	302	0	0	322	0
Stage 1	302	-	-	-	-	-
Stage 2	194	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	533	738	-	-	1238	-
Stage 1	750	-	-	-	-	-
Stage 2	839	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	512	738	-	-	1238	-
Mov Cap-2 Maneuver	512	-	-	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	839	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.4	0	2.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	615	1238	-
HCM Lane V/C Ratio	-	-	0.206	0.04	-
HCM Control Delay (s)	-	-	12.4	8	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.1	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	547	61	31	635	86	43
Future Vol, veh/h	547	61	31	635	86	43
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	40	-	0	-
Veh in Median Storage, #	0	-	-	0	16974	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	729	81	41	847	115	57

Major/Minor	Minor2		Major2	
Conflicting Flow All	929	424	0	0
Stage 1	929	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	6.54	6.94	4.14	-
Critical Hdwy Stg 1	5.54	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	4.02	3.32	2.22	-
Pot Cap-1 Maneuver	~ 266	579	-	-
Stage 1	~ 344	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	0	579	-	-
Mov Cap-2 Maneuver	0	-	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-

Approach	EB	WB
HCM Control Delay, s		
HCM LOS	-	

Minor Lane/Major Mvmt	EBLn1	EBLn2	WBL	WBT
Capacity (veh/h)	-	579	-	-
HCM Lane V/C Ratio	-	0.77	-	-
HCM Control Delay (s)	-	29	-	-
HCM Lane LOS	-	D	-	-
HCM 95th %tile Q(veh)	-	7.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	564	44	51	604	62	71
Future Vol, veh/h	564	44	51	604	62	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	16974	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	752	59	68	805	83	95

Major/Minor	Minor2		Major2	
Conflicting Flow All	941	403	0	0
Stage 1	941	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	6.54	6.94	4.14	-
Critical Hdwy Stg 1	5.54	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	4.02	3.32	2.22	-
Pot Cap-1 Maneuver	~ 262	597	-	-
Stage 1	~ 340	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	0	597	-	-
Mov Cap-2 Maneuver	0	-	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-

Approach	EB	WB
HCM Control Delay, s		
HCM LOS	-	

Minor Lane/Major Mvmt	EBLn1	EBLn2	WBL	WBT
Capacity (veh/h)	-	597	-	-
HCM Lane V/C Ratio	-	0.728	-	-
HCM Control Delay (s)	-	25.5	-	-
HCM Lane LOS	-	D	-	-
HCM 95th %tile Q(veh)	-	6.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	26.2

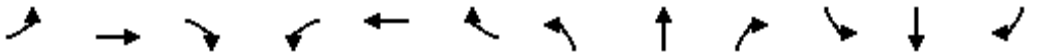
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	38	81	58	1447	858	27
Future Vol, veh/h	38	81	58	1447	858	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	51	108	77	1929	1144	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2281	590	1180	0	-	0
Stage 1	1162	-	-	-	-	-
Stage 2	1119	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 34	451	588	-	-	-
Stage 1	260	-	-	-	-	-
Stage 2	274	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 30	451	588	-	-	-
Mov Cap-2 Maneuver	~ 30	-	-	-	-	-
Stage 1	226	-	-	-	-	-
Stage 2	274	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 546.5	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	588	-	82	-	-
HCM Lane V/C Ratio	0.132	-	1.935	-	-
HCM Control Delay (s)	12	-	$ 546.5	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0.5	-	13.9	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

