Appendix B – Traffic Memo





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TO: Joel Dykstra

FROM: Graham Johnson, PE, PTOE (Lic. MN, SD, IA)

DATE: November 5, 2019

RE: 85th Street Access Traffic Analysis SEH No. OWNJV149418 14.00

This memorandum summarizes the traffic analysis for 85th Street access locations between the proposed I-29 at 85th Street interchange and Sundowner Avenue and Tallgrass Avenue.

Traffic forecasts from the I-29 85th Street Interstate Justification Request (IJR) were used as a basis for the analysis, a forecast year of 2045 was prepared for that study. The forecast information was updated to include an option for either ³/₄ access or full access signalized intersection between the interchange and the adjacent arterials. The forecast memorandum for the updated demands is attached to this document.

The 85th Street corridor falls within four agency jurisdictions including the South Dakota Department of Transportation (SDDOT), the City of Sioux Falls, the City of Tea, and Lincoln County.

While all may have different standards, the purpose of access management is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system.

INTERSECTION SPACING

85th Street is currently being designed as an access category Arterial II. This designation, according to the Sioux Falls Engineering Design Standards Manual, requires traffic signal spacing of ¼ mile (1320 feet), median openings of ¼ mile (1320 feet) and unsignalized intersection spacing of 660 feet. From the design manual, here is a description of an Arterial II:

• Arterial II—Routes that typically have continuity across the city. These routes serve a mixture of commercial and residential need.

Using the City of Tea Design Standards, 85th Street will be classified as a principal arterial (volume >15,000 with posted speed above 40 mph) with the number of intersections normally not spaced less than one-half mile.

The SDDOT requires control of access on an arterial street adjacent to any interchange. New interchanges require a control of access of a minimum of 660 feet, this distance is measured for both the approaching and departing directions. The departure measurement is measured from the radius of the most outside turning movement when the off-ramp is controlled. When the off-ramp is free flow into an add lane, the departure measurement begins at the point the average vehicle obtains the posted speed limit. The approach measurement starts at the beginning of a taper for the turn lanes approaching the interchange; the approach measurement is typically the most impactful.

With the proposed diverging diamond interchange (DDI) design, there is approximately 2,200 feet between the ramp terminal intersections and Sundowner Avenue or Tallgrass Avenue. Accounting for the SDDOT control of access spacing, mid-point access locations were evaluated at approximately:

- 1,200 feet east of Sundowner Avenue (West Access)
- 1,130 feet west of Tallgrass Avenue (East Access)

This access spacing does not currently meet the ¼ mile (1320 feet) spacing for either a median opening or traffic signal along the 85th Street corridor. The attached **Figure 1** shows the intersection and control of access spacing along 85th Street between Sundowner Avenue and Tallgrass Avenue.

TRAFFIC OPERATIONS

To test the viability of including a ³/₄ access or full access traffic signal at the proposed access locations, the Highway Capacity Software (HCS) was utilized from the previous IJR analysis for the interchange.

3/4 Access

A ³/₄ Access intersection was evaluated at the proposed locations; a ³/₄ access intersection allows mainline traffic to turn left and right to the minor street, however the minor street is only allowed a right turn movement onto the mainline. The mainline left turning traffic must yield to the opposing through traffic, and the minor street right turning traffic must yield to mainline traffic before entering.

According to the forecast memorandum, the left turns from 85th Street to the proposed access locations would be relatively small, with all being less than 65 vehicle in each peak hour. The following table shows results of the analysis for the eastbound and westbound left turns as well as the northbound and southbound approaches (right turn only); the 85th Street through movements and right turn movements would have no delay at this control type.

Intersection	on Access		AM Pea	ak Hour		PM Peak Hour				
		EB LT	WB LT	NB RT	SB RT	EB LT	WB LT	NB RT	SB RT	
West	Volume	20	30	255	80	40	65	295	95	
Access	Delay sec/veh / LOS	10.7 / B	13.5 / B	37.7 / E	12.9 / B	14.5 / B	17.5 / C	89.5 / F	18.1 / C	
East	Volume	45	35	105	265	40	45	195	200	
Access	Delay sec/veh / LOS	12.8 / B	12.4 / B	16.1 / C	29.6 / D	18.6 / C	17.1 / C	37.2 / E	47.5 / E	

Table 1 - 2045 3/4 Access Operations

The only operational traffic problems that occur are during the PM peak hour where vehicles turn right onto 85th Street from the minor streets at the East and West intersections; they would have delays finding a gap in between the mainline 85th Street traffic; this delay would only impact the operations for the minor streets where the traffic is looking for a gap to pull out onto 85th Street. This would not impact the operations along 85th Street. If the minor delays become too great, traffic would shift towards either Sundowner Avenue or Tallgrass Avenue to access 85th Street at the signalized intersections.

As a sensitivity test, the left turn movements from 85th Street to the proposed access locations were increased in two stages. The first was an increase by a magnitude of 3-fold, the second stage was an increase of 5-fold.

The following table shows the results of the 3-fold analysis which the left turn movements all operated at a LOS D or better; the minor approach delays do not changed.

Intersection	on Access		AM Pea	ak Hour		PM Peak Hour					
		EB LT	WB LT	NB RT	SB RT	EB LT	WB LT	NB RT	SB RT		
West	Volume	60	90	255	80	120	195	295	95		
Access	Delay sec/veh / LOS	11.1 / B	15.1 / C	37.7 / E	12.9 / B	17.3 / C	29.2 / D	89.5 / F	18.1 / C		
East	Volume	135	105	105	265	120	135	195	200		
Access	Delay sec/veh / LOS	14.6 / B	13.8 / B	16.1 / C	29.6 / D	25.2 / D	22.9 / C	37.2 / E	47.5 / E		

Table 2 - 2045 3/4 Access Operations – Sensitivity 3-Fold

The following table shows the results of the 5-fold analysis which the left turn movements operate at failing conditions in the PM peak hour at both the West and East Access intersections.

Intersectio	on Access		AM Pea	ak Hour		PM Peak Hour					
		EB LT	WB LT	NB RT	SB RT	EB LT	WB LT	NB RT	SB RT		
West	Volume	100	150	255	80	200	325	295	95		
Access	Delay sec/veh / LOS	11.6 / B	17.4 / C	37.7 / E	12.9 / B	22.4 / C	83.8 / F	89.5 / F	18.1 / C		
East	Volume	225	175	105	265	200	225	195	200		
Access	Delay sec/veh / LOS	18.0 / C	15.8 / C	16.1 / C	29.6 / D	41.6 / E	37.7 / E	37.2 / E	47.5 / E		

Table 3 - 2045 3/4 Access Operations – Sensitivity 5-Fold

3/4 Access with 6-lane Section

Currently, 85th Street on the east side of I-29 has the potential to expand to a 6-lane roadway section. At the time of the IJR analysis, the corridor was planned to be constructed as a 4-lane, divided roadway between I-29 and Tallgrass Avenue. As development plans have started, more detailed traffic impacts are being considered near the intersection of 85th Street and Tallgrass Avenue which have resulted in increased capacity needs at the intersection.

It should be noted that any change to geometrics analyzed in the IJR would require an action of FHWA concurrence on the design changes within the 85th Street IJR study area. The degree of geometric change to the corridor or interchange design would determine the level of documentation necessary for FHWA to approve of concur with the changes.

The current understanding is the west leg of the 85th Street at Tallgrass Avenue intersection would need to include a 6-lane divided roadway; the beginning and end points of the 3rd lane in each direction is currently not fully understood. There are three potential locations to begin and end the 3rd lanes in each direction, they are as follows:

- As lanes add/drop between the East Access and Tallgrass Avenue:
 - o This provides the necessary capacity at the intersection with the least roadway impacts.
 - o Does not provide good lane continuity.
 - o FHWA concurrence would likely only require memorandum documenting changes.
- At East Access:
 - \circ $\;$ Lanes would begin and end at northbound right turn and westbound right turn.
 - o This would have roadway impacts between the access and Tallgrass Avenue.
 - Provides continuity between access and Tallgrass Avenue.
 - FHWA concurrence would likely only require memorandum documenting changes.
- At I-29:
 - Lanes would begin and end at northbound right turn and westbound right turn at I-29.
 - This would provide the most impactful with 6-lanes for almost $\frac{1}{2}$ mile.
 - Provides continuity between I-29 and Tallgrass Avenue.

- The SDDOT control of access would be extended from the interchange further east on the departure of 85th Street as the northbound right turn would be a free movement into an add lane versus being controlled at the intersection traffic signal. This could ultimately shift the East Access intersection location by upwards of 200 feet, depending on the posted 85th Street speed limit, potentially reducing the intersection spacing to Tallgrass Avenue to an undesirable spacing.
 - If the posted speed on 85th Street is 40 mph, the COA is extended approximately 300' for a vehicle to accelerate to posted, for a total of 960'. This results in no change to the intersection spacing.
 - As the DDI interchange speeds will be reduced to 30 mph through the interchange, if the speed limit between the two proposed ³/₄ access intersections is reduced, the COA would not impact the intersection spacing.
 - If the posted speed on 85th Street is 45 mph, the COA is extended approximately 490' for a vehicle to accelerate to posted, for a total of 1150'. This results in shifting the East Access intersection approximately 200' east.
- While no significant operational change at DDI interchange, this design change would more than likely require IJR amendment to gain FHWA concurrence.

The first two options would not change the previous ³/₄ access operations analysis as there would remain two through lanes in each direction for the mainline left turns to yield. However, the last option would add an additional through lane in each direction, requiring longer gap times to make the mainline left turn movement.

With the additional roadway width to cross, the mainline left turns would begin to experience more delays trying to find gaps in 3-lanes of traffic. Under the base left turn demands, the eastbound and westbound left turns would only slightly increase to a LOS C for both movement in the AM peak hour; however, in the PM peak hour the delays would reach a LOS E.

Following the initial sensitivity test as before, increasing the mainline left turns by 3-fold, the eastbound and westbound left turns would again only slightly increase to a LOS D for both movements in the AM peak hour. During the PM peak hour, the delays would well exceed the LOS F criteria with between 100 and 124 seconds of delay for the left turn movements; such delays would develop long queues and likely result in riskier driver behavior attempting gaps that may not be adequate.

As the PM peak hour would incur poor LOS movements and the potential safety implications of making a left turn maneuver across 3-through lanes, if 6-lanes are required along 85th Street through the East Access, a ³/₄ access intersection would not be recommended. Additional analysis of a signalized option will be discussed later in this memorandum.

Full Access Signalized Intersections

The design of a DDI interchange is set up with a 2-phase signal control because the majority of the turning movements occur as yielding or free movements. Due to the short distance between ramp terminal intersections, approximately 500 feet of usable vehicle storage, and the 2-phase signal operations, a DDI typically works best with shorter cycle lengths somewhere between 70 and 90 seconds. The IJR analysis had cycle lengths of 80 and 90 seconds for the AM and PM peak hours. Due to the short cycle length of the DDI and the intersection spacing between Sundowner Avenue and Tallgrass Avenue, both of these intersections were previously analyzed as actuated-uncoordinated, otherwise known as operating "free".

Including signalized intersections below the standard intersection spacing will now require the traffic signals to be in a coordinated group between Sundowner Avenue and Tallgrass Avenue, including the two interchange signals. Signal coordination typically improves the overall intersection delay, by giving more green time to the major roadway and less time for the minor street. Without coordination along the corridor, platoons of traffic will potentially arrive at the downstream intersections on a red phase, creating significant delays at all intersections along the corridor as there is no progression.

With the addition of the two signalized access locations, the cycle length becomes critically important for the corridor. A range of cycle lengths were looked at for the corridor between 80 seconds and 130 seconds for each peak period. The AM peak is able to operate acceptably at a coordinated cycle length of 90 seconds, which works well for all intersections including the ramp terminals.

The DDI interchange signals began to have queueing issues between the ramp terminal intersections at all cycle lengths above 100 seconds in the PM peak hour. With this short of a cycle length, the Sundowner Avenue signal is operating near capacity with intersection movements at LOS E; the following Table 3 shows the approach LOS.

While all the approaches are at a LOS D, the Tallgrass Avenue intersection has intersection movements operating at LOS F and would also have queue storage issues. A longer cycle length in the coordinated system would result in acceptable operations at Tallgrass Avenue, a cycle length of approximately 120 seconds or more works for the volumes at this intersection; however this cycle length has significant impacts to the I-29 DDI ramp terminals that would result in queuing through each ramp terminal which is harmful to the safety and operations of the interchange.

One of the main constraints with the signal coordination is the number of signal phases at each intersection that must be served. As mentioned earlier, a DDI interchange operates well due to the simple 2-phase operations between the two ramp terminal intersections which allows for a short cycle length to limit delays. The intersections along 85th Street at both Sundowner Avenue and Tallgrass Avenue would operate under 8 signal phases in order to serve all the left turns and through movements for each approach; typically the more phases included require longer cycle lengths.

The following **Table 4** shows the operational results for a cycle length of 90 seconds in the AM peak and 100 seconds in the PM peak; this table represents the approach and intersection LOS, not individual movements.

		(Dela	AM Peak	105)		PM Peak (Delay sec/veh / LOS)						
85 th at:	EB					EB	WB	NB	SB	Int.		
	Approach	Approach	Approach	Approach	Int.	Approach	Approach	Approach	Approach	IIIL.		
Sundowner Ave	45.7 / D	25.1 / C	37.5 / D	42.0 / D	35.8 / D	69.6 / E	49.2 / D	44.3 / D	47.9 / D	51.3 / D		
West Access	24.6 / C	30.5 / C	25.0 / C	29.7 / C	27.1 / C	27.4 / C	35.8 / D	53.8 / D	34.9 / C	33.2 / C		
SB I-229	15.6 / B	15.3 / B	17.3 / B	15.8 / B	15.6 / B	33.5 / C	18.8 / B	22.2 / C	12.5 / B	24.9 / C		
NB I-229	20.1 / C	20.8 / C	20.1 / C	20.6 / C	20.4 / C	6.4 / A	21.2 / C	28.3 / C	21.8 / C	13.3 / B		
East Access	31.5 / C	34.8 / C	33.6 / C	36.6 / D	33.5 / C	30.4 / C	36.5 / D	39.2 / D	23.8 / C	33.2 / C		
Tallgrass Ave**	34.6 / C	26.5 / C	39.5 / D	25.9 / C	30.4 / C	49.9 / D	41.6 / D	48.6 / D	49.5 / D	46.9 / D		
**Includes new geometry from current 85 th Street Project (Tallgrass to Louise Avenue)												

Table 4 - 2045 Full Access Traffic Signal Operations

Bold indicates either an approach LOS E/F or an intersection with an individual movement at LOS F or a queue storage above 1.0.

³/₄ Access with 6-lane Section – Signalized Intersection

To address the delays and poor LOS with a 6-lane roadway at the ³/₄ access intersection from the previous analysis, an alternative of signalizing the mainline left turns at the ³/₄ access was evaluated; an evaluation of the 4-lane roadway with 5-fold left turns was also completed under signalized control.

The simplified signal operations at a signalized ³/₄ access would allow for better coordination of the intersections with the DDI interchange as they both would operate with only 2-phases. In this case, the minor street approaches would still be a right out only under yield conditions, but the mainline left turns would operate under protected only left turn phases. When the left turn phase comes up, the opposing major through movement would go to a stop condition for only 10 to 20 seconds. This short duration results in a long green time for the 85th Street

through movements. To test for the worst case scenario, the mainline left turns analyzed were completed under the 5-fold volumes.

In the following evaluation, the intersection between Sundowner Avenue and the East Access intersection were coordinated together, however due to the short cycle length the Tallgrass Avenue intersection was considered uncoordinated in this analysis. The Tallgrass Avenue intersection could be coordinated on a different signal system to the east or could still be coordinated on this system until the future volumes would require a different cycle length at that intersection.

The following **Table 5** shows the operational results for the 6-lane roadway with 5-fold mainline left turns. A cycle length of 90 seconds in the AM peak and 100 seconds in the PM peak; this table represents the approach and intersection LOS, not individual movements. While there are two LOS E approaches, no movements are at a LOS F and there are no queue storage issues.

			AM Peak			PM Peak						
85 th at:		(Dela	y sec/veh /	LOS)		(Delay sec/veh / LOS)						
oo ar	EB	WB	NB	SB	Int.	EB	WB	NB	SB	Int.		
	Approach	Approach	Approach	Approach	IIIL.	Approach	Approach	Approach	Approach	IIIC.		
Sundowner Ave	44.6 / D	19.1 / B	42.0 / D	40.3 / D	35.0 / D	54.5 / D	21.8 / C	50.3 / D	58.0 / E	44.5 / D		
West Access	14.2 / B	12.6 / B	n/a	n/a	12.4 / B	24.5 / C	20.5 / C	n/a	n/a	20.8 / C		
SB I-229	20.5 / C	30.1 / C	19.4 / B	19.9 / B	23.2 / C	17.8 / B	31.0 / C	46.7 / D	16.9 / B	25.1 / C		
NB I-229	25.8 / C	11.5 / B	17.9 / B	17.9 / B	17.7 / B	26.2 / C	20.3 / C	13.3 / B	13.3 / B	21.9 / C		
East Access	8.6 / A	11.1 / B	n/a	n/a	8.5 / A	6.8 / A	10.4 / B	n/a	n/a	8.5 / A		
Tallgrass Ave**	47.0 / D	16.8 / B	44.6 / D	32.0 / C	29.7 / C	55.4 / E	43.1 / D	48.9 / D	38.5 / D	45.3 / D		
**Includes new geometry from current 85 th Street Project (Tallgrass to Louise Avenue)												

Table 5 - 2045 Full Access Traffic Signal Operations 6-Lane

'n/a" indicates a minor street approach that HCS Signals doesn't provide data for; operations would be similar to unsignalized conditions.

Bold indicates either an approach LOS E/F or an intersection with an individual movement at LOS F or a queue storage above 1.0.

The following **Table 6** shows the operational results for the 4-lane roadway with 5-fold mainline left turns; the surrounding intersections are essentially unchanged from the previous 6-lane analysis. A cycle length of 90 seconds in the AM peak and 100 seconds in the PM peak; this table represents the approach and intersection LOS, not individual movements. While there are two LOS E approaches, no movements are at a LOS F and there are no queue storage issues.

			AM Peak			PM Peak						
85 th at:		(Dela	y sec/veh /	LOS)		(Dela	y sec/veh /	LOS)				
00 al.	EB	WB	NB	SB	Int.	EB	WB	NB	SB	Int.		
	Approach	Approach	Approach	Approach	IIIL.	Approach	Approach	Approach	Approach	IIIL.		
Sundowner Ave	44.6 / D	19.1 / B	42.0 / D	40.3 / D	35.0 / D	54.5 / D	21.8 / C	50.3 / D	58.0 / E	44.5 / D		
West Access	14.2 / B	12.6 / B	n/a	n/a	12.4 / B	25.0 / C	20.2 / C	n/a	n/a	20.9 / C		
SB I-229	20.5 / C	30.1 / C	19.4 / B	19.9 / B	23.2 / C	17.8 / B	31.0 / C	46.7 / D	16.9 / B	25.1 / C		
NB I-229	25.8 / C	11.5 / B	17.9 / B	17.9 / B	17.7 / B	26.2 / C	20.3 / C	13.3 / B	13.3 / B	21.9 / C		
East Access	8.9 / A	11.0 / B	n/a	n/a	8.6 / A	7.1 / A	11.5 / B	n/a	n/a	9.2 / A		
Tallgrass Ave**	47.0 / D	16.8 / B	44.6 / D	32.0 / C	29.7 / C	55.4 / E	43.1 / D	48.9 / D	38.5 / D	45.3 / D		

**Includes new geometry from current 85th Street Project (Tallgrass to Louise Avenue)

"n/a" indicates a minor street approach that HCS Signals doesn't provide data for; operations would be similar to unsignalized conditions.

Bold indicates either an approach LOS E/F or an intersection with an individual movement at LOS F or a queue storage above 1.0.

OTHER CONSIDERATIONS

With the traffic operations accounted for in the analysis, there are other considerations that the project team considered. The following section reviews some of these considerations:

Land Use

The traffic forecasts utilized for the IJR traffic operations analysis were developed between 2015 and 2016. At the time of that analysis, the travel demand forecast model inputs were updated from the base forecast model assumptions to the then current development information. There are a total of six traffic analysis zones (TAZ) surrounding the proposed interchange area that were updated in the travel demand forecast model to reflect the proposed development area.

- Zones 287 and 288 are between Sundowner Avenue and I-29 north of 85th Street
- Zones 289 and 290 are between I-29 and Tallgrass Avenue north of 85th Street
- Zone 624 is between Sundowner Avenue and I-29 south of 85th Street
- Zone 625 is between I-29 and Tallgrass Avenue south of 85th Street

TAZ	Households	Retail Jobs	Total Jobs
287	501	0	1,154
288	241	52	901
289	0	552	557
290	337	0	2,477
624	10	722	940
625	0	603	603
TOTAL	1,089	1,929	6,632

Table 7 - Land Use - Forecast Model 2015

Significant changes to these inputs could impact the traffic forecasts for the IJR and this memorandum. As development occurs, if there are significant changes to these land use assumptions, traffic impact studies may be required to ensure the surrounding roadway network can handle the changes in traffic forecasts.

Per City of Sioux Falls design standards, a development must compare their estimated trip generation to the projected volumes from the interchange analysis to ensure the volumes would not exceed the previous traffic projections. If the estimated trip generation demands are greater than the projected traffic forecasts, a traffic impact study would be required.

Phased Control/Access Scenario

This development area won't be completely constructed at a single point in time, and therefore the project team had a discussion on whether or not a phased improvement schedule could provide a benefit. This could include constructing a full access intersection now (unsignalized or signalized), with the intent to remove and reduce access as development occurs or traffic problems begin to arise.

This approach would likely result in significant difficulties at the time of the need for the control or access change. A full access intersection, once constructed, is typically expected to be permanent by the adjacent businesses and the traveling public that use the intersection on a daily basis. Even with an agreement in place allowing the removal or reduction in access at a later date, the public and business community would see this change as a major business impact and push back on the change.

Existing Arterial Comparisons

The project team had a discussion on whether or not some of the surrounding traffic corridors follow the same design standards being set forth for the 85th Street corridor. There are two existing corridors in this project area that have similarities with the 85th Street corridor.

CR 106 is an east-west arterial between the City of Tea and the southern portion of the City of Sioux Falls; 41st Street is an east-west arterial in the City of Sioux Falls, north of the project area. Both of these corridors have similarities and difference between them.

The first major difference between these corridors and 85th Street is that CR 106 and 41st Street are existing facilities that have been in place for decades. Design standards have evolved over time, but since this is an existing facility, some of the intersections or access locations were likely in place well before the current design standards. That is why both of these corridors have undergone planning studies to make improvements to each corridor in order to improve the safety and operations of each facility.

On CR 106 the airport location on the west side of I-29, south of CR 106, creates a significant barrier to getting proper intersection spacing along CR 106; as well as the slight skew to I-29 which is closer to Sundowner Avenue than Tallgrass Avenue along CR 106. The existing development between the airport and I-29 has only a single access to get into and out of the area to the roadway network; therefore a full access intersection along CR 106 to serve the existing development area is important.

