August 18, 2023

Fengate Homestead Holding LP
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289-230-1014

RE: Traffic Impact Study Addendum for a Proposed Warehousing Development at 3054 Homestead Drive, 9174 & 9166 Airport Road West, Mount Hope, City of Hamilton

SLBC Inc. is pleased to provide this Traffic Impact Study Addendum for the proposed warehousing development at 3054 Homestead Drive, 9174 and 9166 Airport Road West, Mount Hope, in the City of Hamilton, as part of the Official Plan Amendment, Zoning By-law Amendment and Draft Plan of Subdivision applications.

A previous Traffic Impact Study (TIS) Addendum (dated February 2023) was submitted to City staff for the subject development. Comments from the City's Transportation Planning staff concerning that submission were received, and responses to those comments have been prepared and are documented in the Response Matrix provided in **Appendix A**. Per subsequent consultation completed between SLBC and City Transportation Planning staff regarding a required update of that addendum, it was determined that City staff required a subsequent addendum include the following:

1. Updated trip generation estimates reflecting modifications to the proposed land uses;
2. Updated intersection capacity analysis for the 2028 Future Total scenario based on the updated trip generation estimates;
3. Intersection capacity analysis for an "alternative scenario" in which a northern secondary connection to the site is provided via Street "A";
4. Confirmation that the proposed intersection configuration of Street "A" at Airport Road West to the south of the site is sufficient to accommodate the forecasted 2028 traffic while maintaining an acceptable level of service;
5. Confirmation of any intersection improvements required at the other study area intersections to maintain an acceptable level of service up to the study's 2028 horizon year; and
6. Review the proposed location of a future site driveway which is to be located on a 90-degree curve in Street "A"s alignment and confirm if sightlines will be appropriate per the Transportation Association of Canada (TAC) Geometric Design Guide.

This TIS Addendum presents the additional analysis as described above and as requested by City staff.

1. Trip Generation

Automobile and truck trip generation for the proposed development during the peak hours of the adjacent street traffic was updated based on the current concept plan as provided in **Appendix B** and based on modifications to the proposed land uses. The previous TIS Addendum assumed all proposed buildings (Buildings A to D) would be "Industrial Park" (Land Use Code (LUC) #130 in the Institute of Transportation Engineers (ITE) Trip Generation Manual 11th Edition). However, the current site plan now proposes Buildings A to C as "Warehousing" (LUC #150) and Building D as "Industrial Park" (LUC #130). The ITE Trip Generation Manual was utilized for the trip generation estimates, with detailed trip generation datasheets provided in **Appendix C**.

As presented in **Table 1**, the proposed development is projected to generate approximately 294 two-way trips during the weekday a.m. peak hour of the adjacent street traffic (231 inbound trips and 63 outbound trips), and 304 two-way trips during the weekday p.m. peak hour of the adjacent street traffic (78 inbound trips and 226 outbound trips).

Table 1: Trip Generation Estimates (Cars & Trucks)

Land Use Code	Building	Magnitude (ft^2)	Parameters	AM Directional Distribution		Morning Peak Hour			PM Directional Distribution		Afternoon Peak Hour		
				In	Out	In	Out	Total	In	Out	In	Out	Total
Warehouse (150)	A	360,257	Average Trip Rates	77%	23%	0.13	0.04	0.17	28%	72%	0.07	0.27	0.18
			New Auto Trips			47	14	61			18	47	65
	B	411,921	Average Trip Rates	77%	23%	0.13	0.04	0.17	28%	72%	0.07	0.27	0.18
			New Auto Trips			54	16	70			21	53	74
	C	285,918	Average Trip Rates	77%	23%	0.13	0.04	0.17	28%	72%	0.07	0.27	0.18
			New Auto Trips			37	12	49			14	37	51
Industrial Park (130)	D	336,382	Average Trip Rates	81%	19%	0.28	0.06	0.34	22%	78%	0.07	0.27	0.34
			New Auto Trips			93	21	114			25	89	114
Total New Trips				-	-	**231**	**63**	**294**	-	-	**78**	**226**	**304**
Total New Trips Reported in Previous TIS Addendum				-	-	**400**	**95**	**495**	-	-	**105**	**395**	**500**
Net Change in Trip Generation Estimates				-	-	**-169**	**-32**	**-201**	-	-	**-27**	**-169**	**-196**

As presented in **Table 2**, with respect to trucks specifically, the proposed development is projected to generate approximately 34 two-way truck trips during the weekday a.m. peak hour of the adjacent street traffic (17 inbound trips and 17 outbound trips), and 45 two-way trips during the weekday p.m. peak hour of the adjacent street traffic (21 inbound trips and 24 outbound trips).

Table 2: Truck Trip Generation Estimates

Land Use Code	Building	Magnitude (ft^2)	Parameters	AM Directional Distribution		Morning Peak Hour			PM Directional Distribution		Afternoon Peak Hour		
				In	Out	In	Out	Total	In	Out	In	Out	Total
Warehouse (150)	A	360,257	Average Trip Rates	52%	48%	0.01	0.01	0.02	52%	48%	0.02	0.01	0.03
			New Auto Trips			4	3	7			6	5	11
	B	411,921	Average Trip Rates	52%	48%	0.01	0.01	0.02	52%	48%	0.02	0.01	0.03
			New Auto Trips			4	4	8			6	6	12
	C	285,918	Average Trip Rates	52%	48%	0.01	0.01	0.02	52%	48%	0.02	0.01	0.03
			New Auto Trips			3	3	6			4	5	9
Industrial Park (130)	D	336,382	Average Trip Rates	45%	55%	0.02	0.02	0.04	38%	62%	0.02	0.02	0.04
			New Auto Trips			6	7	13			5	8	13
Total New Truck Trips				-	-	**17**	**17**	**34**	-	-	**21**	**24**	**45**
Total New Truck Trips Reported in Previous TIS Addendum				-	-	**10**	**5**	**15**	-	-	**5**	**15**	**20**
Net Change in Truck Trip Generation Estimates				-	-	**+7**	**+12**	**+19**	-	-	**+16**	**+9**	**+25**

2. Trip Distribution and Trip Assignment

The trip distribution assumptions applied in the previous TIS addendum are primarily based off 2016 Transportation Tomorrow Survey (TTS) commuter data, and refined with consideration for localized factors (e.g., logical routing, anticipated traffic operations, travel time estimates, etc.).

Car Distribution

SLBC has generally maintained these travel assumptions which apply to cars generated by the site (not trucks), although with some slight modifications based on some additional trip distribution considerations. A notable majority of site generated cars (approximately 60%) are estimated to travel to/from the Highway 6 corridor, which provides a direct connection to Highway 403 which in turn provides routes to the Greater Toronto-Hamilton Area (GTHA), communities in southwestern Ontario, and to various neighborhoods within the City of Hamilton (e.g., Ancaster, Flamborough, downtown Hamilton, Dundas, etc.). It is expected a notably lesser proportion will utilize Upper James Street north of Airport Road West (approximately 25%), as that route will primarily serve residents (future employees) residing in the "west mountain" area of Hamilton. There are other routes available to other peripheral areas of the City (e.g., Upper James to the south, and Airport Road West to the east and west of the study area), but these are expected to service a nominal proportion of site generated traffic (approximately 5% each).

The resulting trip distribution assumptions for the site generated cars are shown in **Table 3**.

Table 3: Trip Distribution Assumptions

Direction	Proportion of Site Trips
Upper James Street, north of Airport Road West	25%
Airport Road West, east of Upper James Street	5%
Upper James Street, south of Airport Road West	5%
Highway 6 connection to Highway 403	60%
Airport Road West, west of the airport	5%
TOTAL	100%

Truck Distribution

With respect to the routing of site generated trucks, existing regulatory signage currently restricts trucks from entering the Homestead neighbourhood via Airport Road West. Furthermore, the proposed intersection of Street "A" at Airport Road West is planned to have regulatory signage restricting outbound site generated trucks from entering the Homestead neighborhood. Therefore, all of the site generated trucks (inbound and outbound) are expected to utilize the Highway 6 connection west of the site, with no site generated trucks travelling east of the site along Airport Road West.

Combined Vehicle Distribution

The site generated traffic (cars and trucks) has been assigned to individual turning movements at the study area intersections based on the aforementioned trip distribution assumptions. The assignment of the estimated peak hour site generated traffic for cars, trucks, and all vehicles (cars plus trucks) is shown in **Figures C1, C2, and C3**, respectively, in **Appendix D**.

Alternative Trip Distribution Scenario

Given a potential future connection of Street "A" through the development lands north of site and ultimately connecting to Upper James Street may occur subsequent to build-out of the subject development, thus providing a second route between the site and the Upper James Street corridor, an alternative trip distribution scenario has been prepared to analyze and identify the anticipated operational implications of a potential future northern connection. In this scenario, it is expected the vast majority of site generated trips travelling between the site and Upper James Street to the north will utilize this future northern connection, with a nominal volume of traffic (approximately 5%) maintaining the original route through the Homestead neighborhood given it's comparatively longer travel distance and time. As a conservative approach, it is assumed that site generated trucks will continue to utilize the Highway 6 corridor as opposed to Upper James Street even with the northern connection in place, given the desire for a direct route to Highway 403 and the QEW (this represents a worst-case scenario for the capacity analysis, as it maintains 100% of site generated trucks travelling along Airport Road West rather than utilizing a potential northern connection north of the site away from Airport Road West).

The re-distributed site generated traffic based on the alternative scenario (northern connection of Street "A" to Upper James Street) for cars and all vehicles (truck distribution has remain unchanged) is shown in **Figures C4 and C5**, respectively, in **Appendix D**.

3. Forecasted Intersection Volumes in 2028

The updated 2028 Future Total intersection volumes have been forecasted by adding the 2028 Future Background volumes (assumes corridor growth and traffic generated from other developments, found in the previous TIS Addendum) with the updated site generated traffic for the "proposed" and "alternative" scenarios, as shown in **Figures C6** and **C7**, respectively, in **Appendix D.**

4. Intersection Capacity Analysis Results

The industry standard Synchro macroscopic traffic analysis software was utilized to analyze the study intersections. Key performance measures such as Level of Service (LOS), volume-to-capacity ratio (v/c ratio), and 95th percentile queuing was reported. This section summarizes the findings from the capacity analysis with detailed output reports from the Synchro software provided in **Appendix E**.

Table 4 presents the results from the capacity analysis for the study intersections under the forecasted 2028 Future Total Conditions scenario, with the proposed single connection of Street "A" to Airport Road West. The key results of the analysis can be summarized as follows:

- The northbound through/right-turn movement on Upper James Street at Airport Road West is expected to be nearing capacity during the a.m. peak hour with 95th percentile queueing more than 200 metres, with similar operations for the southbound through movement during the p.m. peak hour. This is similar to the 2028 Future Background conditions reported in the previous TIS Addendum, indicating this is a capacity problem largely associated with the Upper James Street corridor overall, regardless of the subject development, and is therefore not being caused by the subject development. This analysis is based on the current cross-section of Upper James Street (two lanes per direction) which is expected to be widened to three lanes per direction shortly after 2028, thus providing the needed additional capacity for the Upper James Street corridor as already identified by City staff.
- The analysis of the intersection of Upper James Street at Airport Road West assumes dual eastbound left-turn lanes on Airport Road West, which is considered reasonable given the heavy projected left-turn volumes (460-520 vph in the peak hours). This is confirmed to be a capacity problem associated with the intersection of Upper James Street at Airport Road West in general, and not the site generated traffic from the subject development, given the capacity problem was identified in the 2028 Future Background conditions reported in the previous TIS Addendum.
- The southbound left-turn movement from the proposed Street "A" onto Airport Road West is expected to have a LOS "F" indicating potentially high delays during peak hours. This is due to the limited gaps on Airport Road West which will be uncontrolled (no stop signs), thus increasing the delay to complete a left-turn from Street "A" which will be stop-controlled. It is important to note that although delay is expected to be high during the p.m. peak hour, it does not result in an operational concern for the intersection overall. It is expected that outside peak hours (for the majority of the day) delays will likely decrease to below LOS "F" given anticipated significantly reduced traffic volumes on Airport Road West with nominal levels of commuter traffic during the off-peak periods.
- Signal warrant analysis completed for the future intersection of Street "A" at Airport Road West in the previous TIS Addendum indicated signals are not warranted in 2028 due to insufficient traffic volumes on Street "A". With Street "A" traffic volumes decreasing by approximately 40% in this TIS Addendum, the results of the signal warrant analysis are maintained. All-way Stop Control is also

not warranted due to insufficient volumes on Street "A" compared to Airport Road West, as per the minimum directional split requirements of the Ontario Traffic Manual (OTM) Book 5.

- There are no other operational concerns at the other study intersections forecasted for the 2028 horizon year requiring mitigation.

Table 4: 2028 Future Total Capacity Analysis Results

Scenario	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Storage Length (m)
		v/c	LOS	95%Q (m)	v/c	LOS	95%Q (m)	
Upper James St/Airport Rd (Signalized)	EBLL	0.87	E	95	0.87	E	98	120
	EBTR	0.67	D	122	0.68	D	139	220
	WBL	0.43	E	33	0.76	F (82s)	65	15
	WTR	0.81	E	107	**0.86**	**E**	**128**	200
	NBL	0.28	C	32	0.89	E	51	135
	NBTR	**0.93**	**D**	**277**	0.82	D	200	260
	SBL	0.38	C	12	0.71	D	34	120
	SBT	0.34	B	64	**0.95**	**D**	**270**	300
	SBR	0.20	A	11	0.21	A	22	80
Homestead Dr/Airport Rd W (Signalized)	EBL	0.09	A	<1 veh	0.09	A	<1 veh	30
	EBTR	0.70	B	88	0.83	B	147	800
	WBL	0.10	A	<1 veh	0.58	C	26	30
	WBTR	0.44	A	40	0.40	A	40	220
	NBL	0.21	C	12	0.32	C	17	30
	NBTR	0.47	B	21	0.27	A	16	260
	SBL	0.26	C	13	0.42	C	34	30
	SBTR	0.45	B	20	0.71	C	78	550
Street A/Airport Rd (Unsignalized)	EBLT	0.18	A	<1 veh	0.07	A	< 1 veh	15
	SBL	0.31	**F (100s)**	8	0.97	**F (183s)**	40	45
	SBR	0.11	B	<1 veh	0.34	C	11	200
E Cargo Rd/Provident Way (Signalized)	EBL	0.06	C	8	0.12	A	<1 veh	15
	ETR	0.52	C	51	0.71	B	130	320
	WBL	0.66	B	60	0.36	A	17	15
	WTR	0.28	B	40	0.47	A	60	840
	NBL	0.16	B	14	0.36	C	29	15
	NBTR	0.86	B	60	0.17	A	-	100
	SBL	0.21	C	8	0.28	C	23	60
	SBTR	0.06	B	<1 veh	0.11	A	-	310
Hwy 6/Hamilton Airport Entrance/Airport Rd W (Signalized)	EBL	0.06	C	8	0.05	C	<1 veh	30
	EBTR	0.52	C	51	0.65	D	64	160
	WBL	0.66	B	60	0.79	C	97	30
	WBTR	0.28	B	40	0.29	B	38	320
	NBL	0.16	B	14	0.22	C	15	30
	NBTR	**0.86**	**B**	60	0.81	B	52	135
	SBL	0.21	C	8	0.56	D	23	30
	SBTR	0.06	B	<1 veh	0.13	B	15	90

Table 5 presents the results from the capacity analysis for the study intersections under the forecasted 2028 Future Total Conditions "Alternative Scenario", which assumes a potential future northern connection of Street "A" to the north and ultimately to Upper James Street. The key results of the analysis can be summarized as follows:

- Traffic operations at the study intersections are anticipated to either slightly improve (intersections east of Street "A") or remain unchanged (intersections west of Street "A") due to the re-distribution of a portion of the site generated traffic to the north of the study area.
- The southbound left-turn movement from the proposed Street "A" onto Airport Road West is still expected to have a LOS "F" during peak hours, although with notably lesser average vehicle delays. Traffic signals and all-way stop control are still not warranted due to even lesser side street (Street "A") approach volumes. It is expected that outside peak hours (for the majority of the day) delays will likely decrease to below LOS "F" given anticipated significantly reduced traffic volumes on Airport Road West with nominal levels of commuter traffic during the off-peak periods.
- There are no other operational concerns at the other study intersections forecasted for the 2028 horizon year requiring mitigation.

Table 5: 2028 Future Total Capacity Analysis Results - Alternative Scenario

Scenario	Movement	Weekday AM Peak Hour			Weekday PM Peak Hour			Storage Length (m)
		v/c	LOS	95%Q (m)	v/c	LOS	95%Q (m)	
Upper James St/Airport Rd (Signalized)	EBL	0.86	E	92	0.84	E	90	120
	EBTR	0.67	D	122	0.69	D	139	220
	WBL	0.43	E	33	0.76	F	65	15
	WTR	0.81	E	107	**0.86**	**E**	**128**	200
	NBL	0.28	C	32	0.88	E	51	135
	NBTR	**0.93**	**D**	**277**	0.82	D	200	260
	SBL	0.38	C	12	0.69	D	32	120
	SBT	0.34	B	64	**0.94**	**D**	**270**	300
	SBR	0.15	A	10	0.20	A	20	80
Homestead Dr/Airport Rd W (Signalized)	EBL	0.09	A	<1 veh	0.09	A	<1 veh	30
	EBTR	0.70	B	85	0.80	B	131	800
	WBL	0.10	A	<1 veh	0.53	B	22	30
	WBTR	0.41	A	35	0.40	A	39	220
	NBL	0.20	C	12	0.30	C	17	30
	NBTR	0.46	B	20	0.26	A	16	260
	SBL	0.25	C	13	0.41	C	34	30
	SBTR	0.45	B	20	0.69	C	78	550
Street A/Airport Rd (Unsignalized)	EBLT	0.17	A	<1 veh	0.07	A	<1 veh	15
	SBL	0.12	**F (77s)**	<1 veh	0.41	**F (77s)**	12	30
	SBR	0.10	B	<1 veh	0.33	C	11	200
E Cargo Rd/Provident Way (Signalized)	EBL	0.18	A	9	0.12	A	<1 veh	15
	ETR	**0.89**	**C**	**142**	0.71	B	130	320
	WBL	0.40	B	16	0.36	A	17	15
	WTR	0.47	A	46	0.47	A	60	840
	NBL	0.55	D	38	0.36	C	29	15
	NBTR	0.26	A	<1 veh	0.17	A	<1 veh	100
	SBL	0.30	C	18	0.28	C	23	60
	SBTR	0.12	A	<1 veh	0.11	A	<1 veh	310
Hwy 6/Hamilton Airport Entrance/Airport Rd W (Signalized)	EBL	0.06	C	8	0.05	C	<1 veh	30
	EBTR	0.52	C	51	0.65	D	64	160
	WBL	0.66	B	60	0.79	C	97	30
	WBTR	0.28	B	40	0.29	B	38	320
	NBL	0.16	B	14	0.22	C	15	30
	NBTR	0.86	B	60	0.81	B	52	135
	SBL	0.21	C	8	0.56	D	23	30
	SBTR	0.06	B	<1 veh	0.13	B	15	90

5. Review of Sightline at Proposed Driveway on Street "A"

The proposed alignment of Street "A" includes two 90-degree curves in the road's horizontal alignment, with the northernmost curve proposed to have a private driveway intersecting Street "A" at the outermost corner of the curve. This driveway will provide truck access for Building "C". This configuration is common on the City of Hamilton's road network. For example, most of the 90-degree curves on City roads within the nearby Red Hill Business Park area have industrial driveways located on the outside of the curves, given this generally does not limit sightlines.

Given the proposed driveway will be situated within the horizontal curve, City staff have requested the driveway placement be reviewed to confirm no operational or safety concerns (e.g., sightlines issues) are expected. The Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads also recommends sightlines should be checked for driveways proposed to be situated on curves. The following therefore provides the findings of the operational and safety review of the proposed driveway placement.

Based on the configuration of the overall site and the need to have vehicular access on both sides of each of the proposed buildings (to provide and keep separate employee parking and truck servicing areas), there is a need from a site planning perspective to have a driveway provide access to the east side of Building "C". Due to the proximity of Building "C" with the NHS Compensation lands, this situates the driveway in the vicinity of the proposed 90-degree curve in the road's alignment, with no alternative options without major revisions to the site layout.

With respect to trucks exiting the site via the proposed driveway, trucks exiting the driveway would be situated in a position of unobstructed visibility when looking at both approaches of Street "A" while seeking an adequate gap in approaching traffic before commencing the turning movement. This is compared to if the driveway was situated at the inside of the curve, resulting in reduced available sightlines. In the current proposed configuration, sightlines are maximized and fully unobstructed for trucks exiting the site, turning left or right.

Upon construction of Street "A" and build-out of the site, Street "A" will have a cul-de-sac at its northernmost limit, meaning the volume of inbound trucks (or any vehicle) destined for Building "C" and approaching from the north will be negligible; all inbound trucks will be approaching from the south and turning right into the driveway. For these inbound trucks turning right into the subject driveway, sightlines are not impacted by the curve and these trucks have the right-of-way when exiting Street "A" and entering the driveway.

Upon a future extension of Street "A" to the north in which case some inbound trucks may approach the site from the north, sightlines for inbound trucks will also be unobstructed. As shown in **Figure 1**, an inbound truck stopped on Street "A" awaiting a gap in opposing traffic before turning left into the driveway will be positioned well past the southeast corner of Building "D" which is the nearest physical feature which could limit sightlines in this situation (there are also no parking spaces in this area which could limit sightlines either). Therefore, based on the alignment of Street "A" and the position of Building "D", there is no potential sightline obstruction in this situation.

The driveway is currently proposed to have no auxiliary turn lanes, which simplifies the matter.

Based on the findings of the review as described above, a formal sightline assessment drawing is not required, given sightlines are fully unobstructed for all movements with no sightline restrictions to measure and compare against minimum recommendations provided in the TAC Geometric Design Guide.

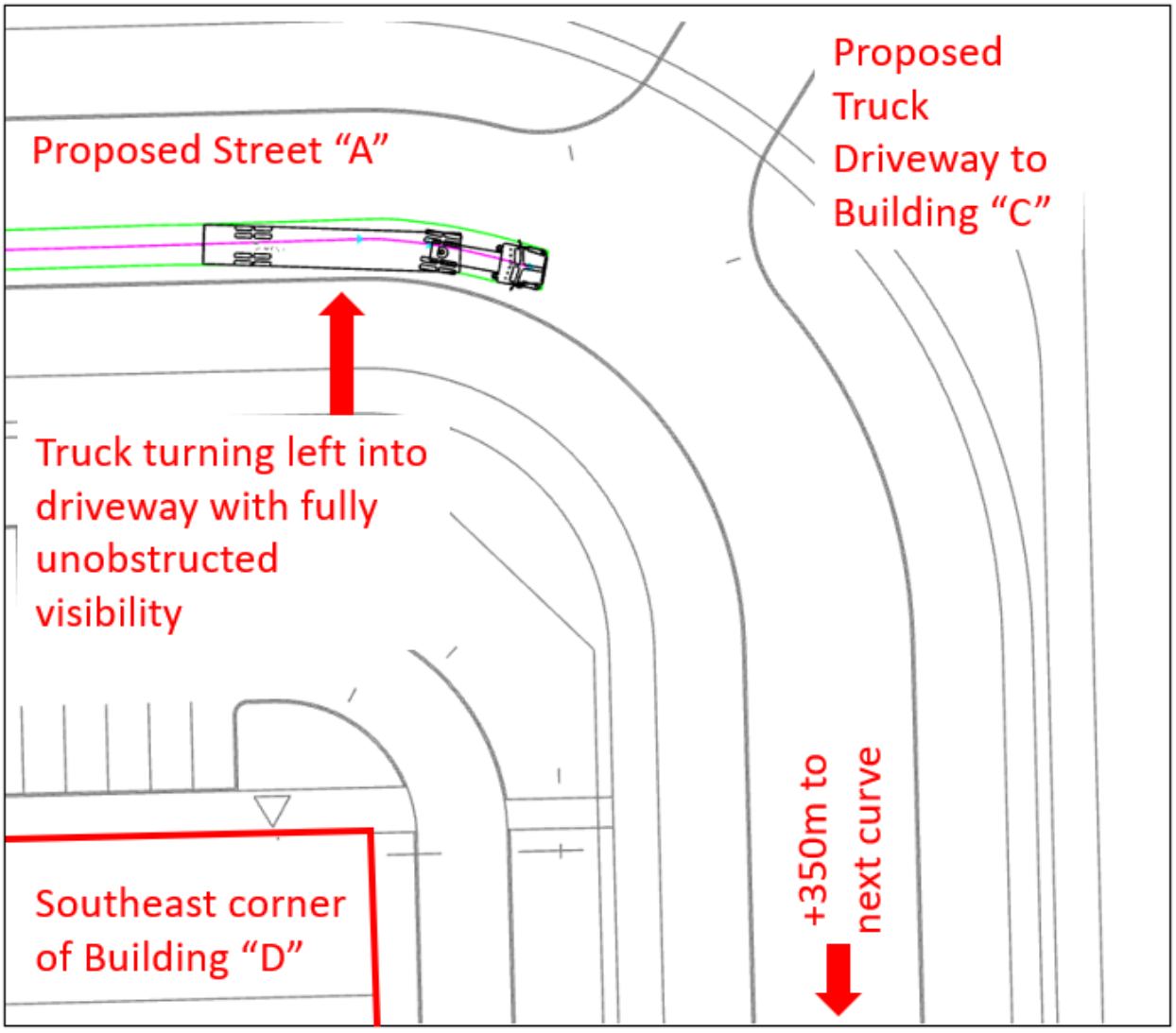


Figure 1: Proposed Driveway on Curve with No Visibility Constraints

6. Summary of Findings

- The northbound and southbound approaches on Upper James Street at Airport Road West are expected to be nearing capacity by 2028 in their current two-lanes per direction configuration, with nominal impact from traffic generated by the proposed development. Fortunately, the City is planning to widen this section of Upper James Street to three-lanes per direction, which will provide the needed additional capacity.
- Dual eastbound left-turn lanes on Airport Road West at Upper James Street are justified due to heavy forecasted left-turning volumes in 2028, which is primarily associated with background growth and not the site generated traffic from the subject development.
- The southbound left-turn movement from the proposed Street "A" onto Airport Road West is expected to have a LOS "F" by 2028, indicating potentially high delays during peak hours, although without operational concerns for other movements at the intersection nor for Airport Road West. However, operations are expected to notably improve upon introduction of a norther connection of Street "A" to Upper James Street as an alternative site access point. In the meantime, the proposed unsignalized intersection of Street "A" at Airport Road West is expected to operate satisfactorily overall as the sole access point for the site. Traffic signals or all-way stop control is not warranted.
- There are no other operational concerns at the other study intersections forecasted for the 2028 horizon year requiring mitigation, with or without a secondary northern connection from Street "A" to Upper James Street. The impact of the site generated traffic on the study intersections along Airport Road West is considered nominal.
- The proposed location of the truck driveway for Building "C" on the outside of the proposed horizontal curve on Street "A" is a common design configuration on City roads in industrial areas and does not pose a sightline or operational concern. There will be no sightline limitations to vehicles entering or exiting the driveway.