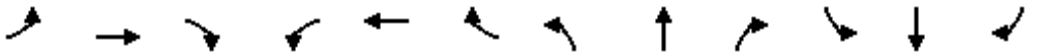


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	503	195	82	711	34	269	114	157	40	32	36
Future Volume (vph)	26	503	195	82	711	34	269	114	157	40	32	36
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.97		1.00	0.98	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	0.96		1.00	0.99		1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1692	3161		1524	3227		1685	1405		1692	1580	
Flt Permitted	0.23	1.00		0.25	1.00		0.70	1.00		0.41	1.00	
Satd. Flow (perm)	408	3161		404	3227		1245	1405		735	1580	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	32	629	244	102	889	42	336	142	196	50	40	45
RTOR Reduction (vph)	0	58	0	0	5	0	0	71	0	0	28	0
Lane Group Flow (vph)	33	815	0	103	927	0	336	268	0	50	57	0
Confl. Peds. (#/hr)	28		4	4		28	15		19	19		15
Confl. Bikes (#/hr)			1			1			24			5
Heavy Vehicles (%)	0%	2%	5%	12%	5%	3%	0%	0%	24%	0%	0%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	35.4	35.4		35.4	35.4		25.4	25.4		25.4	25.4	
Effective Green, g (s)	37.0	37.0		37.0	37.0		27.0	27.0		27.0	27.0	
Actuated g/C Ratio	0.53	0.53		0.53	0.53		0.39	0.39		0.39	0.39	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Grp Cap (vph)	215	1670		213	1705		480	541		283	609	
v/s Ratio Prot		0.26			c0.29			0.19			0.04	
v/s Ratio Perm	0.08			0.25			c0.27			0.07		
v/c Ratio	0.15	0.49		0.48	0.54		0.70	0.50		0.18	0.09	
Uniform Delay, d1	8.5	10.5		10.4	10.9		18.1	16.3		14.2	13.7	
Progression Factor	1.00	1.00		0.96	0.93		0.97	0.95		1.00	1.00	
Incremental Delay, d2	1.5	1.0		6.9	1.1		8.2	3.2		1.4	0.3	
Delay (s)	10.0	11.5		17.0	11.3		25.7	18.8		15.5	14.0	
Level of Service	A	B		B	B		C	B		B	B	
Approach Delay (s)		11.4			11.8			22.2			14.6	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

Description: Northwest TSA

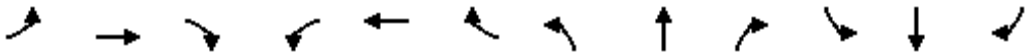
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	185	365	200	122	352	41	202	1284	87	29	639	132
Future Volume (vph)	185	365	200	122	352	41	202	1284	87	29	639	132
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.98		1.00	0.99		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1708	3059		1706	3217		1626	3319		1710	3241	
Flt Permitted	0.38	1.00		0.24	1.00		0.23	1.00		0.10	1.00	
Satd. Flow (perm)	683	3059		431	3217		397	3319		180	3241	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	231	456	250	152	440	51	252	1605	109	36	799	165
RTOR Reduction (vph)	0	105	0	0	12	0	0	7	0	0	25	0
Lane Group Flow (vph)	231	601	0	153	479	0	253	1707	0	36	939	0
Confl. Peds. (#/hr)	3		7	7		3	6		5	5		6
Confl. Bikes (#/hr)			1			1			1			1
Heavy Vehicles (%)	0%	3%	9%	0%	5%	0%	5%	1%	3%	0%	2%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	0	0	4	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	22.4	22.4		22.4	22.4		38.4	38.4		38.4	38.4	
Effective Green, g (s)	24.0	24.0		24.0	24.0		40.0	40.0		40.0	40.0	
Actuated g/C Ratio	0.34	0.34		0.34	0.34		0.57	0.57		0.57	0.57	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
Lane Grp Cap (vph)	234	1048		147	1102		226	1896		102	1852	
v/s Ratio Prot		0.20			0.15			0.51			0.29	
v/s Ratio Perm	0.34			c0.35			c0.64			0.20		
v/c Ratio	0.99	0.57		1.04	0.43		1.12	0.90		0.35	0.51	
Uniform Delay, d1	22.8	18.8		23.0	17.8		15.0	13.2		8.1	9.1	
Progression Factor	1.00	1.00		1.00	1.00		0.73	0.73		1.00	1.00	
Incremental Delay, d2	55.6	2.3		85.5	1.2		76.4	3.4		9.3	1.0	
Delay (s)	78.5	21.1		108.5	19.0		87.4	13.0		17.4	10.0	
Level of Service	E	C		F	B		F	B		B	B	
Approach Delay (s)		35.2			40.3			22.6			10.3	
Approach LOS		D			D			C			B	