41st Street has significant safety and congestion issues which are partially due to high traffic volumes and poor intersection and access spacing. The current 41st Street project will construct a DDI at the I-29 interchange, as well as add capacity and reduce access along the corridor; many existing full access, including signalized intersections, will be reduced with the current project to improve safety and intersection spacing.

East Side versus West Side Signalized Access

Along 85th Street, the projected year 2045 traffic volumes will increase from Sundowner Avenue over to Louise Avenue. The projected volumes on the surrounding corridors were as follows:

- Sundowner Avenue : 10,000 vpd to the south and 18,000 vpd to the north
- Tallgrass Avenue : 13,000 vpd to the south and 27,000 vpd to the north
- 85th Street : 6,300 vpd west of Sundowner Avenue, 33,000 vpd east of Sundowner Avenue, 36,000 vpd west of Louise Avenue

Signalizing the East Access intersection would require us to coordinate the signal with both the Tallgrass intersection and the I-29 DDI interchange signals. Because of the larger predicted traffic volumes on the east side of the freeway, the Tallgrass Avenue intersection will require a longer cycle length than the DDI signals can accommodate, and we will start to develop major operational problems on 85th Street at Tallgrass Avenue.

Traffic signal coordination is intended to provide smooth flow along a corridor to reduce travel times by allowing platoons of vehicles to travel through multiple intersections. A well-timed, coordinated system permits continuous movement along an arterial or throughout a network of major streets with minimal stops and delays. In order to coordinate multiple intersections, the cycle length for all intersections in the system have to be identical to keep the intersections in coordination.

The traffic volumes on the west side of the freeway are somewhat lower and there is slightly better spacing between signals which allows us to have a little bit shorter signal cycle length which would potentially work with the DDI signals and allow proper coordination without major impacts to the 85th Street traffic progression.

Both the City of Sioux Falls and the City of Tea have discussed this type of scenario and have determined they would prefer to see similar treatments on each side of the freeway at the two mid-point access locations. If each side was treated differently, there is potential for development to shift between the surrounding TAZ and overload one side of the interchange. In order to ensure this doesn't occur, both the East and West access locations should be treated in a similar manner

CONCLUSIONS

The purpose of access management is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system. While, the access spacing guidelines for both the City of Sioux Falls and the City of Tea are not immediately in support of a median opening between Sundowner Avenue and I-29 and between I-29 and Tallgrass Avenue, the analysis shows that a ³/₄ access would operate reasonably well and would not create any significant traffic or safety issues along the 85th Street corridor.

The proposed East and West access spacing are just under the design standard criteria; the minimum intersection spacing would be approximately 1,070 feet, which is about 80% of the ¼ mile design criteria between the West Access and the I-29 DDI west ramp terminal. All other intersection spacing would be between 83% and 91% of the spacing criteria; this includes Sundowner Avenue to the West access (1,200 feet) and both distances on either side of the East access (1,100 feet, 1,130 feet).

With a median opening and access restricted to ³/₄ access and with two through lanes in each direction on 85th Street, both of the access intersections would operate reasonably well. The mainline 85th Street through movements and right turn movements would not be impacted by this access configuration and the left turns at the East and West ³/₄ access locations would operate at a LOS C or better; a sensitivity test showed that by increasing the left turn volumes by 3 times, the movement would still function at a LOS D or better; increasing by 5 times would result in LOS E/F in the PM peaks. Under the base forecasts, the only poor movement at the ³/₄ access would be the minor street right turn movements onto 85th Street; this delay would not impact 85th Street traffic and would stay on the development side of the intersection. The ³/₄ access would provide for the majority of movements into and out of the development without causing harm to the 85th Street corridor.

However, under a 6-lane roadway configuration, 3-through lanes in each direction on 85th Street, the unsignalized ³⁄₄ access would have failing operations for the mainline left turns and potentially create a safety concern with such a long crossing distance. With signalization of the mainline left turn movements, in both the 4-lane and 6lane roadway configurations, the short phase interruption has minimal impacts to 85th Street traffic and is easily coordinated with the interchange; this would leave Tallgrass Avenue as an uncoordinated intersection or potentially coordinated on a separate system.

Under full access traffic signal control, the East and West intersection access locations would need to be coordinated with the adjacent signalized intersections at Tallgrass Ave and Sundowner Ave as well as the I-29 DDI interchange signals to ensure progression along the corridor. Due to the short cycle length required to ensure the DDI functions properly, the PM peak hour has operational problems at the Tallgrass Avenue intersection. The operational issues are not easily mitigated at Tallgrass Avenue without a longer cycle length in order to serve each movement at the intersection, the current design has dual left turn lanes and two or three through lanes for each approach.

A longer cycle length on the corridor would create a negative safety and operational problem at the I-29 DDI interchange intersections as traffic would queue through each intersection. Additionally, operating the signals as an uncoordinated system would result in vehicle platoons without progression, and arriving on red and yellow phases and potentially stopping at all intersections along the corridor; this results in significant delay increase along 85th Street. With the impacts along the corridor due to full access signalized intersections, the East Access control would not be recommended from a traffic operations and safety standpoint.

If we were to signalize the West Access intersection and coordinate the signals between Sundowner Avenue and the I-29 DDI intersection, while leaving the Tallgrass Avenue intersection uncoordinated or operating on a different coordinated system to the east, we would have a scenario that operates well as the volumes projected on the west side of I-29 are less than the east side of the freeway. The East Access would not be signalized in this scenario, rather served potentially by a ³/₄ access intersection to get traffic into the development; traffic leaving the development area should utilize a well-designed supporting roadway network to get traffic out to Tallgrass Avenue.

In order to not sway development to one side of the interchange over the other, both the City of Sioux Falls and the City of Tea would like to treat the mid-point access location in a similar fashion. Therefore, signalizing the west side and not the east side access is not considered reasonable.

Recommendations

As similar treatments of each access location would be preferred, it would be recommended to provide unsignalized ³/₄ access intersections, with the 4-lane section on 85th Street, at both the East and West Access intersections during the initial construction of the project. The only 6-lane portion of 85th Street should be designed to start on the east side of the East Access intersection and extend to Tallgrass Avenue, as these lanes start and end at the northbound and westbound right turn lanes, this would ensure only two through lanes for the mainline left turns to cross, which provided acceptable operations.

The accommodation of the potential future widening of 85th Street should consider widening on both sides of the roadway. Widening on the outside will allow for the interchange design to be utilized with minimal impacts at and through the interchange and will allow for minimal alignment shifting to accommodate the future project.

As this design change from the IJR analysis does not directly impact the I-29 interchange, a memorandum documenting the changes from the IJR will address SDDOT and FHWA considerations and provide a document for both agencies to provide concurrence on the changes from the IJR documentation.

The design of each access intersection should accommodate potential signalization of the ³/₄ access intersections in either the 4-lane or 6-lane roadway configuration width; this would ensure that the left turn demands would be able to operate acceptably if they fluctuate significantly from the forecasted volumes and the unsignalized movements begin to operate poorly.

The design of 85th Street should accommodate future potential expansion of 85th Street to 6-lanes from the I-29 interchange to the East Access; this could include right of way and other design features. Thus, the East and West Access locations should also be designed accordingly and with the ability to accommodate potential signalization of the ³/₄ access intersections at a later time.

The 85th Street IJR analysis forecasted traffic through the 2045 design year; this analysis did not indicate a 6-lane section need through this time frame. Additional development traffic impact studies conducted since the IJR was approved have indicated some needs along 85th Street that may require spot 6-lane sections, but the need is localized to the Tallgrass Avenue intersection as previously discussed in this document. As traffic projections outside of the 2045 design year could result in the need for 6-lane section, the City will continue to monitor traffic volumes beyond the 2045 design year.

gtj Traffic Forecast Memorandum – 85th Street Access Options Figure 1: I-29/85th St. Interchange Design 2045 HCS ³/₄ Access Reports 2045 HCS Signal Reports

c: Al Murra, SEH Ross Harris, SEH Mark Dierling, SEH

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MEMORANDUM DRAFT

То:	Graham Johnson, PE, PTOE Al Murra, PE SEH Inc
From:	Haifeng Xiao, PE, PTOE HFTE Inc
Date:	August 15, 2019
Subject:	Traffic Forecasts for the new ¾ and Full Access Options on 85 th Street I-29/85 th Street Interchange Study

The traffic forecast memorandum dated on July 29, 2016 documented the traffic forecast assumptions, methodology and results for the I-29/85th Street Interchange Study. The 2045 intersection peak hour traffic forecasts for the Build Scenario S3 were used to conduct operations analysis to evaluate if the proposed interchange and study intersections are able to accommodate future traffic demand.

Two options with new accesses on 85th Street were recently proposed for both sides of the I-29/85th Street DDI (Diverging Diamond Interchange). One is an ³/₄ access option and the other is a conventional 4-leg intersection access option. The 3/4 access option provided by SEH is illustrated in **Figure 1** (the drawing for the full access option is not included in this memo). Concerns, especially with regards to traffic operations, were raised due to the closeness between the new accesses and the interchange intersections. This memorandum documents the peak hour traffic forecast assumptions, steps and results for the two new access options. The traffic forecasts will be subsequently used for traffic operations to address the concerns.

TRAFFIC FORECAST ASSUMPTIONS AND STEPS

The peak hour traffic forecasts for the two access options were developed largely based on the Sioux Falls (SF) travel demand model that was previously used for the I-29/85th Street Interchange Study. Engineering judgements and assumptions were made in the process at this level of analysis. The traffic forecasts were developed following the steps below:

- The AM (7-9am) and PM (16-18pm) trips entering/exiting the four quadrants of the I-29/85th Street were extracted from the 2045 SF travel demand model. The model included all the land uses assumed for the study Scenario S3 in the I-29/85th Street Interchange Study.
- Based on the existing traffic counts in the adjacent intersections, it was assumed the ratio of the peak hour over the 2-hour traffic volumes was 0.6 in the AM peak period while it was 0.57 in the PM peak period. These ratios were respectively applied to the 2-hour model outputs to calculate the AM and PM peak hour traffic volumes generated in the four quadrants.
- Selected links analyses were respectively conducted for the AM and PM periods to determine the directional distributions for the trips entering/exiting the quadrants. The directional percentages

were applied to the trips to calculate the turning movements entering/exiting the quadrants using the access intersections on 85th Street and Sundowner Avenue (or Tallgrass Avenue).

- Through traffic volumes on I-85th Street at the intersections were calculated based on the traffic forecasts at their adjacent intersections that were developed in the I-29/85th Street Interchange Study.
- The turning movements at Sundowner Avenue and Tallgrass Avenue were adjusted to develop traffic forecasts for the full access option while they remained unchanged from the I-29/85th Street interchange study. The traffic forecasts for the interchange intersections remain unchanged for the two access options assuming the two access options wouldn't affect system travel demand in the study area.

TRAFFIC FORECAST RESULTS

The traffic forecasts for the two access options are respectively summarized in Table 1 and Table 2.

Table 1

Peak Hour	85th Street Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
	Sundowner Avenue	20	80	390	590	55	55	35	350	20	240	330	335
	West 3/4 Access			255			80	20	1,260	50	30	825	120
AM	I-29 SB Ramps				190		335		1410	105	270	640	
AIVI	I-29 NB Ramps	70		225				615	985			840	535
	East 3/4 Access			105			265	45	1,085	80	35	1,110	60
	Tallgrass Avenue	80	315	185	330	170	250	355	545	290	210	875	670
	Sundowner Avenue	25	90	390	835	65	80	40	365	20	325	555	475
	West 3/4 Access			295			95	40	1,445	105	65	1,260	120
	I-29 SB Ramps				430		580		1640	100	280	865	
PM	I-29 NB Ramps	70		205				655	1415			1075	690
	East 3/4 Access			195			200	40	1,465	115	45	1,565	135
	Tallgrass Avenue	155	280	335	645	360	485	310	925	425	260	1105	450

2045 Peak Hour Traffic Forecasts for the 3⁄4 Access Option*

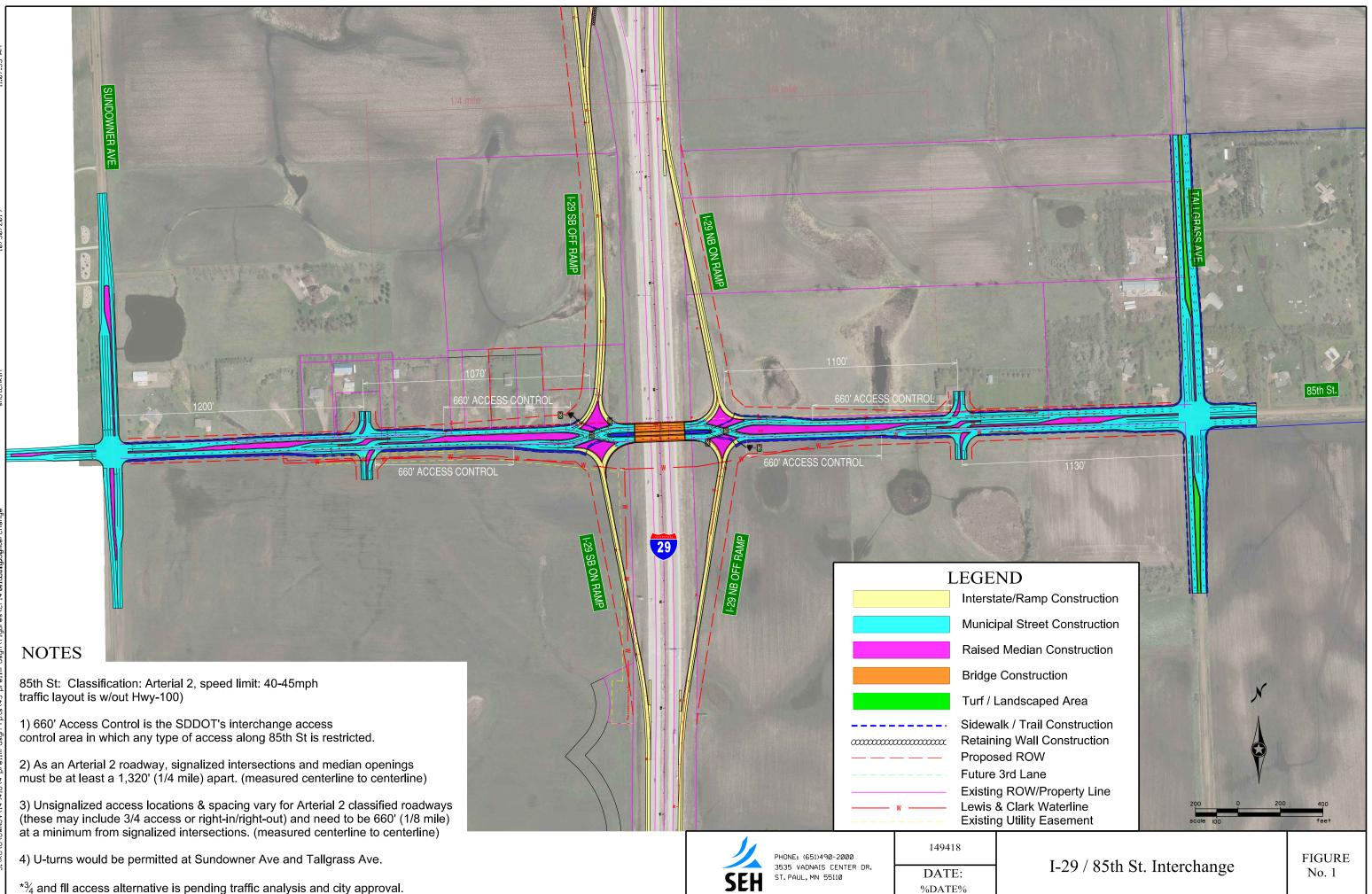
* The traffic forecasts for the adjacent intersections are included for convenience.

Table 2

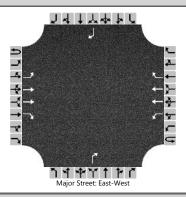
2045 Peak Hour Traffic Forecasts for the Full Access Option*

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Peak Hour	85th Street Intersection	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
	Sundowner Avenue	20	60	390	540	55	55	35	350	20	220	330	355
	West Full Access	60	5	255	100	5	80	70	1,160	50	90	765	120
AM	I-29 SB Ramps				190		335		1410	105	270	640	
AIVI	I-29 NB Ramps	70		225				615	985			840	535
	East Full Access	40	5	105	80	5	265	95	1,035	80	75	1,070	60
	Tallgrass Avenue	40	315	185	270	150	250	305	605	310	170	915	670
	Sundowner Avenue	25	70	390	745	65	80	40	365	20	305	555	495
	West Full Access	80	10	295	130	5	95	80	1,315	105	145	1,180	120
PM	I-29 SB Ramps				430		580		1640	100	280	865	
FIVI	I-29 NB Ramps	70		205				655	1415			1075	690
	East Full Access	80	10	195	60	10	200	100	1,405	115	95	1,485	135
	Tallgrass Avenue	75	280	335	605	340	485	250	965	445	210	1,155	450

* The traffic forecasts for the adjacent intersections are included for convenience.



HCS7 Two-Way Stop-Control Report										
General Information Site Information										
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass							
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls							
Date Performed	8/5/2019	East/West Street	85th Street							
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)							
Time Analyzed	AM Peak	Peak Hour Factor	0.90							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	Project Description 85th Street 3/4 Access Analysis									



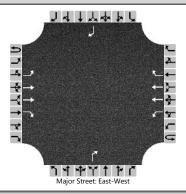
Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	bound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	45	1085	80	0	35	1110	60				105				265
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)											0		0			
Right Turn Channelized		N	lo			Ν	10			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice								<u>.</u>		<u>.</u>			
Flow Rate, v (veh/h)	Τ	50				39						117				294
Capacity, c (veh/h)		523				526						440				431
v/c Ratio		0.10				0.07						0.27				0.68
95% Queue Length, Q ₉₅ (veh)		0.3				0.2						1.1				5.0
Control Delay (s/veh)		12.6				12.4						16.1				29.6
Level of Service (LOS)		В				В						С				D
Approach Delay (s/veh)		0	.5		0.4			16.1				29.6				
Approach LOS								С				D				

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HCS7 Two-Way Stop-Control Report										
	Site Information									
Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass								
SEH Inc.	Jurisdiction	City of Sioux Falls								
8/5/2019	East/West Street	85th Street								
2045	North/South Street	3/4 Access (East of I-29)								
AM Peak	Peak Hour Factor	0.90								
East-West	Analysis Time Period (hrs)	0.25								
85th Street 3/4 Access Analysis										
	Graham Johnson, PE, PTOE SEH Inc. 8/5/2019 2045 AM Peak East-West	Site InformationGraham Johnson, PE, PTOEIntersectionSEH Inc.Jurisdiction8/5/2019East/West Street2045North/South StreetAM PeakPeak Hour FactorEast-WestAnalysis Time Period (hrs)								

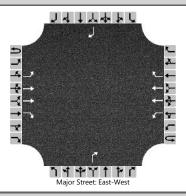


Vehicle Volumes and Adjustments

Approach	Eastbound Westbound									North	bound		Southbound				
	<u> </u>			P			-	-									
Movement	U	L	Т	R	U	L	Т	R	U	L	T	R	U	L	Т	R	
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12	
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1	
Configuration		L	Т	R		L	Т	R				R				R	
Volume (veh/h)	0	135	1085	80	0	105	1110	60				105				265	
Percent Heavy Vehicles (%)	3	3			3	3						3				3	
Proportion Time Blocked																	
Percent Grade (%)											0		0				
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	es		
Median Type Storage				Undi	vided												
Critical and Follow-up H	eadwa	ys															
Base Critical Headway (sec)		4.1				4.1						6.9				6.9	
Critical Headway (sec)		4.16				4.16						6.96				6.96	
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3	
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33	
Delay, Queue Length, an	d Leve	l of S	ervice														
Flow Rate, v (veh/h)		150				117						117				294	
Capacity, c (veh/h)		523				526						440				431	
v/c Ratio		0.29				0.22						0.27				0.68	
95% Queue Length, Q ₉₅ (veh)		1.2				0.8						1.1				5.0	
Control Delay (s/veh)		14.6				13.8						16.1				29.6	
Level of Service (LOS)		В				В						С				D	
Approach Delay (s/veh)		1	.5		1.1			16.1				29.6					
Approach LOS								С				D					

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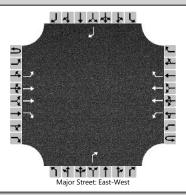
HCS7 Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass						
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls						
Date Performed	8/5/2019	East/West Street	85th Street						
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)						
Time Analyzed	AM Peak	Peak Hour Factor	0.90						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	85th Street 3/4 Access Analysis - 5x LEFTS								



Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	225	1085	80	0	175	1110	60				105				265
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)											0		0			
Right Turn Channelized		N	lo			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		250				194						117				294
Capacity, c (veh/h)		523				526						440				431
v/c Ratio		0.48				0.37						0.27				0.68
95% Queue Length, Q ₉₅ (veh)		2.6				1.7						1.1				5.0
Control Delay (s/veh)		18.0				15.8						16.1				29.6
Level of Service (LOS)		С				С						С				D
Approach Delay (s/veh)		2	.9		2.1			16.1				29.6				
Approach LOS								С				D				

HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass							
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls							
Date Performed	8/5/2019	East/West Street	85th Street							
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)							
Time Analyzed	PM Peak	Peak Hour Factor	0.90							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	85th Street 3/4 Access Analysis									



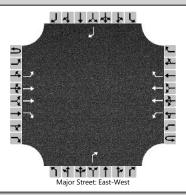
Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	40	1465	115	0	45	1565	135				195				200
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)									0						0	
Right Turn Channelized		N	0			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		44				50						217				222
Capacity, c (veh/h)		309				348						319				293
v/c Ratio		0.14				0.14						0.68				0.76
95% Queue Length, Q ₉₅ (veh)		0.5				0.5						4.7				5.7
Control Delay (s/veh)		18.6				17.1						37.2				47.5
Level of Service (LOS)		С				С						E				E
Approach Delay (s/veh)		0	.5		0.4			37.2				47.5				
Approach LOS					1			E				E				

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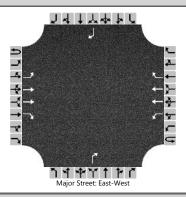
HCS7 Two-Way Stop-Control Report										
General Information		Site Information								
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass							
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls							
Date Performed	8/5/2019	East/West Street	85th Street							
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)							
Time Analyzed	PM Peak	Peak Hour Factor	0.90							
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25							
Project Description	85th Street 3/4 Access Analysis									



Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	bound			North	bound		Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	120	1465	115	0	135	1565	135				195				200
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)											0		0			
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		133				150						217				222
Capacity, c (veh/h)		309				348						319				293
v/c Ratio		0.43				0.43						0.68				0.76
95% Queue Length, Q ₉₅ (veh)		2.1				2.1						4.7				5.7
Control Delay (s/veh)		25.2				22.9						37.2				47.5
Level of Service (LOS)		D				С						E				E
Approach Delay (s/veh)		1	.8		1.7			37.2				47.5				
Approach LOS								E				E				