7. Recommendations

It is recommended the proposed intersection of Street "A" at Airport Road West be introduced as to provide vehicular access to the subject site, reflecting the lane configurations shown in **Appendix F**. Should a future northern connection from Street "A" to Upper James Street be introduced in the future as a secondary access point, it is expected traffic operations will future improve at the intersection of Street "A" at Airport Road West.

The proposed connection of Street "A" directly to Airport Road West is critical, given site generated traffic (trucks especially) require a direct route between the site and the freeway system (via Highway 6) given the predominantly "warehousing" nature of the site. Furthermore, the direct connection to Street "A" keeps most site generated traffic out of the Homestead neighbourhood to the east, whereas providing only a northern connection directly to Upper James Street may result in traffic routing back through the Homestead neighbourhood enroute to Highway 6.

It is recommended the City continue with plans for implementing capacity improvements along Upper James Street and especially at its intersection with Airport Road West.

SLBC Inc.

Adam Mildenberger, BA, CET
Principal, Transportation Advisory Services

Appendix A
Response Matrix

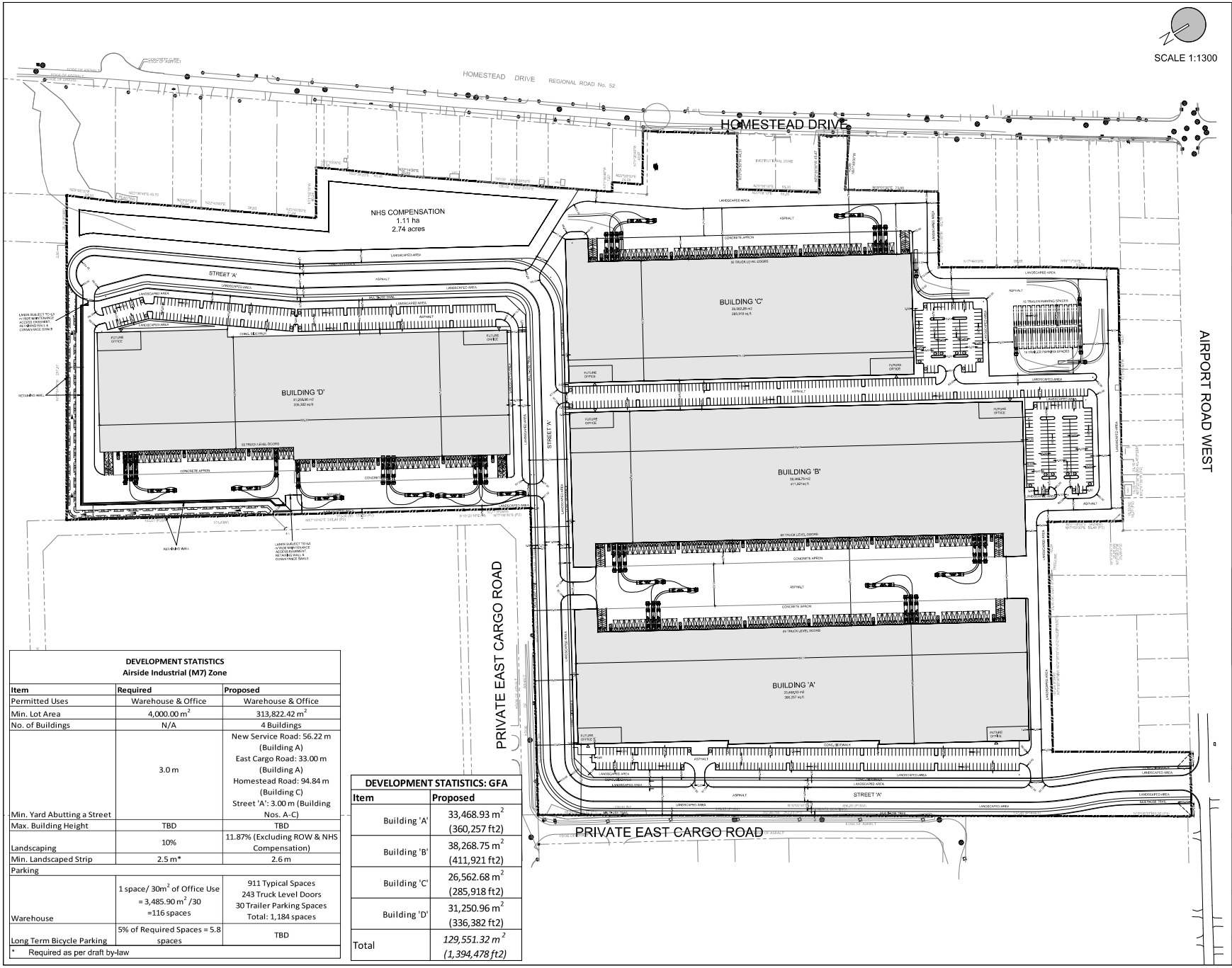
3054 Homestead Drive,
Comment Tracking Chart

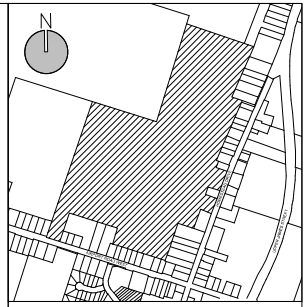
Commenting Agency	Comment	Responsible Consultant	Response
Transportation Planning (Gregory Borys)	**1.** As a condition of approval, prior to servicing, the Owner shall provide a pavement marking and signage plan for the overall subdivision to be completed to the satisfaction and approval of the Manager, Transportation Planning and the Manager, Transportation Operations & Maintenance.	SLBC	Noted. For Applicant's information.
	2. As a condition of approval prior to servicing, the Owner shall include in the engineering design and cost estimate schedule for the provision of all required works within the proposed new Municipal street, Street 'A', including lighting, signage, LID features and pavement markings to the satisfaction and approval of the Manager, Transportation Planning and the Manager, Transportation Operations & Maintenance and further that: **a.** All costs associated with these works, including but not limited to the design and construction, will be at the expense of the Owner; **b.** The design shall incorporate but is not limited to required street lighting, signage, pavement markings, textured pavement treatments, and concrete/asphalt works; and **c.** The final engineering design shall be completed to	SLBC	Noted. For Applicant's information.
	3. As a condition of approval prior to servicing, the Owner shall include in the engineering design and cost estimate schedule for the provision of all required works within Airport Road, including signage and pavement markings.	SLBC	Noted. For Applicant's information.
	4. As a condition of approval prior to servicing, 1.8 metre sidewalks shall be provided on both sides of Street 'A' to the satisfaction and approval of the Manager, Transportation Planning.	SLBC	Noted. For Applicant's information.
	5. As a condition of approval, prior to servicing, the Owner/Applicant shall include in the engineering design and cost estimate schedules provisions for the installation of all works associated with the required construction of Street A, Airport Road West upgrades, and further that:	SLBC	Noted. For Applicant's information.
	Transportation Planning do not support the proposed development. In order to protect the existing and future pedestrian realm, cycling infrastructure and road network, Transportation Planning shall require the following: • Approximately 8.4 metres are to be dedicated to the right-of-way on Airport Road West to achieve an ultimate width of 37.0 metres in accordance with the Official Plan. • The Owner/Applicant will be required to provide an adequate proportion of funds and enter into a cost sharing agreement with the City of Hamilton required for the implementation of westbound leftturn lane, dual eastbound left-turn lane at the intersection of Upper James Street & Airport Road	SLBC	Proportion of funds to be provied by the applicant as part of the cost sharing agreement to be discussed further between the Applicant and the City. Latest traffic study submission (Traffic Addendum, dated August 2023, prepared by SLBC Inc.) provides information to support future cost sharing discussions.
	• The Owner/Applicant will be required to provide an adequate proportion of funds and enter into a cost sharing agreement with the City of Hamilton required for the implementation of westbound leftturn lane, dual eastbound left-turn lane at the intersection of Upper James Street & Airport Road	SLBC	Proportion of funds to be provided by the applicant as part of the cost sharing agreement to be discussed further between the Applicant and the City. Latest traffic study submission (Traffic Addendum, dated August 2023, prepared by SLBC Inc.) provides information to support future cost sharing discussions.
	• Updates to the Transportation Impact Study based on the comments provided below, to the satisfaction and approval of the Manager, Transportation Planning	SLBC	Noted. Traffic Addendum (dated August 2023, prepared by SLBC Inc.) submitted based on revisions required by City Transportation Planning staff, per email correspondence from Dominic DiFlavio, Transportation Planning, City of Hamilton (dated June 23, 2023).
	• Street 'A' is to be dedicated as a 30.0 metre Local roadway in order to incorporate LID features in accordance with ongoing updates to the Airport Employment Growth District Transportation Master Plan (AEGD TMP).	SLBC	Noted. For Applicant's information.
	• A 10.0 metres x 10.0 metres Daylighting Triangle is required to be dedicated to the municipal right-ofway at Airport Road West & Street 'A'.	SLBC	Noted. For Applicant's information.
	• A temporary cul-de-sac is required to be located at the northern terminus of 'Street 'A'. 'Street 'A' shall ultimately be extended to service future planned development to the north.	SLBC	Noted. For Applicant's information.
	• Lane reconfigurations requirements for the intersection of Airport Road West and Street 'A' to include: a) One (1) eastbound exclusive left turn lane and one through lane on Airport Road West; b) One (1) shared through / right lane on Airport Road West; c) One (1) southbound exclusive left turn lane and one exclusive right turn lane on Street 'A'; d) The intersection will be stop-controlled on Street "A', with free-flow on Airport Road West.	SLBC	Agreed. Reflected in the latest Traffic Addendum submission (dated August 2023, prepared by SLBC Inc.)
	The Applicant is to provide a pavement marking and signage plan for the overall subdivision to be completed to the satisfaction and approval of the Manager, Transportation Planning and the Manager, Transportation Operations & Maintenance.	SLBC	Noted. For Applicant's information.
	Draft Plan of Subdivision – Conditions **1.** As a condition of approval, prior to servicing, the Owner shall provide a pavement marking and signage plan for the overall subdivision to be completed to the satisfaction and approval of the Manager, Transportation Planning and the Manager, Transportation Operations & Maintenance.	SLBC	Noted. For Applicant's information.
	Draft Plan of Subdivision - Conditions **2.** As a condition of approval prior to servicing, the Owner shall include in the engineering design and cost estimate schedule for the provision of all required works within the proposed new Municipal street, Street 'A', including lighting, signage, LID features and pavement markings to the satisfaction and approval of the Manager, Transportation Planning and the Manager, Transportation Operations & Maintenance and further that: **a.** All costs associated with these works, including but not limited to the design and construction, will be at the expense of the Owner; **b.** The design shall incorporate but is not limited to required street lighting, signage, pavement markings, textured pavement treatments, and concrete/asphalt works; and **c.** The final engineering design shall be completed to the satisfaction and approval of the Manager, Transportation Planning and the Manager, Transportation Operations & Maintenance.	SLBC	Noted. For Applicant's information.
	Draft Plan of Subdivision - Conditions **3.** As a condition of approval prior to servicing, the Owner shall include in the engineering design and cost estimate schedule for the provision of all required works within Airport Road, including signage and pavement markings.	SLBC	Noted. For Applicant's information.
	Draft Plan of Subdivision - Conditions **4.** As a condition of approval prior to servicing, 1.8 metre sidewalks shall be provided on both sides of Street 'A' to the satisfaction and approval of the Manager, Transportation Planning.	SLBC	Noted. For Applicant's information.
	Transportation Impact Study – Revisions Required **5.** Transportation Planning have reviewed the revised Transportation Impact Study prepared by NexTrans Consulting Engineers dated February 2023. Upon review, Transportation Planning require further revisions to the TIS.	SLBC	Noted. Traffic Addendum (dated August 2023, prepared by SLBC Inc.) submitted based on revisions required by City Transportation Planning staff, per email correspondence from Dominic DiFlavio, Transportation Planning, City of Hamilton (dated June 23, 2023).
	Transportation Impact Study – Revisions Required **6.** The TIS did not analyze the future connection through the property adjacent to the north which will create a new intersection of Street 'A' and Upper James Street. Transportation Planning anticipates there will be extra capacity at this future intersection enough to accommodate all or a proportion of traffic from the subject site. This will eliminate or reduce demand on Airport Road West in the horizon year and beyond, which is expected to be at capacity if maintaining its current 2-lane configuration. The Applicant is required to coordinate with the Applicant directly to the north (ZAC-22-027/UHOPA- 22-014/25T-202205) for the construction of 'Street A'.	SLBC	Noted. Traffic Addendum (dated August 2023, prepared by SLBC Inc.) submitted based on revisions required by City Transportation Planning staff, per email correspondence from Dominic DiFlavio, Transportation Planning, City of Hamilton (dated June 23, 2023). The addendum includes analysis for the future northern connection scenario.

Transportation Impact Study – Revisions Required **7.** The study has demonstrated that Airport Road West will be at capacity in the horizon year and cannot accommodate all the vehicular traffic generated by the proposed development at full build-out without major infrastructure improvements. These improvements are being planned but shall be regarded as long-term as they cannot realistically be implemented before the horizon year. Consequently, Transportation Planning cannot support the proposed development at this time, however, recommend further assessment of the following alternatives: **a.** Eliminate access to Airport Road West and coordinate with the Applicant directly to the north to expedite construction of 'Street A'. The proposed subdivided lands will have direct access to 'Street A' and connect to Upper James Street, which will operate with signal control. **b.** Should the Applicant insist on access to Airport Road West via Street 'A', only short-term improvements will be considered subject to analysis demonstrating these can provide enough capacity to meet the demand of sitegenerated traffic. The following improvements can be considered short-term: **i.** Auxiliary lanes at the intersection of Airport Road West and Street 'A'. **ii.** Restricting access (median / channelizing islands) at the intersection of Airport Road West and Street 'A'. **iii.** Eastbound dual left-turn lanes at Airport Road West and Upper James Street. **iv.** Traffic signal upgrades at Airport Road West and Upper James Street. **c.** A Phased development approach, where the initial Phase(s) site-generated traffic can be accommodated on the existing network or with short-term improvements; and build-out of the subsequent Phase(s) to coincide with build-out of planned long-term improvements.	SLBC	Traffic Addendum (dated August 2023, prepared by SLBC Inc.) submitted based on revisions required by City Transportation Planning staff, per email correspondence from Dominic DiFlavio, Transportation Planning, City of Hamilton (dated June 23, 2023). The addendum confirms Airport Road West has sufficient capacity to accomodate projected traffic generation from the subject site, and identifies needed improvements to support the subject development (e.g., future intersection of Street "A" at Airport Road West).
Transportation Impact Study – Revisions Required **8.** Lane reconfigurations requirements for the intersection of Airport Road West and Street 'A' to include: **a.** One (1) eastbound exclusive left turn lane and one through lane on Airport Road West; **b.** One (1) shared through / right lane on Airport Road West; **c.** One (1) southbound exclusive left turn lane and one exclusive right turn lane on Street 'A'; **d.** The intersection will be stop-controlled on Street 'A', with free-flow on Airport Road West.	SLBC	Agreed. Reflected in the latest Traffic Addendum submission (dated August 2023, prepared by SLBC Inc.)
Transportation Impact Study – Revisions Required **9.** Based on the results of the TIS a significant proportion of employees will be utilizing the intersection of Upper James Street & Airport Road in order to travel to/from the subject lands. Following internal discussion, it has been determined that infrastructure improvements are required in order to facilitate the build-out of the subject lands as well as an additional similar Airport Use development (9555 Airport Road West, 25T-202106, UHOPA-21-008 & ZAC-21-018). The proposed development will be required to contribute towards a cost sharing agreement with the other nearby development in order to provide the infrastructure improvements necessary for the intersection to adequately function prior to any additional improvements being completed along Airport Road West as a result of planned studies or environmental assessment. Based on the trip generation comparison with the nearby development contributing to operational concerns at Upper James Street & Airport Road, the subject lands are contributing an approximate 65% of the increase in demand as indicated in Table 1. The Owner/Applicant will be required to provide an adequate proportion of funds and enter into a cost sharing agreement with the City of Hamilton required for the implementation of westbound left-turn lane, dual eastbound left-turn lane at the intersection of Upper James Street & Airport Road.	SLBC	Traffic Addendum (dated August 2023, prepared by SLBC Inc.) submitted based on revisions required by City Transportation Planning staff, per email correspondence from Dominic DiFlavio, Transportation Planning, City of Hamilton (dated June 23, 2023). The addendum confirms Airport Road West has sufficient capacity to accomodate projected traffic generation from the subject site, and identifies needed improvements to support the subject development (e.g., future intersection of Street "A" at Airport Road West). Proportion of funds to be provided by the applicant as part of the cost sharing agreement to be discussed further between the Applicant and the City. The Traffic Addendum provides information to support future cost sharing discussions.
Additional Information **10.** Transportation Planning have concerns with Street A connection to Airport Road West and the amount of traffic that will be generated. Transportation Planning reserve the right to close Street A at Airport Road West at a future time should concerns arise. Street A will connect to a signalized intersection at Street A and Upper James as part of the Application directly to the north.	SLBC	Noted. For Applicant's information.
Infrastructure Improvements – Required **11.** The Applicant will be responsible for any road improvements that are identified in association with their development (left turn lanes, right turn lanes, etc.) all at their cost.	SLBC	Noted. For Applicant's information.
Infrastructure Improvements – Required **12.** It is noted that a concurrent ongoing Development Application (2876 Upper James Street, UHOPA-22-014, ZAC-22-014, 25T-202205) has been submitted for the lands immediately to the north of the subject property. It is not clear if the Applicant/Owner has done any coordination regarding the connection of municipal rightof- way between the properties. Coordination between the properties are needed to allow for the continuous connection of Street 'A' to the lands to the north.	SLBC	Noted. For Applicant's information.
Intersection of Upper James Street & Airport Road West **13.** The Owner/Applicant will be required to provide an adequate proportion of funds and enter into a cost sharing agreement with the City of Hamilton required for the implementation of westbound left-turn lane, dual eastbound left-turn lane at the intersection of Upper James Street & Airport Road. Transportation Planning shall coordinate with Development Engineering Approvals in order to determine the details of the cost sharing agreement proportional to the impact at the intersection	SLBC	Proportion of funds to be provided by the applicant as part of the cost sharing agreement to be discussed further between the Applicant and the City. Latest traffic study submission (Traffic Addendum, dated August 2023, prepared by SLBC Inc.) provides information to support future cost sharing discussions.
Street 'A' **14.** Any design, road work and modifications to the related municipal infrastructure will be fully at the expense of the Applicant. The Applicant is advised that should any modifications be required to the traffic signals and/or pavement markings and/or signage because of this development, they must be completed by a qualified traffic signal/pavement markings design consultant and fully at the expense of the Applicant. The City will review and approve the engineering design and provide the final design detail requirements. It is the Applicant's responsibility to contact trafficops@hamilton.ca for information regarding the City's design standards and drawing format. The email subject line is to be 3054 Homestead Drive (Ward 11) Traffic Signal/Pavement Markings.	SLBC	Noted. For Applicant's information.
Street 'A' **15.** A temporary terminating cul-de-sac is required to be located at the northern terminus of Street 'A' prior to extension / continuation of the road on the adjacent property located to the north. Development engineering approvals shall confirm the dimensions of the required terminating cul-de-sac accordingly.	SLBC	Noted. For Applicant's information.
Street 'A' **16.** A 1.8 metre sidewalks shall be implemented along both sides of the municipal roadway.	SLBC	Noted. For Applicant's information.
Airport Road West **17**. Any design, road work and modifications to the related municipal infrastructure will be fully at the expense of the Applicant. The Applicant is advised that should any modifications be required to the traffic signals and/or pavement markings and/or signage because of this development, they must be completed by a qualified traffic signal/pavement markings design consultant and fully at the expense of the Applicant. The City will review and approve the engineering design and provide the final design detail requirements. It is the Applicant's responsibility to contact trafficops@hamilton.ca for information regarding the City's design standards and drawing format. The email subject line is to be 3054 Homestead Drive (Ward 11) Traffic Signal/Pavement Markings.	SLBC	Noted. For Applicant's information.
Airport Road West **18.** Lane reconfigurations requirements for the intersection of Airport Road West and Street 'A' to include: **a.** One (1) eastbound exclusive left turn lane and one through lane on Airport Road West; **b.** One (1) westbound shared through / right lane on Airport Road West; **c.** One (1) southbound exclusive left turn lane and one exclusive right turn lane on Street 'A'; **d.** The intersection will be stop-controlled on Street 'A', with free-flow on Airport Road West.	SLBC	Agreed. Reflected in the latest Traffic Addendum submission (dated August 2023, prepared by SLBC Inc.)
Airport Road West **19.** The Applicant will be responsible for a cost-sharing agreement with the Applicant directly to the north (ZAC- 22-027/UHOPA-22-014/25T-202205) for the design and construction work required at the intersection of Airport Road West and Upper James Street.	SLBC	Proportion of funds to be provided by the applicant as part of the cost sharing agreement to be discussed further between the Applicant and the City. Latest traffic study submission (Traffic Addendum, dated August 2023, prepared by SLBC Inc.) provides information to support future cost sharing discussions.
Right-of-Way Dedications – Required Airport Road West **20.** The existing right-of-way at the subject property is approximately 20.2 metres. Approximately 8.4 metres are to be dedicated to the right-of-way on Airport Road West, as per the Council Approved Urban Official Plan: Volume 2, Chapter B – Airport Employment Growth District (AEGD), Section 8.10.12. Minor Arterial roads within the AEGD are to be 37.0 metres.	SLBC	Noted. For Applicant's information.
Street 'A' **21.** Street 'A' shall have a right-of-way width of 30.0 metres in accordance with ongoing updates to the AEGD TMP cross-sectional design requirements. It shall be noted that the maximum prescribed right-of-way for this tentatively classified Local road is required to adequately include Low Impact Development (LID) and other complete street features. Transportation Planning defers further comments regarding LID requirements to Development Engineering Approvals.	SLBC	Noted. For Applicant's information.