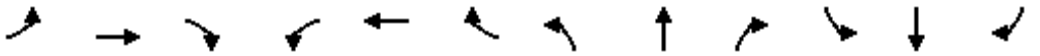
Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	103.9%	ICU Level of Service	G
Analysis Period (min)	15		
Description: Northwest TSA			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1	11	224	1	255	9	1432	108	122	1215	12
Future Volume (vph)	17	1	11	224	1	255	9	1432	108	122	1215	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)		4.6			4.6	3.0		3.0	3.0	3.0	3.0	
Lane Util. Factor		1.00			1.00	1.00		0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98		1.00	0.92	1.00	1.00	
Flpb, ped/bikes		1.00			0.98	1.00		1.00	1.00	1.00	1.00	
Frt		0.95			1.00	0.85		1.00	0.85	1.00	1.00	
Flt Protected		0.97			0.95	1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1462			1505	1332		3022	1274	1539	2989	
Flt Permitted		0.80			0.70	1.00		0.94	1.00	0.10	1.00	
Satd. Flow (perm)		1203			1106	1332		2848	1274	156	2989	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	21	1	14	280	1	319	11	1790	135	152	1519	15
RTOR Reduction (vph)	0	10	0	0	0	17	0	0	51	0	1	0
Lane Group Flow (vph)	0	26	0	0	281	302	0	1801	84	153	1533	0
Confl. Peds. (#/hr)				16		9			27	15		
Confl. Bikes (#/hr)						3			1			
Heavy Vehicles (%)	2%	2%	2%	1%	2%	1%	2%	1%	0%	0%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	4	0	0	4	0
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4		4	2		2	2		
Actuated Green, G (s)		20.9			20.9	20.9		39.9	39.9	39.9	39.9	
Effective Green, g (s)		20.9			20.9	22.5		41.5	41.5	41.5	41.5	
Actuated g/C Ratio		0.30			0.30	0.32		0.59	0.59	0.59	0.59	
Clearance Time (s)		4.6			4.6	4.6		4.6	4.6	4.6	4.6	
Vehicle Extension (s)		3.0			3.0	3.0		0.2	0.2	0.2	0.2	
Lane Grp Cap (vph)		359			330	428		1688	755	92	1772	
v/s Ratio Prot											0.51	
v/s Ratio Perm		0.02			c0.25	0.23		0.63	0.07	c0.98		
v/c Ratio		0.07			0.85	0.71		1.07	0.11	1.66	0.87	
Uniform Delay, d1		17.6			23.1	20.8		14.2	6.2	14.2	11.9	
Progression Factor		1.00			1.00	1.00		1.00	1.00	1.24	1.24	
Incremental Delay, d2		0.1			18.6	5.2		42.2	0.3	339.1	5.6	
Delay (s)		17.7			41.7	26.1		56.5	6.5	356.8	20.4	
Level of Service		B			D	C		E	A	F	C	
Approach Delay (s)		17.7			33.4			53.0			50.9	
Approach LOS		B			C			D			D	