HCS7 Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass						
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls						
Date Performed	8/5/2019	East/West Street	85th Street						
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)						
Time Analyzed	PM Peak	Peak Hour Factor	0.90						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	85th Street 3/4 Access Analysis - 5x LEFTS								
Lanas									



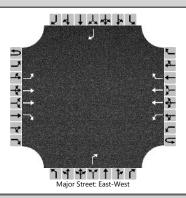
Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	200	1465	115	0	225	1565	135				195				200
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)										(D		0			
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		222				250						217				222
Capacity, c (veh/h)		309				348						319				293
v/c Ratio		0.72				0.72						0.68				0.76
95% Queue Length, Q ₉₅ (veh)		5.2				5.3						4.7				5.7
Control Delay (s/veh)		41.6				37.7						37.2				47.5
Level of Service (LOS)		E				E						E				E
Approach Delay (s/veh)		4	.7		4.4			37.2				47.5				
Approach LOS								E				E				

HCS7 Two-Way Stop-Control Report General Information Site Information Analyst Graham Johnson, PE, PTOE Intersection 85th btwn Sundowner/I-29

Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn Sundowner/I-29
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls
Date Performed	8/5/2019	East/West Street	85th Street
Analysis Year	2045	North/South Street	3/4 Access (West of I-29)
Time Analyzed	AM Peak	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	85th Street 3/4 Access Analysis		

Lanes



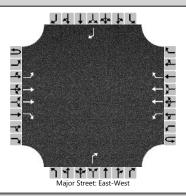
Vehicle Volumes and Adjustments

												1				
Approach		Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	20	1260	50	0	30	825	120				255				80
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)									0						0	
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	'es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice								<u> </u>					
Flow Rate, v (veh/h)		22				33						283				89
Capacity, c (veh/h)		653				456						379				547
v/c Ratio		0.03				0.07						0.75				0.16
95% Queue Length, Q ₉₅ (veh)		0.1				0.2						5.9				0.6
Control Delay (s/veh)		10.7				13.5						37.7				12.9
Level of Service (LOS)		В				В						E				В
Approach Delay (s/veh)		0	.2		0.4			37.7				12.9				
Approach LOS								E				В				

HCS7 Two-Way Stop-Control Report General Information Site Information Analyst Graham Johnson, PE, PTOE Intersection 85th btwn Sundowner/I-29

Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn Sundowner/I-29
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls
Date Performed	8/5/2019	East/West Street	85th Street
Analysis Year	2045	North/South Street	3/4 Access (West of I-29)
Time Analyzed	AM Peak	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	85th Street 3/4 Access Analysis		

Lanes



Vehicle Volumes and Adjustments

							N 411 1					Could be ad				
Approach		Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	60	1260	50	0	90	825	120				255				80
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)											0				0	
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		67				100						283				89
Capacity, c (veh/h)		653				456						379				547
v/c Ratio		0.10				0.22						0.75				0.16
95% Queue Length, Q ₉₅ (veh)		0.3				0.8						5.9				0.6
Control Delay (s/veh)		11.1				15.1						37.7				12.9
Level of Service (LOS)		В				С						E				В
Approach Delay (s/veh)		0	.5		1.3			37.7				12.9				
Approach LOS								E				В				

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HCS7 Two-Way Stop-Control Report								
General Information		Site Information						
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn Sundowner/I-29					
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls					
Date Performed	8/5/2019	East/West Street	85th Street					
Analysis Year	2045	North/South Street	3/4 Access (West of I-29)					
Time Analyzed	AM Peak	Peak Hour Factor	0.90					

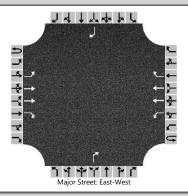
Analysis Time Period (hrs)

0.25

Lanes

Intersection Orientation

Project Description



Vehicle Volumes and Adjustments

East-West

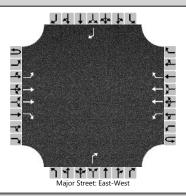
85th Street 3/4 Access Analysis - 5x LEFTS

Approach		Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	100	1260	50	0	150	825	120				255				80
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)											0				0	
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)	Τ	4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)	Τ	111				167						283				89
Capacity, c (veh/h)		653				456						379				547
v/c Ratio		0.17				0.37						0.75				0.16
95% Queue Length, Q ₉₅ (veh)		0.6				1.7						5.9				0.6
Control Delay (s/veh)		11.6				17.4						37.7				12.9
Level of Service (LOS)		В				С						E				В
Approach Delay (s/veh)		0	.8		2.4			37.7				12.9				
Approach LOS								E				В				

HCS7 Two-Way Stop-Control Report General Information Site Information Analyst Graham Johnson, PE, PTOE Intersection 85th btwn Sundowner/I-29

Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn Sundowner/I-29
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls
Date Performed	8/5/2019	East/West Street	85th Street
Analysis Year	2045	North/South Street	3/4 Access (West of I-29)
Time Analyzed	PM Peak	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	85th Street 3/4 Access Analysis		

Lanes



Vehicle Volumes and Adjustments

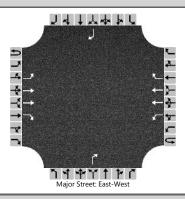
Approach		Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	40	1445	105	0	65	1260	120				295				95
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)										(0			(0	1
Right Turn Channelized		N	0			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of Se	ervice													
Flow Rate, v (veh/h)		44				72						328				106
Capacity, c (veh/h)		425				359						324				379
v/c Ratio		0.10				0.20						1.01				0.28
95% Queue Length, Q ₉₅ (veh)		0.3				0.7						11.3				1.1
Control Delay (s/veh)		14.5				17.5						89.5				18.1
Level of Service (LOS)		В				С						F				С
Approach Delay (s/veh)		0	.4		0.8				89.5				18.1			
Approach LOS									F				С			

HCS7 Two-Way Stop-Control Report **General Information Site Information** Graham Johnson, PE, PTOE Intersection 85th btwn Sundowner/I-29

Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls
Date Performed	8/5/2019	East/West Street	85th Street
Analysis Year	2045	North/South Street	3/4 Access (West of I-29)
Time Analyzed	PM Peak	Peak Hour Factor	0.90
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	85th Street 3/4 Access Analysis		

Lanes

Analyst



Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	bound			North	bound			South	bound	
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	120	1445	105	0	195	1260	120				295				95
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)											D				D	
Right Turn Channelized		Ν	lo			Ν	10			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice				<u> </u>							<u> </u>		
Flow Rate, v (veh/h)		133				217						328				106
Capacity, c (veh/h)		425				359						324				379
v/c Ratio		0.31				0.60						1.01				0.28
95% Queue Length, Q ₉₅ (veh)		1.3				3.8						11.3				1.1
Control Delay (s/veh)		17.3				29.2						89.5				18.1
Level of Service (LOS)		С				D						F				С
Approach Delay (s/veh)		. 1	.2		3.6			89.5				18.1				
Approach LOS	1							F				С				

HCS7 Two-Way Stop-Control Report								
General Information		Site Information						
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn Sundowner/I-29					
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls					
Date Performed	8/5/2019	East/West Street	85th Street					
Analysis Year	2045	North/South Street	3/4 Access (West of I-29)					
Time Analyzed	PM Peak	Peak Hour Factor	0.90					

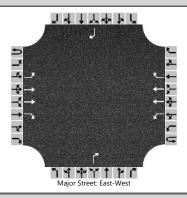
Analysis Time Period (hrs)

0.25

Lanes

Intersection Orientation

Project Description



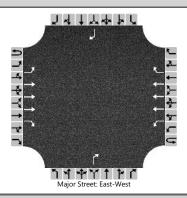
Vehicle Volumes and Adjustments

East-West

85th Street 3/4 Access Analysis - 5x LEFTS

Approach	T	Eastb	ound			West	oound		Northbound				Southbound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R
Priority	10	1	2	3	40	4	5	6	-	7	8	9	-	10	11	12
Number of Lanes	0	1	2	1	0	1	2	1		0	0	1		0	0	1
Configuration		L	Т	R		L	Т	R				R				R
Volume (veh/h)	0	200	1445	105	0	325	1260	120				295				95
Percent Heavy Vehicles (%)	3	3			3	3						3				3
Proportion Time Blocked																
Percent Grade (%)		1									0				0	<u>/</u>
Right Turn Channelized		Ν	lo			Ν	lo			Y	es			Y	es	
Median Type Storage				Undi	vided											
Critical and Follow-up H	eadwa	ys														
Base Critical Headway (sec)		4.1				4.1						6.9				6.9
Critical Headway (sec)		4.16				4.16						6.96				6.96
Base Follow-Up Headway (sec)		2.2				2.2						3.3				3.3
Follow-Up Headway (sec)		2.23				2.23						3.33				3.33
Delay, Queue Length, an	d Leve	l of S	ervice													
Flow Rate, v (veh/h)		222				361						328				106
Capacity, c (veh/h)		425				359						324				379
v/c Ratio		0.52				1.01						1.01				0.28
95% Queue Length, Q ₉₅ (veh)		2.9				11.8						11.3				1.1
Control Delay (s/veh)		22.4				83.8						89.5				18.1
Level of Service (LOS)		С				F						F				С
Approach Delay (s/veh)		2	.6		16.0			89.5				18.1				
Approach LOS								F				С				

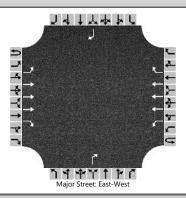
HCS7 Two-Way Stop-Control Report									
General Information		Site Information							
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass						
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls						
Date Performed	8/5/2019	East/West Street	85th Street						
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)						
Time Analyzed	AM Peak	Peak Hour Factor	0.90						
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25						
Project Description	85th Street 3/4 Access Analysis - 6lane								



Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound			
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R		
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12		
Number of Lanes	0	1	3	1	0	1	3	1		0	0	1		0	0	1		
Configuration		L	Т	R		L	Т	R				R				R		
Volume (veh/h)	0	135	1085	80	0	105	1110	60				105				265		
Percent Heavy Vehicles (%)	3	3			3	3						3				3		
Proportion Time Blocked																		
Percent Grade (%)					7 8 9 10 11 12 0 0 1 0 0 1 0 0 1 0 0 1 10 R 0 0 1 10 R 0 0 1 10 105 0 1 265 10 3 0 1 3 0 3 0 10 10 0 3 0 10 10 3 0 3 105 0 10 10 0 3 105 0 10 10 110 10 10 10 10 10 110 10 10 10 10 10 111 10 10 10 30 30 30 30 1117 117 10 10 20 204 10 377 10 10 30 36													
Right Turn Channelized No No										Yes Yes								
Median Type Storage Undivided																		
Critical and Follow-up H	eadwa	ys																
Base Critical Headway (sec)		5.3				5.3						7.1				7.1		
Critical Headway (sec)		5.36				5.36						7.16				7.16		
Base Follow-Up Headway (sec)		3.1				3.1						3.9				3.9		
Follow-Up Headway (sec)		3.13				3.13						3.93				3.93		
Delay, Queue Length, an	d Leve	l of S	ervice															
Flow Rate, v (veh/h)	Τ	150				117						117				294		
Capacity, c (veh/h)		277				279						377				369		
v/c Ratio		0.54				0.42						0.31				0.80		
95% Queue Length, Q ₉₅ (veh)	Í	3.0				2.0						1.3				6.8		
Control Delay (s/veh)		32.3				26.9						18.8				43.9		
Level of Service (LOS)		D				D						С				E		
Approach Delay (s/veh)		3	.4			2	.2			18	3.8			43	3.9			
Approach LOS										(С				E			

	HCS7 Two-Way Stop-Control Report													
General Information		Site Information												
Analyst	Graham Johnson, PE, PTOE	Intersection	85th btwn I-29/Tallgrass											
Agency/Co.	SEH Inc.	Jurisdiction	City of Sioux Falls											
Date Performed	8/5/2019	East/West Street	85th Street											
Analysis Year	2045	North/South Street	3/4 Access (East of I-29)											
Time Analyzed	PM Peak	Peak Hour Factor	0.90											
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25											
Project Description	85th Street 3/4 Access Analysis - 6lanes													



Vehicle Volumes and Adjustments

Approach		Eastb	ound			West	oound			North	bound			South	bound							
Movement	U	L	Т	R	U	L	Т	R	U	L	Т	R	U	L	Т	R						
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12						
Number of Lanes	0	1	3	1	0	1	3	1		0	0	1		0	0	1						
Configuration		L	Т	R		L	Т	R				R				R						
Volume (veh/h)	0	120	1465	115	0	135	1565	135				195				200						
Percent Heavy Vehicles (%)	3	3			3	3						3				3						
Proportion Time Blocked																						
Percent Grade (%)										0 0												
Right Turn Channelized No No										Y	es			Y	es	12 1 R 200						
Median Type Storage																						
Critical and Follow-up H	eadwa	ys																				
Base Critical Headway (sec)		5.3				5.3						7.1				7.1						
Critical Headway (sec)		5.36				5.36						7.16				7.16						
Base Follow-Up Headway (sec)		3.1				3.1						3.9				3.9						
Follow-Up Headway (sec)		3.13				3.13						3.93				3.93						
Delay, Queue Length, an	d Leve	l of S	ervice																			
Flow Rate, v (veh/h)		133				150						217				222						
Capacity, c (veh/h)		141				164						274				252						
v/c Ratio		0.95				0.91						0.79				0.88						
95% Queue Length, Q ₉₅ (veh)		6.6				6.7						6.1				7.5						
Control Delay (s/veh)		124.0				104.2						54.1				72.8						
Level of Service (LOS)		F				F						F				F						
Approach Delay (s/veh)		8	.8			7	.7			54	1.1			72	2.8							
Approach LOS											F				F							

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	HCS	7 Sig	nalize	d In	tersec	tion F	lesu	Its Sur	nmar	У					
								1.1					4 년 4 1	5.1	
General Information								Intersec		1	-	_		4* <u>5</u>	
Agency	SEH Inc.							Duration		0.250				K.	
Analyst	Graham Johnson				e Jun 1			Area Typ	e	Other	•		W A E		
Jurisdiction	SDDOT		Time F		AM P			PHF		0.90		-	W + E 8	÷ +	
Urban Street	85th Street		Analys				1	Analysis		1> 16	5:45	7		ب ۲	
Intersection	Sundowner		File Na	ame	85th 8	St Corric	lor 20	45 AM.xu	s						
Project Description	85th Corridor											<u>1</u>	1 1 4 Y	<u>*1 4</u>	
Demand Information				EB			W	R		NB			SB		
Approach Movement				T	R	1.1	Т	1		Т	R	L	T	R	
Demand (v), veh/h			35	350	_	220	33		20	60	390	540	55	55	
			00	000	20	220		0 000	20	00	000	040	00	00	
Signal Information				5	5	<u> </u>		5 215	. 21				_		
Cycle, s 90.0	Reference Phase	2			74 1				· [- · ,	tz ■		A	`	4	
Offset, s 0	Reference Point	End	Croon	0.5	7 3	3.1	2.1		12.5		1	Y 2	3	4	
Uncoordinated No	Simult. Gap E/W	On			13.9 5.0	5.0	5.0		5.0	,	~	\rightarrow		17	
Force Mode Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.5		1.5	5		6	7	8	
Timer Results				Yellow 5.0 5. Red 1.5 1. EBL EBT 5 2 1.3 3.0		WB	L	WBT	NBI	-	NBT	SBL	-	SBT	
Assigned Phase			5	5 2		1		6	3		8	7		4	
Case Number			1.3		3.0	1.2		3.0	2.0		3.0	2.0		3.0	
Phase Duration, s			9.6		30.0	16.0)	36.4	8.6		19.0	25.0)	35.4	
Change Period, (Y+R	c), S		6.5		6.5	6.5		6.5	6.5 6.5		6.5			6.5	
Max Allow Headway (<i>MAH</i>), s		3.0		0.0	3.0		0.0 2.		3.1		2.9		3.1	
Queue Clearance Time	e (g s), s		2.0			11.5	5		3.2		14.5	18.0)	4.2	
Green Extension Time	e (g e), s		0.3		0.0	0.0		0.0	0.0		0.0	0.4		0.8	
Phase Call Probability			0.62	2		1.00)		0.43	3	1.00	1.00)	1.00	
Max Out Probability			1.00)		1.00)		0.43	3	1.00	1.00)	0.00	
Movement Group Be	oulto			EB			WE			NB			SB		
Movement Group Re Approach Movement	Suits		L	T	R	L	T	R	L	T	R	L	T	R	
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow Rate (()) voh/h		39	389	22	244	366		22	67	267	600	61	50	
Adjusted Saturation FI		In	1688	1772		1688	1772		1688	1772	1502	1639	1772	1502	
Queue Service Time (0.0	18.7		9.5	11.4		1.2	3.0	12.5	16.0	2.2	2.1	
Cycle Queue Clearand	• /		0.0	18.7		9.5	11.4	_	1.2	3.0	12.5	16.0	2.2	2.1	
Green Ratio (g/C)	<i>Je Time (g c), s</i>		0.0	0.26		0.28	0.33	_	0.02	0.14	0.24	0.21	0.32	0.32	
Capacity (<i>c</i>), veh/h			272	463	392	258	588		40	247	368	673	568	482	
Volume-to-Capacity R	atio (X)		0.143	0.841		0.945	0.62	_	0.556	0.270	0.725	0.892	0.108	0.104	
Back of Queue (Q), f)	32.2	372.1		223.4	168.		23.2	56.1	235.4	284.7	37.8	30.7	
Back of Queue (Q), v			1.3	14.6		8.8	6.6	_	0.9	2.2	9.3	11.2	1.5	1.2	
Queue Storage Ratio	· ·	,	0.21	0.00		0.64	0.00		0.15	0.00	0.78	0.47	0.00	0.20	
Uniform Delay (d 1), s		/	32.5	31.5	_	22.4	13.3		43.5	34.7	31.2	34.8	21.5	16.8	
Incremental Delay (d			0.1	16.7	0.3	36.7	4.2		4.4	0.2	6.1	11.4	0.0	0.0	
Initial Queue Delay (a			0.0	0.0	0.0	0.0	0.0	_	0.0	0.0	0.0	0.0	0.0	0.0	
Control Delay (d), s/v	•		32.6	48.2		59.1	17.5	_	47.9	34.9	37.3	46.2	21.5	16.8	
Level of Service (LOS			C	D	C	E	В	A	D	C	D	D	C	B	
Approach Delay, s/veh	,		45.7		D	25.1		C	37.5		D	42.0	<u> </u>	D	
Intersection Delay, s/v						5.8						D			
												5			
Multimodal Results			EB				WE			NB			SB		
Pedestrian LOS Score	e / LOS		2.33	3	В	2.32	2	В	2.44	<u>ا</u>	В	2.11		В	

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		HCS	7 Sig	nalize	ed In	tersec	tion F	lesu	ilts Sur	nmar	у				
Concretilinform									Interes	tion Inf				14741	لمالم
General Inform	nation								Intersec		1	-	- É		2.
Agency		SEH Inc.							Duration		0.250				K
Analyst		Graham Johnson				te Jun 1			Area Typ	e	Other	-			
Jurisdiction		SDDOT		Time F					PHF		0.90		*	w∔e 8	÷ 9
Urban Street		85th Street		Analys					Analysis		1> 16	6:45	* ~		10 41
Intersection		Sundowner		File Na	ame	85th \$	St Corric	dor 20	45 PM 10	0.xus				3 13 - 13 -	
Project Descrip	tion	85th Corridor											<u> </u>	1 1 1 4 1 7	1
Demand Infor	nation				EB	2		W	/B		NB			SB	
Approach Move				L	T	, R	1 1	7	1 ¹	L	T	R		T	R
Demand (v), v				40	36		305			25	70	390	745	65	80
Demand (V), (40	500	5 20	505	50	55 495	25	10	390	745	0.5	00
Signal Informa	ation					5	9	<u> </u>	5 215	. 21					
Cycle, s	100.0	Reference Phase	2	1	۲a	e 1	74	F,	s		<u>↑</u> 2 ¥		4	\mathbf{N}	4
Offset, s	0	Reference Point	End		25	2 1 2				0.1		1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		4.5	23.5 5.0	2.7		2 9.1 5.0		~	\rightarrow		† 7
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.5		1.5		5	6	7	8
Timer Results					Red 1.5 EBL E		WB	L	WBT	NB		NBT	SBI		SBT
Assigned Phas	е			5		2	1		6	3		8	7		4
Case Number				1.1		3.0	1.1		3.0	2.0		3.0	2.0		3.0
Phase Duration	n, s			10.0)	30.0	21.0	2	41.0	41.0 9.2		15.6	33.4	<u>۲</u>	39.8
Change Period	, (Y+ R	c), S		6.5		6.5	6.5		6.5	6.5		6.5	6.5		6.5
Max Allow Hea	dway(/	ИАН), s		3.0		0.0	3.0		0.0			3.1			3.1
Queue Clearar	ice Time	; (g s), s		4.0			16.5			3.6		11.1		7	5.4
Green Extensio	on Time	(ge), s		0.0		0.0	0.0		0.0	0.0		0.0	0.2		0.9
Phase Call Pro	bability			0.71			1.00)		0.54	1	1.00	1.00)	1.00
Max Out Proba	bility			0.00)		1.00)		1.00)	1.00	1.00)	0.00
Movement Gro		sulte			EB			WE	2		NB			SB	
Approach Move				L	T	R	L	T	R	L	T	R	L	T	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow		() veh/h		44	406		324	590		28	78	267	828	72	72
-		ow Rate (s), veh/h/l	n	1688	1772		1688	177		1688	1772	1502	1639	1772	1502
Queue Service			11	2.0	22.7		14.5	32.7		1.6	4.2	9.1	24.7	2.8	3.4
								32.			4.2			<u> </u>	3.4
Green Ratio (g		e Time (<i>g c</i>), s		2.0 0.27	22.7 0.23	_	14.5 0.40	0.34	_	1.6 0.03	4.2 0.09	9.1 0.24	24.7 0.27	2.8 0.33	0.33
Capacity (c),				132	416	_	324	611		45	161	354	883	590	500
Volume-to-Cap		$x_{io}(X)$		0.337	0.974		0.998	0.96	_	0.612	0.484	0.754	0.938	0.122	
	-	/In (95 th percentile)		35.8	502.8		269.5	551.		32.5	80.7	266.6	418.8	50.2	50.6
		eh/In (95 th percenti		1.4	19.8		10.6	21.7		1.3	3.2	10.5	16.5	2.0	2.0
		RQ) (95 th percent	,	0.24	0.00		0.77	0.00		0.22	0.00	0.89	0.70	0.00	0.34
Uniform Delay				30.1	37.9	_	20.6	31.8		48.1	43.2	35.5	35.7	23.2	23.4
Incremental De				0.6	38.1	-	39.0	21.6	_	4.9	0.8	7.9	16.4	0.0	0.0
Initial Queue D				0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (•		30.6	76.0		59.7	53.3		53.0	44.1	43.5	52.1	23.2	23.4
Level of Service				C	70.0	C	E	D	C	D	D	-+5.5 D	D	23.2 C	C
Approach Dela	. ,			69.6		E	49.2		D	44.3		D	47.9		D
Intersection De				03.0			1.3	-	D	74.(47.8 D		
						5							_		
Multimodal Re	sults				EB			WE	3		NB			SB	
Pedestrian LOS		/ LOS		EB 2.34		В	2.30		В	2.52		С	2.11	11	В
I EUESIIIAII LOG					,	Α	2.70		С	1.10		А	2.09		В