	Daylighting Triangle Dedications – Required **Airport Road West at Street 'A'** **22.** Airport Road West is an Arterial Road and Street 'A' shall be classified as either a Local or Collector road. The Applicant is to dedicate a 12.19 metres x 12.19 metres Daylighting Triangle to the right-of-way to meet the requirements of the Council Approved Urban Official Plan: Chapter C - City Wide Systems and Designations 4.5 Road Network Functional Classification; Daylighting Triangles 4.5.7 – however without setting precedent, Transportation Planning waives this requirement in favour of a reduced Daylighting Triangle measuring no less than 10.0 metres x 10.0 metres.	SLBC	Noted. For Applicant's information.
	Site Plan – Future Requirements **Driveway Location / Design** **23.** Driveways accesses are not permitted within sharp curves, 90-degree bends or intersections.	SLBC	Traffic Addendum (dated August 2023, prepared by SLBC Inc.) submitted based on revisions required by City Transportation Planning staff, per email correspondence from Dominic DiFlavio, Transportation Planning, City of Hamilton (dated June 23, 2023). The addendum confirms the proposed drvieway located on the 90-degree curve is justified from operational and safety standpoints.
	Site Plan – Future Requirements **Driveway Location / Design** **24.** Proposed access to Building A is currently located within a cul-de-sac for proposed Street A. The Applicant is to note that the terminus of Street A is a temporary condition and will be extended in the future, the proposed access may be impacted through future development of Street A.	SLBC	Noted. For Applicant's information.
	25. Heavy Vehicle Access – For two-way operation onto municipal road, the driveway access width(s) must be minimum 9.0 metres at the ultimate property line and curve radii minimum 9.0 metres for heavy vehicles. All shall be identified and dimensioned on the future site plan applications.	SLBC	Noted. For Applicant's information.
	26. Passenger Vehicle Access – For two-way operation onto municipal road, the driveway access width(s) must be 7.5 metres at the ultimate property line and curve radii minimum 7.0 metres for passenger vehicles. All shall be identified and dimensioned on the future site plan applications.	SLBC	Noted. For Applicant's information.
	27. Visibility triangles measuring 5.0 metres x 5.0 metres must be provided for each driveway access. They must be illustrated, dimensioned and identified on the site plan. Visibility triangles are between the driveway limits and the ultimate property line (right-of-way limit) and no object or mature vegetation can exceed a height of 0.6 metres above the corresponding perpendicular centreline elevation of the adjacent street.	SLBC	Noted. For Applicant's information.
	28. Reversing of vehicles onto the right-of-way is not permitted, and a turning plan will be required to be provided for future site plan applications in order to demonstrate a vehicle can enter the site in a forward manner, turn around on private property, and exit in a forward manner.	SLBC	Noted. For Applicant's information.
	Transportation Demand Management **29.** Transportation Planning notes that all Transportation Demand Management features will be reviewed at the site plan stage and shall generally be consistent with what is provided within the Transportation Impact Study.	SLBC	Noted. For Applicant's information.
	Municipal Sidewalks **30.** The municipal sidewalk must be continuous through any driveway approaches and any driveway curbing must end behind the municipal sidewalk.	SLBC	Noted. For Applicant's information.

Appendix B
Concept Plan





KEY MAP - N.T.S.

SCALE: 1:1300

0 50 100 150m

LEGEND:

- SUBJECT LANDS
- EXISTING PROPERTY LINES
- PROPOSED BUILDING
- MAN DOOR
- OVERHEAD DOOR

DEVELOPMENT STATISTICS
Airside Industrial (M7) Zone

Item	Required	Proposed
Permitted Uses	Warehouse & Office	Warehouse & Office
Min. Lot Area	4,000.00 m^2	313,822.42 m^2
No. of Buildings	N/A	4 Buildings
Min. Yard Abutting a Street	3.0 m	New Service Road: 56.22 m (Building A) East Cargo Road: 33.00 m (Building A) Homestead Road: 94.84 m (Building C) Street 'A': 3.00 m (Building Nos. A-C)
Max. Building Height	TBD	TBD
Landscaping	10%	11.87% (Excluding ROW & NHS Compensation)
Min. Landscaped Strip	2.5 m*	2.6 m
Parking		
Warehouse	1 space/ 30m^2 of Office Use = 3,485.90 m^2 /30 =116 spaces	911 Typical Spaces 243 Truck Level Doors 30 Trailer Parking Spaces Total: 1,184 spaces
Long Term Bicycle Parking	5% of Required Spaces = 5.8 spaces	TBD

* Required as per draft by-law

DEVELOPMENT STATISTICS: GFA

Item	Proposed
Building 'A'	33,468.93 m^2 (360,257 ft2)
Building 'B'	38,268.75 m^2 (411,921 ft2)
Building 'C'	26,562.68 m^2 (285,918 ft2)
Building 'D'	31,250.96 m^2 (336,382 ft2)
Total	*129,551.32 m^2 (1,394,478 ft2)*

DESIGN BY: S. McKAY | CHECKED BY: S. MANCHIA

DRAWN BY: L. DRENNAN | DATE: AUGUST 2, 2023

URBAN SOLUTIONS
PLANNING & LAND DEVELOPMENT
3 STUDEBAKER PLACE, UNIT 1
HAMILTON, ON L8L 0C8
905-546-1087 URBANSOLUTIONS.INFO

PROJECT:
3054 HOMESTEAD DRIVE, 9174 & 9166 AIRPORT ROAD WEST
City of Hamilton

CLIENT:
FENGATE HOMESTEAD HOLDINGS LP

TITLE:
CONCEPT PLAN

U/S FILE NUMBER: 413-21

SHEET NUMBER: 1

Appendix C
ITE Trip Generation Sheets

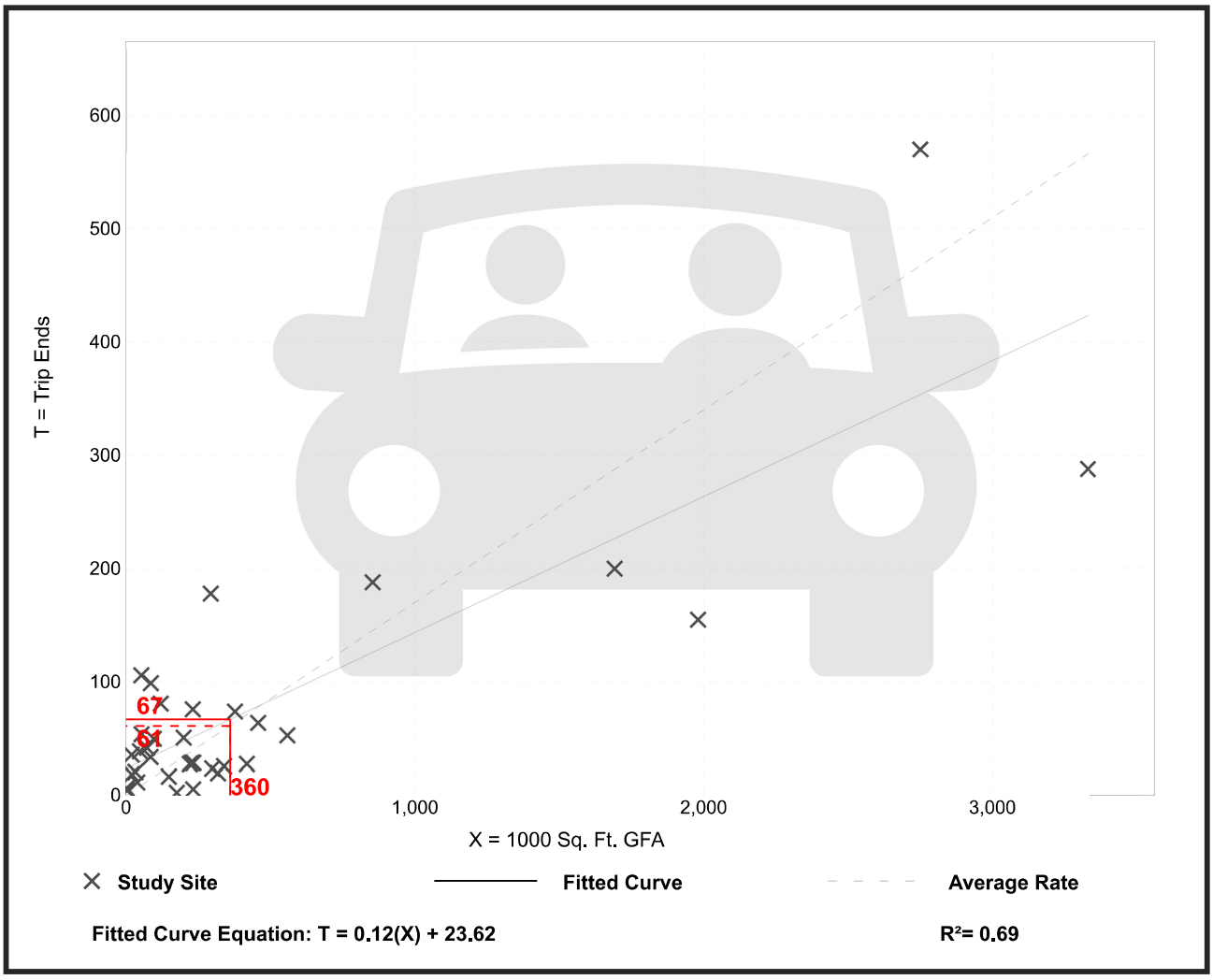
Warehousing
(150)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 36
Avg. 1000 Sq. Ft. GFA: 448
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.19

Data Plot and Equation



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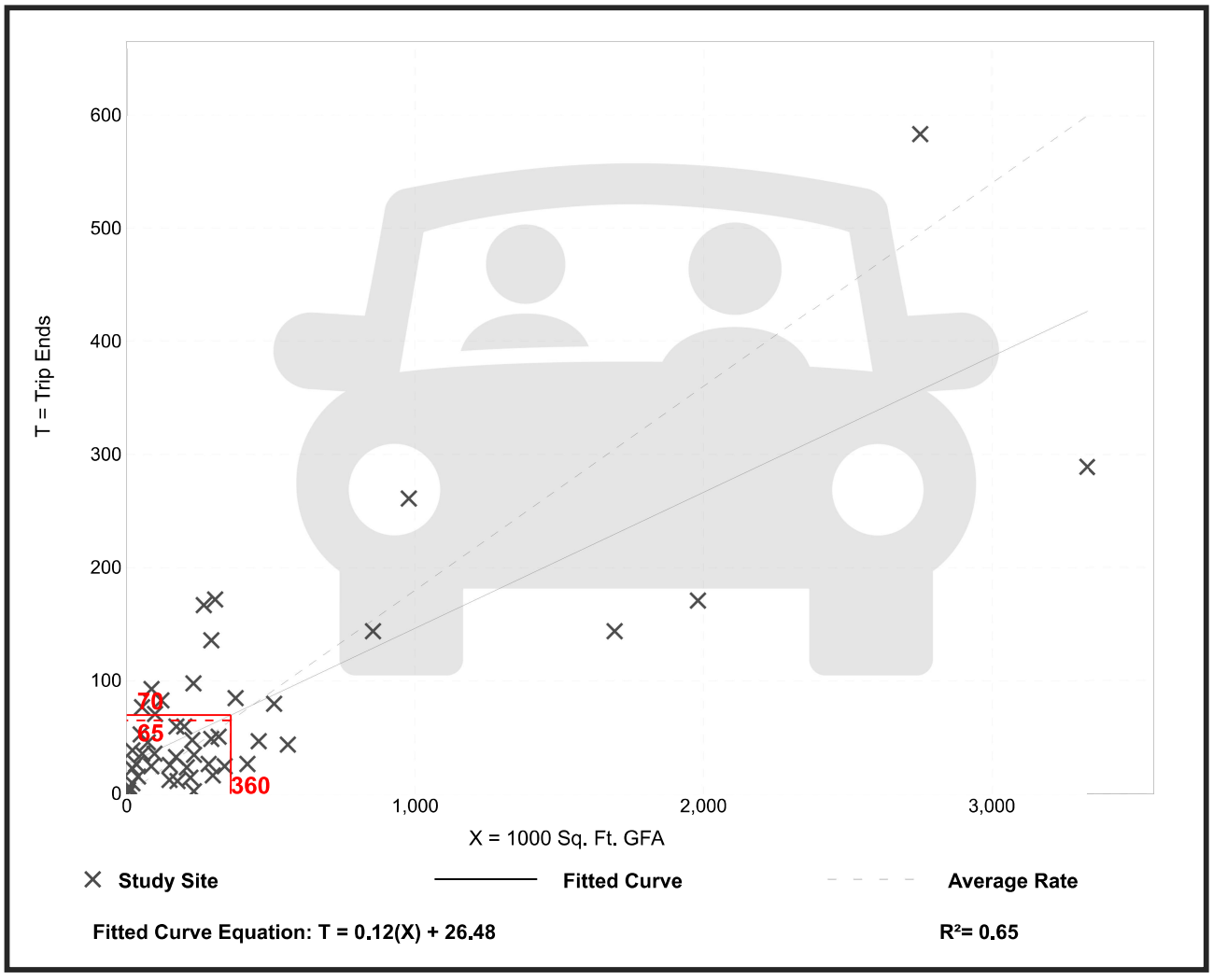
Warehousing
(150)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 49
Avg. 1000 Sq. Ft. GFA: 400
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.01 - 1.80	0.18

Data Plot and Equation



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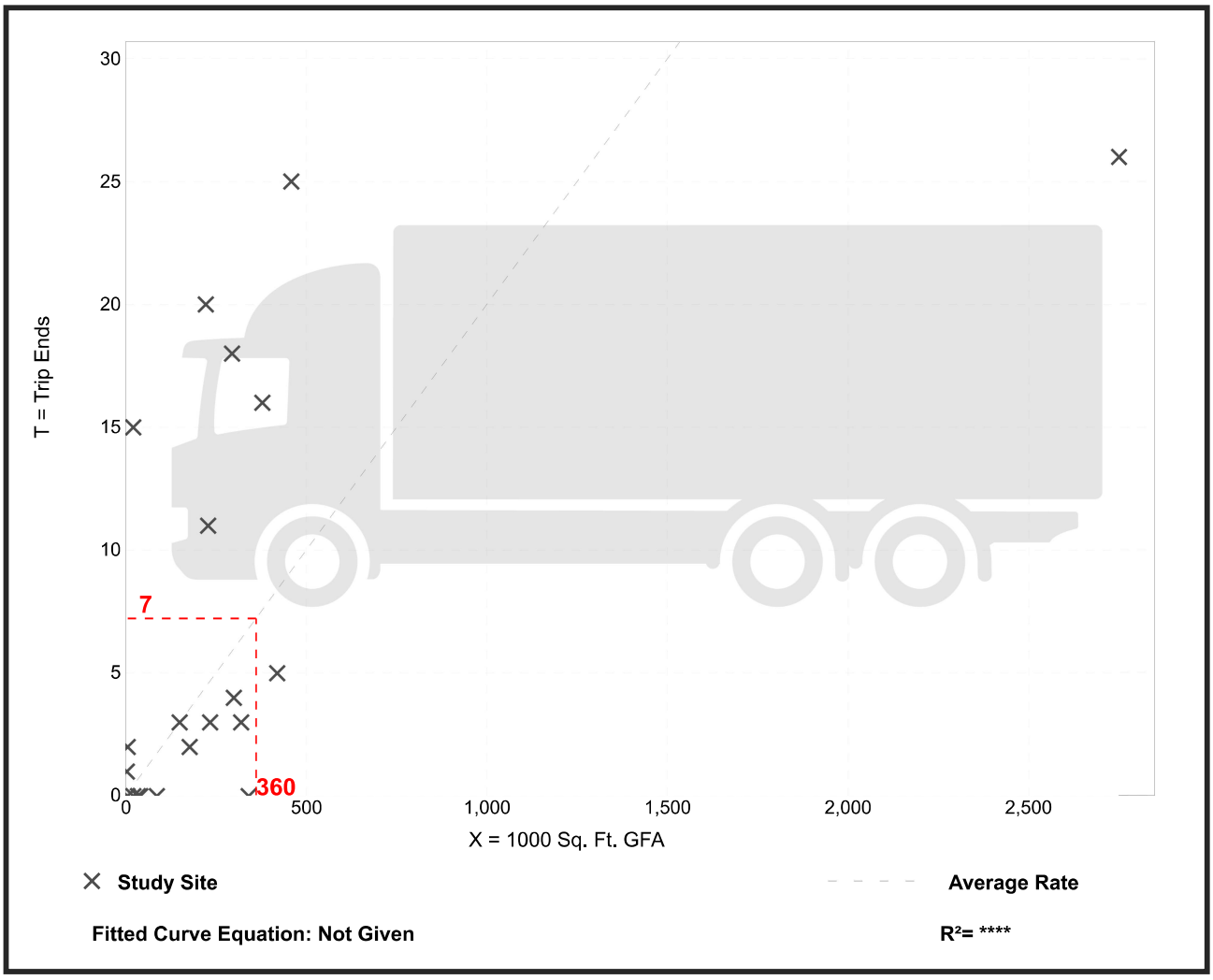
Warehousing
(150)

Truck Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 309
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.69	0.05

Data Plot and Equation



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Warehousing
(150)

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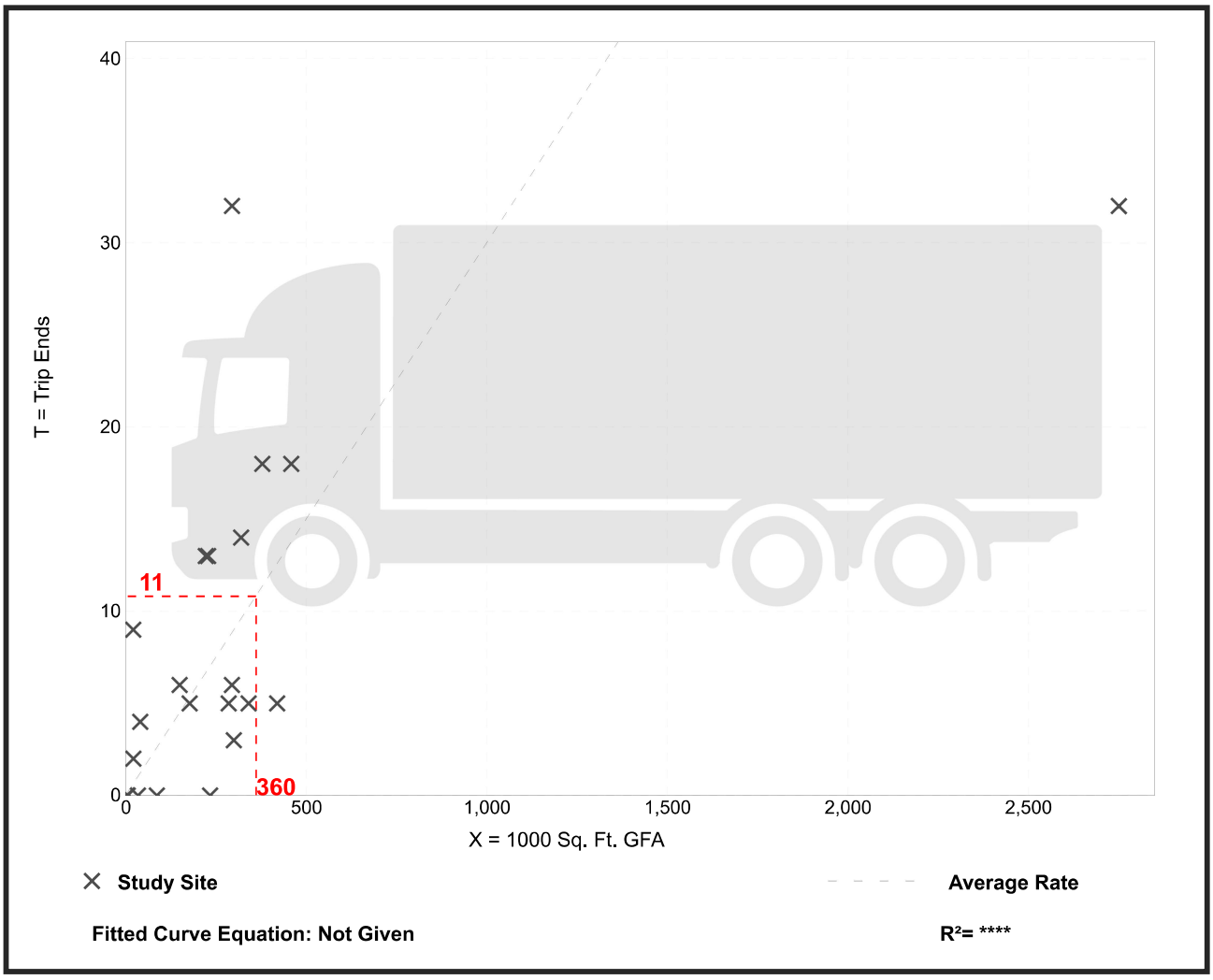
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 23
Avg. 1000 Sq. Ft. GFA: 308
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.42	0.03

Data Plot and Equation



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Warehousing
(150)

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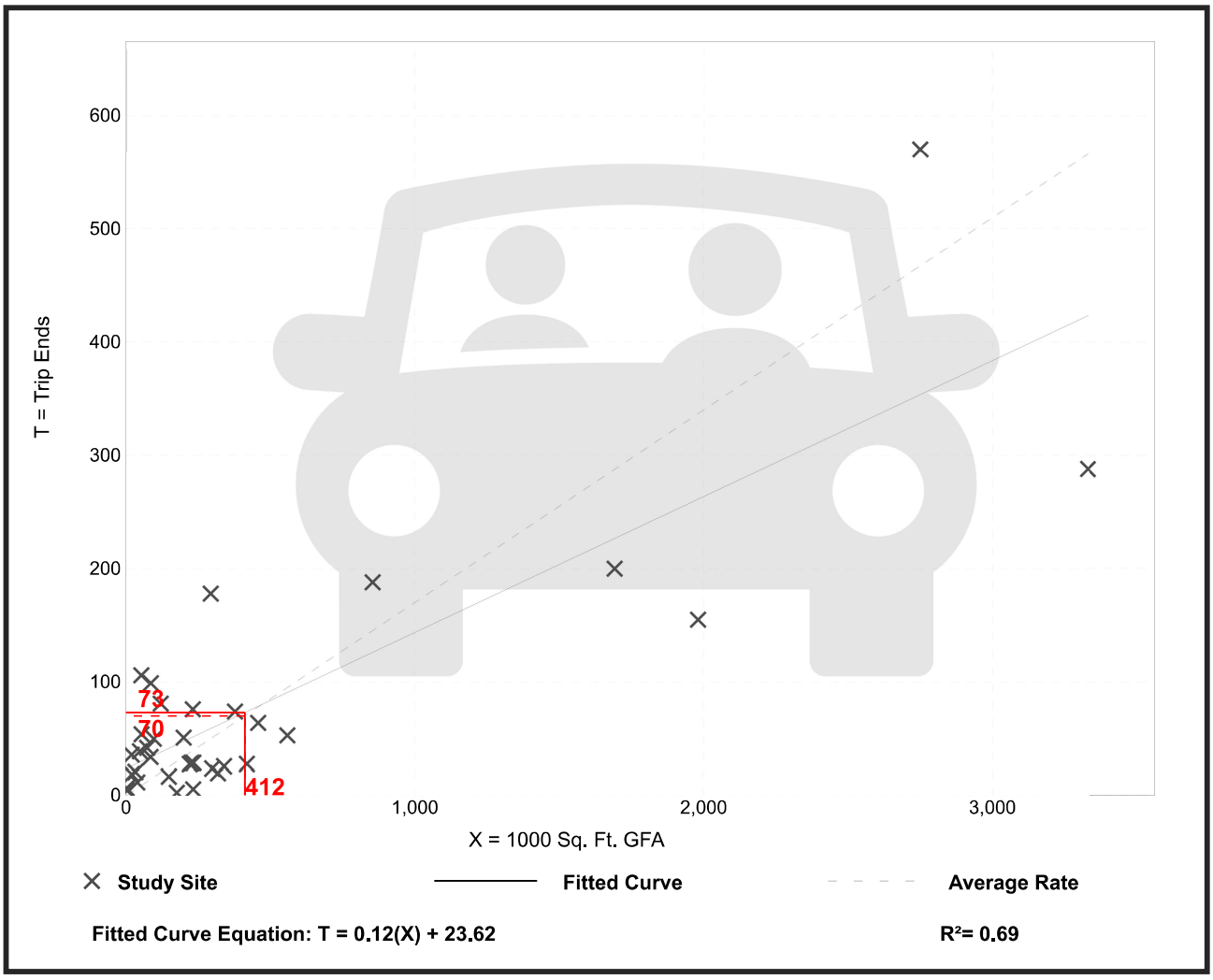