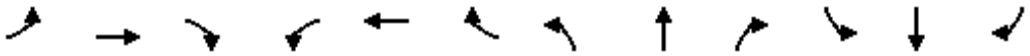
Intersection Summary			
HCM 2000 Control Delay	49.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	7.6
Intersection Capacity Utilization	118.4%	ICU Level of Service	H
Analysis Period (min)	15		
Description: Downtown TSA			
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	79	6	4	116	12	68	239	46	9	46	79
Future Volume (vph)	76	79	6	4	116	12	68	239	46	9	46	79
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	11	14	12	12	14	14	12	12	12	10	12	10
Total Lost time (s)	4.0	4.0			4.0		4.3	4.3		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00			1.00		1.00	0.99		1.00	0.97	
Flpb, ped/bikes	1.00	1.00			1.00		0.98	1.00		0.98	1.00	
Frt	1.00	0.99			0.99		1.00	0.98		1.00	0.91	
Flt Protected	0.95	1.00			1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1614	1636			1856		1635	1725		1568	1532	
Flt Permitted	0.65	1.00			0.99		0.66	1.00		0.48	1.00	
Satd. Flow (perm)	1106	1636			1849		1132	1725		789	1532	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	95	99	8	5	145	15	85	299	58	11	58	99
RTOR Reduction (vph)	0	4	0	0	5	0	0	10	0	0	50	0
Lane Group Flow (vph)	95	103	0	0	160	0	85	347	0	11	108	0
Confl. Peds. (#/hr)	5		4	4		5	14		18	18		14
Confl. Bikes (#/hr)			7			1			6			3
Heavy Vehicles (%)	2%	17%	0%	0%	0%	20%	2%	1%	0%	0%	1%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		D.Pm	NA	
Protected Phases		4			4			2			6	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	26.4	26.4			26.4		34.7	34.7		34.7	35.0	
Effective Green, g (s)	27.0	27.0			27.0		34.7	34.7		35.0	35.0	
Actuated g/C Ratio	0.39	0.39			0.39		0.50	0.50		0.50	0.50	
Clearance Time (s)	4.6	4.6			4.6		4.3	4.3		4.3	4.0	
Lane Grp Cap (vph)	426	631			713		561	855		394	766	
v/s Ratio Prot		0.06						c0.20			0.07	
v/s Ratio Perm	0.09				c0.09		0.08			0.01		
v/c Ratio	0.22	0.16			0.22		0.15	0.41		0.03	0.14	
Uniform Delay, d1	14.5	14.1			14.5		9.6	11.1		8.9	9.4	
Progression Factor	1.00	1.00			1.01		1.00	1.00		0.88	0.77	
Incremental Delay, d2	1.2	0.6			0.7		0.6	1.4		0.1	0.4	
Delay (s)	15.7	14.6			15.3		10.2	12.6		7.9	7.7	
Level of Service	B	B			B		B	B		A	A	
Approach Delay (s)		15.1			15.3			12.1			7.7	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.3
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		
Description: Downtown TSA			

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	37	78	1	27	261	49	12	280	36	64	105	79
Future Volume (vph)	37	78	1	27	261	49	12	280	36	64	105	79
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width	12	12	12	12	12	12	10	10	10	11	11	11
Total Lost time (s)	3.0	3.0		3.0	3.0		3.0	3.0			3.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95			0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00			0.98	
Flpb, ped/bikes	1.00	1.00		0.98	1.00		0.98	1.00			1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.98			0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00			0.99	
Satd. Flow (prot)	1708	1743		1673	1739		1563	3098			3050	
Flt Permitted	0.37	1.00		0.69	1.00		0.56	1.00			0.79	
Satd. Flow (perm)	667	1743		1220	1739		917	3098			2443	
Peak-hour factor, PHF	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Adj. Flow (vph)	46	98	1	34	326	61	15	350	45	80	131	99
RTOR Reduction (vph)	0	1	0	0	10	0	0	14	0	0	48	0
Lane Group Flow (vph)	46	98	0	34	377	0	15	381	0	0	262	0
Confl. Peds. (#/hr)	2		26	26		2	19		6	6		19
Confl. Bikes (#/hr)			1			1			4			3
Heavy Vehicles (%)	0%	3%	11%	0%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	26.4	26.4		26.4	26.4		34.4	34.4			34.4	
Effective Green, g (s)	28.0	28.0		28.0	28.0		36.0	36.0			36.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.51	0.51			0.51	
Clearance Time (s)	4.6	4.6		4.6	4.6		4.6	4.6			4.6	
Lane Grp Cap (vph)	266	697		488	695		471	1593			1256	
v/s Ratio Prot		0.06			c0.22			c0.12				
v/s Ratio Perm	0.07			0.03			0.02				0.11	
v/c Ratio	0.17	0.14		0.07	0.54		0.03	0.24			0.21	
Uniform Delay, d1	13.5	13.4		13.0	16.1		8.4	9.4			9.2	
Progression Factor	1.00	1.00		1.09	1.10		0.79	0.75			1.00	
Incremental Delay, d2	1.4	0.4		0.3	3.0		0.1	0.3			0.4	
Delay (s)	14.9	13.8		14.4	20.7		6.7	7.4			9.6	
Level of Service	B	B		B	C		A	A			A	
Approach Delay (s)		14.1			20.2			7.4			9.6	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

Description: Count Date 6/4/09
Downtown TSA
c Critical Lane Group

Intersection	
Int Delay, s/veh	4.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	54	76	464	40	56	252
Future Vol, veh/h	54	76	464	40	56	252
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	40	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	95	580	50	70	315