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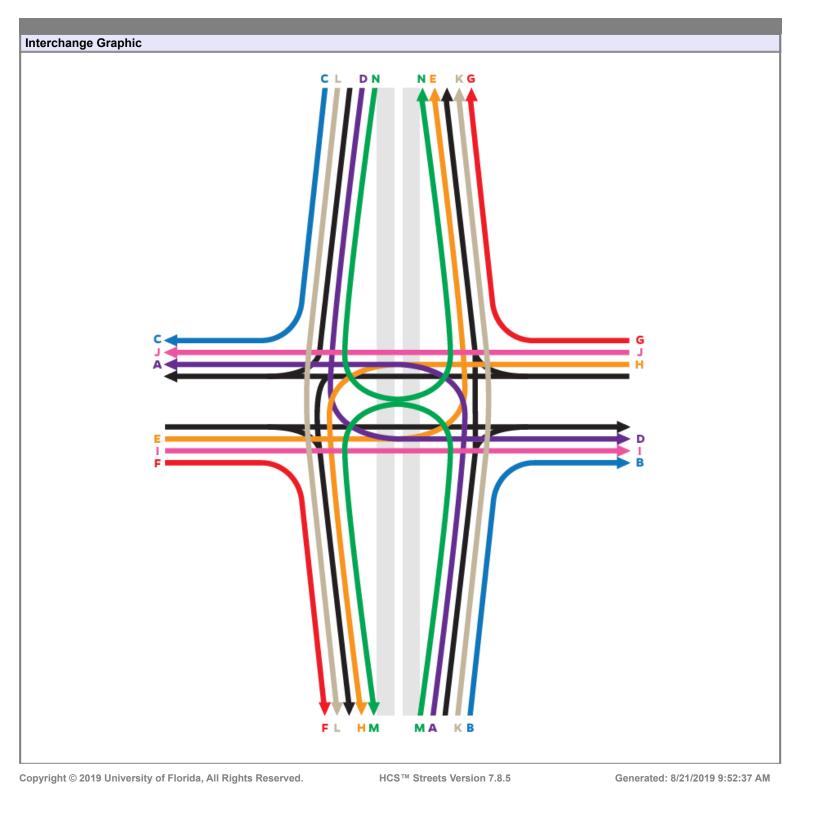
	HCS	7 Sig	nalize	d In	tersec	tion F	lesu	lts Sur	nmar	У				
														ul i
General Informatio	Y							Intersec		1	-	_	4 4 4 +	4° 4
Agency	SEH Inc.							Duration		0.250		_		×
Analyst	Graham Johnson				e Jun 1			Area Typ	e	Other	•			4
Jurisdiction	SDDOT		Time F		AM P			PHF		0.90		*	₩ 1 E 8	₽
Urban Street	85th Street		Analys	sis Yea	r 2045	Build		Analysis	Period	1> 16	:45	7		* *
Intersection	New Signal West		File Na	ame	85th S	St Corric	lor 20	45 AM.xu	s				18. (N. 18)	
Project Description	85th Corridor											1	\$ 1 \$ \$ 1	7 4
Daman d hafarmati								D					00	
Demand Information			<u> </u>	EB		<u> </u>	W	1	<u>.</u>	NB		<u> </u>	SB	
Approach Movemer			L	T	R	L	-		L	T	R	L	T	R
Demand (v), veh/h	1		70	1160) 50	90	76	5 120	60	5	255	100	5	80
Signal Information	1					5		5 215	. 20.	_				1
Cycle, s 90	1	2	-	ĸ	- L •	7 2	₹.				<u> </u>		5	Φ
Offset, s 52		End			3						1	Y 2	3	4
Uncoordinated No		On	Green		26.0	8.0	4.1		14.2	2		4	l	
Force Mode Fixe		On	Yellow Red	1.5	4.5 1.5	4.5 1.5	4.5		4.5	_	5	6		Y
		On	1.00	1.0	1.0	1.0	1.5	0.0	1.5					
Timer Results			EBI	_	EBT	WB	L	WBT	NBI	_	NBT	SBI	_	SBT
Assigned Phase			5		2	1		6	3		8	7		4
Case Number			2.0	-	3.0	2.0	+	3.0	1.1		3.0	1.1		3.0
Phase Duration, s			11.3		43.3	14.0		46.0	10.1		20.2	12.5		22.7
Change Period, (Y-	(+Rc)s		6.0		6.0	6.0		6.0	6.0		6.0	6.0		6.0
Max Allow Headway			3.0		0.0	3.0	_	0.0	3.2		3.4	3.2		3.4
Queue Clearance T			6.1	-	0.0	7.3		0.0	4.8		13.6			5.4
Green Extension Tir			0.1		0.0	1.4		0.0	0.1		0.6	6.9 0.0		0.6
Phase Call Probabil			0.86	;	0.0	0.92		0.0	0.81		1.00	0.94		1.00
Max Out Probability			0.00			0.54			0.00		0.00			0.00
Max Out 1 Tobability			0.00	,		0.5-			0.00	/	0.00	1.00	,	0.00
Movement Group	Results			EB			WB			NB			SB	
Approach Movemer	nt		L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movemen	nt		5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate	e (v), veh/h		78	1289	56	100	849	133	67	6	200	111	6	67
Adjusted Saturation	Flow Rate (s), veh/h/l	In	1688	1687	1502	1688	1687	7 1502	1688	1772	1502	1688	1772	1502
Queue Service Time	e (g s), s		4.1	31.3	1.8	5.3	20.4	7.3	2.8	0.2	11.6	4.9	0.2	3.4
Cycle Queue Cleara	ance Time (g c), s		4.1	31.3	1.8	5.3	20.4	7.3	2.8	0.2	11.6	4.9	0.2	3.4
Green Ratio (g/C)			0.06	0.41	0.41	0.09	0.44	0.44	0.23	0.16	0.16	0.23	0.19	0.19
Capacity (c), veh/h			100	1398	622	150	1498	3 667	414	280	238	421	328	278
Volume-to-Capacity			0.781	0.922	2 0.089	0.668	0.56	7 0.200	0.161	0.020	0.842	0.264	0.017	0.240
), ft/ln (95 th percentile))	76.9	320.2	2 26.8	104.1	349.		52.2	4.7	145.7	89.4	4.5	56.3
), veh/ln (95 th percent		3.0	12.6		4.1	13.8		2.1	0.2	5.7	3.5	0.2	2.2
	io (RQ) (95 th percen	,	0.26	0.00		0.35	0.00		0.17	0.00	0.49	0.30	0.00	0.19
Uniform Delay (d 1			41.7	18.4		42.8	28.1		27.8	32.0	20.8	28.5	30.0	31.3
Incremental Delay (•		2.2	5.6	0.1	1.7	1.4	0.6	0.1	0.0	3.1	0.1	0.0	0.2
Initial Queue Delay			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d),			43.9	24.1	11.1	44.5	29.5		27.8	32.0	23.9	28.7	30.0	31.4
Level of Service (LC			D	C	B	D	C	C	C	C	C	C	C	C
Approach Delay, s/v	,		24.6		C	30.5		C	25.0		C	29.7		C
						7.1		-				C		-
Intersection Delay												-		
Intersection Delay, s			EB											
Intersection Delay, s Multimodal Results	S						WB			NB			SB	
			2.24		В	2.12		В	2.45		B	2.45		В

		HCS	7 Sig	nalize	d In	tersec	tion F	kesi	ults	s Sur	nmar	/				
														1 1	4,744↑	L.I.
General Inform	nation	0=									tion Info	1		- É		4≈ <u>/</u> x
Agency		SEH Inc.								uration,		0.250				<u>₹_</u>
Analyst		Graham Johnson		Analys			5, 2016			еа Тур	e	Other		 		2
Jurisdiction		SDDOT		Time F					P			0.90		**	w	₽
Urban Street		85th Street		Analys						nalysis		1> 16	:45	7		* ~
Intersection		New Signal West		File Na	ame	85th 8	St Corrio	dor 2	045	PM 10	0.xus				10. A. 31	
Project Descrip	tion	85th Corridor												1	4 1 4 M	7 4
Demand Inform	nation				EB	<u> </u>		V	VB			NB		1	SB	
Approach Move				L	T	, R			T	R	L	T	R	L	T	R
Demand (v), v				80	131		145		180	120	80	10	295	130	5	95
	CI III			00	101	0 100	110		100	120	00	10	200	100	U	00
Signal Informa	ation					5		<u> </u>	ζ	21	20.	,			_	
Cycle, s	100.0	Reference Phase	2		P^	e 1	न⇒ `	٦.	~	5	5			→		Φ
Offset, s	68	Reference Point	End	Green	65	4.2	43.5	5.		3.3	12.6		1	Y 2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Yellow		0.0	43.5	- 5. - 4.		0.0	4.5	<u> </u>	X			sta
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5			0.0	1.5	5		6	7	8
Timer Results				EBL	-	EBT	WB	L	V	VBT	NBL	-	NBT	SBL	-	SBT
Assigned Phas	е			5		2	1		6		3		8	7		4
Case Number				2.0		3.0	2.0		3.0		1.1		3.0	1.1		3.0
Phase Duration	n, s			12.5	;	49.5	16.7	7	5	53.7	11.8		18.6	15.2	2	21.9
Change Period	, (Y+ R	c), S		6.0		6.0	6.0		6	6.0	6.0		6.0	6.0		6.0
Max Allow Hea	dway(/	<i>MAH</i>), s		3.0		0.0	3.0		(0.0	0 3.2		3.4			3.4
Queue Clearan				7.1			10.8	3			6.3		12.5	9.3		6.2
Green Extension	on Time	(g _e), s		0.0		0.0	0.1		0.0		0.0		0.1	0.0		0.4
Phase Call Pro	bability			0.92	2		0.99	9			0.92	2	1.00	0.98	3	1.00
Max Out Proba	bility			0.85	5		0.19	9			0.53	;	1.00	1.00)	0.00
Movement Gro		sulte			EB			W	D			NB	_		SB	
Approach Move	-	Suits		L	T	R	L	T		R	L	T	R	L	T	R
Assigned Move				5	2	12	1	6	-	16	3	8	18	7	4	14
Adjusted Flow) veh/h		89	146		154	125		127	89	11	161	144	6	72
-		ow Rate (s), veh/h/l	n	1688	1687		1688	168		1502	1688	1772	1502	1688	1772	1502
Queue Service		. ,	1	5.1	42.9		8.8	34.		7.6	4.3	0.6	10.5	7.3	0.3	4.2
		e Time (g c), s		5.1	42.9	_	8.8	34.	-	7.6	4.3	0.6	10.5	7.3	0.3	4.2
Green Ratio (g		e fille (<i>g c</i>), s		0.07	0.43		0.11	0.4		0.48	4.3 0.22	0.0	0.13	0.22	0.3	0.16
Capacity (c), v	-			110	1467	_	181	161	-	716	392	223	189	396	282	239
Volume-to-Cap		tio (X)		0.809	0.99		0.850	0.7	-	0.178	0.227	0.050	0.852	0.365	0.020	0.302
	-	(In (95 th percentile)		80.2	320	_	160	526		186.6	81.1	11	224	137	5.3	71.7
		eh/In (95 th percenti		3.2	12.6	_	6.3	20.	-	7.3	3.2	0.4	8.8	5.4	0.2	2.8
		RQ) (95 th percent		0.27	0.00	_	0.53	0.0	-	0.62	0.27	0.00	0.75	0.46	0.00	0.24
Uniform Delay			,	41.5	15.9	-	39.3	32.		26.3	32.3	38.4	42.8	33.5	35.4	37.1
Incremental De				2.1	11.6		9.2	2.	-	0.4	0.1	0.0	23.9	0.2	0.0	0.3
Initial Queue D		-		0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (•		43.5	27.5		48.5	35.	-	26.7	32.4	38.5	66.7	33.7	35.5	37.4
Level of Service				D	C	B	D	D		C	C	D	E	C	D	D
Approach Dela				27.4		C	35.8			D	53.8		D	34.9	L	C
Intersection De	-					33	3.2							С		
Multimodal Re	sults			EE				W	В			NB			SB	
Pedestrian LOS			2.31	EB 2.31		2.14	4		В	2.46	;	В	2.45	5	В	
Bicycle LOS So	core / LC	DS		1.86	;	В	1.8	1		В	0.92		А	0.85	5	А

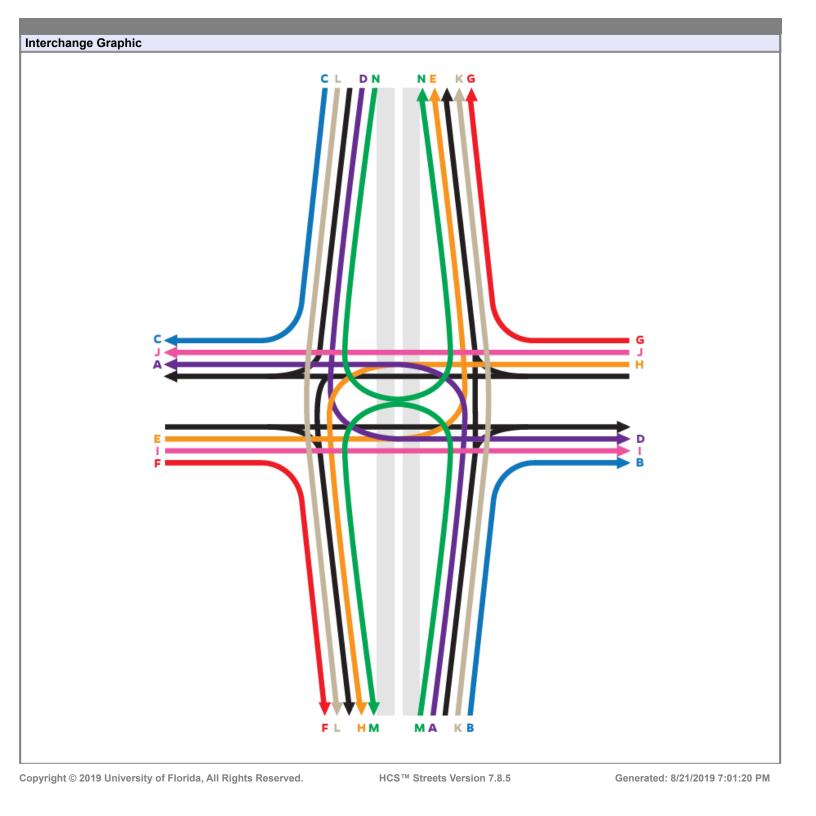
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					НС	:S7	Inte	rchar	iges l	Resu	lts Sı	ummai	у					
0	11.6	c.																
	al Inforn	nation	0511									Intercha	-					
Agency			SEH	-								Interchar				iamond		
Analyst				am Johnso	on	-		sis Date	1			Segmen				00		
Jurisdio			SDDC				Durati	on, h	0.250			Freeway				orth-Sou		
Interse				St at I-29 St			PHF		0.90			Arterial [Directior	١	E	ast-Wes	t	
File Na			85th \$	St Corrido	r 2045 A	M.xu	JS											
Project	Descrip	tion	85th (Corridor														
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Deman	-					_	EBL	EBT	EBR				R NBL	_			SBT	SBR
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E		1		39.2		0.0		39.2	<u> </u>	10		No	C	_				
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Control	l Delay (d) , s/ve	eh				11.8	15.8	11.8	12.1	14.7	16.6		0.0	17.3		0.0	15.8
Level o	Level of Service (LOS)						В	В	В	В	В	В			В			В
Approa	ch Dela	y, s/veh	/LOS				15.6	3	В	15.	3	В	17.3	3	В	15.8	3	В
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	ch Move						L	Т	R	L	Т	R	L	Т	R	L	Т	R
<u> </u>	I Delay (eh				23.4	13.9	30.1	20.6	20.5			0.0	20.1		0.0	20.6
	of Service						C	B	C	C	C	C			C			C
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Jurisdicion SDOT Duration, N 0.200 Freeway Direction North-South Intersection 8th St Corndor 2045 PM H00 xus Prive Set Vect Set Vect Demand EBL EBL EBL EBL WBT WBR NBL NBL NBT SBL SB	<u> </u>			<u> </u>				Analy	aia Data	lun d	F 0040	<u>, </u>							a	
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Demand EBL EBL EBT EBR WBL WBL WBL NBL NBT NBL NBT NBL NBT NBL NBT NBL NBT NBT NBL NBT NBL NBT NBT<		-	tion			r 2045	PIVI	IUU.XUS												
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$ \begin{array}{ c c c c c c } \hline C & 644 & 12.5 & 0.0 & 12.5 & N_{O} & N_{O} & A \\ \hline D & 0 & 6.4 & 12.5 & 0.0 & 12.5 & N_{O} & N_{O} & A \\ \hline D & 0 & 6.4 & 0.0 & 6.4 & N_{O} & N_{O} & A \\ \hline D & 1 & 54.4 & 0.0 & 54.4 & N_{O} & N_{O} & C \\ \hline F & 56 & 33.9 & 0.0 & 33.9 & N_{O} & N_{O} & C \\ \hline G & 4011 & 19.9 & 0.0 & 19.9 & N_{O} & N_{O} & B \\ \hline I & 1571 & 40.3 & 0.0 & 29.3 & N_{O} & N_{O} & B \\ \hline I & 1571 & 40.3 & 0.0 & 41.2 & N_{O} & N_{O} & C \\ \hline J & 889 & 41.2 & 0.0 & 41.2 & N_{O} & N_{O} & C \\ \hline J & 889 & 41.2 & 0.0 & 41.2 & N_{O} & N_{O} & C \\ \hline J & 0 & 0.0 & 0.0 & - & - & - \\ \hline I & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline Signalized Intersection One Results & EB & VB & VB & SB \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ Control Delay (d), siveh & 16.8 & 33.9 & 21.8 & 7.7 & 19.6 & 16.0 & 0.0 & 22.2 & 0.0 & 12.5 \\ \hline Level of Service (LOS) & B & C & C & A & B & B \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Delay, siveh / LOS & 33.5 & C & 18.8 & B & 22.2 & C & 12.5 & B \\ \hline Intersection Delay, siveh / LOS & 33.5 & C & 18.8 & B & 22.2 & C & 12.5 \\ \hline Signalized Intersection Two Results & EB & VB & VB & VB & VB & VB & VB & VB$			-			-					-	_								
$ \begin{array}{ c c c c c c } \hline D & 0 & 6.4 & 0.0 & 6.4 & N & N & N & A \\ \hline E & 1 & 54.4 & 0.0 & 54.4 & N & N & C \\ \hline F & 56 & 33.9 & 0.0 & 33.9 & N & N & O & C \\ \hline G & 401 & 19.9 & 0.0 & 19.9 & N & N & B \\ \hline I & 1571 & 40.3 & 0.0 & 40.3 & N & N & C \\ \hline J & 889 & 41.2 & 0.0 & 41.2 & N & N & C \\ \hline J & 889 & 41.2 & 0.0 & 41.2 & N & N & C \\ \hline L & 0 & 0.0 & - & - & - \\ \hline L & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & 0.0 & - & - & - \\ \hline N & 0 & 0.0 & - & - & - \\ \hline Signalized Intersection One Results & EE & WB & R & E & SB \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Delay, s/veh / LOS & 33.5 & C & 18.8 & B & 22.2 & C & 12.5 & B \\ \hline Intersection Delay, s/veh / LOS & 56.4 & 62 & 33.4 & 21.6 & 19.9 & 0.0 & 28.3 & 0.0 & 21.8 \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Obelay, s/veh / LOS & 33.5 & C & 18.8 & B & 22.2 & C & 12.5 & B \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & A & A & C & C & B & C & C & 12.5 \\ \hline Approach Movement & L & A & A & C & C & B & C & C & 12.5 \\ \hline Approach Movement & L & A & A & A & C & C & B & C & C & 12.5 \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & A & A & C & C & B & C & C & 12.8 \\ \hline Approach Movement & L & A & A & C & C & B & C & C & 21.8 \\ \hline Approach Movement & L & A & A & C & C & B & C & C & 21.8 \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & T & R & L & T & R & L & T & R \\ \hline Approach Movement & L & C & Z & Z & C & 21.8 \\ \hline \hline \ Approach M$										<u> </u>	-					_				
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Approach MovementLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRLTRCCCCCDDD </td <td>Signali</td> <td>zed Inte</td> <td>ersectio</td> <td>on One</td> <td>Results</td> <td></td> <td></td> <td></td> <td>EB</td> <td></td> <td></td> <td>W</td> <td>/B</td> <td></td> <td></td> <td>NB</td> <td></td> <td></td> <td>SB</td> <td></td>	Signali	zed Inte	ersectio	on One	Results				EB			W	/B			NB			SB	
$ \begin{array}{c c c c c c c } \hline \begin{titmedicate{control Delay (d), s/veh} & 16.8 & 16.8 & 33.9 & 21.8 & 37.7 & 19.6 & 16.0 & 0.0 & 22.2 & 0.0 & 0.0 & 12.5 \\ \hline \end{titmedicate{control Delay (d), s/veh / LOS} & B & C & C & A & B & B & B & 22.2 & C & 12.5 & B \\ \hline \end{titmedicate{control Delay, s/veh / LOS} & 33.5 & Z & 0.0 & 12.5 & 0.0 & 12.5 & 0.0 & 0.$								L	Т	R	L	Т	-	R	L	Т	R	L	Т	R
Level of Service (LOS)BCCABBCCABBCCABBCCABBCCABBCCABBACBAABACABBACABBACABBBCCABAABBBBCCABAABBBBBBBBBBBBABACABBBBBBBBBBBABABABB <t< td=""><td><u> </u></td><td></td><td></td><td>h</td><td></td><td></td><td></td><td>16.8</td><td>33.9</td><td>21.8</td><td>7.7</td><td>19</td><td>.6</td><td>16.0</td><td></td><td>0.0</td><td>22.2</td><td></td><td>0.0</td><td>12.5</td></t<>	<u> </u>			h				16.8	33.9	21.8	7.7	19	.6	16.0		0.0	22.2		0.0	12.5
Intersection Delay, s/veh / LOS 24.9 $I = 24.9$ Signalized Intersection Two Results $I = 24.9$ $I = 24.9$ Signalized Intersection Two Results $I = 12^{-1}$ $I = 24.9$ $I = 24.9$ $I = 24.9$ Signalized Intersection Two Results $I = 12^{-1}$ $I = 12$	Level o	• • •						В	С	С	Α	B	3	В			С			В
Signalized Intersection Two Results $\mathbb{E} \mathbb{E}$ \mathbb{E}		Approach Delay, s/veh / LOS							5	С	18	.8		В	22.2		С	12	2.5	В
Approach MovementLTR </td <td>Interse</td> <td>ction De</td> <td>lay, s/ve</td> <td>eh / LO</td> <td>S</td> <td></td> <td></td> <td></td> <td></td> <td>2</td> <td>4.9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>С</td> <td></td> <td></td>	Interse	ction De	lay, s/ve	eh / LO	S					2	4.9							С		
Approach MovementLTR </td <td></td>																				
Control Delay (d) , s/veh20.5 6.4 6.2 33.4 21.6 19.9 0.0 28.3 0.0 21.8 Level of Service (LOS)CAACCBCC	Signali	zed Inte	ersectio	on Two	Results				ii.			W	/B						SB	
Level of Service (LOS) C A A C C B C C C C A Approach Delay, s/veh / LOS 6.4 A 21.2 C 28.3 C 21.8 C															L	Т		L		R
Approach Delay, s/veh / LOS 6.4 A 21.2 C 28.3 C 21.8 C									6.4	6.2		_	_	19.9		0.0			0.0	
										1							1			
Intersection Delay, s/veh / LOS 13.3 B		•••						6.4				.2		С	28.3		С		1.8	С
	Interse	ction De	lay, s/ve	eh / LO	S					1	3.3							В		



		HCS	7 Sig	nalize	d Int	ersec	tion F	Resi	ilts Su	mmar	У				
									ľ•••						
General Inform	nation	(<u></u>							Intersec		1	-	- 1	444	
Agency		SEH Inc.							Duration		0.250				<u>k</u> _
Analyst		Graham Johnson				e Jun 1			Area Typ	be	Other	•			2
Jurisdiction		SDDOT		Time F		AM P			PHF		0.90		*	W + E 8	♦
Urban Street		85th Street		Analys		_			Analysis		1> 16	:45	7		*
Intersection		New Signal East		File Na	ame	85th 8	St Corric	dor 20)45 AM.xu	IS				18. N. 31	
Project Descrip	otion	85th Corridor											1	1414Y	
Demand Infor	mation				EB			١٨	/B		NB			SB	
Approach Move					T	R	1 1	1	r R	1 1		R	L	<u>ЗБ</u> Т	R
Demand (v), v				95	103	_	75		70 60	40	5	105	80	5	265
Demand (V), (30	105	00	15	10	10 00	40	5	105	00	5	205
Signal Informa	ation							<u> </u>	5 210	. 20.					I
Cycle, s	90.0	Reference Phase	2	1	P 4	d₽ –	L '		7 7				→	י ר	Φ
Offset, s	8	Reference Point	End					_				1	Y 2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		1.5 0.0	40.6	3.4 4.5		13.0 4.5	,	~	Δ		sta
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.		1.5		5	6	7	8
		· · ·													
Timer Results				EBI	-	EBT	WB	L	WBT	NBI	-	NBT	SBI	_	SBT
Assigned Phas	е			5		2	1		6	3		8	7		4
Case Number				2.0		3.0	2.0		3.0	1.1		3.0	1.1		3.0
Phase Duration	1, S			13.1		48.1	11.6	3	46.6	9.4		19.0	11.3	3	21.0
Change Period	Period, (Y+R c), s					6.0	6.0		6.0	6.0		6.0	6.0		6.0
Max Allow Hea	dway(/	<i>MAH</i>), s		3.0		0.0	3.0		0.0	3.2		3.4	3.2		3.4
Queue Clearar	ice Time	e (g s), s		7.5			6.2			3.9		7.2	6.0		14.3
Green Extensio	on Time	(ge),s		0.2		0.0	0.1		0.0	0.0		0.7	0.0		0.7
Phase Call Pro	bability			0.93	3		0.88	3		0.67	7	1.00	0.89)	1.00
Max Out Proba	bility			0.00)		0.00)		0.00)	0.00	1.00)	0.00
				_					_						
Movement Gro		sults			EB			WE	1		NB			SB	
Approach Move				L	Т	R	L	T	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow		•		105	1149		83	118		44	6	94	89	6	211
-		w Rate (s), veh/h/l	n	1688	1687	-	1688	168		1688	1772	1502	1688	1772	1502
Queue Service				5.5	28.3	4.3	4.2	30.		1.9	0.2	5.2	4.0	0.2	12.3
		e Time (g c), s		5.5	28.3	4.3	4.2	30.		1.9	0.2	5.2	4.0	0.2	12.3
Green Ratio (g				0.08	0.47	0.47	0.06	0.4		0.20	0.14	0.14	0.20	0.17	0.17
Capacity (c),				133	1579		104	152		374	255	216	380	295	250
Volume-to-Cap				0.795	0.727		0.800	0.78	1	0.119	0.022	0.436	0.234	0.019	0.846
		In (95 th percentile)		100.6		_	70.7	444		35.7	4.8	86.6	73.5	4.6	206.8
		eh/In (95 th percenti	,	4.0	17.6	4.3	2.8	17.		1.4	0.2	3.4	2.9	0.2	8.1
		RQ) (95 th percent	lie)	0.34	0.00	0.37	0.24	0.0		0.12	0.00	0.29	0.24	0.00	0.69
Uniform Delay				38.9	29.0	20.7	35.8	33.		29.3	33.1	35.2	30.1	31.4	36.4
Incremental De				3.1	2.3	0.3	2.0	1.6		0.1	0.0	0.5	0.1	0.0	3.0
Initial Queue D		•		0.0	0.0	0.0	0.0	35.		0.0		0.0	0.0	0.0	0.0
Control Delay (Level of Servic				42.1 D	31.3 C	21.0 C	37.8 D	35. D	2 24.6 C	29.4 C	33.1 C	35.7 D	30.2 C	31.4 C	39.4 D
Approach Dela		31.5		C	34.8		C	33.6		C	36.6		D		
Intersection Dela		51.0	,		34.0 3.5		U	33.0	,		30.0 C	,			
				3.	0.0						U				
Multimodal Re	sults				EB			W	3		NB			SB	
Pedestrian LOS		/ LOS		2.12		В	2.20		B	2.45		В	2.45	11	В
Bicycle LOS So				1.60		B	1.59		B	0.73		A	0.99		A
				1.50		_			_	0.70		••	0.00		••

		HCS	7 Sig	nalize	d In	tersec	tion F	lesi	ults Su	mmar	у				
Concretinform	otion								Interne	tion Inf	o ren oti r			4 년 4 1	b L
General Inform	nation								Intersec		1/		- É		
Agency		SEH Inc.							Duration		0.250				R.
Analyst		Graham Johnson				te Jun 1			Area Typ	e	Other	•			4
Jurisdiction		SDDOT		Time F					PHF		0.90		- <u>+</u>	W B B	± +
Urban Street		85th Street				ar 2045			Analysis		1> 16	5:45	<u>√</u>		5 5
Intersection		New Signal East		File Na	ame	85th 8	St Corric	dor 20	045 PM 10	0.xus					
Project Descrip	tion	85th Corridor												1414Y	14
Demand Inform	nation				EB			W	/B		NB			SB	
Approach Move				L	T	R	L	1	r R			R	L	T	R
Demand (v), v				100	140		95		85 135	80	10	195	60	10	200
Demand (V), V				100	140	5 115	90	14	00 100	00	10	195	00	10	200
Signal Informa	ation		_			<u>s </u>	<u> </u>		5 3	. 24					I
Cycle, s	100.0	Reference Phase	2			₽_, ^	⊫⊰		_				→	\	Φ
Offset, s	61	Reference Point	End									1	2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		35.1 4.5	8.0 4.5	4.0		13.6 4.5		χ.	4	L	r †3
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.		1.5		5	6	7	
				r											
Timer Results				EBI	-	EBT	WB	L	WBT	NB		NBT	SBI	-	SBT
Assigned Phas	е			5		2	1		6	3		8	7		4
Case Number				2.0		3.0	2.0		3.0	1.1		3.0	1.1		3.0
Phase Duration	1, S			14.0)	55.1	13.4	4	54.4	12.0)	21.0	10.6	3	19.6
Change Period	e Period, (Y+R c), s					6.0	6.0		6.0	6.0		6.0	6.0		6.0
Max Allow Hea			3.0		0.0	3.0		0.0	3.2		3.4	3.2		3.4	
Queue Clearan	÷ :	· · ·		8.4			7.7			6.5		12.2	5.3		12.8
Green Extensio				0.0		0.0	0.1		0.0	0.1		0.8	0.1		0.8
Phase Call Pro				0.95	5		0.93			0.92		1.00	0.84		1.00
Max Out Proba				1.00			0.00			0.04		0.00	0.00		0.00
Movement Gro	-	sults			EB			WE	1		NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow	Rate (v), veh/h		111	1560) 128	98	152	8 139	89	11	161	67	11	167
Adjusted Satura	ation Flo	ow Rate (s), veh/h/l	n	1688	1687	7 1502	1688	168	7 1502	1688	1772	1502	1688	1772	1502
Queue Service	Time (g	g s), S		6.4	43.1	4.2	5.7	44.4	4 8.4	4.5	0.5	10.2	3.3	0.5	10.8
Cycle Queue C	learanc	e Time (<i>g c</i>), s		6.4	43.1	4.2	5.7	44.4	4 8.4	4.5	0.5	10.2	3.3	0.5	10.8
Green Ratio (g				0.08	0.49	0.49	0.07	0.4		0.20	0.15	0.15	0.20	0.14	0.14
Capacity (c), v	/eh/h			136	1657	737	124	163	4 727	356	265	225	352	240	204
Volume-to-Cap	acity Ra	itio(X)		0.819	0.942	2 0.173	0.787	0.93	85 0.191	0.250	0.042	0.716	0.190	0.046	0.818
		In (95 th percentile)		142.8			80.1	548		83.9	10.7	175.5	62.1	10.9	109.3
		eh/In (95 th percenti		5.6	20.8		3.2	21.		3.3	0.4	6.9	2.4	0.4	4.3
-		RQ) (95 th percent	ile)	0.48	0.00	0.20	0.27	0.0		0.28	0.00	0.58	0.21	0.00	0.36
Uniform Delay				43.1	20.9	12.4	47.0	36.	7 12.3	34.2	36.4	40.5	33.7	37.6	15.8
Incremental De	-			20.6	8.5	0.3	0.4	1.4	0.1	0.1	0.0	1.6	0.1	0.0	3.1
Initial Queue D		· ·		0.0	0.0	0.0	0.0	0.0	_	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (63.7	29.4	12.7	47.4	38.	0 12.3	34.3	36.4	42.1	33.8	37.6	18.9
Level of Service		E	С	В	D	D	В	С	D	D	С	D	В		
Approach Dela		30.4	ł	С	36.5	5	D	39.2	2	D	23.8	3	С		
Intersection De				33	3.2						С				
Multimodal Re					EB			WE			NB	_		SB	_
Pedestrian LOS				2.16		B	2.2		B	2.45		В	2.46		В
Bicycle LOS So	core / LC	DS		1.97	/	В	2.06	5	В	0.92	2	A	0.89)	А

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		HCS	7 Sig	nalize	d In	tersec	tion F	Resi	ilts Sui	mmar	у				
General Inform	otion								Interees	tion Inf	o ren oti d			4741	b L
	hation								Intersec		W.		- 1		12.
Agency		SEH Inc.					- 0010		Duration		0.250				K
Analyst		Graham Johnson				e Jun 1			Area Typ	be	Other			w∔e	2
Jurisdiction		SDDOT		Time F		AM P			PHF		0.90		<u>+</u>	w + E S	₩ +
Urban Street		85th Street		Analys					Analysis		1> 16	5:45			· ¥
Intersection		Tallgrass		File Na	ame	85th 8	St Corric	dor 20	45 AM.xu	IS			_ Ц	1. 1. A A	
Project Descrip	tion	85th Corridor											<u>^</u>	4 † 4 Y	<u>1111</u>
Demand Inform	nation				EB			W	/B		NB			SB	
Approach Move	ement			L	Т	R	L		r R	L	Т	R	L	Т	R
Demand (v), v	eh/h			305	605	5 310	170	91	15 670	40	315	185	270	150	250
							_	_							
Signal Informa	r		-	-			¥La -		5 20	a 24				κ	X
Cycle, s	90.0	Reference Phase	2		'	° 📑 –	R		S I		17 5	1		3	-◆
Offset, s	57	Reference Point	End	Green		16.4	11.3	3.4		15.2	2		<u> </u>	I	
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.5	4.5	4.		4.5		~			- P
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.	5 1.5	1.5		5	6	7	8
Timer Results				EBI		EBT	WB	1	WBT	NBI		NBT	SBL		SBT
Assigned Phase	e		_	5		2	1		6	3	-	8	7	-	4
Case Number	•			2.0		3.0	2.0		3.0	2.0		3.0	2.0		3.0
Phase Duration	I S			17.3	3	39.6	13.		35.5	9.4		21.2	16.1		27.9
Change Period		c) S		6.0		6.0	6.0		6.0	6.0		6.0	6.0		6.0
Max Allow Head				3.0		0.0	3.0		0.0	3.0		3.1	3.0		3.1
Queue Clearan	. .	· · ·		11.2	,	0.0	7.1		0.0	3.2		13.9	10.0		17.5
Green Extensio				0.0	-	0.0	0.1		0.0	0.0		1.3	0.1	·	1.7
Phase Call Pro		(9 °), °		1.00)	0.0	0.99		0.0	0.67		1.00	1.00)	1.00
Max Out Proba				1.00			1.00			0.00		0.49	1.00		0.15
Movement Gro	-	sults			EB			WE			NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I				339	672	278	189	101		44	350	206	300	167	278
-		ow Rate (s), veh/h/l	n	1639	1609		1639	168		1639	1687	1502	1639	1687	<u> </u>
Queue Service				9.2	10.6	_	5.1	26.1		1.2	8.7	11.9	8.0	3.5	<u> </u>
Cycle Queue C		e Time (<i>g c</i>), s		9.2	10.6		5.1	26.1		1.2	8.7	11.9	8.0	3.5	
Green Ratio (g	,			0.13	0.37		0.08	0.3		0.04	0.17	0.17	0.11	0.24	<u> </u>
Capacity (c), v				411	1803	_	259	110		122	568	253	369	822	
Volume-to-Capa Back of Queue	· ·	itio(X) /In(95 th percentile)		0.825 182.6	0.372		0.730 93.4	0.92 441.		0.364	0.616 155	0.813	0.814	0.203 61.7	
		eh/In (95 th percentile)		7.2	6.8	10.4	93.4 3.7	441.		0.9	6.1	8.4	6.5	2.4	
		RQ) (95 th percent		0.46	0.00	_	0.31	0.0		0.05	0.00	0.53	0.25	0.00	
Uniform Delay				42.5	25.8		40.5	29.		42.3	34.7	36.1	39.0	27.1	1
Incremental De				8.6	0.4	2.1	2.6	13.		0.7	0.4	10.0	10.2	0.0	<u> </u>
Initial Queue De		•		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	1
Control Delay (,		51.1	26.2		43.1	42.9		43.0	35.1	46.1	49.3	27.1	0.0
Level of Service				D	С	С	D	D	A	D	D	D	D	С	Α
Approach Delay				34.6	;	С	26.	5	С	39.5	5	D	25.9)	С
Intersection De				30).4						С				
	•													<u> </u>	
Multimodal Re		// 00			EB			WE			NB			SB	
Pedestrian LOS				2.57		C	2.59		C	2.72		C	2.80		C
Bicycle LOS Sc	ore / LC	5		1.20		Α	2.10	ו נ	В	0.98	5	A	1.10		A

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		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	Its Su	nmar	У				
Ormer all f	4 *								1-4	41				4741	NU.
General Inform	nation	Ϊ							Intersec		W			444+	
Agency		SEH Inc.							Duration		0.250				
Analyst		Graham Johnson				e Jun 1			Area Typ	e	Other	•	_ <u>→</u>		± 2
Jurisdiction		SDDOT		Time F		PM P	eak		PHF		0.90		*	w 🗍 E 8	∲ ←
Urban Street		85th Street		Analys	sis Yea	r 2045	Build		Analysis	Period	1> 16	6:45	N		- - *
Intersection		Tallgrass		File Na	ame	85th 8	St Corric	lor 20	45 PM 10	0.xus				al al como	
Project Descrip	otion	85th Corridor											1	4144	<u>1</u> 4
									_				_		
Demand Infor				<u> </u>	EB			W	1		NB			SB	
Approach Move				L	Т	R	L	Т			Т	R	L.	Т	R
Demand (v), v	/eh/h			250	965	445	210	11	55 450	75	280	335	605	340	485
Signal Informa	ation				5				1 1 111						
	1	Deference Dhase	2	-		╡、	Hع_		5 216	. et				5	4
Cycle, s	100.0 94	Reference Phase	2 End	-		a 🔁 🛛	F	7	Ϋ́Ι.				Y 2	3	4
Offset, s		Reference Point		Green		23.1	6.9	4.5		12.0)	_	<u> </u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow		4.5	4.5	4.5		4.5				7	P
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.5	5 1.5	1.5		5	6	7	8
Timer Results				EBI		EBT	WB	1	WBT	NBI		NBT	SBI		SBT
Assigned Phas	e			5	-	2	1	-	6	3	-	8	7	_	4
Case Number	<u> </u>			2.0		3.0	2.0	-	3.0	2.0		3.0	2.0		3.0
	se Duration, s					42.0	15.0		44.1	10.5		18.0	25.0		32.5
Change Period		-) C		12.9 6.0		6.0	6.0		6.0	6.0		6.0	6.0		6.0
Max Allow Hea				3.0		0.0	3.0		0.0	3.0		3.1	3.0		3.1
Queue Clearar	2 ·	· · ·		8.9		0.0	9.0		0.0	4.5		14.0	21.0		28.5
						0.0	9.0		0.0		_				
Green Extensio		(<i>g</i> e), s		0.0		0.0			0.0	0.1		0.0	0.0		0.0
Phase Call Pro				1.00			1.00			0.90		1.00	1.00		1.00
Max Out Proba	DIIIty			1.00)		1.00)		0.00)	1.00	1.00)	1.00
Movement Gro	oup Res	sults			EB			WE	}		NB			SB	
Approach Move	-			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow), veh/h		278	1071		233	128		83	311	239	672	378	539
		ow Rate (s), veh/h/l	n	1639	1609		1639	168		1639	1687	1502	1639	1687	
Queue Service				6.9	17.9	31.0	7.0	38.0		2.5	8.9	12.0	19.0	9.3	
		e Time (<i>g</i> _c), s		6.9	17.9	31.0	7.0	38.0		2.5	8.9	12.0	19.0	9.3	
Green Ratio (g		6 mile (g c), 6		0.07	0.36		0.09	0.38		0.05	0.12	0.21	0.19	0.26	
Capacity (c),				226	1737		296	1286		148	405	316	623	894	
Volume-to-Cap		atio(X)		1.230	0.617		0.789	0.99	_	0.564	0.768		1.080	0.423	
· · ·		/In (95 th percentile)		244.2			142.7	649		46.1	183.6	255	480.8	164.5	
		eh/In (95 th percenti		9.6	8.7	13.9	5.6	25.6	_	1.8	7.2	10.0	18.9	6.5	
		RQ) (95 th percent		0.61	0.00	0.94	0.48	0.00	_	0.12	0.00	0.64	0.74	0.00	
Uniform Delay	,	,, ,		49.8	25.2	27.9	44.6	30.9	_	46.8	42.7	37.1	40.5	30.4	
Incremental De				116.0	0.5	9.4	9.7	24.6	_	1.3	7.9	9.1	59.4	0.1	
Initial Queue D		•		0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Control Delay (,		165.8	25.8	37.3	54.3	55.5	_	48.0	50.5	46.2	99.9	30.5	0.0
Level of Service				F	25.8 C	57.3 D	D	55.0 E	A 0.0	46.0 D	50.5 D	40.2 D	99.9 F	30.5 C	0.0 A
Approach Dela				г 49.9	L	D	41.6		D	48.6	<u> </u>	D	г 49.5		D
Intersection Dela				49.5			41.0 6.9		D	40.0	,		49.0 D	,	U
milersection De	ay, S/VE					40	J.Ə						U		
Multimodal Re	sulte				EB			WE	3		NB			SB	
Pedestrian LOS		/1.05		2.74		С	2.60		C	2.73		С	2.71	11	С
Bicycle LOS So				1.50		B	2.00		B	1.01	_	A	1.80	_	B
				1.30		U	2.10	,	D	1.0		Λ	1.00	,	D

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		HCS	7 Sig	nalize	d Int	ersec	tion R	lesu	lts Sur	nmar	у				
General Inforn	nation								Intersec	tion Inf	ormatio	חר	al a	4444	ta la
Agency	ation	SEH Inc.							Duration		0.250				
Analyst		Graham Johnson		Apolyc	vie Date	e Jun 1	5 2016		Area Typ		Other		_1 _1		<u>د</u> 4
						AM P			PHF		0.90		- → ×	w ‡ e	<u>≻</u>
Jurisdiction		SDDOT		Time F						Doriod	1> 16				* +
Urban Street		85th Street				· 2045		IL	Analysis			0.40			<u> </u>
Intersection	tion	Sundowner	2/4 4 4	File Na		85th 3	St Corrio	IOF 204	5 AM 3q	rt 6-LN.	xus		_	4 1 4 M	2
Project Descrip	tion	85th Corridor 6-Lan	3/4 AC	cess Sig	gnai									المراجب الجار	
Demand Inform	nation				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			35	350	20	240	330) 335	20	80	390	590	55	55
					- 11										
Signal Informa				-	1	R	╘┓╹	י ו	s 215	121			_	ĸ	
Cycle, s	90.0	Reference Phase	2				, 🗮 📍	5			12	┢┙┛	€₂		*↓ 4
Offset, s	0	Reference Point	End	Green	3.1	5.4	23.5	2.1	11.5	11.8	}		5		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	5.0	0.0	5.0	5.0	5.0	5.0				\	ヤ
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.5	1.5	1.5		5	6	7	8
Timer Results				EDI		EDT				ND		NDT	CD1		CDT
				EBI 5		EBT 2	WB		WBT 6	NBI 3	-	NBT 8	SBI 7	-	SBT
Assigned Phase	e								-	· · · ·		-			4
Case Number				1.1 9.6		3.0	1.1 15.0		3.0	2.0		3.0	2.0		3.0 36.4
Phase Duration				9.6		30.0 6.5			35.4 6.5	8.6		18.3	26.7		
Change Period Max Allow Head	-			3.0		0.0	6.5 3.0		0.0	6.5 2.9		6.5 3.1	6.5 2.9		6.5 3.1
Queue Clearan				3.0		0.0	9.8		0.0	3.2		13.8	2.9		4.1
Green Extensio				0.0		0.0	9.0		0.0	0.0		0.0	0.7		0.8
Phase Call Pro		(ge), s		0.62		0.0	0.99		0.0	0.0		1.00	1.00		1.00
Max Out Proba				0.02			1.00			0.01		1.00	0.51		0.00
Max Out 1100a	onity			0.02	-		1.00	,		0.0		1.00	0.01		0.00
Movement Gro	oup Res	ults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate (v), veh/h		39	389	22	205	282	200	22	89	267	656	61	44
Adjusted Satura	ation Flo	w Rate (s), veh/h/l	n	1688	1772	1502	1688	1772	1502	1688	1772	1502	1639	1772	1502
Queue Service	Time (g	g s), S		1.4	18.7	1.0	7.8	7.5	5.3	1.2	4.1	11.8	17.5	2.1	1.8
Cycle Queue C	learance	e Time (<i>g c</i>), s		1.4	18.7	1.0	7.8	7.5	5.3	1.2	4.1	11.8	17.5	2.1	1.8
Green Ratio (g	/C)			0.36	0.26	0.26	0.36	0.32	0.32	0.02	0.13	0.23	0.22	0.33	0.33
Capacity (c), v	/eh/h			399	462	392	292	569	482	40	233	339	735	588	498
Volume-to-Cap		. ,		0.097	0.841	0.057	0.701	0.495		0.556	0.382	0.786	0.892	0.104	0.089
		In (95 th percentile)		23	372.1	16.8	167.6	118	70.3	23.2	76.8	253.7	297.7	37	26.7
	v	eh/In (95 th percenti	,	0.9	14.6	0.7	6.6	4.6	2.8	0.9	3.0	10.0	11.7	1.5	1.1
		RQ) (95 th percent	tile)	0.15	0.00	0.11	0.42	0.00	0.00	0.15	0.00	0.85	0.50	0.00	0.18
Uniform Delay				19.5	31.5	24.9	26.1	12.2	10.4	43.5	35.8	32.8	33.9	20.8	20.7
Incremental De		·		0.0	16.7	0.3	5.3	2.6	2.3	4.4	0.4	10.7	9.6	0.0	0.0
Initial Queue D		•		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (19.5	48.2	25.2	31.4	14.9	12.6	47.9	36.1	43.4	43.5	20.8	20.7
Level of Service	. ,			B 44.6	D	С	С	В	В	D	D	D	D	С	С
<u> </u>	Approach Delay, s/veh / LOS					D	19.1		В	42.0)	D	40.3	3	D
Intersection De	lay, s/ve	eh / LOS				3	5.0						D		
Multimodel De	Multimodal Results										ND			00	
Pedestrian LOS		/1.05		2.33	EB	В	2.30	WB	В	2.44	NB	В	2.11	SB	В
Bicycle LOS Sc				1.23		A	1.96		B	1.11		A	1.74		B
Dicycle LOS SC				1.23	,	7	1.90	,	U	1.1		Λ	1.74		U

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	1103	/ Sig	nalize	a m	ersec		kesu	Its Sur	nmar	y				
General Information							ſ	Interess	tion Inf	ormotic			4 7 4 +	b L
	051114							Intersec		1/		- 1		
Agency	SEH Inc.							Duration	-	0.250				R
Analyst	Graham Johnson				e Jun 1			Area Typ	e	Other	•			
Jurisdiction	SDDOT		Time F		PM P			PHF		0.90			w‡e s	♦
Urban Street	85th Street				r 2045			Analysis		1> 16	5:45	<u>ک</u>		<u>म</u> भ
Intersection	Sundowner		File Na		85th 8	St Corrid	lor 20	45 PM 3q	rt 6-Ln.:	xus			Sec. 25 - 35	
Project Description	85th Corridor 6-Lan	e 3/4 A	ccess S	ignal								<u>1</u>	4 1 4 1	1
Demand Information				EB			W	3		NB			SB	
Approach Movement			L	Т	R	L	Т		1 1	T	R	L	T	R
Demand (v), veh/h			40	365	_	305	55		25	90	390	835	65	80
Beinana (V), Venin			-10	000	20	000	00	0 470	20	00	000	000	00	00
Signal Information		_			5	-	4	5 215	. 21				_	J
Cycle, s 100.0	Reference Phase	2	1	P° •	(² 2	743				tr27 ■		4	י ר	4
Offset, s 0	Reference Point	End	Green	25	2.5	25.4	2.7	19.3	7.5		1	Y 2	3	4
Uncoordinated No	Simult. Gap E/W	On	Yellow		5.0	5.0	5.0		5.0		▶	\rightarrow	L	t z
Force Mode Fixed		On	Red	1.5	1.5	1.5	1.5		1.5		5	6	7	8
Timer Results			EBL	-	EBT	WB	L	WBT	NB	-	NBT	SBL	-	SBT
Assigned Phase			5		2	1		6	3		8	7		4
Case Number			1.1		3.0	1.1		3.0	2.0		3.0	2.0		3.0
Phase Duration, s			10.0)	31.9	19.1	1	41.0	9.2		14.0	35.0)	39.8
Change Period, (Y+R	c), S		6.5		6.5	6.5		6.5	6.5		6.5	6.5		6.5
Max Allow Headway (3.0		0.0	3.0		0.0	2.9		3.1	2.9		3.1
Queue Clearance Time			3.7			12.5	5		3.6		9.5	30.2	2	5.4
Green Extension Time			0.0		0.0	0.1		0.0	0.0		0.0	0.0		0.8
Phase Call Probability			0.71			1.00			0.54		1.00	1.00)	1.00
Max Out Probability			1.00			1.00			0.15		1.00	1.00		0.00
				, ii										
Movement Group Re	sults			EB			WB	10		NB			SB	
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Movement			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate ()			44	406	22	249	453	225	28	100	211	928	72	72
Adjusted Saturation FI		n	1688	1772		1688	1772		1688	1772	1502	1639	1772	1502
Queue Service Time (g s), S		1.7	22.1	1.1	10.5	17.0	6.7	1.6	5.5	7.5	28.2	2.8	3.4
Cycle Queue Clearand	ce Time (<i>g</i> c), s		1.7	22.1	1.1	10.5	17.0		1.6	5.5	7.5	28.2	2.8	3.4
Green Ratio (g/C)			0.38	0.25		0.38	0.34	_	0.03	0.08	0.20	0.28	0.33	0.33
Capacity (c), veh/h			295	451	382	316	611	517	45	133	301	934	590	500
Volume-to-Capacity R	. ,		0.151	0.899		0.787	0.74		0.612	0.752	0.701	0.993	0.122	0.144
Back of Queue (Q), f			28.8	448.1	19.1	205.6	193.	_	32.5	137.2	219.3	506.5	50.2	50.6
Back of Queue (Q), v	· ·	,	1.1	17.6	0.8	8.1	7.6	3.2	1.3	5.4	8.6	19.9	2.0	2.0
Queue Storage Ratio	(RQ) (95 th percent	ile)	0.19	0.00	0.13	0.51	0.00	0.00	0.22	0.00	0.73	0.84	0.00	0.34
Uniform Delay (d 1), s			21.3	36.0	28.2	29.2	14.0	11.3	48.1	45.3	37.2	35.7	23.2	23.4
Incremental Delay (d	2), s/veh		0.1	23.5	0.3	5.8	5.0	1.6	4.9	19.1	6.0	27.7	0.0	0.0
Initial Queue Delay (a	3), s/veh		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay (d), s/v	reh		21.4	59.5	28.5	34.9	19.0	12.9	53.0	64.5	43.2	63.4	23.2	23.4
Level of Service (LOS)		С	E	С	С	В	В	D	E	D	E	С	С
Approach Delay, s/veh		54.5	5	D	21.8	3	С	50.3	3	D	58.0)	E	
	Intersection Delay, s/veh / LOS					4.5						D		
Multimodal Results				EB			WB			NB			SB	
Pedestrian LOS Score			2.41		В	2.30	_	В	2.59		С	2.11	_	В
Bicycle LOS Score / L	OS		1.27		А	2.57	7	С	1.05	5	А	2.26	6	В

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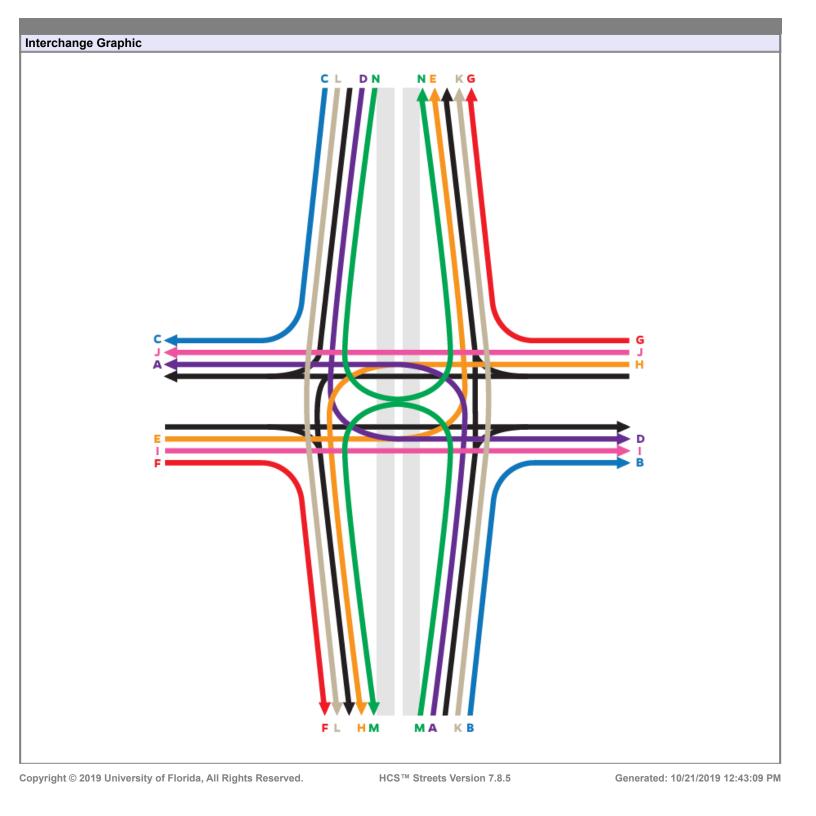
			J						lts Sur						
General Inform	nation								Intersect	tion Inf	ormatic	on	k	147 <mark>41</mark>	4 L
Agency		SEH Inc.							Duration,		0.250			ΥĻ	
Analyst		Graham Johnson		Analvs	sis Date	e Jun 1	5, 2016		Area Typ		Other		¥¥		بر 4
Jurisdiction		SDDOT		Time F		AM P			PHF	-	0.90		⇒ →	w∱E	
Urban Street		85th Street				r 2045			Analysis	Period	1> 16	:45			÷ •
Intersection		New 3/4 Signal We	st	File Na					15 AM 3q					+ 0	
Project Descrip	otion	85th Corridor 6-Lan												1414Y	7 4
i rojoot b ocomp			0/1/10		Jinean										
Demand Inform	mation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	/eh/h			100	1260	50	150	82	5 120		0	255		0	80
Signal Informa	10				a .	_ 5	¥ 1	421				_			
Cycle, s	90.0	Reference Phase	2		Г ^е	7 "			12			1	$\mathbf{\nabla}_{2}$	3	× ↓ 4
Offset, s	22	Reference Point	End	Green	7.5	1.2	66.3	1.0	0.0	0.0			<u>,</u>		
Uncoordinated		Simult. Gap E/W	On	Yellow	4.5	0.0	4.5	1.0	0.0	0.0					レ
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0	0.0	0.0		5	6	7	8
Timer Results				EBI		EBT	WB		WBT	NBI		NBT	SBI		SBT
Assigned Phas				5	-	2	1		<u>vvв1</u> 6	INDI	-	8	SBI		4
Case Number	ic .			2.0		3.0	2.0		3.0			o 7.0			7.0
Phase Duration				13.5		72.3	2.0		73.5			3.0			3.0
Change Period				6.0		6.0	6.0		6.0			2.0		+	2.0
Max Allow Hea				3.0		0.0	3.0		0.0			3.4			3.4
Queue Clearan				7.5		0.0	8.7		0.0			3.0		+	3.0
Green Extensio				0.1		0.0	0.1	-	0.0			0.0			0.0
Phase Call Pro		(9,0), 3		1.00)	0.0	1.00)	0.0			1.00	<u> </u>	+	1.00
Max Out Proba				0.01			0.06					1.00			1.00
	lonity			0.0			0.00					1.00			1.00
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16		8	18		4	14
Adjusted Flow	Rate (v), veh/h		105	1321	52	136	748	109		0	172		0	56
Adjusted Satura	ation Flo	ow Rate (s), veh/h/l	n	1688	1687	1502	1688	1687	1502		1772			1772	
Queue Service	Time (g	g s), S		5.5	24.1	1.3	6.7	12.1	4.4		0.0			0.0	
Cycle Queue C	learanc	e Time (<i>g c</i>), s		5.5	24.1	1.3	6.7	12.1	4.4		0.0			0.0	
Green Ratio (g	g/C)			0.08	0.74	0.74	0.10	0.75	0.75		0.01			0.01	
Capacity (c), v	veh/h			141	2483	1105	164	2529	1126		20			20	
Volume-to-Cap	acity Ra	itio(X)		0.743	0.532	0.047	0.829	0.296	6 0.097		0.000			0.000	
		/In (95 th percentile)		94.7	315.3	12.6	101.4	178.8			0			0	
		eh/In (95 th percenti	,	3.7	12.4	0.5	4.0	7.0	1.8		0.0			0.0	
Queue Storage	e Ratio (RQ) (95 th percent	tile)	0.32	0.00	0.04	0.34	0.00	0.15		0.00			0.00	
Uniform Delay	(d 1), s	/veh		40.0	12.0	5.2	28.9	9.0	8.7		0.0			0.0	
Incremental De				1.2	0.3	0.0	4.8	0.3	0.1		0.0			0.0	
Initial Queue D		•		0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (41.2	12.4	5.3	33.7	9.3	8.8		0.0	0.0		0.0	0.0
Level of Service				D	В	A	С	A	A			A			A
Approach Dela				14.2	2	В	12.6	6	В	0.0		А	0.0		Α
Intersection De	lay, s/ve	eh / LOS				12	2.4						В		
Na. 14								14/5			NID			05	
Multimodal Re		/1.00		4.00	EB		4.00	WB		0.40	NB	D	0.47	SB	
Pedestrian LOS				1.99		B	1.88		B	2.46	_	B	2.46		B
Bicycle LOS So				1.78		B	1.49		A	0.77	_	A	0.58		A

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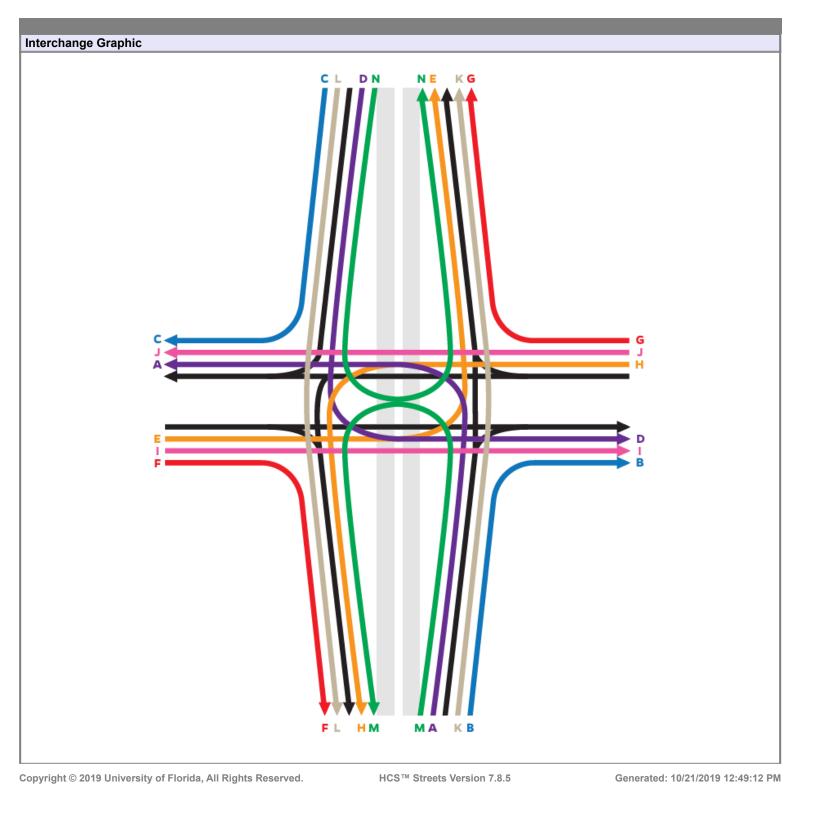
		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Sur	nmar	у				
0	C.													4741	NIT .
General Inform	nation	0							Intersect					, T	4. 7
Agency		SEH Inc.							Duration,	-	0.250		_1		R.
Analyst		Graham Johnson		1		e Jun 1			Area Typ	е	Other		**		• • [▲]
Jurisdiction		SDDOT		Time F		PM P			PHF		0.90		*	w∱e	*
Urban Street		85th Street				r 2045			Analysis		1> 16	:45	7		र २
Intersection		New 3/4 Signal We		File Na		85th \$	St Corric	lor 204	45 PM 3q	rt 6-Ln.:	xus			<u>1</u>	
Project Descrip	tion	85th Corridor 6-Lan	e 3/4 A	ccess S	ignal									1 4 1 4 M	1
Demand Inform	mation				EB			W	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				200	1445		325	126	_		0	295		0	95
				1				<u> </u>		<u> </u>					i and
Signal Informa	17			_	2	_ 5	<u> </u>	4 21				<u> </u>			
Cycle, s	100.0	Reference Phase	2		F "	<u>ר</u> י			12				$\mathbf{\nabla}_{2}$	3	≭↓
Offset, s	22	Reference Point	End	Green	13.7	4.2	67.1	1.0	0.0	0.0			<u> </u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	4.5	0.0	4.5	1.0	0.0	0.0		>			Þ
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0	0.0	0.0		5	6	7	8
Timer Results				EBI		EBT	WB	1	WBT	NBI	1	NBT	SBI		SBT
Assigned Phas	0			5		2	1		6		-	8	30	-	4
Case Number	C			2.0		3.0	2.0	\rightarrow	3.0			7.0			7.0
Phase Duration				19.7		73.1	23.9		77.3			3.0	<u> </u>		3.0
				6.0		6.0	6.0		6.0	<u> </u>			<u> </u>	_	
-	e Period, (Y+R c), s low Headway (<i>MAH</i>), s								0.0			2.0 3.4	<u> </u>		2.0
				3.0		0.0	3.0		0.0	<u> </u>	_		<u> </u>		3.4
Queue Clearan Green Extensio				13.7 0.0		0.0	17.8 0.1	5	0.0			3.0 0.0			3.0 0.0
Phase Call Pro		(<i>g</i> e), s		1.00		0.0	1.00		0.0	<u> </u>	_	1.00	<u> </u>		1.00
Max Out Proba				1.00			1.00					1.00			1.00
	onity			1.00	,		1.00	,				1.00			1.00
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16		8	18		4	14
Adjusted Flow	Rate (v), veh/h		202	1459	106	284	1101	105		0	217		0	72
Adjusted Satura	ation Flo	ow Rate (s), veh/h/l	n	1688	1687	1502	1688	1687	1502		1772			1772	1
Queue Service	Time (g	g s), S		11.7	35.8	3.9	15.8	21.4	4.7		0.0			0.0	
Cycle Queue C	learanc	e Time (g c), s		11.7	35.8	3.9	15.8	21.4	4.7		0.0			0.0	
Green Ratio (g	ŋ/C)			0.14	0.67	0.67	0.18	0.71	0.71		0.01	İ		0.01	1
Capacity (c), v	/eh/h			232	2263	1007	302	2405	5 1070		18			18	
Volume-to-Cap	acity Ra	itio (X)		0.872	0.645	0.105	0.939	0.458	3 0.098		0.000			0.000	
Back of Queue	(Q), ft/	/In (95 th percentile)		179.2	463	49	243.3	322.2	2 58.5		0			0	
		eh/In (95 th percenti		7.1	18.2	1.9	9.6	12.7	2.3		0.0			0.0	1
		RQ) (95 th percent		0.60	0.00	0.16	0.81	0.00			0.00			0.00	
Uniform Delay				41.9	21.6	9.6	24.2	12.7	10.8		0.0			0.0	
Incremental De				8.6	0.4	0.1	28.1	0.5	0.1		0.0			0.0	
	itial Queue Delay (<i>d</i> ₃), s/veh					0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (ontrol Delay (<i>d</i>), s/veh					9.7	52.3	13.2	10.9		0.0	0.0		0.0	0.0
Level of Service				50.5 D	С	Α	D	В	В			Α			Α
Approach Dela		24.5	5	С	20.5	5	С	0.0		A	0.0		A		
Intersection De				20	D.8						С				
Multimodal Re					EB			WB			NB			SB	
Pedestrian LOS				2.01		В	1.90		В	2.47		В	2.47		B
Bicycle LOS So	core / LC	DS		2.09)	В	2.05	5	В	0.85	5	A	0.61		A

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					Н	CS7	' Inte	rchar	nges	Re	sult	s Su	ımma	iry							
Conor	ol Inform	nation										1	Intoroh		o Info	rm oti a					
	al Inforn	nation	SEH Ir										Interch					Diam	and		
Agency Analys				m Johnso	20		Analys	sis Date		15 2	016		Intercha Segme	-				500	onu		
Jurisdie			SDDO				Durati		0.25		010		Freewa						-Sout	·h	
Interse				t at I-29 \$	SB		PHF	011, 11	0.20				Arterial	-		1			West		
File Na			<u> </u>	t Corrido					0.90			/	Aitenai	Dire	CIUT		L		vvest		
	Descrip	tion		Corridor 6			-														
Појссі	Descrip		05010			ACC	033 010	griai													
Demar	nd						EBL	EBT	EB	י א	NBL	WB	T WB	R	NBL	NBT	NB	R	SBL	SBT	SBR
Interse	ction On	e Dema	and (v)), veh/h			1	1410	105	5	1	640) 27	0		0	190)		0	335
Interse	ction Tw	o Dema	nd(v)	, veh/h			1	985	615	5	1	840) 53	5		0	22	5		0	70
				li-															1	1.1.1.1.1	
	One Inf	17					퉡사	l					_	-						1444	14 (<u>u</u>
Cycle,		<u> </u>	0.0	_	F 6	₿.		12					Г	} —	♥ 2		3 ⊾↑	. 4	141		신
Offset,			0	Green	36.0	44.(0 1.	0 0	.0	0.0	0.	.0			Ā				\$ Y \$		∲ ←
<u> </u>	rdinated	<u> </u>	10	Yellow		4.0	0.			0.0	0.							V			r -
Force I	Mode	Fib	ked	Red	0.0	1.0	0.	υ 0	.0	0.0	0.	.0		5	6		7	8		ነ ተ ተ ቀ ዋ	1 4
Oinn al	True luf						- 4	· · · ·			_							_	1	<u> 1 4 1 4 1</u>	ы ц
	Two Inf	1		-	≽		يً≓	Ľ	Ψ					-						Ϊţ	
Cycle, Offset,			0.0 69		2	5	_F		<u> 17</u>					1	Y 2		3	4			
	s rdinated	<u> </u>		Green		5.0	35			0.0	0.		┛		A				k	W + L B	₩ ₩ ₩
Force			lo ked	Yellow Red	4.0 0.0	4.0 0.0	4.			0.0	0.			-	•		7	P		1 t r	
Forcer	Noue		keu	Reu	0.0	0.0	1.	0 10	.0	0.0	0.	.0		5	0		1	•	J	<u>141</u> 49	7 4
Interch	nange R	oculte																			
O-D	-	nd (veh/	(h)	Delay (s		DTT	-	ETT	v/c	: > 1	2	Ro	>1?		LOS						
A	Dema		11)	30.7	<u> </u>	0.0		30.7		No	:		No	┿	C	_		ÌÌ	ÎÎ t		
B		250		0.0		0.0	_	0.0		No			No	+-	A	_					
C		372		19.9		0.0		19.9		No			No	+	B	_					
D		0	_	26.6		0.0		26.6		No			No	+-	B	-					
E		1		39.3		0.0		39.3		No			No	+-	C	_]			
F		52		20.6		0.0		20.6		No			No	+-	B	- :=		⁄ Ш		ШV	G
G		517		0.0		0.0		0.0		No			No	+-	A	^*∓		-77			
H		1		27.4	_	0.0	_	27.4		No			No	+-	B	- F		=#₽		₩=	
		954		47.3		0.0		47.3	<u> </u>	No			No	+	C	-					B
J		620		49.6	_	0.0		49.6		No			No	+-	C	_					
K		020		49.0	_	0.0		49.0		-			-	+	-	_					
L		0				0.0							-	+-	_						
M		0				0.0				-			-	+-	-						
N		0				0.0	_			-			_	+-				₩ ₩ FL	нм ми	КВ	
	Interc	-	=TT (e/	veh) and	1.05	5.0		30.5				С									
	intere	ange I	_ 1 (3/		200			00.0				0									
Signal	ized Inte	ersectio	on One	Results				EB				WB				NB				SB	
	ach Move						L	Т	R	T	L	Т	R	T	L	Т	R	Г	L	Т	R
<u> </u>	l Delay (h				13.8	20.6	16.0	5	3.5	30.7	28.4			0.0	19.4			0.0	19.9
	of Service	-					B	С	B		A	С	С	T			В	Т			В
	ach Dela						20.5		С		30.1		С		19.4		В		19.9		В
	ction De	•		S						23.2								С			
Signal	ized Inte	ersectio	on Two	Results				EB				WB				NB				SB	
Approa	ach Move	ement					L	Т	R		L	Т	R		L	Т	R		L	Т	R
Contro	l Delay (d) , s/ve	h				18.7	26.6	22.4	1	6.4	18.8	0.0			0.0	0.0			0.0	17.9
Level c	of Service	e (LOS)					В	С	С		В	В	Α				Α				В
Approa	ach Dela	y, s/veh	/ LOS				25.8	3	С		11.5		В		0.0		A		17.9		В
Interse	ction De	lay, s/ve	eh / LOS	S					1	17.7				T				В			
-																					



						HCS	7 Inte	ercha	nges	Resu	lts S	Sum	nmary	/					
Conor	al Inforn	nation										Int	orobon	ao Infe	rmotia				
Agency		nation	SEH I	nc									erchan	-			Diamon	4	
Analyst			<u> </u>	am Johnso	<u></u>		Analy	sis Date	a lun 1	5 201	3		gment				500	u	
Jurisdic			SDDC		511			tion, h	0.250		J		eeway [North-S	outh	
Interse				St at I-29 \$	SR		PHF		0.90	,			terial Di				East-We		
File Na				St Corrido		5 PM 3		n xus	0.00			/							
	Descrip	otion	1	Corridor 6			-												
Troject	Beeeinp		oouric	Serrider e	Lan	0,170	00000	Signal											
Deman	nd						EBL	EBT	EBF	R WE	LW	′BT	WBR	NBL	NBT	NBF	R SB	L SBT	SBR
Interse	ction On	ie Dema	and (v), veh/h			1	1640	100	1	8	65	280		0	430)	0	580
Interse	ction Tw	o Dema	and (v), veh/h			1	1415	655	1	10)75	690		0	205	5	0	70
																		~ 석 각 석	L S L
	One Inf	1/		_	Ľa.	ہلے۔		_ ►	4										
Cycle, s			0.0	_	Γ	۶R	5	1	17				″ ┌┽ ╹			3	4	4 *	
Offset,			0	Green			.0 4	0.0 1			0.0	4		<u>ठ</u>				**************************************	へ <u>学</u> ← マー 安
	rdinated		lo vod	Yellow		4.0					0.0	_				-	P		
Force N	viode	ED.	xed	Red	0.0	1.0	J U	.0 0	.0 (0.0	0.0		5	6		7	8	14 f 🕂	141
Signal	Two Inf	ormativ	on		1	5	R 6	2										1444	
Cycle,		1/	0.0	-		E.	₽Ľ	<u>a</u> 14	4					\		4		1	~
Offset,			6.0 69	-		2 5	F	ú –			_		1	Y 2		3	4		•× ↓×
	rdinated		10	Green							0.0	-+-	」	-	-		* -		
Force N			xed	Yellow Red	4.0	4.0					0.0	_	5	6		7		<u>`11</u>	
1 0100 1	nouo		Nou	Ttou	0.0	0.0	, I.I.	.0 0	.0	5.0	0.0						•	1 1 1 1	
Interch	ange R	esults																	
O-D	-	nd (veh/	/h)	Delay (s)	EDT	Т	ETT	v/c	>1?	R	{q >	1?	LOS			CL DN	NE KG	
A		0	,	31.7		0.0		31.7	1	No		No)	С					
В		228		0.0		0.0		0.0	1	No		No	,	Α					
С		644		16.9		0.0		16.9	1	No		No)	В					
D		0		27.3		0.0		27.3	1	No		No)	В					
E		1		33.6		0.0		33.6	1	No		No)	С)		
F		45		17.9		0.0		17.9	1	No		No)	В					G H
G		673		0.0		0.0		0.0	1	No		No)	Α				\leq	
Н		1		47.7		0.0		47.7	1	No		No)	С	ļ				
	1	1340		45.2		0.0		45.2		No		No)	С					
J		845		65.1		0.0		65.1		No		No		D					
K		0				0.0				-		-		-					
L		0				0.0				-		-		-					
Μ		0				0.0				-		-					titti		
N		0				0.0				-		-							
	Interc	change I	ETT (s/	/veh) and	LOS			33.7				С							
0.			-	D											NIE.				
			on One	Results				EB			W	17			NB	-	- ·	SB	
<u> </u>	ch Move		- I				L	T	R	L	T		R	L	T	R	L	T	R
	I Delay (-					5.9	17.9	13.8	14.4	_		28.5		0.0	46.7		0.0	16.9
	of Servic						A	B	В	B			C	40.7		D			В
	ich Dela	-					17.	8	В	31	.0		С	46.7		D		6.9	В
Interse	ction De	ay, s/ve	en / LO	5					2	5.1							С		
Signali	izad Inte	arsactic	n Two	Results				EB			W	B			NB			SB	
	ach Move			Results			L	<u></u> Т	R	L	T	1	R	L	T	R	t t	<u>т</u>	R
<u> </u>	I Delay (h				15.7	27.3	20.5	21.4		_	0.0	L	0.0	0.0		0.0	13.3
	of Servic	-					B	27.3 C	20.5 C	21.4 C	- 33. C		0.0 A		0.0	0.0 A	-	0.0	B
	ach Dela						26.		C	20			C	0.0		A	13	3.3	В
	ction Dela	-					20.	-		1.9			-	0.0			C		5
				5					2				1				<u> </u>		



		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	ts Sur	nmar	У				
O	4!								4					4 7 4 1	b. L.
General Inform	nation								Intersect				- É		4* <u>7</u>
Agency		SEH Inc.							Duration,		0.250		-		R.
Analyst		Graham Johnson				e Jun 1			Area Typ	е	Other				
Jurisdiction		SDDOT		Time F		AM P			PHF		0.90		*	w ‡ E 8	•
Urban Street		85th Street				r 2045		IL	Analysis		1> 16	:45	<u>ح</u> م م		<u>.</u>
Intersection		New Signal East		File Na		85th 8	St Corric	lor 204	5 AM 3q	rt 6-Ln.>	kus			18 - 18 -	
Project Descrip	tion	85th Corridor 6-Lan	3/4 Ac	cess Sig	gnal								K	1 4 1 4 Y	14
Demand Infor	nation				EB			WE	2		NB			SB	
Approach Move				L	T	R	L	T	, R	L	T	R	L	T	R
Demand (v), v				225	1085	_	175	111	_	<u> </u>	0	105		0	265
Demand (V), (225	1000		175		0 00		0	100		U	205
Signal Informa	ation				Ľ	Ľ		<u>-</u> 1							J
Cycle, s	90.0	Reference Phase	2		P 4	,≓€	⊨ `		Φ 2				↔	1	4
Offset, s	48	Reference Point	End	Croon	11.0		_	1.0				1	Y 2	3	4
Uncoordinated	No	Simult. Gap E/W	On	Green Yellow		1.4	62.5 4.5	1.0	0.0	0.0	↓_	7	4		† 7
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0	0.0	0.0		5	6	7	8
					1										
Timer Results				EBI	-	EBT	WB	L	WBT	NBI	-	NBT	SBI	-	SBT
Assigned Phas	е			5		2	1		6			8			4
Case Number				2.0		3.0	2.0		3.0			7.0			7.0
Phase Duration	Duration, s e Period, (Y+ <i>R</i> c), s				5	69.8	17.2	2	68.5			3.0			3.0
-				6.0		6.0	6.0		6.0			2.0			2.0
Max Allow Hea	, .	· · ·		3.0		0.0	3.0		0.0			3.4			3.4
Queue Clearar				12.4			11.1					3.0			3.0
Green Extensio		(ge), s		0.2		0.0	0.1		0.0			0.0	L		0.0
Phase Call Pro				1.00			1.00					1.00			1.00
Max Out Proba	bility			0.02	2		1.00)				1.00			1.00
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move	-		_	1	Т	R	L	Т	R	L	T	R	L	T	R
Assigned Move				5	2	12	1	6	16		8	18	_	4	14
Adjusted Flow) veh/h	_	195	940	69	174	1105			0	117		0	294
-		ow Rate (s), veh/h/l	n	1688	1609	1502	1688	1609			1772			1772	
Queue Service				10.4	1.6	0.1	9.1	8.2	1.1		0.0		<u> </u>	0.0	
		e Time (<i>g</i> _c), s		10.4	1.6	0.1	9.1	8.2	1.1		0.0			0.0	
Green Ratio (g		G IIIIG (g C), S		0.14	0.71	0.71	0.12	0.69	0.69		0.01			0.01	
Capacity (c), v				235	3424	1065	209	3350	_		20			20	
Volume-to-Cap		itio (X)		0.829	0.274		0.833	0.330			0.000			0.000	
•		(In (95 th percentile)		208.9	15.2	1.9	171.4	91.3	12.5		0.000			0.000	
		eh/In (95 th percenti		8.2	0.6	0.1	6.7	3.6	0.5		0.0			0.0	
		RQ) (95 th percent		0.70	0.00	0.01	0.57	0.00	0.04		0.00			0.00	
Uniform Delay		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	- /	43.2	0.9	0.2	38.5	5.5	4.4		0.0			0.0	
Incremental De				4.8	0.2	0.1	9.2	0.2	0.1		0.0			0.0	
Initial Queue D				0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Control Delay (•		48.0	1.1	0.3	47.7	5.6	4.5		0.0	0.0		0.0	0.0
Level of Servic	-			D	A	A	D	A	A			A			A
	Approach Delay, s/veh / LOS					A	11.1		В	0.0		A	0.0		A
Intersection De		8.6			.5			5.5			A 0.0				
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS	edestrian LOS Score / LOS					В	1.86	6	В	2.73	3	С	2.73	3	С
Bicycle LOS So	core / LC	DS		1.34	1	А	1.31		А	0.68	3	А	0.97	7	А

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		HCS	7 Sig	nalize	d In	tersec	tion F	Resi	ults S	umn	nary	/				
General Inform	nation								Inters	ectior	n Info	ormatio	'n		4 <mark>14</mark> 4 ↓	1- L
Agency		SEH Inc.							Durati			0.250			<u>10 - 10</u>	
Analyst		Graham Johnson		Analys	sis Dat	e Jun 1	5, 2016		Area T			Other		 		<u>د</u> د ک
Jurisdiction		SDDOT		Time F		PM P			PHF	76-		0.90		- <u>→</u>	w ^N ∈	<u>2</u> 4
Urban Street		85th Street		Analys					Analys	sis Per	riod	1> 16	:45	<u>₹</u> >		→ * *
Intersection		New Signal East		File Na			St Corric	lor 20	r							
Project Descrip	tion	85th Corridor 6-Lan	e 3/4 A												1 1 4 M	1
.,,					<u> </u>											
Demand Inform	mation				EB			N	/B			NB			SB	
Approach Move	ement			L	Т	R	L	-	T F	२	L	Т	R	L	Т	R
Demand (v), v	/eh/h			200	146	5 115	225	15	65 1	35		0	195		0	200
							_			_						
Signal Informa	Ir			-	2		ן ז	닐괸					<u> </u>			
Cycle, s	100.0	Reference Phase	2		Γ 5	2 2	, 📑 🛛		12						3	▲
Offset, s	48	Reference Point	End	Green	12.6	1.4	71.0	1.0	0 0.	.0	0.0		•	<u> </u>		
Uncoordinated	No	Simult. Gap E/W	On	Yellow	-	0.0	4.5	1.0			0.0		× .			ア
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0	0 0.	.0	0.0		5	6	7	8
Timer Results				EBL		EBT	WB		WBT	_	NBL		NBT	SBI		SBT
Assigned Phas	<u> </u>			5		2	1		6		INDL	· · · ·	8	301	-	4
Case Number	C			2.0	+	3.0	2.0	\rightarrow	3.0	-		+	7.0			7.0
Phase Duration				18.6		77.0	2.0	_	78.4				3.0			3.0
	ge Period, (Y+R c), s				,	6.0	6.0		6.0	_			2.0	<u> </u>	_	2.0
-	e Period, (Y+R c), s low Headway (<i>MAH</i>), s					0.0	3.0	_	0.0	_		_	2.0 3.4			3.4
Queue Clearan	• •	· ·		3.0 12.4		0.0	14.6		0.0				3.4 3.0			3.0
Green Extensio				0.2		0.0	0.0		0.0			_	0.0			0.0
Phase Call Pro		(ge), s		1.00		0.0	1.00		0.0				0.0 0.95		_	0.95
Max Out Proba				0.02			1.00						1.00			1.00
Max Out 100a	onity			0.02			1.00	,					1.00			1.00
Movement Gro	oup Res	sults			EB			WE	3	Т		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R		L	Т	R	L	Т	R
Assigned Move	ement			5	2	12	1	6	16	;		8	18		4	14
Adjusted Flow	Rate(<i>v</i>), veh/h		176	1290	101	216	150	1 129	9		0	50		0	56
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/l	n	1688	1609	1502	1688	160	9 150	2		1772			1772	
Queue Service	Time (g	g s), S		10.4	1.9	0.1	12.6	12.4	4 2.6	3		0.0			0.0	
Cycle Queue C	learanc	e Time (<i>g c</i>), s		10.4	1.9	0.1	12.6	12.4	4 2.6	3		0.0			0.0	
Green Ratio (g	ŋ∕C)			0.13	0.71	0.71	0.14	0.7	2 0.7	2		0.01			0.01	
Capacity (c), v				212	3427		236	349				18			18	
Volume-to-Cap		· · ·		0.830			0.913	0.42				0.000			0.000	
	(· <i>)</i> ,	(In (95 th percentile)		205.4	17.7	_	165.8	97				0			0	
		eh/In (95 th percenti		8.1	0.7	0.1	6.5	3.8	_	_		0.0			0.0	
		RQ) (95 th percent	ile)	0.68	0.00		0.55	0.0				0.00			0.00	
Uniform Delay				48.5	0.7	0.1	42.4	5.5				0.0			0.0	
Incremental De				4.8 0.0	0.2	0.1	5.3	0.0	_			0.0			0.0	
	tial Queue Delay (d ȝ), s/veh					0.0	0.0	0.0				0.0			0.0	
,	ontrol Delay (<i>d</i>), s/veh evel of Service (LOS)					0.3	47.7	5.6				0.0	0.0		0.0	0.0
	. ,			D	A	A	D	A	A				A			A
Approach Dela		6.8		A	10.4	ł	В		0.0		A	0.0		Α		
Intersection De	ntersection Delay, s/veh / LOS					8	.5							A		
Multimodal Re	sulte				EB			WE	3			NB			SB	
Pedestrian LOS		/105		2.07		В	2.06		B		2.74		С	2.74	1	С
Bicycle LOS So				1.58		B	1.66		B		0.57		A	0.58		A
2.0,00 200 00				1.00		5	1.00		5		5.01			0.00		

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		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	Its Su	mmar	у					
Concretinform	notion								Interees	tion Inf	ormotic			444		
General Inform	nation								Intersec		V		- É		200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200 - 200	
Agency		SEH Inc.							Duration		0.250				K	
Analyst		Graham Johnson		Analysis Date Jun 15						be	Other	·		W↓E	2	
Jurisdiction		SDDOT		Time PeriodAM PeriodAnalysis Year2045						0.90				w + E 8		
Urban Street		85th Street							Analysis		1> 16	:45			· · · · ·	
Intersection		Tallgrass			File Name 85th St Corridor 2045 AM 3qrt 6-Ln.xus											
Project Descrip	otion	85th Corridor 6-Lan	1 3/4 Ac	cess Sig	gnal									4147		
Demand Inform	mation				EB			W	B		NB			SB		
Approach Move	ement			L	Т	R	L	Г	R	L	Т	R	L	Т	R	
Demand (v), v	/eh/h			355	545	290	210	87	' 5 670	80	315	185	330	170	250	
							_									
Signal Informa	1		-	-	La	- E	4 8	H	5 211	s 21				5		
Cycle, s	117.8	Reference Phase	2		R	R		2 C	s I		17 5		Z 2	3	4	
Offset, s	68	Reference Point	End	Green		1.8	48.2	5.0		15.0)		<u>⊼</u>			
Uncoordinated		· /		Yellow	-	0.0	4.5	4.5		4.5					P	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.5	5 1.5	1.5		5	6	7	8	
Timer Results				EBI	_	EBT	WB	L	WBT	NB	L	NBT	SBI	_	SBT	
Assigned Phas	е			5		2	1			3		8	7		4	
Case Number				2.0		3.0	2.0		3.0	2.0		3.0	2.0		3.0	
Phase Duration	1. S			19.2		21.0	54.2		56.0	11.0		21.0	21.5		31.5	
Change Period		c). S		6.0		6.0	6.0		6.0 6.0				6.0		6.0	
Max Allow Hea	•			3.0		3.0	3.1		3.1	3.0		3.1		3.0		
Queue Clearan		· · ·		12.7		13.0) 7.3		52.0	5.1		13.9	14.9		3.1 22.9	
Green Extensio				0.5		1.3	4.5		0.0	0.1		1.1	0.6		0.6	
Phase Call Pro	bability			1.00)	1.00	1.00)	1.00	0.9	5	1.00	1.00)	1.00	
Max Out Proba	bility			0.00)	0.00	0.23	3	1.00	0.00)	0.03	0.00)	1.00	
Movement Cr	un Dee				EB			WE)		ND			SB		
Movement Gro	-	Suits		L	Т	R	L	T	R	L	NB T	R	L	T	R	
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14	
Adjusted Flow) veh/h		304	466	120	233	972		89	350	94	367	189	278	
		ow Rate (s), veh/h/l	n	1639	1609	1502	1639	168		1639	1687	1502	1639	1687	270	
Queue Service			11	10.7	11.0	8.9	5.3	27.4	_	3.1	11.9	3.7	12.9	5.5		
		e Time (<i>g</i> _c), s		10.7	11.0	8.9	5.3	27.4	_	3.1	11.9	3.7	12.9	5.5		
Green Ratio (g		c fille (g c), s		0.11	0.13	0.13	0.41	0.42		0.04	0.13	0.54	0.13	0.22		
Capacity (c), v	· · ·			368	615	191	1342	143		139	430	806	432	732		
Volume-to-Cap		tio (X)		0.825	<u> </u>		0.174	0.67		0.639	0.813	0.117	0.849	0.258		
· · ·	-	/In (95 th percentile))	195.7	195.2		90.6	405.		59.5	218.8	20.5	230.5	101.2		
		eh/In (95 th percenti		7.7	7.7	5.8	3.6	16.0	_	2.3	8.6	0.8	9.1	4.0		
		RQ) (95 th percent		0.49	0.00	0.49	0.30	0.00		0.15	0.00	0.05	0.35	0.00		
Uniform Delay				51.1	49.6	17.7	22.1	27.4		55.5	50.0	7.4	50.0	38.3		
Incremental Delay (<i>d z</i>), s/veh					0.7	1.2	0.0	1.1		1.8	1.4	0.0	2.9	0.1		
Initial Queue Delay (d 3), s/veh					0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Control Delay (d), s/veh					50.3	18.9	22.1	28.5	5 0.0	57.3	51.4	7.4	52.9	38.3	0.0	
Level of Service				D	D	В	С	С	A	E	D	A	D	D	Α	
Approach Dela				47.0)	D	16.8	3	В	44.6	3	D	32.0)	С	
Intersection De	lay, s/ve	eh / LOS				29	9.7						С			
Multiment	a							10/5)							
Multimodal Re		/1.02		0.74	EB	0	0.5	WE		NB		0	SB		<u> </u>	
Pedestrian LOS Bicycle LOS So				2.71		C	2.57		C	2.74		C	2.94		C	
BICYCIE LUS SC	Joie / LC	10		1.12		A	2.10		В	0.93		A	1.18		A	

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		HCS	7 Sig	nalize	ed Int	tersec	tion F	Resi	ults	Sun	nmar	У					
O an anal lufa	4!								Inte						4 사 수 †	b L	
General Inform	nation	Υ							<u></u>			ormatic				4ª <u>4</u>	
Agency		SEH Inc.		Ú.		- i				ation,		0.250					
Analyst		Graham Johnson				e Jun 1										A 2-	
Jurisdiction		SDDOT		Time Period PM Pe						0.90			<u>+</u>	w ‡ E 8	i ∳ •		
Urban Street		85th Street		Analys	Build	Build Analysis				1> 16	:45	14		<u>.</u> 			
Intersection		Tallgrass		File Na		85th \$	St Corric	dor 20)45 P	PM 3q	rt 6-Ln.:	xus				-31	
Project Descrip	otion	85th Corridor 6-Lan	e 3/4 A	ccess S	ignal									1	141**Y	11	
Demand Infor	mation				EB			١٨	/B			NB			SB		
Approach Move				L	T	R	L		T	R	L	T	R	L	T	R	
Demand (v), v				310	925	_	_		05	450	155	280	_	645	360	485	
					323	423	200		00	+50	100	200	000	043	500	405	
Signal Informa	ation		_										_				
Cycle, s	152.3	Reference Phase	2	1	ĸ	- ⊨`			2			17 4		\rightarrow		4	
Offset, s	68	Reference Point	End	Green	_	8.5	43.6	7 10		20.0			1	Y 2	3	4	
Uncoordinated	Yes			Yellow		4.5	43.0	4.		4.5	4.5		~	\leftarrow		tz.	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	1.5	1.5	1.		1.5	1.5		5	6	7	8	
												I				05-	
Timer Results				EBI	-	EBT	WB	L	WE	_	NBI	-	NBT	SBI	-	SBT	
Assigned Phas	е			5		2	1		6		3		8	7 2.0		4	
Case Number				2.0		3.0		2.0		0	2.0		3.0 25.2			3.0	
Phase Duration				20.9		35.4		49.6						42.2		51.2	
Change Period				6.0		6.0	6.0		6.0		6.0		6.0 6.0			6.0	
Max Allow Hea	2 ·	· · ·		3.0		3.0	3.0		3.0		3.0		3.1	3.0		3.1	
Queue Clearar				14.5		27.0		12.5 56.0							34.5 4		
Green Extensio		(ge), s		0.4		2.4	3.5		2.0		0.2	0.2		1.6		0.0	
Phase Call Pro				1.00)	1.00	1.00)	1.0		1.00)	1.00	1.00)	1.00	
Max Out Proba	bility			0.00		0.00	0.50)	0.8	36	0.00)	1.00	0.00)	1.00	
Movement Gro	oun Res	sults			EB			W	3			NB			SB		
Approach Move	-			L	T	R	L	Т		R	L	Т	R	L	Т	R	
Assigned Move				5	2	12	1	6		16	3	8	18	7	4	14	
Adjusted Flow) veh/h		273	814	198	289	122		500	172	311	239	717	400	539	
-		ow Rate (s), veh/h/l	n	1639	1609	1502	1639	168		000	1639	1687	1502	1639	1687	000	
Queue Service				12.5	25.0	18.7	10.5	54.		-	7.9	13.5	17.0	32.5	14.4		
		e Time (<i>g</i> _c), s		12.5	25.0		10.5	54.		_	7.9	13.5	17.0	32.5	14.4		
Green Ratio (G AIRIG (g C), S		0.10	0.19	0.19	0.29	0.3			0.07	0.13	0.41	0.24	0.30		
Capacity (c),	· /			322	932	290	937	128			218	425	618	779	1002		
Volume-to-Cap		atio (X)		0.848			0.308	0.95			0.789	0.732	0.386	0.920	0.399		
•		/In (95 th percentile)		226.5			193.2	828			152.8	255.5	163.2	514	253		
	. ,	eh/In (95 th percenti		8.9	15.1	5.2	7.6	32.	_		6.0	10.1	6.4	20.2	10.0		
		RQ) (95 th percent		0.57	0.00	0.44	0.64	0.0			0.38	0.00	0.41	0.79	0.00		
			- /	67.6	59.7	12.3	42.6	45.			70.1	64.2	5.3	56.7	42.8		
Uniform Delay (<i>d</i> 1), s/veh Incremental Delay (<i>d</i> 2), s/veh					1.0	1.0	0.1	14.			2.4	5.0	0.1	8.4	0.1		
Initial Queue Delay (<i>d</i> ₃), s/veh					0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0		
		,		0.0 70.3	60.7	13.3	42.7	60.		0.0	72.5	69.2	5.4	65.1	42.8	0.0	
Control Delay (<i>d</i>), s/veh Level of Service (LOS)					E	B	D	E		A	E	E	A	E	D	A	
Approach Delay, s/veh / LOS					1	E	43.1	<u> </u>	D		48.9	L	D	38.5	L	D	
Intersection De							5.3							D			
Multimodal Re	sults				EB			WE	3			NB	NB		SB		
Pedestrian LOS				2.77	7	С	2.59	9	С	;	2.75	5	С	3.01		С	
Bicycle LOS So	core / LC	DS		1.38	3	А	2.15	5	В	3	1.08	3	А	1.85	5	В	

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		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	Its Sur	nmar	У						
<u> </u>													_	1474†			
General Inform	nation	1							Intersect				- 1		14 L		
Agency		SEH Inc.		1					Duration,		0.250						
Analyst		Graham Johnson		Analysis Date Jun 15											بر ج		
Jurisdiction		SDDOT		Time Period AM F					PHF			0.90		₩	t,		
Urban Street		85th Street				r 2045			Analysis		1> 16	:45	7				
Intersection		New 3/4 Signal We		File Na		85th 8	St Corric	lor 20	45 AM 3q	rt 4-Ln.>	kus			11			
Project Descrip	otion	85th Corridor - 4-In	Sign 3/	4 Acces	S									14147	7 4		
Demand Infor	mation				EB			W	B		NB			SB			
Approach Move				L	Т	R	L	Т	1	Τ.	T	R	L	T	R		
Demand (v), v				100	1260		150	_		<u> </u>	0	255	-	0	80		
				100	1200		100	02	0 120		J	200					
Signal Informa	ation				a	5	<u> </u>	<u> </u>				_					
Cycle, s	90.0	Reference Phase	2		F "	7 2	⊂ ⊨ `		172		×		\mathbf{c}	2	x t		
Offset, s	22	Reference Point	End	Green	75	1.2	66.3	1.0	0.0	0.0	_	1	M 2	3			
Uncoordinated	No	Simult. Gap E/W	On	Yellow		0.0	4.5	1.0		0.0		>			t		
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0		0.0		5	6	7	ľ		
						EDT	14/5		MOT			NET	0.00		ODT		
Timer Results				EBI	-	EBT	WB		WBT 6	NBL	-	NBT	SB		SBT		
Assigned Phas	e			5		2		1			_	8	<u> </u>		4		
Case Number				2.0		3.0	2.0		3.0			7.0	<u> </u>		7.0		
Phase Duration				<u> </u>		72.3		14.7		73.5		3.0			3.0		
Change Period Max Allow Hea	-	•		6.0 3.0		6.0 0.0	6.0					2.0			2.0 3.4		
Queue Clearar				3.0 7.5		0.0	.0 3.0 8.7		0.0	<u> </u>	3.4		<u> </u>		3.0		
Green Extensio				0.1		0.0	0.0 0.1		0.0		_	0.0			0.0		
Phase Call Pro		(<i>ge</i>), s		1.00	<u> </u>	0.0	1.00		0.0		1.0		· · · · · · · · · · · · · · · · · · ·		1.00		
Max Out Proba				0.01			0.06					1.00			1.00		
	ionity			0.01			0.00	,				1.00			1.00		
Movement Gro	oup Res	sults			EB			WB			NB			SB			
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R		
Assigned Move	ement			5	2	12	1	6	16		8	18		4	14		
Adjusted Flow	Rate (v), veh/h		105	1321	52	136	748	109		0	172		0	56		
Adjusted Satur	ation Flo	ow Rate (s), veh/h/l	In	1688	1687	1502	1688	1687	7 1502		1772			1772			
Queue Service	Time (g	g s), S		5.5	24.1	1.3	6.7	12.1	4.4		0.0			0.0			
Cycle Queue C	learanc	e Time (<i>g c</i>), s		5.5	24.1	1.3	6.7	12.1	4.4		0.0			0.0			
Green Ratio (g	g/C)			0.08	0.74	0.74	0.10	0.75	0.75		0.01	1		0.01			
Capacity (c), v	veh/h			141	2483	1105	164	2529	9 1126		20			20			
Volume-to-Cap	acity Ra	atio (X)		0.743	0.532	0.047	0.829	0.29	6 0.097		0.000			0.000	1		
Back of Queue	(Q), ft	/In (95 th percentile))	94.7	315.3	12.6	101.4	178.	8 44.8		0			0			
Back of Queue	(Q), ve	eh/In (95 th percenti	ile)	3.7	12.4	0.5	4.0	7.0	1.8		0.0			0.0			
Queue Storage	e Ratio (RQ) (95 th percent	tile)	0.32	0.00	0.04	0.34	0.00	0.15		0.00			0.00			
Uniform Delay	(d 1), s	/veh		40.0	12.0	5.2	28.9	9.0	8.7		0.0			0.0			
Incremental De	elay(d 2	2), s/veh		1.2	0.3	0.0	4.8	0.3	0.1		0.0			0.0			
Initial Queue Delay (d 3), s/veh				0.0	0.0	0.0	0.0	0.0	0.0		0.0			0.0			
Control Delay (41.2	12.4	5.3	33.7	9.3	8.8		0.0	0.0		0.0	0.0		
Level of Service (LOS)					В	Α	С	A	Α			A			Α		
Approach Dela				14.2	2	В	12.6	3	В	0.0		А	0.0		А		
Intersection De	lay, s/ve	eh / LOS				1:	2.4						В				
		11.00		4.00		P				0.15		D			_		
															B A		
Multimodal Re Pedestrian LOS Bicycle LOS So	S Score			1.99 1.78		B	1.88 1.49		B A	2.46 0.77		BA	2.46 0.58				

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		HCS	7 Sig	nalize	ed Int	ersec	tion F	Resu	ilts Sui	mmar	у						
									• •					4741			
General Inform	nation	Ĩ. -							Intersec						124 La		
Agency		SEH Inc.		1					Duration	-	0.250		_		R		
Analyst		Graham Johnson		Analysis Date Jun 15											•* •*		
Jurisdiction		SDDOT		Time Period PM P						0.90			*	w∱e	 		
Urban Street		85th Street				r 2045			Analysis		1> 16	:45	7		10 10		
Intersection		New 3/4 Signal We		File Na		85th \$	St Corric	lor 20	45 PM 30	rt 4-Ln.	xus			11			
Project Descrip	otion	85th Corridor - 4Ln	3/4 Acc	ess Sig	nal								K	14 1 4 Y	7		
Demand Inform	mation				EB			W	′B		NB			SB			
Approach Move	ement			L	Т	R	L	Г	R	L	Т	R	L	Т	R		
Demand (v), v				200	1445	5 105	325	12	60 120		0	295		0	95		
					1										i, i		
Signal Informa	1/			-	La.			님씨									
Cycle, s	100.0	Reference Phase	2		Γ "				12			1		3	••		
Offset, s	22	Reference Point	End	Green	13.7	5.0	66.3	1.0	0.0	0.0			- K				
Uncoordinated	No	Simult. Gap E/W	On	Yellow	-	0.0	4.5	1.0		0.0		~			レ		
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0	0.0	0.0	- 10	5	6	7	8		
Timer Results				EBI	_	EBT	WB	L	WBT	NBI	L.	NBT	SBI	_	SBT		
Assigned Phas				5		2	1	_	6		_	8			4		
Case Number				2.0		3.0	2.0	-	3.0			7.0			7.0		
Phase Duration	1. S			19.7				2.0				3.0			3.0		
Change Period		c). S		6.0		72.3 6.0	6.0			77.3 6.0		2.0			2.0		
Max Allow Hea		•		3.0		0.0	3.0		0.0			3.4			3.4		
Queue Clearan	2 ·	· · ·		13.7		0.0	18.7		0.0			3.0			3.0		
Green Extensio				0.0		0.0	0.0		0.0			0.0			0.0		
Phase Call Pro		(90),0		1.00		0.0	1.00		0.0			1.00			1.00		
Max Out Proba			_	1.00			1.00					1.00			1.00		
Movement Gro	oup Res	sults			EB			WE	3		NB			SB			
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R		
Assigned Move	ement			5	2	12	1	6	16		8	18		4	14		
Adjusted Flow	Rate (v), veh/h		202	1459	106	298	115	6 110		0	217		0	72		
Adjusted Satura	ation Flo	ow Rate (s), veh/h/l	n	1688	1687	1502	1688	168	7 1502		1772			1772			
Queue Service	Time (g	g s), S		11.7	36.1	3.9	16.7	21.8	3 4.5		0.0			0.0			
Cycle Queue C	learanc	e Time (<i>g c</i>), s		11.7	36.1	3.9	16.7	21.8	3 4.5		0.0			0.0			
Green Ratio (g	g/C)			0.14	0.66	0.66	0.19	0.7	1 0.71		0.01			0.01			
Capacity (c), v	veh/h			232	2235	995	316	240	5 1070		18			18			
Volume-to-Cap	acity Ra	itio(X)		0.872	0.653	0.107	0.943	0.48	1 0.103		0.000			0.000			
Back of Queue	(Q), ft/	/In (95 th percentile))	178.7	465.6	49.3	255.5	317.	5 56.1		0			0			
Back of Queue	(Q), ve	eh/In (95 th percenti	le)	7.0	18.3	1.9	10.1	12.5	5 2.2		0.0			0.0			
Queue Storage	e Ratio (RQ) (95 th percent	tile)	0.60	0.00	0.16	0.85	0.00	0.19		0.00			0.00			
Uniform Delay	(d 1), s	/veh		42.0	22.2	9.9	24.6	12.1	1 9.8		0.0			0.0			
Incremental Delay (<i>d</i> ₂), s/veh				8.3	0.4	0.1	28.8	0.5	0.1		0.0			0.0			
Initial Queue Delay (<i>d s</i>), s/veh					0.0	0.0	0.0	0.0	0.0		0.0			0.0			
Control Delay (d), s/ve	eh		50.4	22.6	9.9	53.4	12.6	3 10.0		0.0	0.0		0.0	0.0		
Level of Service (LOS)					С	Α	D	В	A			Α			Α		
Approach Dela	y, s/veh	/ LOS		25.0)	С	20.2	2	С	0.0		А	0.0		A		
Intersection De	lay, s/ve	eh / LOS				2	0.9						С				
Multimodal Re					EB			WE			NB			SB			
Pedestrian LOS				2.01	_	В	1.90		В	2.47		В	2.47		В		
Bicycle LOS So	core / LC	DS		2.09)	В	2.05	5	В	0.85	5	А	0.61		Α		

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General Information Agency Analyst Jurisdiction	SEH Inc.													
Agency Analyst	SEH Inc						T	1	lan laf				444	ba L
Analyst	ISEH Inc							Intersect		1/		-		+* <u>*</u>
-								Duration,		0.250				R.
Jurisdiction	Graham Johnson		Analysis Date Jun 15											₹_ 4
	SDDOT		Time Period AM P							0.90		\rightarrow	w‡e 8	+ ↓
Urban Street	85th Street				r 2045			Analysis		1> 16	:45			¥ 6
Intersection	New Signal East		File Na		85th S	St Corric	lor 20	45 AM 3q	rt 4-Ln.>	kus			17	
Project Description	85th Corridor - 4-In	Sign 3/4	4 Acces	S								<u>1</u>	4 1 4 7	<u>*</u>
Demand Information				EB			W	B		NB		SB		
Approach Movement				Т	R		Т	1		Т	R	L	T	R
Demand (v), veh/h			225	1085		175	111		<u> </u>	0	105	<u> </u>	0	265
			220	1000		n e		0		Ű	100		Ű	200
Signal Information				l	2		11							
Cycle, s 90.0	Reference Phase	2		P 4	⊂¥ –	₿`		<u>4</u> 2				→	١	4
Offset, s 48	Reference Point	End	Green	11 2	1.3	62.5	1.0	0.0	0.0	_	1		3	4
Uncoordinated No	Simult. Gap E/W	On	Yellow		0.0	4.5	1.0		0.0		x '			tz.
Force Mode Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0		0.0		5	6	7	8
						1	_			_				
Timer Results			EBL	-	EBT	WB		WBT	NBL	-	NBT	SBL	-	SBT
Assigned Phase			5		2	1		6			8			4
Case Number			2.0		3.0	2.0		3.0		_	7.0			7.0
Phase Duration, s			18.5		69.8	17.2		68.5	5		3.0			3.0
Change Period, (Y+R			6.0		6.0	6.0		6.0			2.0			2.0
Max Allow Headway (I	,		3.0		0.0	3.0		0.0		3.4				3.4
Queue Clearance Time			12.4			11.1					3.0			3.0
Green Extension Time	(ge), s		0.2		0.0	0.2		0.0		0.0		$ \longrightarrow $		0.0
Phase Call Probability			1.00)		1.00)				1.00			1.00
Max Out Probability			0.02			0.00)				1.00			1.00
Movement Group Res	sults			EB			WB			NB			SB	
Approach Movement	54113			T	R	L	T	R	L	T	R	L	T	R
Assigned Movement			5	2	12	1	6	16		8	18		4	14
Adjusted Flow Rate (v) veh/h	_	195	940	69	174	1105			0	117		0	294
Adjusted Saturation Flo		n	1688	1687	1502	1688	1687			1772			1772	201
Queue Service Time (10.4	2.7	0.1	9.1	13.4	_		0.0			0.0	
Cycle Queue Clearanc			10.4	2.7	0.1	9.1	13.4	_		0.0			0.0	
Green Ratio (g/C)	6 mile (g c), 6		0.14	0.71	0.71	0.12	0.69			0.01			0.01	
Capacity (<i>c</i>), veh/h			235	2390	1064	211	234			20			20	
Volume-to-Capacity Ra	atio (X)		0.829	0.393		0.827	0.47			0.000			0.000	
Back of Queue (Q), ft	. ,		208.9	25.9	1.9	156.9	151.	_		0.000			0.000	
Back of Queue (Q), ve			8.2	1.0	0.1	6.2	6.0	0.5		0.0			0.0	
			0.2	0.00	0.01	0.2	0.00			0.00			0.00	
Queue Storage Ratio (RQ) (95 th percentile) Uniform Delay ($d \uparrow$), s/veh				1.0	0.01	38.4	6.3	4.4		0.0			0.00	
Incremental Delay (<i>d</i> ₂), s/veh				0.4	0.2	2.0	0.3			0.0			0.0	
Initial Queue Delay (<i>d</i> ₃), s/veh				0.4	0.0	0.0	0.4	0.0		0.0			0.0	
Control Delay (<i>d</i>), s/ve	0.0 48.0	1.4	0.0	40.5	6.7	4.5		0.0	0.0		0.0	0.0		
Level of Service (LOS)		40.0 D	1.4 A	0.3 A	40.5 D	0.7 A	4.5 A		0.0	0.0 A		0.0	0.0 A	
Approach Delay, s/veh			8.9	7	A	11.0		B	0.0		A	0.0		A
Intersection Delay, s/ven			0.9			.6		5	0.0			4 0.0		
					0							`		
Multimodal Results				EB			WB		NB			SB		
Pedestrian LOS Score	/LOS		1.85		В	1.86		В	2.46	-	В	2.46		В
Bicycle LOS Score / LO			1.76		В	1.72		B	0.68		A	0.97		A

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		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	Its Sur	nmar	У					
								ľ	•					1.1.1.1.1.1.1		
General Inform	nation	Y							Intersec		V			4 14 t+ 	44 4	
Agency		SEH Inc.							Duration,	h	0.250		_		×_	
Analyst		Graham Johnson		Analysis Date Jun 1											₹≹	
Jurisdiction		SDDOT		Time Period PM					PHF		0.90		*	w ∔ E s		
Urban Street		85th Street		Analys	r 2045			Analysis		1> 16	:45			¥ ۲		
Intersection		New Signal East		File Na	ame	85th \$	St Corric	lor 20	45 PM 3q	rt 4-Ln.:	xus			<u>1</u>		
Project Descrip	tion	85th Corridor - 4Ln	3/4 Acc	ess Sig	nal								ľ	◀ ↑ ┿ \Ÿ	* 1	
Demand Inform	nation				EB			W	B		NB			SB		
Approach Move				L	Т	R	L	Т		L	Т	R	L	T	R	
Demand (v), v				200	146	_	225	156			0	195	<u> </u>	0	200	
201101102 (17), 1																
Signal Informa	ation				2	5	<u> </u>	42								
Cycle, s	100.0	Reference Phase	2	1	P .		-∟`		42				→	1	4	
Offset, s	48	Reference Point	End	Green	12.6	1 1	71.0	1.0	0.0	0.0		1	Y 2	3	4	
Uncoordinated	No	Simult. Gap E/W	On	Yellow		1.4	4.5	1.0		0.0	↓_	7	4		17	
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.5	0.0	1.5	1.0		0.0		5	6	7	8	
Thus D. If						EDT	14/5		MOT			NDT	0.5		ODT	
Timer Results				EBL		EBT	WB		WBT	NBI	-	NBT	SBI		SBT	
Assigned Phase	e			5		2	1	-+	6	<u> </u>		8	<u> </u>		4	
Case Number				2.0		3.0	2.0		3.0			7.0			7.0	
Phase Duration						77.0	20.0		78.4		3.0		┣──┥		3.0	
Change Period				6.0		6.0	6.0		6.0		2.0				2.0	
Max Allow Head	÷ :	· · ·		3.0		0.0			0.0	0.0		3.4			3.4	
Queue Clearan				12.4			14.6				3.0				3.0	
Green Extensio		(ge), S		0.2		0.0	.0 0.0		0.0			0.0			0.0	
Phase Call Pro				1.00						<u> </u>		0.95			0.95	
Max Out Proba	bility			0.02	2		1.00)			1.00				1.00	
Movement Gro	oup Res	sults			EB	_		WB			NB			SB		
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Assigned Move	ment			5	2	12	1	6	16		8	18		4	14	
Adjusted Flow I	Rate (v), veh/h		176	1290	101	216	1501	1 129		0	50		0	56	
		w Rate (s), veh/h/l	n	1688	1687	1502	1688	1687	7 1502		1772			1772		
Queue Service				10.4	3.6	0.1	12.6	22.1	2.6		0.0			0.0		
Cycle Queue C	learanc	e Time (g c), s		10.4	3.6	0.1	12.6	22.1	2.6		0.0			0.0		
Green Ratio (g	I/C)			0.13	0.71	0.71	0.14	0.72	0.72		0.01			0.01		
Capacity (c), v	/eh/h			212	2395	1066	236	2444	1088		18			18		
Volume-to-Cap	acity Ra	itio(X)		0.830	0.539	0.095	0.913	0.614	4 0.119		0.000			0.000		
Back of Queue	(Q), ft/	/In (95 th percentile))	205.4	31.6	2.5	165.8	171.3	3 24.3		0			0		
		eh/In (95 th percenti		8.1	1.2	0.1	6.5	6.7	_		0.0			0.0		
		RQ) (95 th percent		0.68	0.00	0.01	0.55	0.00			0.00			0.00		
Uniform Delay (-			48.5	0.7	0.1	42.4	6.8	4.2		0.0			0.0		
Incremental Delay (<i>d z</i>), s/veh				4.8	0.6	0.1	5.3	0.1	0.0		0.0			0.0	1	
Initial Queue Delay (d 2), s/veh					0.0	0.0	0.0	0.0			0.0			0.0		
Control Delay (<i>d</i>), s/veh					1.4	0.3	47.7	7.0	4.2		0.0	0.0		0.0	0.0	
Level of Service				53.3 D	Α	Α	D	Α	Α			Α			Α	
Approach Dela		/ LOS		7.1		A	11.5	5	В	0.0		A	0.0		A	
Intersection De							.2						A			
	•															
Multimodal Re					EB			WB				NB		SB		
Pedestrian LOS				2.07		B	2.06		В	2.47		В	2.47		В	
Bicycle LOS Sc	core / LC	DS		2.12	2	В	2.25	5	В	0.57		A	0.58	3	А	

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