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One Hour Between 4 and 6 p.m.
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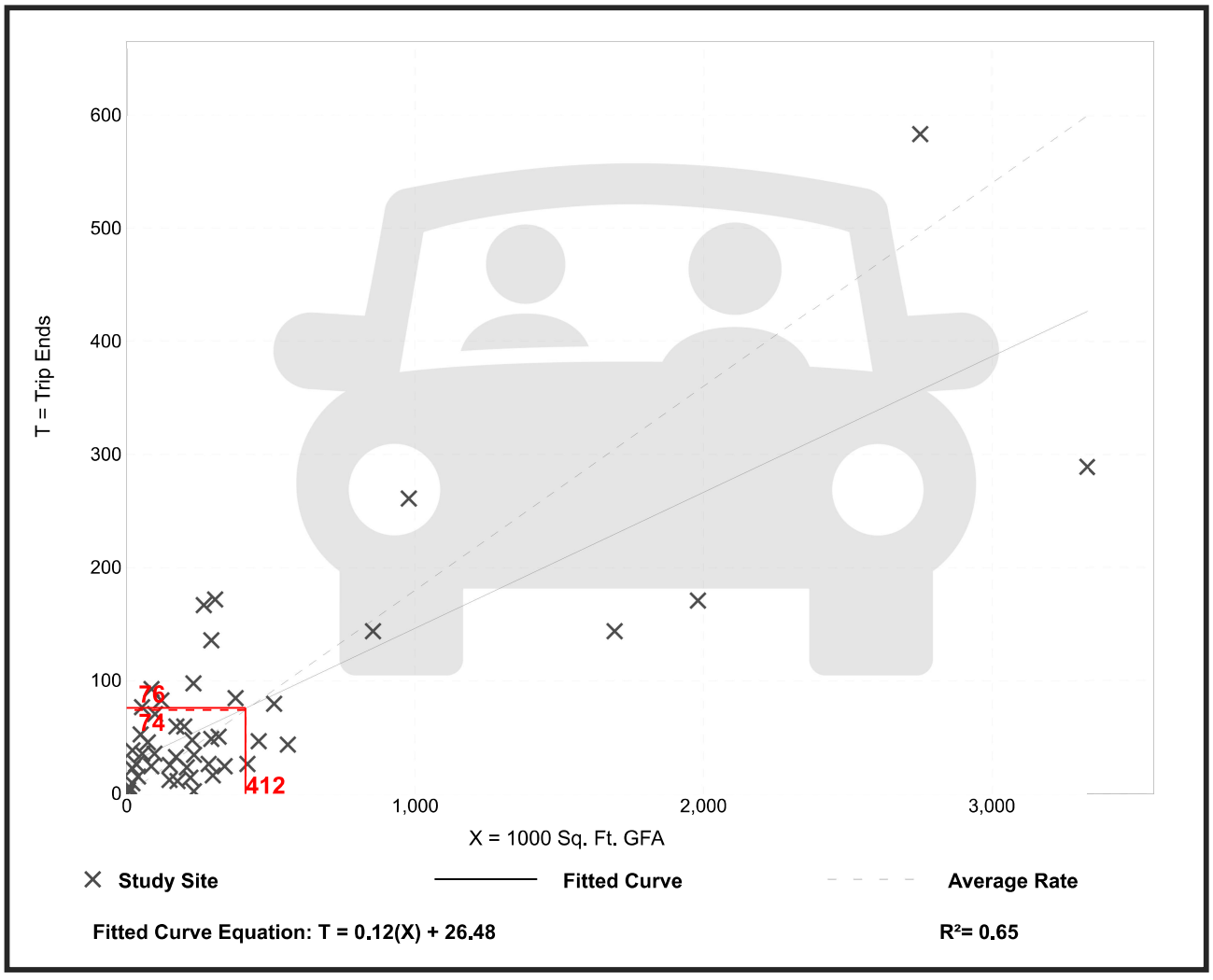

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Warehousing
(150)

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One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
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Avg. 1000 Sq. Ft. GFA: 309
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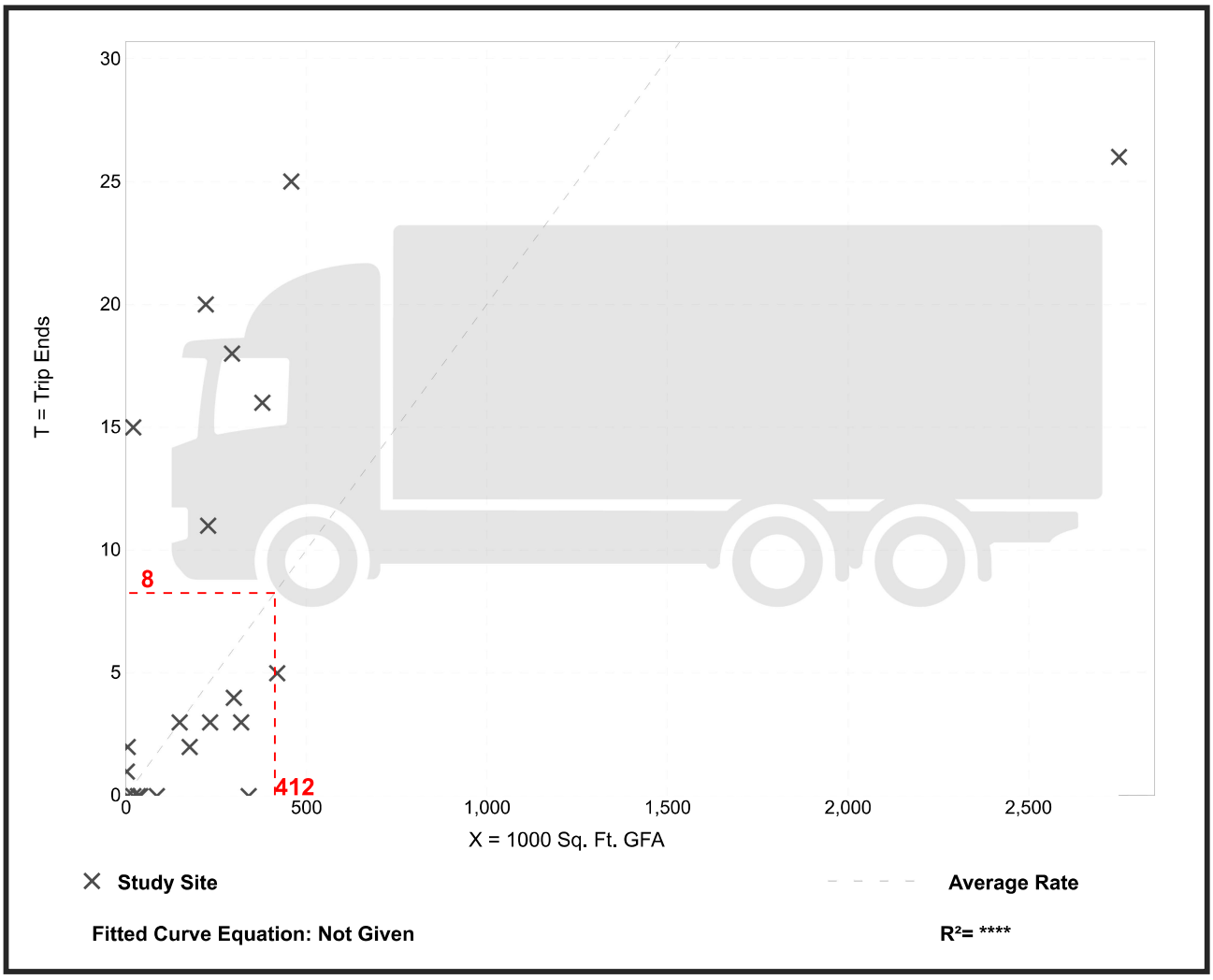
Data Plot and Equation



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Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 23
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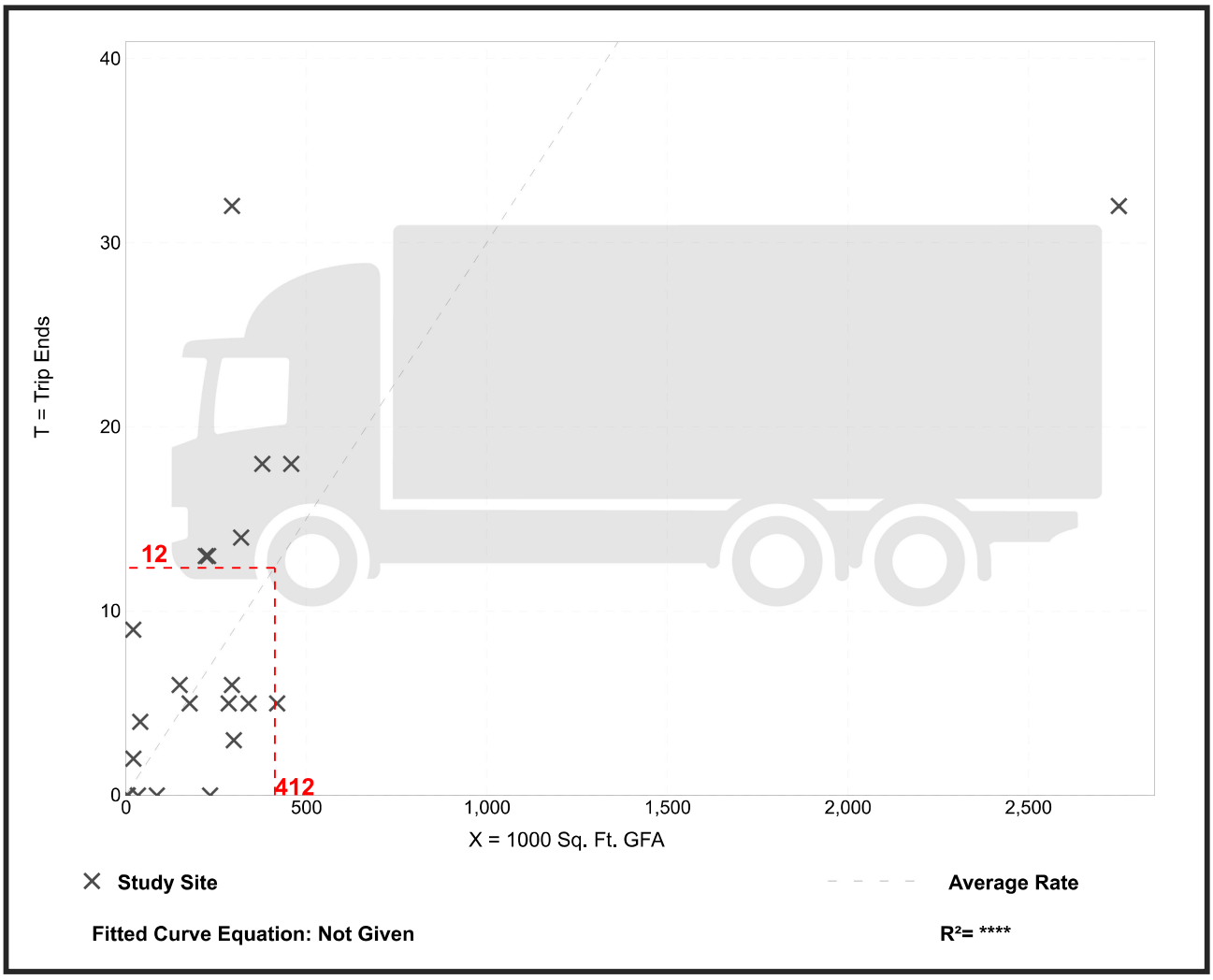
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.42	0.03

Data Plot and Equation



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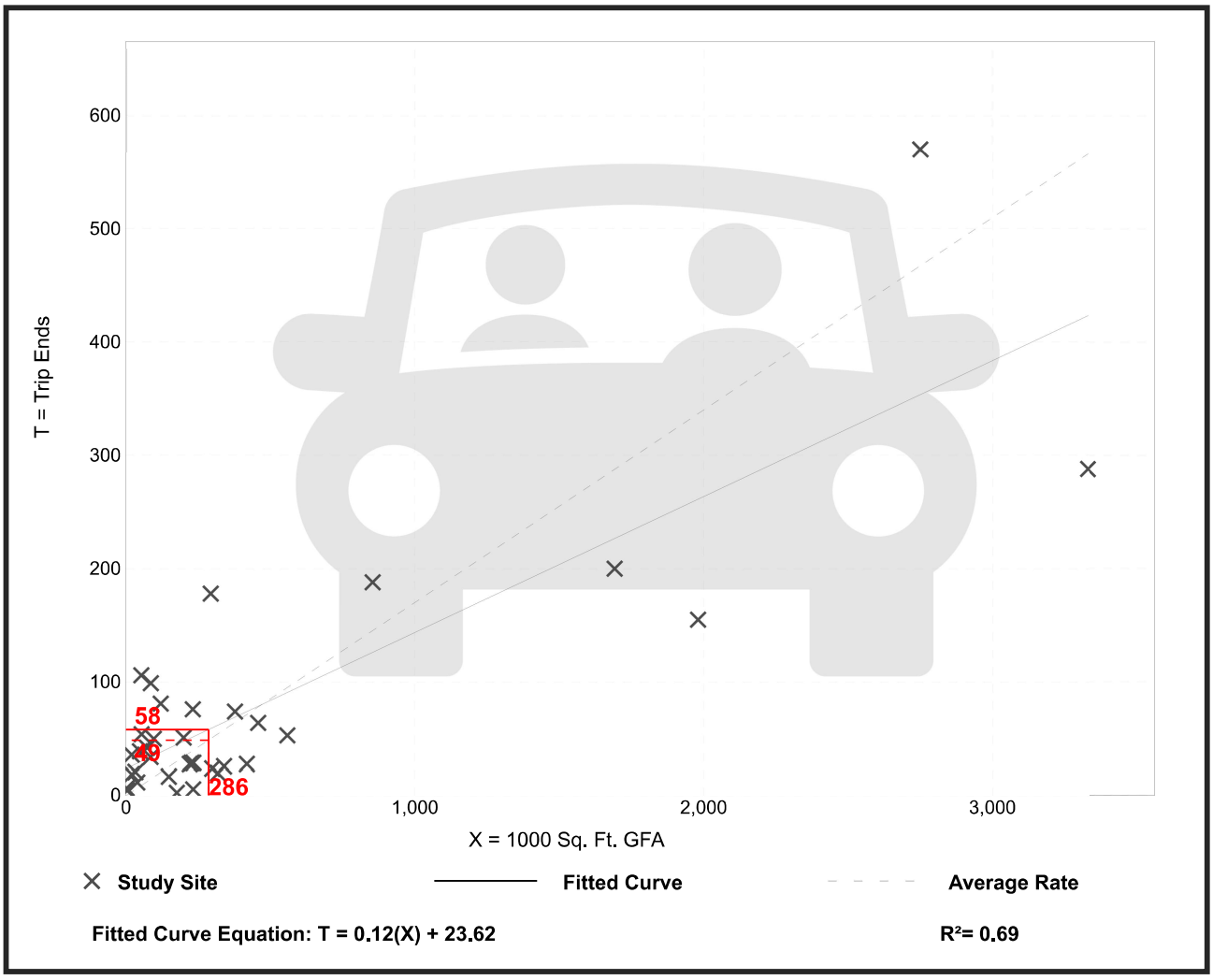
Warehousing
(150)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 36
Avg. 1000 Sq. Ft. GFA: 448
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.19

Data Plot and Equation



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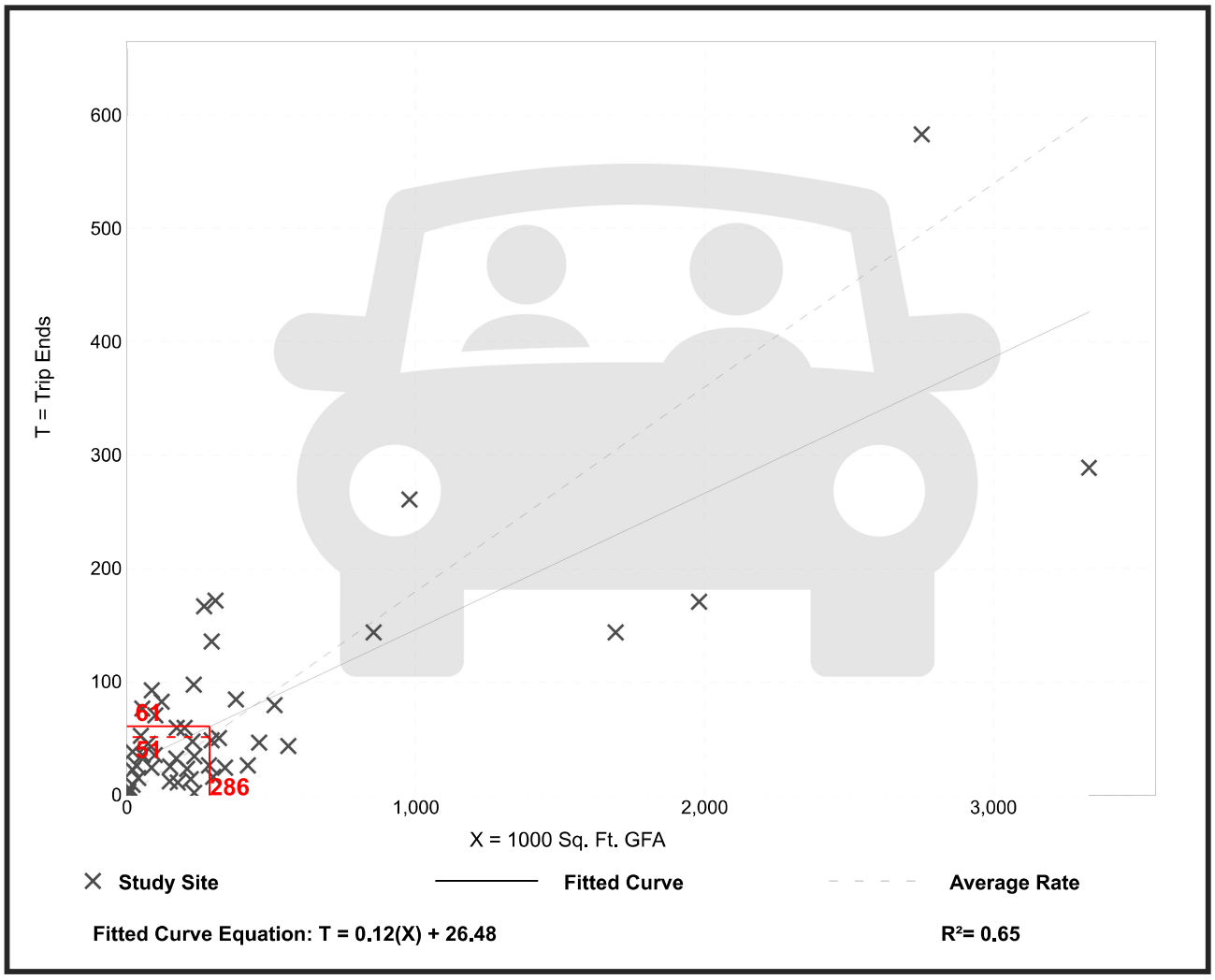
Warehousing
(150)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 49
Avg. 1000 Sq. Ft. GFA: 400
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.01 - 1.80	0.18

Data Plot and Equation



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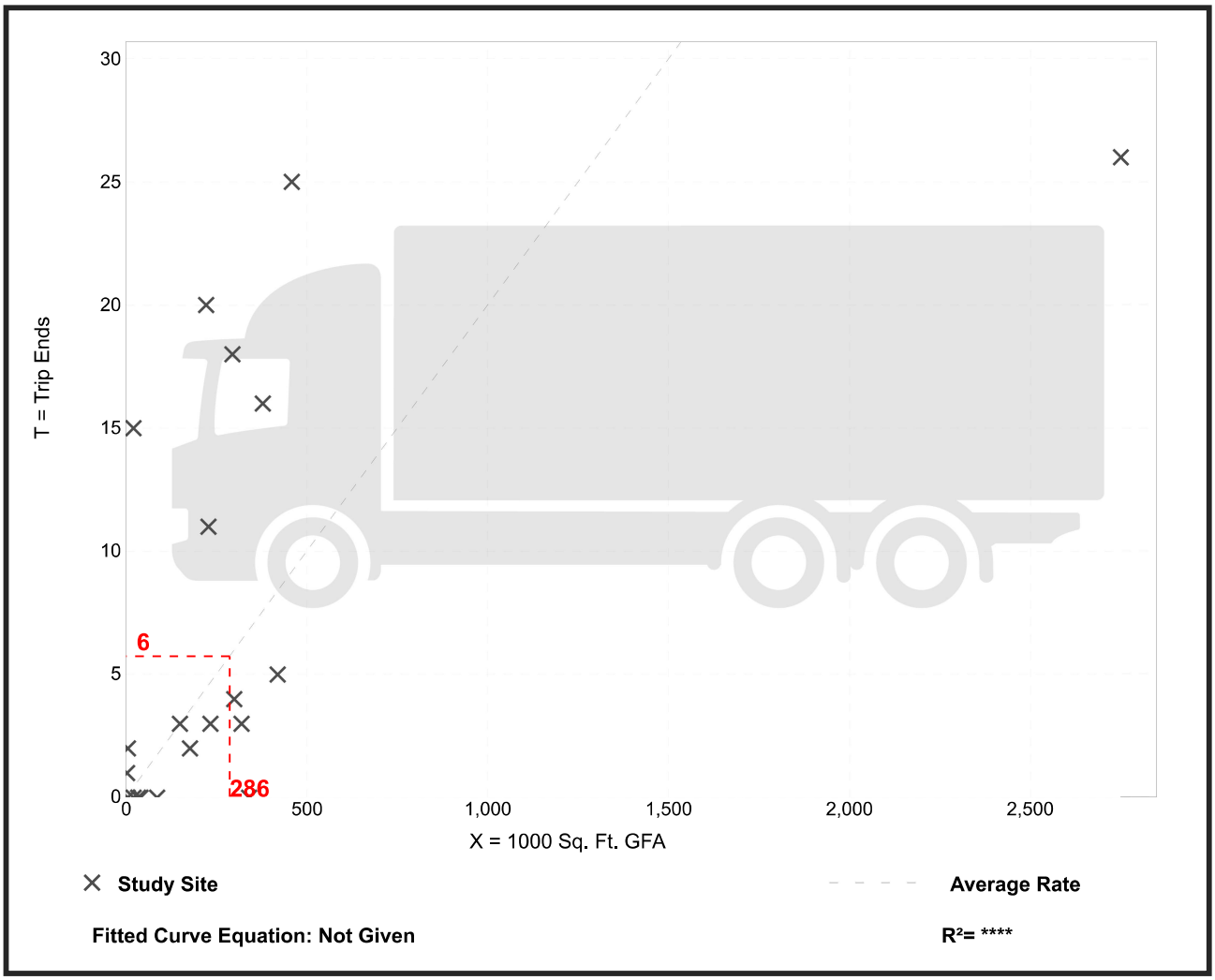
Warehousing
(150)

Truck Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 21
Avg. 1000 Sq. Ft. GFA: 309
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.02	0.00 - 0.69	0.05

Data Plot and Equation



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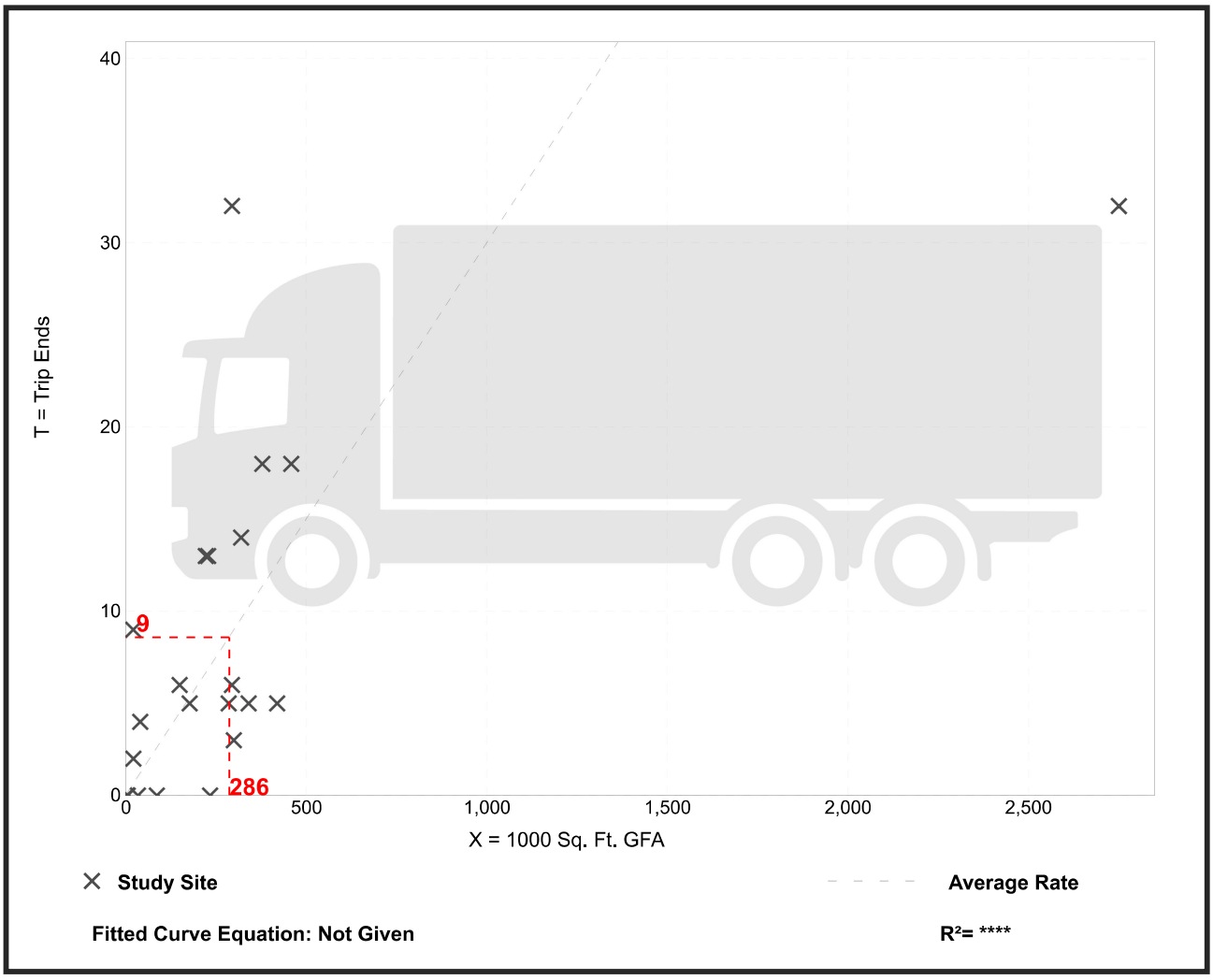
Warehousing
(150)

Truck Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 23
Avg. 1000 Sq. Ft. GFA: 308
Directional Distribution: 52% entering, 48% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.03	0.00 - 0.42	0.03

Data Plot and Equation



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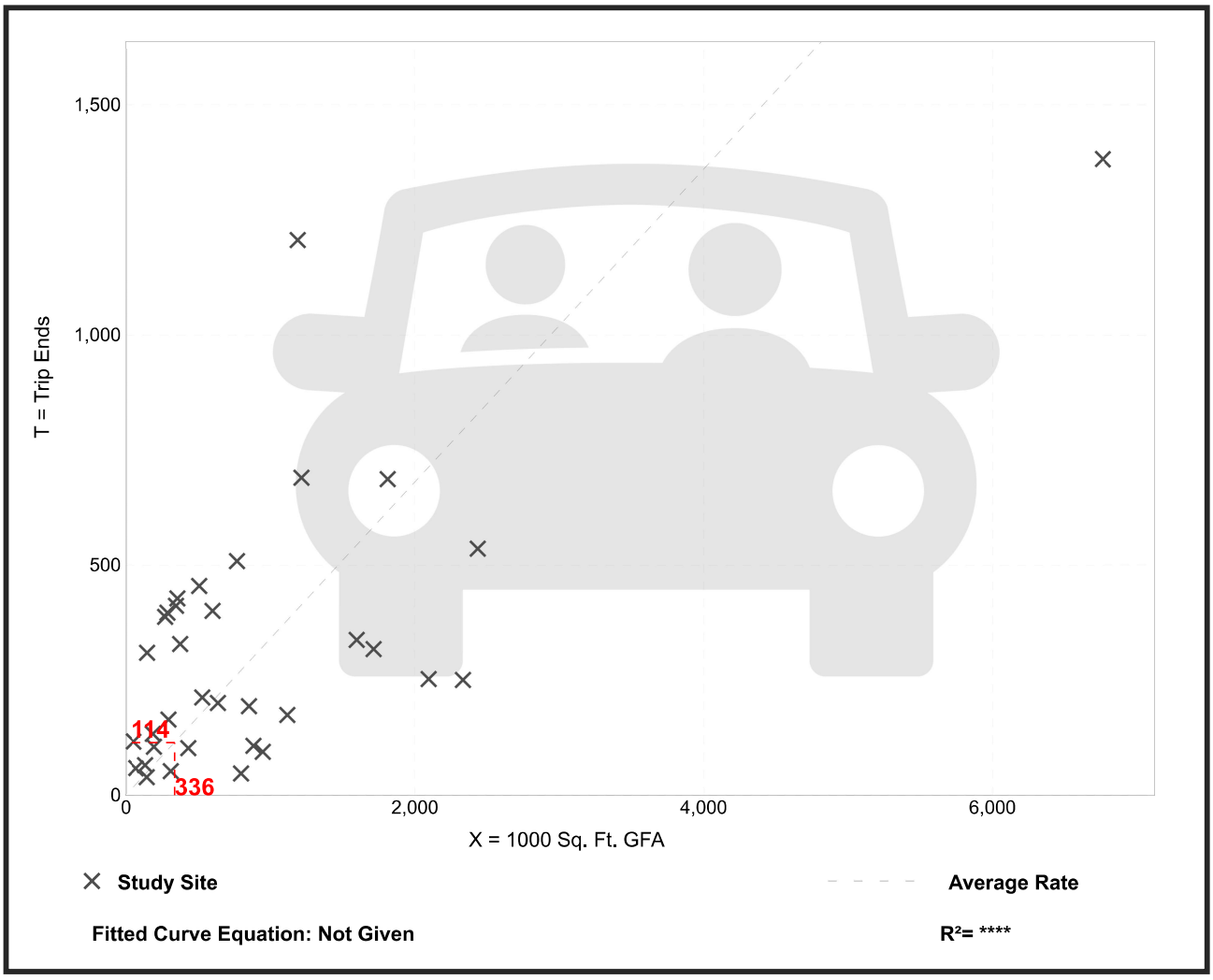
Industrial Park
(130)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 34
Avg. 1000 Sq. Ft. GFA: 956
Directional Distribution: 81% entering, 19% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.34	0.06 - 2.13	0.33

Data Plot and Equation



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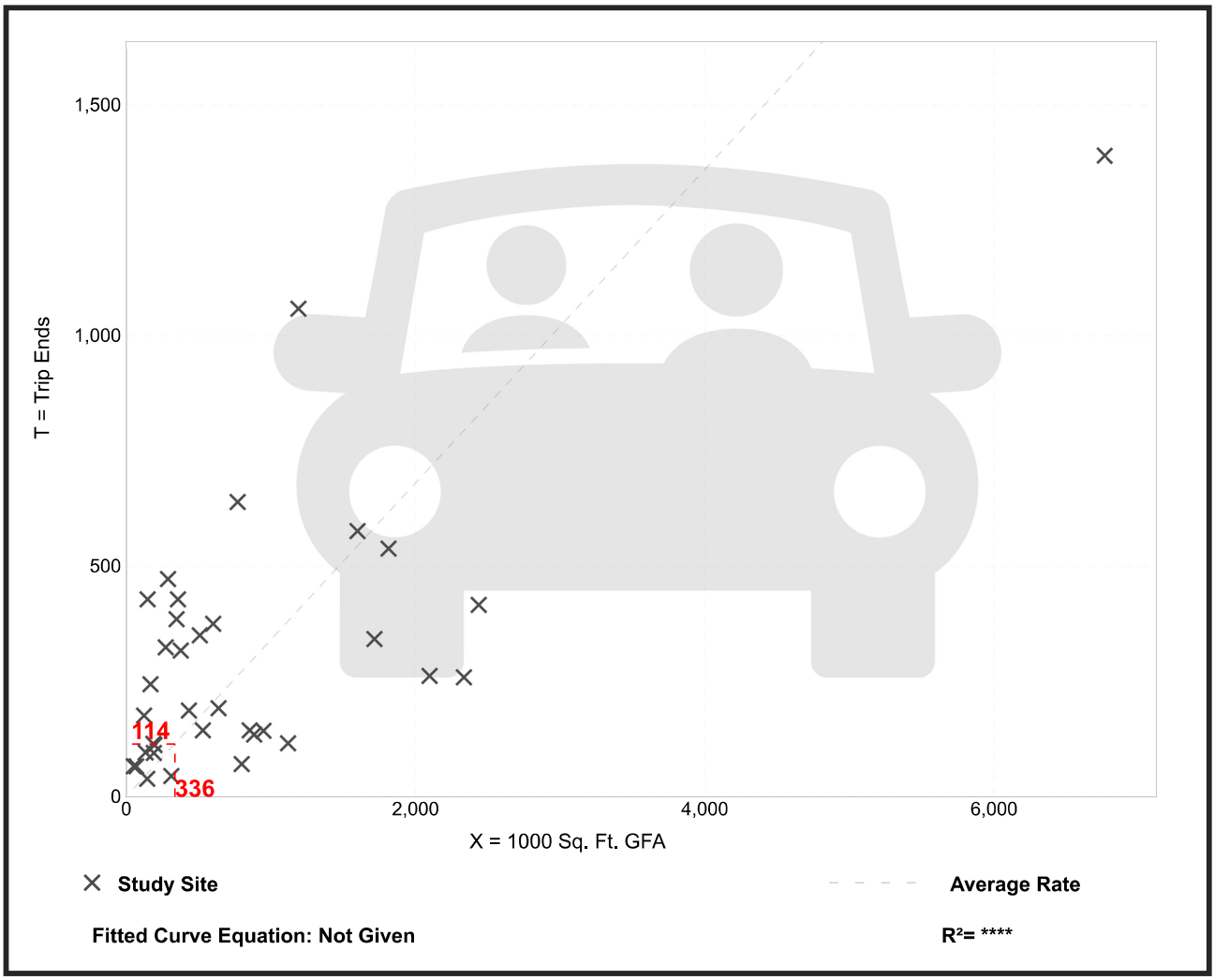
Industrial Park
(130)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 35
Avg. 1000 Sq. Ft. GFA: 899
Directional Distribution: 22% entering, 78% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.34	0.09 - 2.85	0.36

Data Plot and Equation



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Industrial Park
(130)

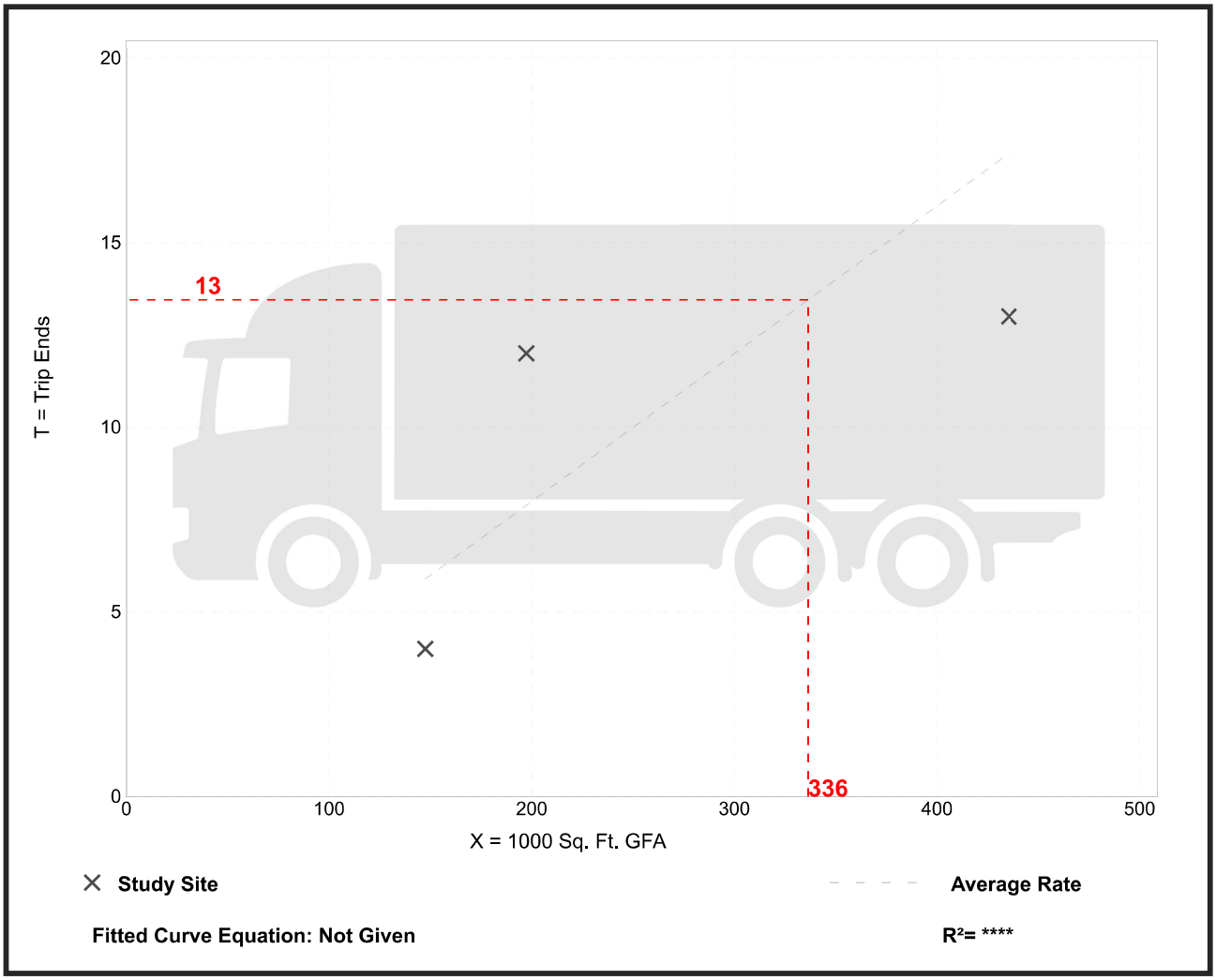
Truck Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 45% entering, 55% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.04	0.03 - 0.06	0.02

Data Plot and Equation

Caution – Small Sample Size



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Industrial Park
(130)

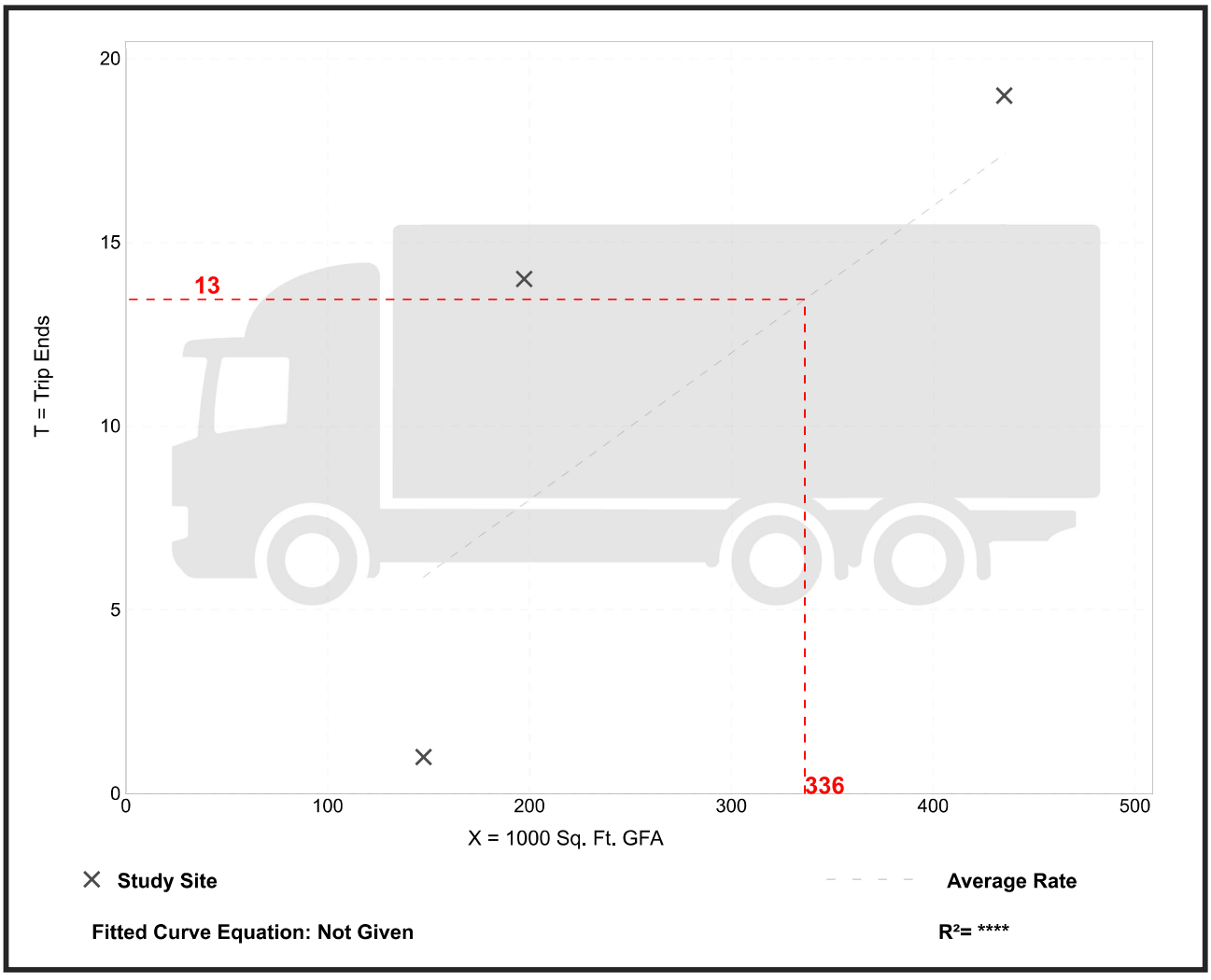
Truck Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 3
Avg. 1000 Sq. Ft. GFA: 260
Directional Distribution: 38% entering, 62% exiting

Truck Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.04	0.01 - 0.07	0.03

Data Plot and Equation

Caution – Small Sample Size



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Appendix D
Turning Movement Figures

Figure C1: Site Trip Assignment (Cars)

Figure C2: Site Trip Assignment (Trucks)

Figure C3: Site Trip Assignment (Cars and Trucks)

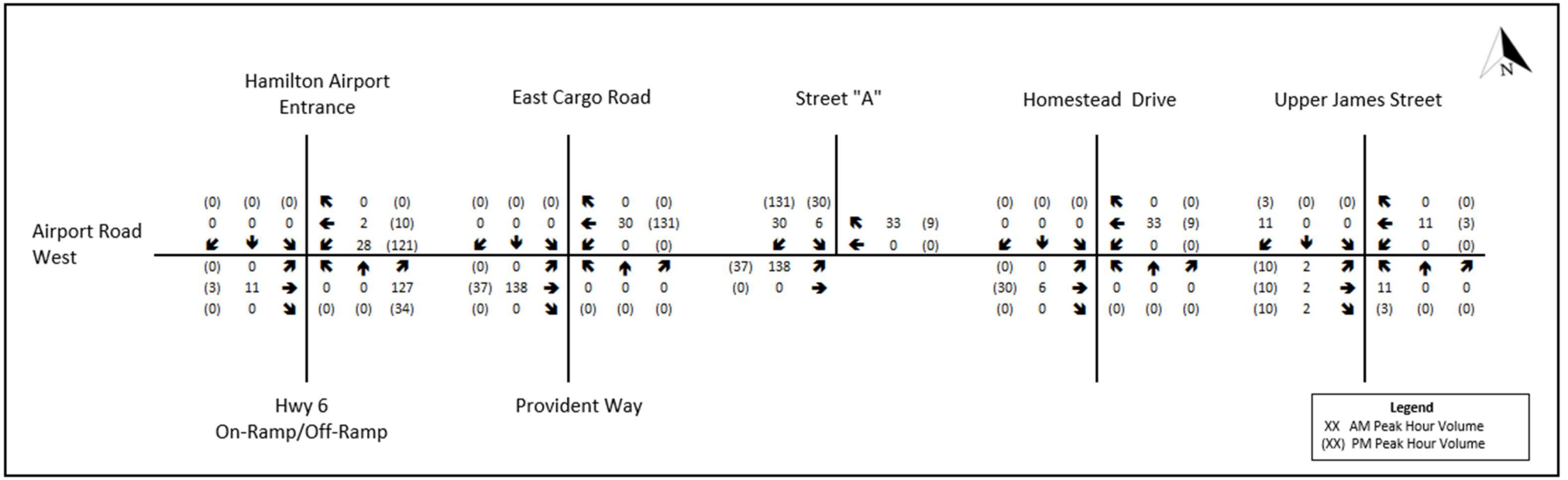


Figure C4: Site Trip Assignment (Alternative - Cars)

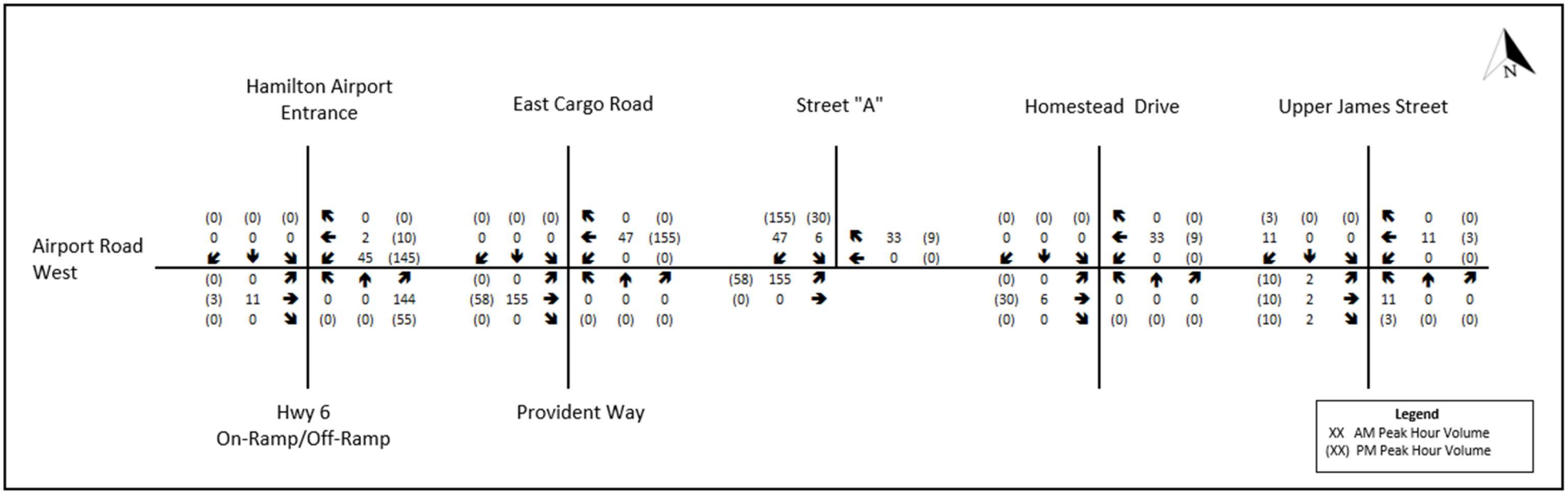


Figure C5: Site Trip Assignment (Alternative – Cars & Trucks)

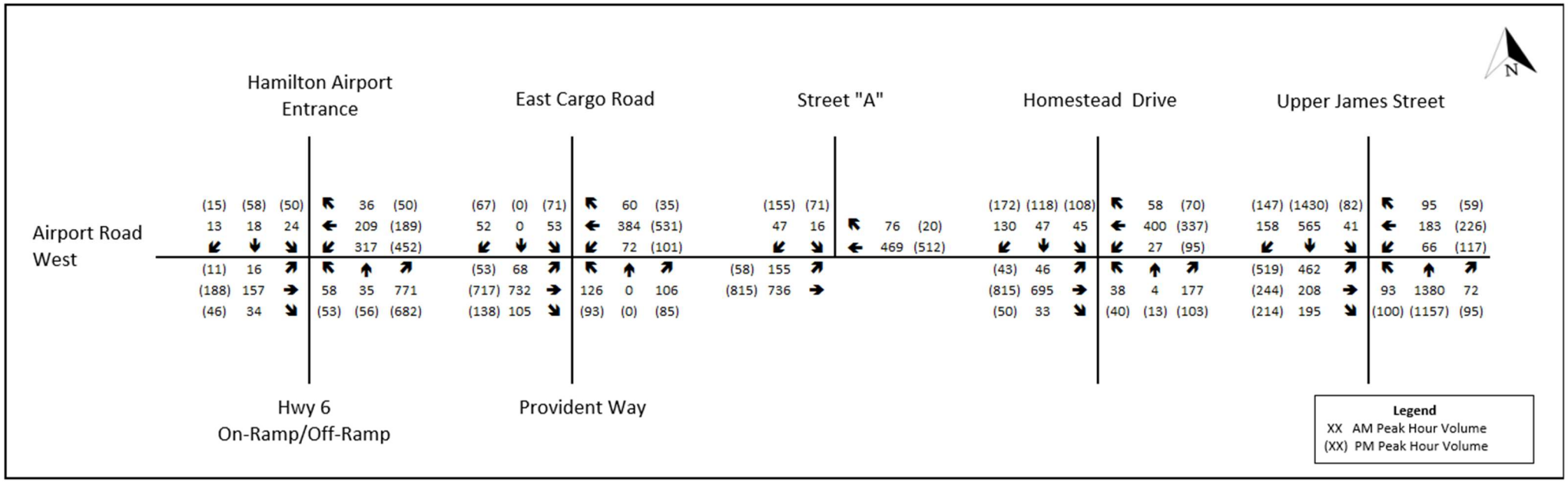


Figure C6: 2028 Future Total Traffic

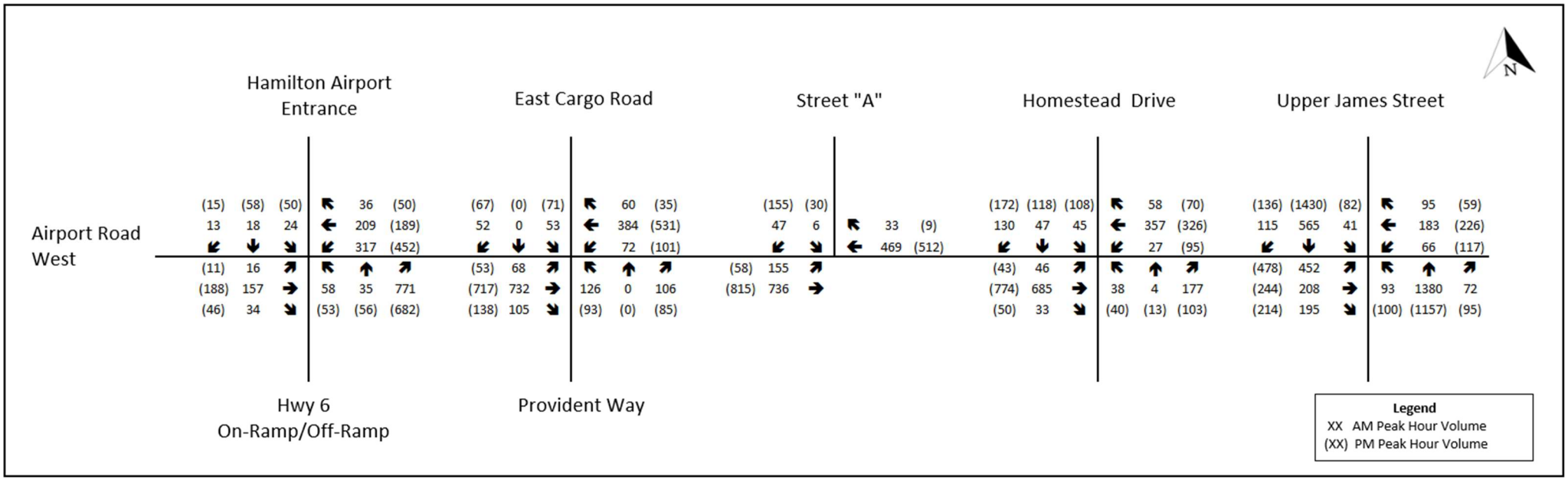
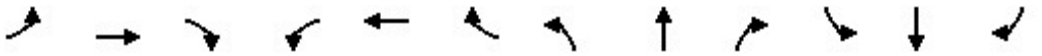
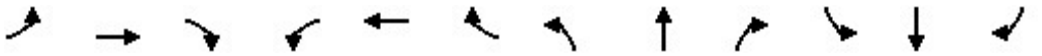


Figure C7: 2028 Future Total Traffic (Alternative - Total)

Appendix E
Synchro Analysis Results



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	462	208	195	66	183	95	93	1380	72	41	565	158
Future Volume (vph)	462	208	195	66	183	95	93	1380	72	41	565	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	15.0		0.0	135.0		0.0	120.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.927			0.949			0.993				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3330	1565	0	1513	1731	0	1733	3375	*0	1668	3305	1439
Flt Permitted	0.950			0.510			0.406			0.059		
Satd. Flow (perm)	3330	1565	0	812	1731	0	741	3375	0	104	3305	1439
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42			17			5				170
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		218.0			195.5			259.1			310.3	
Travel Time (s)		15.7			14.1			11.7			14.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	5%	18%	18%	3%	3%	3%	5%	6%	7%	8%	11%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	497	224	210	71	197	102	100	1484	77	44	608	170
Shared Lane Traffic (%)												
Lane Group Flow (vph)	497	434	0	71	299	0	100	1561	0	44	608	170
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	Prot	NA		Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases	3	8			4			2		1	6	
Permitted Phases				4			2			6		6
Detector Phase	3	8		4	4		2	2		1	6	6
Switch Phase												



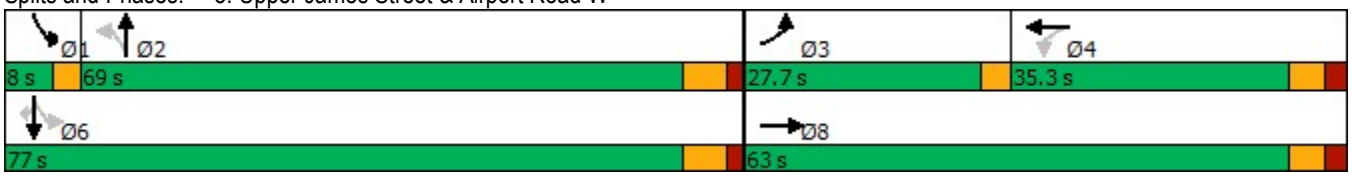
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	8.0	42.3		42.3	42.3		42.3	42.3		8.0	42.3	42.3
Total Split (s)	27.7	63.0		35.3	35.3		69.0	69.0		8.0	77.0	77.0
Total Split (%)	19.8%	45.0%		25.2%	25.2%		49.3%	49.3%		5.7%	55.0%	55.0%
Maximum Green (s)	24.7	56.7		29.0	29.0		62.7	62.7		5.0	70.7	70.7
Yellow Time (s)	3.0	3.7		3.7	3.7		4.6	4.6		3.0	4.6	4.6
All-Red Time (s)	0.0	2.6		2.6	2.6		1.7	1.7		0.0	1.7	1.7
Lost Time Adjust (s)	0.0	-2.3		-2.3	-2.3		0.0	-2.3		0.0	-2.3	-2.3
Total Lost Time (s)	3.0	4.0		4.0	4.0		6.3	4.0		3.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	None		None	None		Max	Max		None	Max	Max
Walk Time (s)		12.0		12.0	12.0		12.0	12.0			12.0	12.0
Flash Dont Walk (s)		24.0		24.0	24.0		24.0	24.0			24.0	24.0
Pedestrian Calls (#/hr)		0		0	0		0	0			0	0
Act Effct Green (s)	23.1	53.8		27.6	27.6		64.6	66.9		74.2	73.2	73.2
Actuated g/C Ratio	0.17	0.40		0.20	0.20		0.48	0.50		0.55	0.54	0.54
v/c Ratio	0.87	0.67		0.43	0.81		0.28	0.93		0.38	0.34	0.20
Control Delay	71.5	35.4		55.7	66.3		26.4	44.3		25.3	18.7	2.9
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	71.5	35.4		55.7	66.3		26.4	44.3		25.3	18.7	2.9
LOS	E	D		E	E		C	D		C	B	A
Approach Delay		54.7			64.3			43.2			15.8	
Approach LOS		D			E			D			B	
Queue Length 50th (m)	68.9	85.1		16.9	73.7		17.2	218.8		5.6	49.8	0.0
Queue Length 95th (m)	#95.1	122.1		32.7	107.3		32.0	#277.4		11.9	63.8	11.1
Internal Link Dist (m)		194.0			171.5			235.1			286.3	
Turn Bay Length (m)	30.0			15.0			135.0			120.0		80.0
Base Capacity (vph)	610	709		188	415		354	1675		115	1791	857
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.81	0.61		0.38	0.72		0.28	0.93		0.38	0.34	0.20

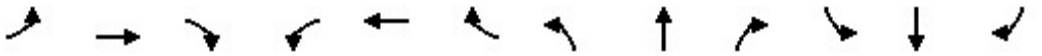
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 135			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 42.1		Intersection LOS: D	
Intersection Capacity Utilization 86.5%		ICU Level of Service E	
Analysis Period (min) 15			

* User Entered Value

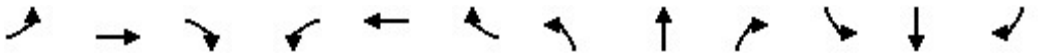
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Upper James Street & Airport Road W





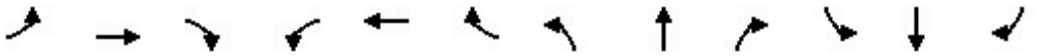
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	695	33	27	400	58	38	4	177	45	47	130
Future Volume (vph)	46	695	33	27	400	58	38	4	177	45	47	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	30.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.993			0.981			0.853			0.890	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1720	0	1552	1702	0	1733	1603	0	1716	1610	0
Flt Permitted	0.440			0.260			0.561			0.551		
Satd. Flow (perm)	827	1720	0	425	1702	0	1023	1603	0	995	1610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			11			142			141	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		531.2			218.0			261.5			546.2	
Travel Time (s)		38.2			15.7			18.8			39.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	8%	18%	15%	7%	17%	3%	0%	0%	4%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	50	755	36	29	435	63	41	4	192	49	51	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	791	0	29	498	0	41	196	0	49	192	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												



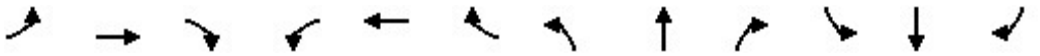
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	42.0	42.0		42.0	42.0		42.0	42.0		42.0	42.0	
Total Split (s)	48.0	48.0		48.0	48.0		42.0	42.0		42.0	42.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	42.0	42.0		42.0	42.0		36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	36.0	36.0		36.0	36.0		10.5	10.5		10.5	10.5	
Actuated g/C Ratio	0.66	0.66		0.66	0.66		0.19	0.19		0.19	0.19	
v/c Ratio	0.09	0.70		0.10	0.44		0.21	0.47		0.26	0.45	
Control Delay	4.2	10.2		4.8	6.1		23.6	11.9		24.6	11.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.2	10.2		4.8	6.1		23.6	11.9		24.6	11.6	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		9.9			6.0			13.9			14.3	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.4	37.2		0.8	17.5		3.5	4.6		4.2	4.3	
Queue Length 95th (m)	5.1	88.2		3.8	40.3		11.5	20.6		13.4	19.9	
Internal Link Dist (m)		507.2			194.0			237.5			522.2	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	676	1408		347	1394		730	1185		710	1189	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.56		0.08	0.36		0.06	0.17		0.07	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 54.7			
Natural Cycle: 85			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 9.9		Intersection LOS: A	
Intersection Capacity Utilization 63.9%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 6: Homestead Drive & Airport Road W



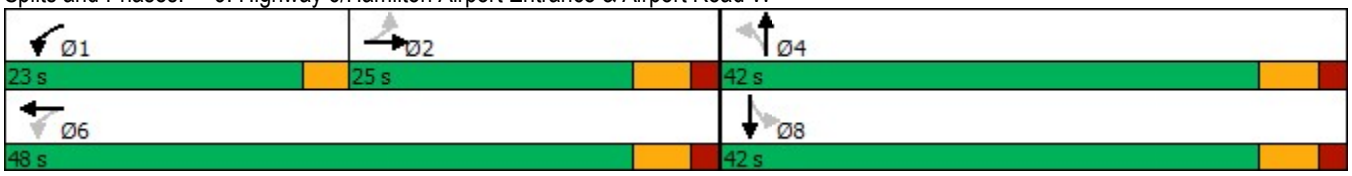
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	157	34	317	209	36	58	35	771	24	18	13
Future Volume (vph)	16	157	34	317	209	36	58	35	771	24	18	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	70.0		0.0	70.0		0.0	80.0		0.0	65.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.978			0.857			0.936	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1529	0	1428	1707	0	1566	1418	0	1785	1653	0
Flt Permitted	0.600			0.415			0.736			0.198		
Satd. Flow (perm)	1127	1529	0	624	1707	0	1213	1418	0	372	1653	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			14			773			14	
Link Speed (k/h)		50			50			80			50	
Link Distance (m)		158.4			319.2			136.8			89.0	
Travel Time (s)		11.4			23.0			6.2			6.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	11%	59%	25%	6%	17%	14%	3%	14%	0%	0%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	17	165	36	334	220	38	61	37	812	25	19	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	201	0	334	258	0	61	849	0	25	33	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												

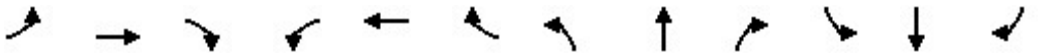


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		9.5	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0		23.0	48.0		42.0	42.0		42.0	42.0	
Total Split (%)	27.8%	27.8%		25.6%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	19.0	19.0		20.0	42.0		36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		1.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.7	15.7		33.7	33.7		20.5	20.5		20.5	20.5	
Actuated g/C Ratio	0.25	0.25		0.53	0.53		0.32	0.32		0.32	0.32	
v/c Ratio	0.06	0.52		0.66	0.28		0.16	0.86		0.21	0.06	
Control Delay	25.2	28.7		18.8	10.7		16.8	13.6		21.2	11.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.2	28.7		18.8	10.7		16.8	13.6		21.2	11.4	
LOS	C	C		B	B		B	B		C	B	
Approach Delay		28.5			15.3			13.8			15.6	
Approach LOS		C			B			B			B	
Queue Length 50th (m)	1.4	17.0		18.6	12.2		4.6	5.8		2.0	1.4	
Queue Length 95th (m)	7.6	50.6		59.7	40.0		13.9	59.5		8.2	7.1	
Internal Link Dist (m)		134.4			295.2			112.8			65.0	
Turn Bay Length (m)	70.0			70.0			80.0			65.0		
Base Capacity (vph)	419	576		603	1286		817	1207		250	1118	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.35		0.55	0.20		0.07	0.70		0.10	0.03	

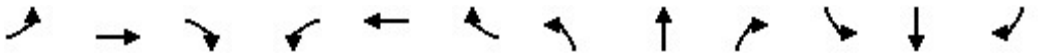
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 63.1			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 87.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 9: Highway 6/Hamilton Airport Entrance & Airport Road W





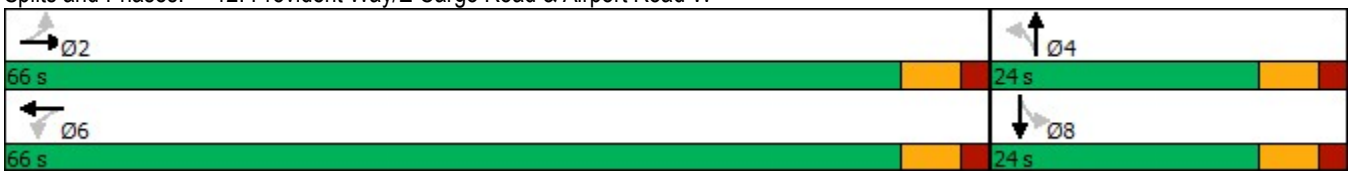
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	732	105	72	384	60	126	0	106	53	0	52
Future Volume (vph)	68	732	105	72	384	60	126	0	106	53	0	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	15.0		0.0	15.0		0.0	15.0		0.0	60.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.984			0.980			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1638	1657	0	1785	1681	0	1785	1597	0	1750	1183	0
Flt Permitted	0.398			0.145			0.713			0.660		
Satd. Flow (perm)	686	1657	0	272	1681	0	1340	1597	0	1216	1183	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			20			183			435	
Link Speed (k/h)		50			50			40			40	
Link Distance (m)		319.2			308.0			175.1			311.2	
Travel Time (s)		23.0			22.2			15.8			28.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.92	0.92	0.78	0.78	0.92	0.92	0.92	0.78	0.92	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	9%	13%	0%	0%	11%	0%	0%	0%	0%	2%	0%	35%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	87	938	114	78	492	77	137	0	115	68	0	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1052	0	78	569	0	137	115	0	68	67	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												

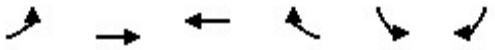


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Total Split (%)	73.3%	73.3%		73.3%	73.3%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	60.0	60.0		60.0	60.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	58.2	58.2		58.2	58.2		15.3	15.3		15.3	15.3	
Actuated g/C Ratio	0.71	0.71		0.71	0.71		0.19	0.19		0.19	0.19	
v/c Ratio	0.18	0.89		0.40	0.47		0.55	0.26		0.30	0.12	
Control Delay	5.6	21.5		13.2	6.9		39.5	2.3		33.1	0.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	5.6	21.5		13.2	6.9		39.5	2.3		33.1	0.4	
LOS	A	C		B	A		D	A		C	A	
Approach Delay		20.2			7.6			22.5			16.9	
Approach LOS		C			A			C			B	
Queue Length 50th (m)	3.8	107.0		4.1	31.0		20.6	0.0		9.7	0.0	
Queue Length 95th (m)	8.5	142.8		16.3	45.8		38.2	2.9		18.0	0.0	
Internal Link Dist (m)		295.2			284.0			151.1			287.2	
Turn Bay Length (m)	15.0			15.0			15.0			60.0		
Base Capacity (vph)	526	1276		208	1295		331	533		301	620	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.82		0.38	0.44		0.41	0.22		0.23	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 81.6			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			

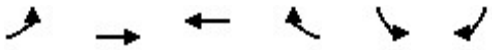
Splits and Phases: 12: Provident Way/E Cargo Road & Airport Road W





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	155	736	469	76	16	47
Future Volume (vph)	155	736	469	76	16	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.6				7.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.981			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1608	1708	1767	0	1785	1174
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1608	1708	1767	0	1785	1174
Link Speed (k/h)		40	40		40	
Link Distance (m)		209.1	301.2		123.2	
Travel Time (s)		18.8	27.1		11.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	10%	5%	0%	0%	36%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	168	800	510	83	17	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	168	800	593	0	17	51
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		7.0	7.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

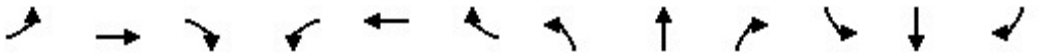
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 51.2%		ICU Level of Service A	
Analysis Period (min) 15			



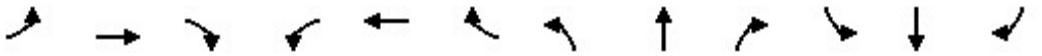
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	155	736	469	76	16	47
Future Volume (Veh/h)	155	736	469	76	16	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	168	800	510	83	17	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		209	301			
pX, platoon unblocked					0.71	
vC, conflicting volume	593				1688	552
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	593				1766	552
tC, single (s)	4.2				6.4	6.6
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.6
p0 queue free %	82				69	89
cM capacity (veh/h)	940				54	474

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	168	800	593	17	51
Volume Left	168	0	0	17	0
Volume Right	0	0	83	0	51
cSH	940	1700	1700	54	474
Volume to Capacity	0.18	0.47	0.35	0.31	0.11
Queue Length 95th (m)	4.9	0.0	0.0	8.4	2.7
Control Delay (s)	9.7	0.0	0.0	99.8	13.5
Lane LOS	A			F	B
Approach Delay (s)	1.7		0.0	35.1	
Approach LOS				E	

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	519	244	214	117	226	59	100	1157	95	82	1430	147
Future Volume (vph)	519	244	214	117	226	59	100	1157	95	82	1430	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	15.0		0.0	135.0		0.0	120.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.930			0.969			0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3330	1729	0	1700	1821	0	1785	3423	*0	1785	3466	1493
Flt Permitted	0.950			0.484			0.064			0.067		
Satd. Flow (perm)	3330	1729	0	866	1821	0	120	3423	0	126	3466	1493
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			8			8				106
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		218.0			195.5			259.1			310.3	
Travel Time (s)		15.7			14.1			11.7			14.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	2%	0%	5%	0%	0%	0%	3%	5%	0%	3%	7%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	558	262	230	126	243	63	108	1244	102	88	1538	158
Shared Lane Traffic (%)												
Lane Group Flow (vph)	558	492	0	126	306	0	108	1346	0	88	1538	158
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	Prot	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8			4		5	2		1	6	
Permitted Phases				4			2			6		6
Detector Phase	3	8		4	4		5	2		1	6	6
Switch Phase												



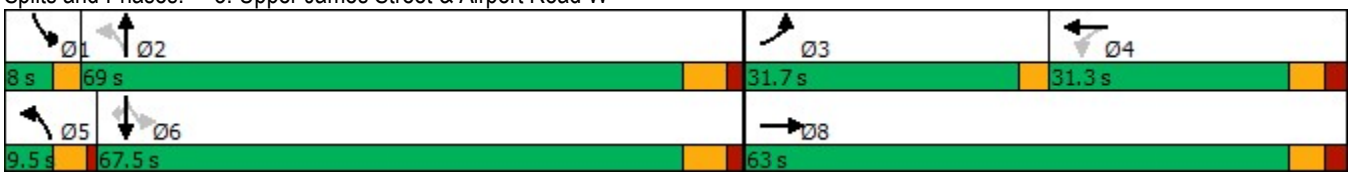
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	8.0	42.3		42.3	42.3		9.5	42.3		8.0	42.3	42.3
Total Split (s)	31.7	63.0		31.3	31.3		9.5	69.0		8.0	67.5	67.5
Total Split (%)	22.6%	45.0%		22.4%	22.4%		6.8%	49.3%		5.7%	48.2%	48.2%
Maximum Green (s)	28.7	56.7		25.0	25.0		5.0	62.7		5.0	61.2	61.2
Yellow Time (s)	3.0	3.7		3.7	3.7		3.5	4.6		3.0	4.6	4.6
All-Red Time (s)	0.0	2.6		2.6	2.6		1.0	1.7		0.0	1.7	1.7
Lost Time Adjust (s)	0.0	-2.3		-2.3	-2.3		0.0	-2.3		0.0	-2.3	-2.3
Total Lost Time (s)	3.0	4.0		4.0	4.0		4.5	4.0		3.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		12.0		12.0	12.0			12.0			12.0	12.0
Flash Dont Walk (s)		24.0		24.0	24.0			24.0			24.0	24.0
Pedestrian Calls (#/hr)		0		0	0			0			0	0
Act Effct Green (s)	26.5	55.6		26.1	26.1		69.6	65.1		69.6	63.6	63.6
Actuated g/C Ratio	0.19	0.41		0.19	0.19		0.51	0.48		0.51	0.47	0.47
v/c Ratio	0.87	0.68		0.76	0.86		0.89	0.82		0.71	0.95	0.21
Control Delay	68.3	35.7		81.8	76.1		79.3	36.6		48.6	49.7	8.9
Queue Delay	0.0	0.4		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	68.3	36.1		81.8	76.1		79.3	36.6		48.6	49.7	8.9
LOS	E	D		F	E		E	D		D	D	A
Approach Delay		53.2			77.7			39.8			46.0	
Approach LOS		D			E			D			D	
Queue Length 50th (m)	76.8	99.6		33.2	80.6		14.9	169.0		11.8	216.7	8.0
Queue Length 95th (m)	97.9	138.7		#65.2	#128.4		#51.1	200.3		#33.7	#270.0	21.6
Internal Link Dist (m)		194.0			171.5			235.1			286.3	
Turn Bay Length (m)	30.0			15.0			135.0			120.0		80.0
Base Capacity (vph)	699	769		172	370		122	1634		124	1612	751
Starvation Cap Reductn	0	58		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.80	0.69		0.73	0.83		0.89	0.82		0.71	0.95	0.21

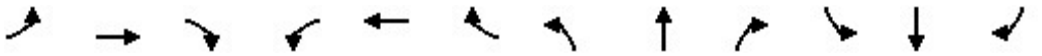
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 136.7			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 48.6		Intersection LOS: D	
Intersection Capacity Utilization 91.2%		ICU Level of Service F	
Analysis Period (min) 15			

* User Entered Value

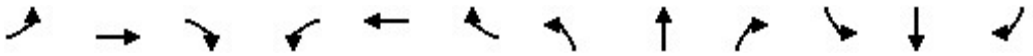
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Upper James Street & Airport Road W





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	815	50	95	337	70	40	13	103	108	118	172
Future Volume (vph)	43	815	50	95	337	70	40	13	103	108	118	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	30.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.974			0.867			0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1788	0	1785	1730	0	1733	1615	0	1653	1646	0
Flt Permitted	0.457			0.150			0.313			0.672		
Satd. Flow (perm)	859	1788	0	282	1730	0	571	1615	0	1169	1646	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			27			113			75	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		531.2			218.0			261.5			546.2	
Travel Time (s)		38.2			15.7			18.8			39.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	4%	6%	0%	7%	0%	3%	0%	1%	8%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	47	896	55	104	370	77	44	14	113	119	130	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	951	0	104	447	0	44	127	0	119	319	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												



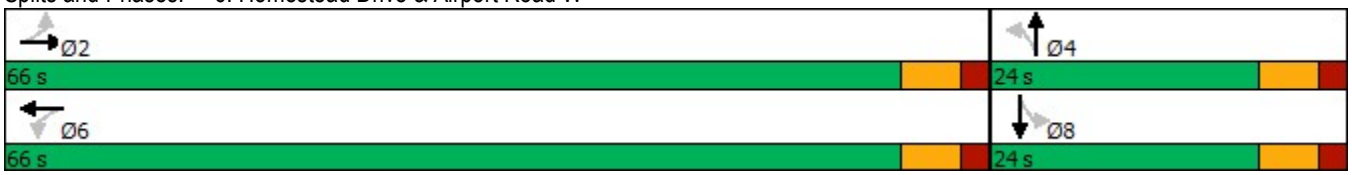
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Total Split (%)	73.3%	73.3%		73.3%	73.3%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	60.0	60.0		60.0	60.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	46.0	46.0		46.0	46.0		17.2	17.2		17.2	17.2	
Actuated g/C Ratio	0.64	0.64		0.64	0.64		0.24	0.24		0.24	0.24	
v/c Ratio	0.09	0.83		0.58	0.40		0.32	0.27		0.42	0.71	
Control Delay	5.2	17.1		22.5	6.8		34.9	9.5		32.8	31.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	5.2	17.1		22.5	6.8		34.9	9.5		32.8	31.5	
LOS	A	B		C	A		C	A		C	C	
Approach Delay		16.5			9.8			16.0			31.9	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.2	90.6		7.4	25.0		5.0	1.5		14.0	30.9	
Queue Length 95th (m)	5.6	147.1		26.7	40.3		16.8	15.5		34.4	#77.5	
Internal Link Dist (m)		507.2			194.0			237.5			522.2	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	724	1509		238	1463		170	561		348	543	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.63		0.44	0.31		0.26	0.23		0.34	0.59	

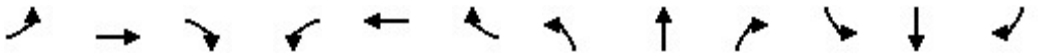
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 71.7			
Natural Cycle: 70			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 85.4%		ICU Level of Service E	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

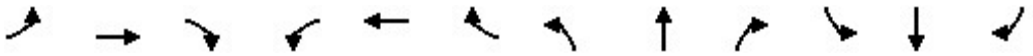
Queue shown is maximum after two cycles.

Splits and Phases: 6: Homestead Drive & Airport Road W





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	188	46	452	189	50	53	56	682	50	58	15
Future Volume (vph)	11	188	46	452	189	50	53	56	682	50	58	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	70.0		0.0	70.0		0.0	80.0		0.0	65.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.970			0.969			0.861			0.970	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1657	0	1594	1692	0	1026	1464	0	1785	1729	0
Flt Permitted	0.597			0.382			0.705			0.150		
Satd. Flow (perm)	1122	1657	0	641	1692	0	761	1464	0	282	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			22			741			16	
Link Speed (k/h)		50			50			80			50	
Link Distance (m)		158.4			319.2			136.8			89.0	
Travel Time (s)		11.4			23.0			6.2			6.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	7%	22%	12%	7%	10%	74%	4%	11%	0%	0%	27%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	12	207	51	497	208	55	58	62	749	55	64	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	258	0	497	263	0	58	811	0	55	80	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												



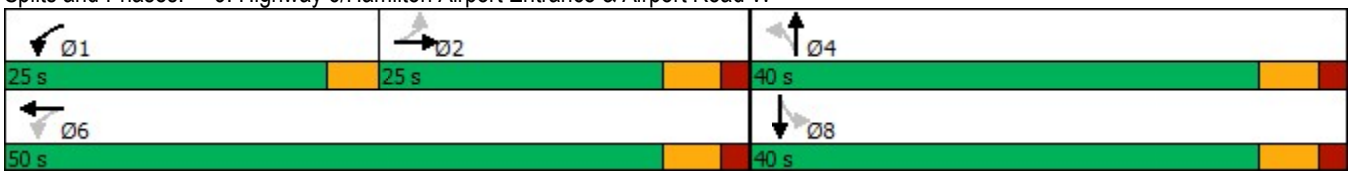
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		9.5	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0		25.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	27.8%	27.8%		27.8%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	19.0	19.0		21.5	44.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	4.0	4.0		3.5	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		1.5	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	17.7	17.7		42.9	40.3		26.8	26.8		26.8	26.8	
Actuated g/C Ratio	0.23	0.23		0.57	0.53		0.35	0.35		0.35	0.35	
v/c Ratio	0.05	0.65		0.79	0.29		0.22	0.81		0.56	0.13	
Control Delay	27.4	36.3		23.6	11.5		20.1	10.6		44.1	14.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	36.3		23.6	11.5		20.1	10.6		44.1	14.7	
LOS	C	D		C	B		C	B		D	B	
Approach Delay		35.9			19.4			11.2			26.7	
Approach LOS		D			B			B			C	
Queue Length 50th (m)	1.6	37.0		50.6	21.2		6.2	7.3		6.8	6.6	
Queue Length 95th (m)	6.0	63.8		#97.1	37.8		14.9	51.9		#22.8	15.4	
Internal Link Dist (m)		134.4			295.2			112.8			65.0	
Turn Bay Length (m)	70.0			70.0			80.0			65.0		
Base Capacity (vph)	333	502		681	1108		388	1110		143	890	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.51		0.73	0.24		0.15	0.73		0.38	0.09	

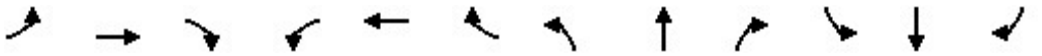
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 75.6			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 92.8%		ICU Level of Service F	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

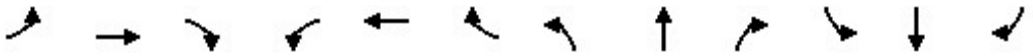
Queue shown is maximum after two cycles.

Splits and Phases: 9: Highway 6/Hamilton Airport Entrance & Airport Road W





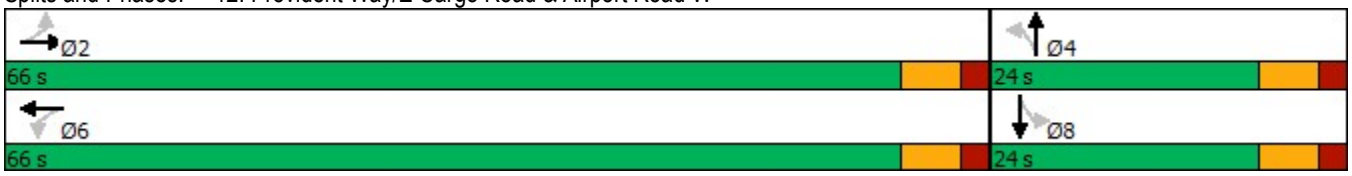
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	717	138	101	531	35	93	0	85	71	0	67
Future Volume (vph)	53	717	138	101	531	35	93	0	85	71	0	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	15.0		0.0	15.0		0.0	15.0		0.0	60.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975			0.991			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1552	1717	0	1785	1717	0	1785	1597	0	1785	1551	0
Flt Permitted	0.391			0.222			0.711			0.697		
Satd. Flow (perm)	639	1717	0	417	1717	0	1336	1597	0	1310	1551	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			8			266			387	
Link Speed (k/h)		50			50			40			40	
Link Distance (m)		319.2			308.0			175.1			311.2	
Travel Time (s)		23.0			22.2			15.8			28.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.92	0.92	0.96	0.96	0.92	0.92	0.92	0.96	0.92	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	15%	8%	0%	0%	9%	0%	0%	0%	0%	0%	0%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	55	747	150	110	553	36	101	0	92	74	0	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	897	0	110	589	0	101	92	0	74	70	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												

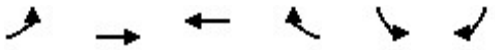


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Total Split (%)	73.3%	73.3%		73.3%	73.3%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	60.0	60.0		60.0	60.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	45.7	45.7		45.7	45.7		12.9	12.9		12.7	12.7	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.21	0.21		0.20	0.20	
v/c Ratio	0.12	0.71		0.36	0.47		0.36	0.17		0.28	0.11	
Control Delay	4.9	10.9		9.3	6.6		29.5	0.7		28.0	0.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.9	10.9		9.3	6.6		29.5	0.7		28.0	0.4	
LOS	A	B		A	A		C	A		C	A	
Approach Delay		10.5			7.0			15.8			14.6	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	1.8	54.1		4.5	26.5		9.5	0.0		6.8	0.0	
Queue Length 95th (m)	6.6	129.7		16.9	60.2		29.1	0.0		22.6	0.0	
Internal Link Dist (m)		295.2			284.0			151.1			287.2	
Turn Bay Length (m)	15.0			15.0			15.0			60.0		
Base Capacity (vph)	580	1560		378	1559		463	727		454	790	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.57		0.29	0.38		0.22	0.13		0.16	0.09	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 62.3			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

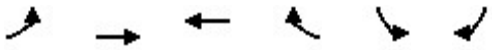
Splits and Phases: 12: Provident Way/E Cargo Road & Airport Road W





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	58	815	512	20	71	155
Future Volume (vph)	58	815	512	20	71	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.6				7.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.995			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1312	1807	1784	0	1785	1389
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1312	1807	1784	0	1785	1389
Link Speed (k/h)		40	40		40	
Link Distance (m)		209.1	301.2		123.2	
Travel Time (s)		18.8	27.1		11.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	36%	4%	5%	0%	0%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	63	886	557	22	77	168
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	886	579	0	77	168
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		7.0	7.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

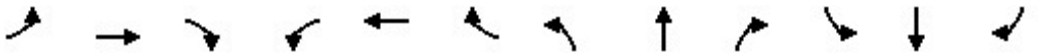
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 53.5%		ICU Level of Service A	
Analysis Period (min) 15			



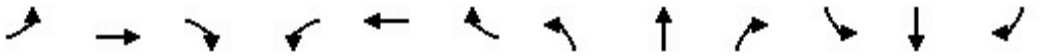
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	815	512	20	71	155
Future Volume (Veh/h)	58	815	512	20	71	155
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	886	557	22	77	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		209	301			
pX, platoon unblocked					0.74	
vC, conflicting volume	579				1580	568
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	579				1608	568
tC, single (s)	4.5				6.4	6.4
tC, 2 stage (s)						
tF (s)	2.5				3.5	3.4
p0 queue free %	93				3	66
cM capacity (veh/h)	847				80	498

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	63	886	579	77	168
Volume Left	63	0	0	77	0
Volume Right	0	0	22	0	168
cSH	847	1700	1700	80	498
Volume to Capacity	0.07	0.52	0.34	0.97	0.34
Queue Length 95th (m)	1.8	0.0	0.0	39.5	11.2
Control Delay (s)	9.6	0.0	0.0	182.5	15.8
Lane LOS	A			F	C
Approach Delay (s)	0.6		0.0	68.2	
Approach LOS				F	

Intersection Summary			
Average Delay	9.8		
Intersection Capacity Utilization	53.5%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	452	208	195	66	183	95	93	1380	72	41	565	115
Future Volume (vph)	452	208	195	66	183	95	93	1380	72	41	565	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	15.0		0.0	135.0		0.0	120.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.927			0.949			0.993				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3330	1565	0	1513	1731	0	1733	3375	*0	1668	3305	1377
Flt Permitted	0.950			0.510			0.406			0.059		
Satd. Flow (perm)	3330	1565	0	812	1731	0	741	3375	0	104	3305	1377
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		42			17			5				124
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		218.0			195.5			259.1			310.3	
Travel Time (s)		15.7			14.1			11.7			14.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	4%	5%	18%	18%	3%	3%	3%	5%	6%	7%	8%	16%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	486	224	210	71	197	102	100	1484	77	44	608	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	486	434	0	71	299	0	100	1561	0	44	608	124
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	Prot	NA		Perm	NA		Perm	NA		pm+pt	NA	Perm
Protected Phases	3	8			4			2		1	6	
Permitted Phases				4			2			6		6
Detector Phase	3	8		4	4		2	2		1	6	6
Switch Phase												



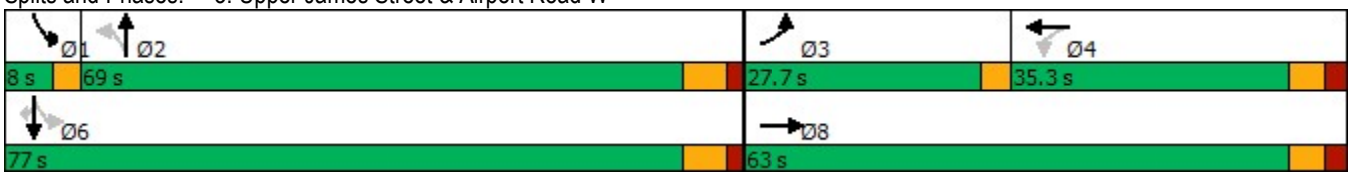
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	8.0	42.3		42.3	42.3		42.3	42.3		8.0	42.3	42.3
Total Split (s)	27.7	63.0		35.3	35.3		69.0	69.0		8.0	77.0	77.0
Total Split (%)	19.8%	45.0%		25.2%	25.2%		49.3%	49.3%		5.7%	55.0%	55.0%
Maximum Green (s)	24.7	56.7		29.0	29.0		62.7	62.7		5.0	70.7	70.7
Yellow Time (s)	3.0	3.7		3.7	3.7		4.6	4.6		3.0	4.6	4.6
All-Red Time (s)	0.0	2.6		2.6	2.6		1.7	1.7		0.0	1.7	1.7
Lost Time Adjust (s)	0.0	-2.3		-2.3	-2.3		0.0	-2.3		0.0	-2.3	-2.3
Total Lost Time (s)	3.0	4.0		4.0	4.0		6.3	4.0		3.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag		Lead		
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes		
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	None		None	None		Max	Max		None	Max	Max
Walk Time (s)		12.0		12.0	12.0		12.0	12.0			12.0	12.0
Flash Dont Walk (s)		24.0		24.0	24.0		24.0	24.0			24.0	24.0
Pedestrian Calls (#/hr)		0		0	0		0	0			0	0
Act Effct Green (s)	22.9	53.5		27.6	27.6		64.6	66.9		74.2	73.2	73.2
Actuated g/C Ratio	0.17	0.40		0.20	0.20		0.48	0.50		0.55	0.54	0.54
v/c Ratio	0.86	0.67		0.43	0.81		0.28	0.93		0.38	0.34	0.15
Control Delay	70.5	35.5		55.7	66.2		26.3	43.9		25.2	18.6	3.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	70.5	35.5		55.7	66.2		26.3	43.9		25.2	18.6	3.2
LOS	E	D		E	E		C	D		C	B	A
Approach Delay		54.0			64.2			42.8			16.5	
Approach LOS		D			E			D			B	
Queue Length 50th (m)	67.1	85.1		16.9	73.7		17.2	218.8		5.6	49.8	0.0
Queue Length 95th (m)	#91.5	122.1		32.7	107.3		32.0	#277.4		11.9	63.8	9.7
Internal Link Dist (m)		194.0			171.5			235.1			286.3	
Turn Bay Length (m)	30.0			15.0			135.0			120.0		80.0
Base Capacity (vph)	612	710		189	416		355	1679		115	1795	804
Starvation Cap Reductn	0	0		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.79	0.61		0.38	0.72		0.28	0.93		0.38	0.34	0.15

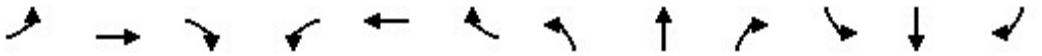
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 134.7			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 42.2		Intersection LOS: D	
Intersection Capacity Utilization 86.3%		ICU Level of Service E	
Analysis Period (min) 15			

* User Entered Value

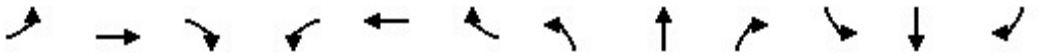
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Upper James Street & Airport Road W





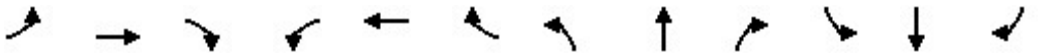
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	685	33	27	357	58	38	4	177	45	47	130
Future Volume (vph)	46	685	33	27	357	58	38	4	177	45	47	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	30.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.993			0.979			0.853			0.890	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1720	0	1552	1684	0	1733	1603	0	1716	1610	0
Flt Permitted	0.471			0.263			0.569			0.559		
Satd. Flow (perm)	885	1720	0	430	1684	0	1038	1603	0	1010	1610	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		4			13			147			141	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		531.2			218.0			261.5			546.2	
Travel Time (s)		38.2			15.7			18.8			39.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	8%	18%	15%	8%	17%	3%	0%	0%	4%	9%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	50	745	36	29	388	63	41	4	192	49	51	141
Shared Lane Traffic (%)												
Lane Group Flow (vph)	50	781	0	29	451	0	41	196	0	49	192	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												



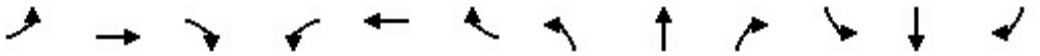
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	42.0	42.0		42.0	42.0		42.0	42.0		42.0	42.0	
Total Split (s)	48.0	48.0		48.0	48.0		42.0	42.0		42.0	42.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	42.0	42.0		42.0	42.0		36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	34.8	34.8		34.8	34.8		10.4	10.4		10.4	10.4	
Actuated g/C Ratio	0.65	0.65		0.65	0.65		0.19	0.19		0.19	0.19	
v/c Ratio	0.09	0.70		0.10	0.41		0.20	0.46		0.25	0.45	
Control Delay	4.1	10.2		4.8	5.7		23.2	11.3		24.1	11.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.1	10.2		4.8	5.7		23.2	11.3		24.1	11.5	
LOS	A	B		A	A		C	B		C	B	
Approach Delay		9.8			5.7			13.3			14.0	
Approach LOS		A			A			B			B	
Queue Length 50th (m)	1.4	36.4		0.8	15.1		3.4	4.0		4.1	4.2	
Queue Length 95th (m)	5.0	84.7		3.7	35.0		11.5	20.0		13.4	20.0	
Internal Link Dist (m)		507.2			194.0			237.5			522.2	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	736	1432		357	1403		760	1213		739	1216	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.07	0.55		0.08	0.32		0.05	0.16		0.07	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 53.5			
Natural Cycle: 85			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 9.8		Intersection LOS: A	
Intersection Capacity Utilization 63.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 6: Homestead Drive & Airport Road W



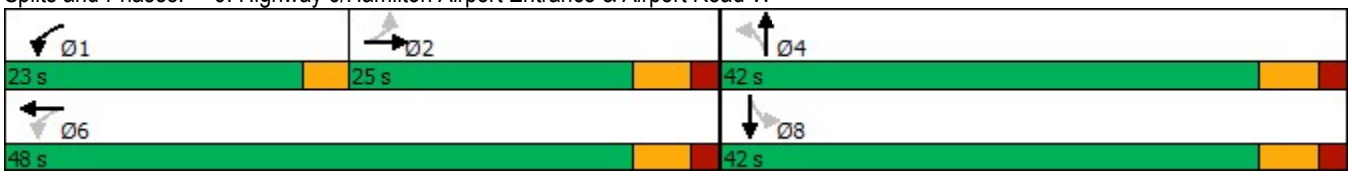
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	157	34	317	209	36	58	35	771	24	18	13
Future Volume (vph)	16	157	34	317	209	36	58	35	771	24	18	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	70.0		0.0	70.0		0.0	80.0		0.0	65.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.973			0.978			0.857			0.936	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1529	0	1428	1707	0	1566	1418	0	1785	1653	0
Flt Permitted	0.600			0.415			0.736			0.198		
Satd. Flow (perm)	1127	1529	0	624	1707	0	1213	1418	0	372	1653	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11			14			773			14	
Link Speed (k/h)		50			50			80			50	
Link Distance (m)		158.4			319.2			136.8			89.0	
Travel Time (s)		11.4			23.0			6.2			6.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	11%	59%	25%	6%	17%	14%	3%	14%	0%	0%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	17	165	36	334	220	38	61	37	812	25	19	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	17	201	0	334	258	0	61	849	0	25	33	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												

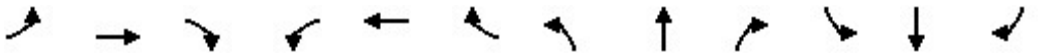


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		9.5	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0		23.0	48.0		42.0	42.0		42.0	42.0	
Total Split (%)	27.8%	27.8%		25.6%	53.3%		46.7%	46.7%		46.7%	46.7%	
Maximum Green (s)	19.0	19.0		20.0	42.0		36.0	36.0		36.0	36.0	
Yellow Time (s)	4.0	4.0		3.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		1.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	15.7	15.7		33.7	33.7		20.5	20.5		20.5	20.5	
Actuated g/C Ratio	0.25	0.25		0.53	0.53		0.32	0.32		0.32	0.32	
v/c Ratio	0.06	0.52		0.66	0.28		0.16	0.86		0.21	0.06	
Control Delay	25.2	28.7		18.8	10.7		16.8	13.6		21.2	11.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	25.2	28.7		18.8	10.7		16.8	13.6		21.2	11.4	
LOS	C	C		B	B		B	B		C	B	
Approach Delay		28.5			15.3			13.8			15.6	
Approach LOS		C			B			B			B	
Queue Length 50th (m)	1.4	17.0		18.6	12.2		4.6	5.8		2.0	1.4	
Queue Length 95th (m)	7.6	50.6		59.7	40.0		13.9	59.5		8.2	7.1	
Internal Link Dist (m)		134.4			295.2			112.8			65.0	
Turn Bay Length (m)	70.0			70.0			80.0			65.0		
Base Capacity (vph)	419	576		603	1286		817	1207		250	1118	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.35		0.55	0.20		0.07	0.70		0.10	0.03	

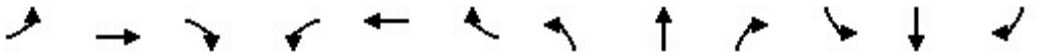
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 63.1			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.86			
Intersection Signal Delay: 16.1		Intersection LOS: B	
Intersection Capacity Utilization 87.4%		ICU Level of Service E	
Analysis Period (min) 15			

Splits and Phases: 9: Highway 6/Hamilton Airport Entrance & Airport Road W





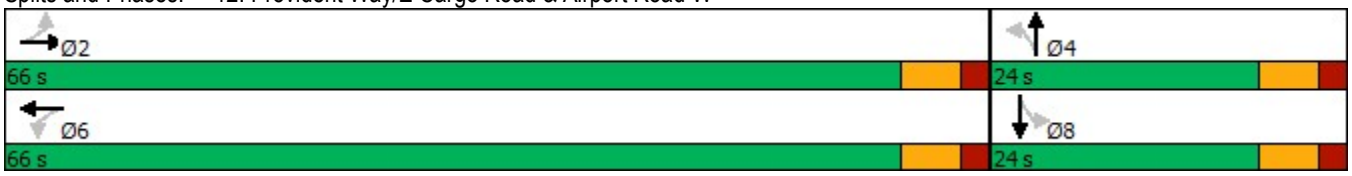
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	732	105	72	384	60	126	0	106	53	0	52
Future Volume (vph)	68	732	105	72	384	60	126	0	106	53	0	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	15.0		0.0	15.0		0.0	15.0		0.0	60.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.984			0.980			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1638	1657	0	1785	1681	0	1785	1597	0	1750	1183	0
Flt Permitted	0.398			0.145			0.713			0.660		
Satd. Flow (perm)	686	1657	0	272	1681	0	1340	1597	0	1216	1183	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		16			20			183			435	
Link Speed (k/h)		50			50			40			40	
Link Distance (m)		319.2			308.0			175.1			311.2	
Travel Time (s)		23.0			22.2			15.8			28.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.78	0.92	0.92	0.78	0.78	0.92	0.92	0.92	0.78	0.92	0.78
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	9%	13%	0%	0%	11%	0%	0%	0%	0%	2%	0%	35%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	87	938	114	78	492	77	137	0	115	68	0	67
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1052	0	78	569	0	137	115	0	68	67	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												

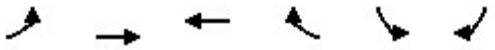


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Total Split (%)	73.3%	73.3%		73.3%	73.3%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	60.0	60.0		60.0	60.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	58.2	58.2		58.2	58.2		15.3	15.3		15.3	15.3	
Actuated g/C Ratio	0.71	0.71		0.71	0.71		0.19	0.19		0.19	0.19	
v/c Ratio	0.18	0.89		0.40	0.47		0.55	0.26		0.30	0.12	
Control Delay	5.6	21.5		13.2	6.9		39.5	2.3		33.1	0.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	5.6	21.5		13.2	6.9		39.5	2.3		33.1	0.4	
LOS	A	C		B	A		D	A		C	A	
Approach Delay		20.2			7.6			22.5			16.9	
Approach LOS		C			A			C			B	
Queue Length 50th (m)	3.8	107.0		4.1	31.0		20.6	0.0		9.7	0.0	
Queue Length 95th (m)	8.5	142.8		16.3	45.8		38.2	2.9		18.0	0.0	
Internal Link Dist (m)		295.2			284.0			151.1			287.2	
Turn Bay Length (m)	15.0			15.0			15.0			60.0		
Base Capacity (vph)	526	1276		208	1295		331	533		301	620	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.17	0.82		0.38	0.44		0.41	0.22		0.23	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 81.6			
Natural Cycle: 90			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 16.5		Intersection LOS: B	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			

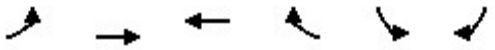
Splits and Phases: 12: Provident Way/E Cargo Road & Airport Road W





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	155	736	469	33	6	47
Future Volume (vph)	155	736	469	33	6	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.6				7.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.991			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1608	1708	1779	0	1785	1174
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1608	1708	1779	0	1785	1174
Link Speed (k/h)		40	40		40	
Link Distance (m)		209.1	301.2		123.2	
Travel Time (s)		18.8	27.1		11.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	11%	10%	5%	0%	0%	36%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	168	800	510	36	7	51
Shared Lane Traffic (%)						
Lane Group Flow (vph)	168	800	546	0	7	51
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		7.0	7.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

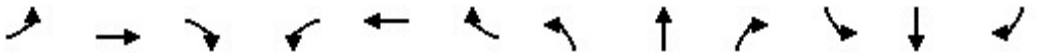
Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 48.7%		ICU Level of Service A	
Analysis Period (min) 15			



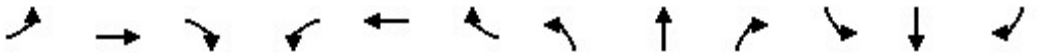
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	155	736	469	33	6	47
Future Volume (Veh/h)	155	736	469	33	6	47
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	168	800	510	36	7	51
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		209	301			
pX, platoon unblocked					0.71	
vC, conflicting volume	546				1664	528
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	546				1733	528
tC, single (s)	4.2				6.4	6.6
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.6
p0 queue free %	83				88	90
cM capacity (veh/h)	979				57	489

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	168	800	546	7	51
Volume Left	168	0	0	7	0
Volume Right	0	0	36	0	51
cSH	979	1700	1700	57	489
Volume to Capacity	0.17	0.47	0.32	0.12	0.10
Queue Length 95th (m)	4.7	0.0	0.0	3.0	2.6
Control Delay (s)	9.4	0.0	0.0	76.7	13.2
Lane LOS	A			F	B
Approach Delay (s)	1.6		0.0	20.9	
Approach LOS				C	

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	48.7%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	478	244	214	117	226	59	100	1157	95	82	1430	136
Future Volume (vph)	478	244	214	117	226	59	100	1157	95	82	1430	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	15.0		0.0	135.0		0.0	120.0		80.0
Storage Lanes	2		0	1		0	1		0	1		1
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	0.97	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Ped Bike Factor												
Frt		0.930			0.969			0.989				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3298	1729	0	1700	1821	0	1785	3423	*0	1785	3466	1479
Flt Permitted	0.950			0.484			0.064			0.070		
Satd. Flow (perm)	3298	1729	0	866	1821	0	120	3423	0	132	3466	1479
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			8			8				98
Link Speed (k/h)		50			50			80			80	
Link Distance (m)		218.0			195.5			259.1			310.3	
Travel Time (s)		15.7			14.1			11.7			14.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	2%	0%	5%	0%	0%	0%	3%	5%	0%	3%	8%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	514	262	230	126	243	63	108	1244	102	88	1538	146
Shared Lane Traffic (%)												
Lane Group Flow (vph)	514	492	0	126	306	0	108	1346	0	88	1538	146
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	6.1
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Turn Type	Prot	NA		Perm	NA		pm+pt	NA		pm+pt	NA	Perm
Protected Phases	3	8			4		5	2		1	6	
Permitted Phases				4			2			6		6
Detector Phase	3	8		4	4		5	2		1	6	6
Switch Phase												



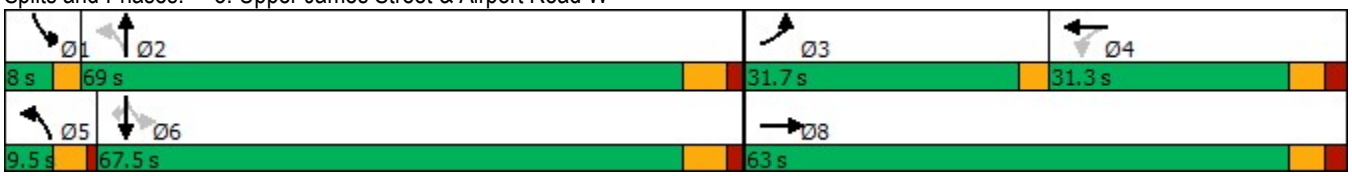
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Minimum Split (s)	8.0	42.3		42.3	42.3		9.5	42.3		8.0	42.3	42.3
Total Split (s)	31.7	63.0		31.3	31.3		9.5	69.0		8.0	67.5	67.5
Total Split (%)	22.6%	45.0%		22.4%	22.4%		6.8%	49.3%		5.7%	48.2%	48.2%
Maximum Green (s)	28.7	56.7		25.0	25.0		5.0	62.7		5.0	61.2	61.2
Yellow Time (s)	3.0	3.7		3.7	3.7		3.5	4.6		3.0	4.6	4.6
All-Red Time (s)	0.0	2.6		2.6	2.6		1.0	1.7		0.0	1.7	1.7
Lost Time Adjust (s)	0.0	-2.3		-2.3	-2.3		0.0	-2.3		0.0	-2.3	-2.3
Total Lost Time (s)	3.0	4.0		4.0	4.0		4.5	4.0		3.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Recall Mode	None	None		None	None		None	Max		None	Max	Max
Walk Time (s)		12.0		12.0	12.0			12.0			12.0	12.0
Flash Dont Walk (s)		24.0		24.0	24.0			24.0			24.0	24.0
Pedestrian Calls (#/hr)		0		0	0			0			0	0
Act Effct Green (s)	25.2	54.3		26.1	26.1		69.7	65.1		69.7	63.6	63.6
Actuated g/C Ratio	0.19	0.40		0.19	0.19		0.51	0.48		0.51	0.47	0.47
v/c Ratio	0.84	0.69		0.76	0.86		0.88	0.82		0.69	0.94	0.20
Control Delay	66.3	36.2		80.4	74.7		77.3	35.7		44.6	47.6	8.8
Queue Delay	0.0	0.3		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	66.3	36.5		80.4	74.7		77.3	35.7		44.6	47.6	8.8
LOS	E	D		F	E		E	D		D	D	A
Approach Delay		51.7			76.3			38.8			44.3	
Approach LOS		D			E			D			D	
Queue Length 50th (m)	69.7	99.6		32.6	78.9		14.4	163.4		11.3	209.9	7.2
Queue Length 95th (m)	89.7	138.7		#65.2	#128.4		#51.1	200.3		#32.1	#270.0	20.3
Internal Link Dist (m)		194.0			171.5			235.1			286.3	
Turn Bay Length (m)	30.0			15.0			135.0			120.0		80.0
Base Capacity (vph)	700	776		174	374		123	1649		128	1628	746
Starvation Cap Reductn	0	46		0	0		0	0		0	0	0
Spillback Cap Reductn	0	0		0	0		0	0		0	0	0
Storage Cap Reductn	0	0		0	0		0	0		0	0	0
Reduced v/c Ratio	0.73	0.67		0.72	0.82		0.88	0.82		0.69	0.94	0.20

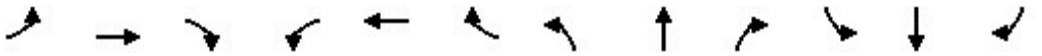
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 135.5			
Natural Cycle: 145			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 47.1		Intersection LOS: D	
Intersection Capacity Utilization 91.2%		ICU Level of Service F	
Analysis Period (min) 15			

* User Entered Value

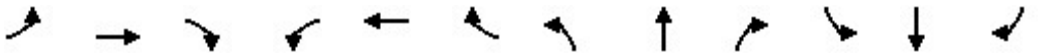
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: Upper James Street & Airport Road W





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	774	50	95	326	70	40	13	103	108	118	172
Future Volume (vph)	43	774	50	95	326	70	40	13	103	108	118	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	30.0		0.0	30.0		0.0	30.0		0.0	30.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.991			0.973			0.867			0.911	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1788	0	1785	1715	0	1733	1615	0	1653	1646	0
Flt Permitted	0.464			0.168			0.331			0.676		
Satd. Flow (perm)	872	1788	0	316	1715	0	604	1615	0	1176	1646	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		8			28			113			75	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		531.2			218.0			261.5			546.2	
Travel Time (s)		38.2			15.7			18.8			39.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	4%	6%	0%	8%	0%	3%	0%	1%	8%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	47	851	55	104	358	77	44	14	113	119	130	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	47	906	0	104	435	0	44	127	0	119	319	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		7.0			7.0			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												



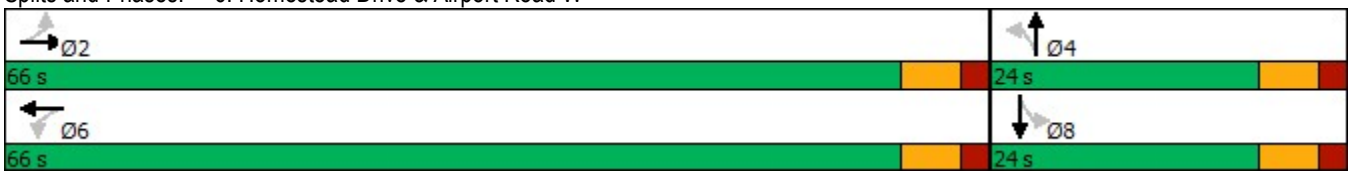
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Total Split (%)	73.3%	73.3%		73.3%	73.3%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	60.0	60.0		60.0	60.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effct Green (s)	43.3	43.3		43.3	43.3		17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.63	0.63		0.63	0.63		0.25	0.25		0.25	0.25	
v/c Ratio	0.09	0.80		0.53	0.40		0.30	0.26		0.41	0.69	
Control Delay	5.3	15.9		18.3	6.9		32.2	9.2		31.0	29.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	5.3	15.9		18.3	6.9		32.2	9.2		31.0	29.7	
LOS	A	B		B	A		C	A		C	C	
Approach Delay		15.4			9.1			15.1			30.1	
Approach LOS		B			A			B			C	
Queue Length 50th (m)	2.2	79.0		6.8	23.3		4.7	1.4		13.0	28.6	
Queue Length 95th (m)	5.6	131.0		21.9	38.9		16.6	15.5		34.4	#77.5	
Internal Link Dist (m)		507.2			194.0			237.5			522.2	
Turn Bay Length (m)	30.0			30.0			30.0			30.0		
Base Capacity (vph)	753	1545		273	1485		188	580		366	564	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.06	0.59		0.38	0.29		0.23	0.22		0.33	0.57	

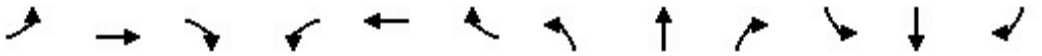
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 68.8			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.80			
Intersection Signal Delay: 16.8		Intersection LOS: B	
Intersection Capacity Utilization 83.3%		ICU Level of Service E	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

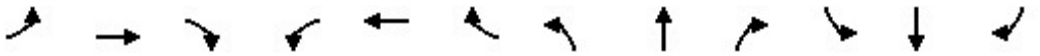
Queue shown is maximum after two cycles.

Splits and Phases: 6: Homestead Drive & Airport Road W





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	188	46	452	189	50	53	56	682	50	58	15
Future Volume (vph)	11	188	46	452	189	50	53	56	682	50	58	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	70.0		0.0	70.0		0.0	80.0		0.0	65.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.970			0.969			0.861			0.970	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1785	1657	0	1594	1692	0	1026	1464	0	1785	1729	0
Flt Permitted	0.597			0.382			0.705			0.150		
Satd. Flow (perm)	1122	1657	0	641	1692	0	761	1464	0	282	1729	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13			22			741			16	
Link Speed (k/h)		50			50			80			50	
Link Distance (m)		158.4			319.2			136.8			89.0	
Travel Time (s)		11.4			23.0			6.2			6.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	7%	22%	12%	7%	10%	74%	4%	11%	0%	0%	27%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	12	207	51	497	208	55	58	62	749	55	64	16
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	258	0	497	263	0	58	811	0	55	80	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		1	6		4	4		8	8	
Switch Phase												



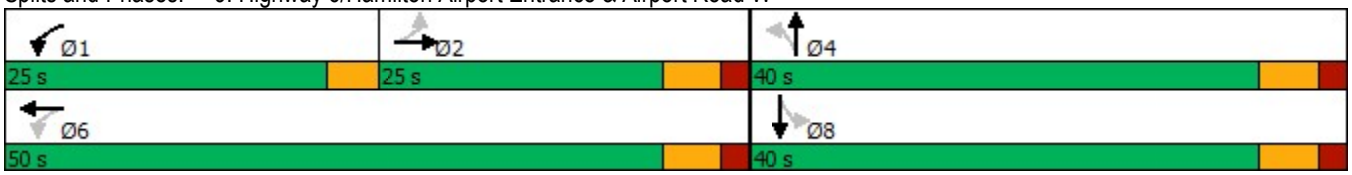
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		9.5	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0		25.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	27.8%	27.8%		27.8%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	19.0	19.0		21.5	44.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	4.0	4.0		3.5	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		0.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		1.5	4.0		4.0	4.0		4.0	4.0	
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		None	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	17.7	17.7		42.9	40.3		26.8	26.8		26.8	26.8	
Actuated g/C Ratio	0.23	0.23		0.57	0.53		0.35	0.35		0.35	0.35	
v/c Ratio	0.05	0.65		0.79	0.29		0.22	0.81		0.56	0.13	
Control Delay	27.4	36.3		23.6	11.5		20.1	10.6		44.1	14.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.4	36.3		23.6	11.5		20.1	10.6		44.1	14.7	
LOS	C	D		C	B		C	B		D	B	
Approach Delay		35.9			19.4			11.2			26.7	
Approach LOS		D			B			B			C	
Queue Length 50th (m)	1.6	37.0		50.6	21.2		6.2	7.3		6.8	6.6	
Queue Length 95th (m)	6.0	63.8		#97.1	37.8		14.9	51.9		#22.8	15.4	
Internal Link Dist (m)		134.4			295.2			112.8			65.0	
Turn Bay Length (m)	70.0			70.0			80.0			65.0		
Base Capacity (vph)	333	502		681	1108		388	1110		143	890	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.04	0.51		0.73	0.24		0.15	0.73		0.38	0.09	

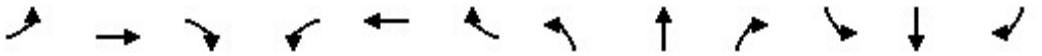
Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 75.6			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 18.6		Intersection LOS: B	
Intersection Capacity Utilization 92.8%		ICU Level of Service F	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.

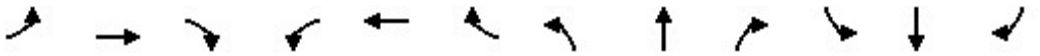
Queue shown is maximum after two cycles.

Splits and Phases: 9: Highway 6/Hamilton Airport Entrance & Airport Road W





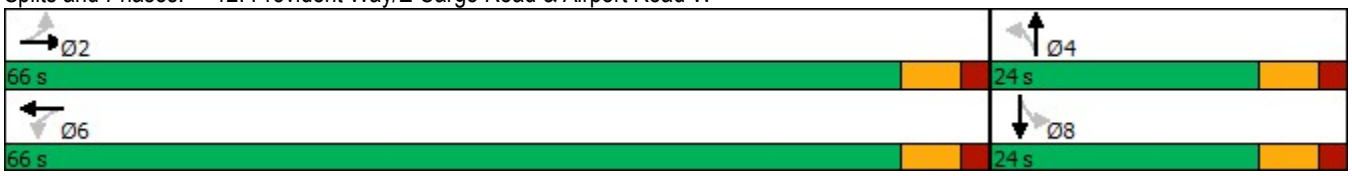
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	717	138	101	531	35	93	0	85	71	0	67
Future Volume (vph)	53	717	138	101	531	35	93	0	85	71	0	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%			0%			0%			0%	
Storage Length (m)	15.0		0.0	15.0		0.0	15.0		0.0	60.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor												
Frt		0.975			0.991			0.850			0.850	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1552	1717	0	1785	1717	0	1785	1597	0	1785	1551	0
Flt Permitted	0.391			0.222			0.711			0.697		
Satd. Flow (perm)	639	1717	0	417	1717	0	1336	1597	0	1310	1551	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		26			8			266			387	
Link Speed (k/h)		50			50			40			40	
Link Distance (m)		319.2			308.0			175.1			311.2	
Travel Time (s)		23.0			22.2			15.8			28.0	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.96	0.96	0.92	0.92	0.96	0.96	0.92	0.92	0.92	0.96	0.92	0.96
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	15%	8%	0%	0%	9%	0%	0%	0%	0%	0%	0%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Adj. Flow (vph)	55	747	150	110	553	36	101	0	92	74	0	70
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	897	0	110	589	0	101	92	0	74	70	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.5			3.5			3.5			3.5	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	6.1	30.5		6.1	30.5		6.1	30.5		6.1	30.5	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												

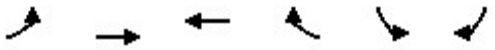


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	66.0	66.0		66.0	66.0		24.0	24.0		24.0	24.0	
Total Split (%)	73.3%	73.3%		73.3%	73.3%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	60.0	60.0		60.0	60.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	45.7	45.7		45.7	45.7		12.9	12.9		12.7	12.7	
Actuated g/C Ratio	0.73	0.73		0.73	0.73		0.21	0.21		0.20	0.20	
v/c Ratio	0.12	0.71		0.36	0.47		0.36	0.17		0.28	0.11	
Control Delay	4.9	10.9		9.3	6.6		29.5	0.7		28.0	0.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	4.9	10.9		9.3	6.6		29.5	0.7		28.0	0.4	
LOS	A	B		A	A		C	A		C	A	
Approach Delay		10.5			7.0			15.8			14.6	
Approach LOS		B			A			B			B	
Queue Length 50th (m)	1.8	54.1		4.5	26.5		9.5	0.0		6.8	0.0	
Queue Length 95th (m)	6.6	129.7		16.9	60.2		29.1	0.0		22.6	0.0	
Internal Link Dist (m)		295.2			284.0			151.1			287.2	
Turn Bay Length (m)	15.0			15.0			15.0			60.0		
Base Capacity (vph)	580	1560		378	1559		463	727		454	790	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.09	0.57		0.29	0.38		0.22	0.13		0.16	0.09	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 62.3			
Natural Cycle: 65			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 10.1		Intersection LOS: B	
Intersection Capacity Utilization 73.5%		ICU Level of Service D	
Analysis Period (min) 15			

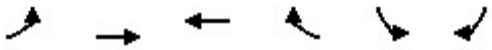
Splits and Phases: 12: Provident Way/E Cargo Road & Airport Road W





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	58	815	512	9	30	155
Future Volume (vph)	58	815	512	9	30	155
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (m)	3.5	3.5	3.5	3.5	3.5	3.5
Grade (%)		0%	0%		0%	
Storage Length (m)	0.0			0.0	0.0	0.0
Storage Lanes	1			0	1	1
Taper Length (m)	7.6				7.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt			0.998			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1312	1807	1787	0	1785	1389
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1312	1807	1787	0	1785	1389
Link Speed (k/h)		40	40		40	
Link Distance (m)		209.1	301.2		123.2	
Travel Time (s)		18.8	27.1		11.1	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	36%	4%	5%	0%	0%	15%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)		0%	0%		0%	
Adj. Flow (vph)	63	886	557	10	33	168
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	886	567	0	33	168
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		7.0	7.0		3.5	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.9	4.9		4.9	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.9%		ICU Level of Service A	
Analysis Period (min) 15			

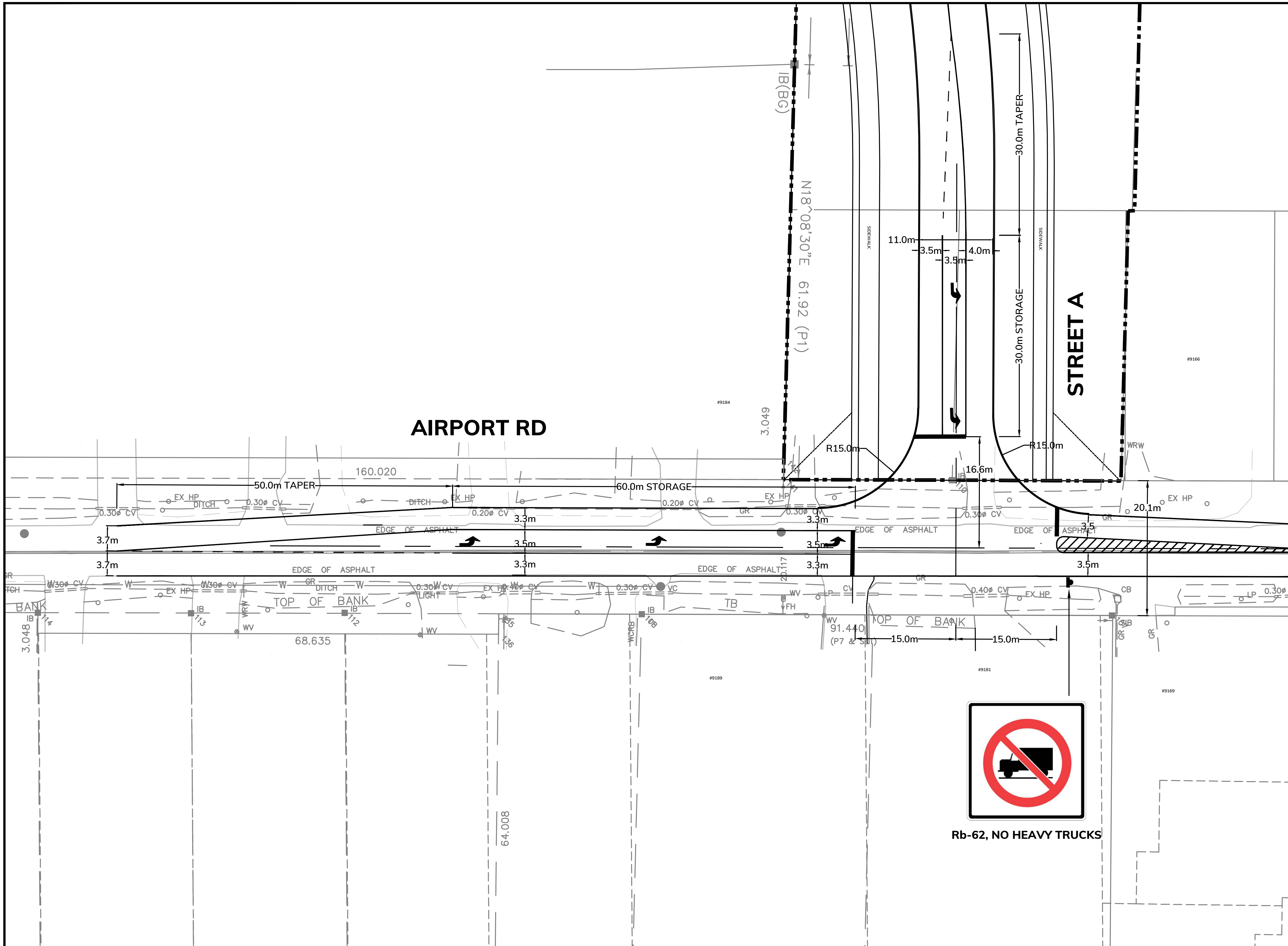


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	58	815	512	9	30	155
Future Volume (Veh/h)	58	815	512	9	30	155
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	886	557	10	33	168
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)		209	301			
pX, platoon unblocked					0.74	
vC, conflicting volume	567				1574	562
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	567				1600	562
tC, single (s)	4.5				6.4	6.4
tC, 2 stage (s)						
tF (s)	2.5				3.5	3.4
p0 queue free %	93				59	67
cM capacity (veh/h)	856				81	502

Direction, Lane #	EB 1	EB 2	WB 1	SB 1	SB 2
Volume Total	63	886	567	33	168
Volume Left	63	0	0	33	0
Volume Right	0	0	10	0	168
cSH	856	1700	1700	81	502
Volume to Capacity	0.07	0.52	0.33	0.41	0.33
Queue Length 95th (m)	1.8	0.0	0.0	12.4	11.1
Control Delay (s)	9.5	0.0	0.0	77.4	15.7
Lane LOS	A			F	C
Approach Delay (s)	0.6		0.0	25.9	
Approach LOS				D	

Intersection Summary			
Average Delay	3.4		
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F
Proposed Intersection Configuration



DATE:	PROJ. NO.:	SCALE:
FEB 2023	21218	NTS

DRAWING :

AIRPORT ROAD INTERSECTION CONCEPT LANE CONFIGURATION

PROJECT :

PROPOSED INDUSTRIAL DEVELOPMENT

3054 HOMESTEAD DRIVE
HAMILTON, ONTARIO

ODAN·DETECH
CONSULTING ENGINEERS