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1060	605	0	0	630	0
Stage 1	605	-	-	-	-	-
Stage 2	455	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	248	498	-	-	952	-
Stage 1	545	-	-	-	-	-
Stage 2	639	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	230	498	-	-	952	-
Mov Cap-2 Maneuver	230	-	-	-	-	-
Stage 1	505	-	-	-	-	-
Stage 2	639	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.4	0	1.7
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	336	952	-
HCM Lane V/C Ratio	-	-	0.484	0.074	-
HCM Control Delay (s)	-	-	25.4	9.1	-
HCM Lane LOS	-	-	D	A	-
HCM 95th %tile Q(veh)	-	-	2.5	0.2	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	660	87	40	710	117	54
Future Vol, veh/h	660	87	40	710	117	54
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	40	-	0	-
Veh in Median Storage, #	0	-	-	0	16974	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	825	109	50	888	146	68

Major/Minor	Minor2		Major2	
Conflicting Flow All	988	444	0	0
Stage 1	988	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	6.54	6.94	4.14	-
Critical Hdwy Stg 1	5.54	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	4.02	3.32	2.22	-
Pot Cap-1 Maneuver	~ 246	561	-	-
Stage 1	~ 323	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	0	561	-	-
Mov Cap-2 Maneuver	0	-	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-

Approach	EB	WB
HCM Control Delay, s		
HCM LOS	-	

Minor Lane/Major Mvmt	EBLn1	EBLn2	WBL	WBT
Capacity (veh/h)	-	561	-	-
HCM Lane V/C Ratio	-	0.929	-	-
HCM Control Delay (s)	-	49.7	-	-
HCM Lane LOS	-	E	-	-
HCM 95th %tile Q(veh)	-	11.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	655	60	70	669	81	95
Future Vol, veh/h	655	60	70	669	81	95
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	50	-	0	-
Veh in Median Storage, #	0	-	-	0	16974	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	819	75	88	836	101	119

Major/Minor	Minor2		Major2	
Conflicting Flow All	1012	418	0	0
Stage 1	1012	-	-	-
Stage 2	0	-	-	-
Critical Hdwy	6.54	6.94	4.14	-
Critical Hdwy Stg 1	5.54	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	4.02	3.32	2.22	-
Pot Cap-1 Maneuver	~ 238	584	-	-
Stage 1	~ 315	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %				-
Mov Cap-1 Maneuver	0	584	-	-
Mov Cap-2 Maneuver	0	-	-	-
Stage 1	0	-	-	-
Stage 2	0	-	-	-

Approach	EB	WB
HCM Control Delay, s		
HCM LOS	-	

Minor Lane/Major Mvmt	EBLn1	EBLn2	WBL	WBT
Capacity (veh/h)	-	584	-	-
HCM Lane V/C Ratio	-	0.829	-	-
HCM Control Delay (s)	-	34.2	-	-
HCM Lane LOS	-	D	-	-
HCM 95th %tile Q(veh)	-	8.6	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	75.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	61	104	77	1537	958	46
Future Vol, veh/h	61	104	77	1537	958	46
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	76	130	96	1921	1198	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2380	628	1256	0	-	0
Stage 1	1227	-	-	-	-	-
Stage 2	1153	-	-	-	-	-
Critical Hdwy	6.84	6.94	4.14	-	-	-
Critical Hdwy Stg 1	5.84	-	-	-	-	-
Critical Hdwy Stg 2	5.84	-	-	-	-	-
Follow-up Hdwy	3.52	3.32	2.22	-	-	-
Pot Cap-1 Maneuver	~ 29	426	550	-	-	-
Stage 1	240	-	-	-	-	-
Stage 2	263	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 24	426	550	-	-	-
Mov Cap-2 Maneuver	~ 24	-	-	-	-	-
Stage 1	198	-	-	-	-	-
Stage 2	263	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, $	1268.9	0.6	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	550	-	59	-	-
HCM Lane V/C Ratio	0.175	-	3.496	-	-
HCM Control Delay (s)	12.9	-	$ 1268.9	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0.6	-	21.9	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon