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Project No. 232001

Mosaik Properties
100-150 Solutions Drive
Halifax, NS
B3S 0E5

Re: 42 Canal Street – Traffic Impact Statement

1 Introduction

Harbourside Transportation Consultants has completed a traffic impact statement, as per Halifax Regional Municipality (HRM) requirements, in support of the development application for a residential development at Maitland Street and Canal Street in Dartmouth, Nova Scotia.

The proposed development is in the early stages of planning and, as a result, will likely be subject to a number of changes, including changes to the building footprints or site access configurations which would impact a Traffic Impact Study and require a revision. A traffic impact statement was prepared at this time to determine the number of trips generated by the proposed development to determine the scale of the potential impact of the development and establish if a Traffic Impact Study will need to be completed at a later stage of the development application.

2 Site Context

The subject site is located between Canal Street and Maitland Street. The site context is shown in Figure 1. The subject site encompasses a former commercial building and has two existing access points: one on Canal Street, and one on Maitland Street.

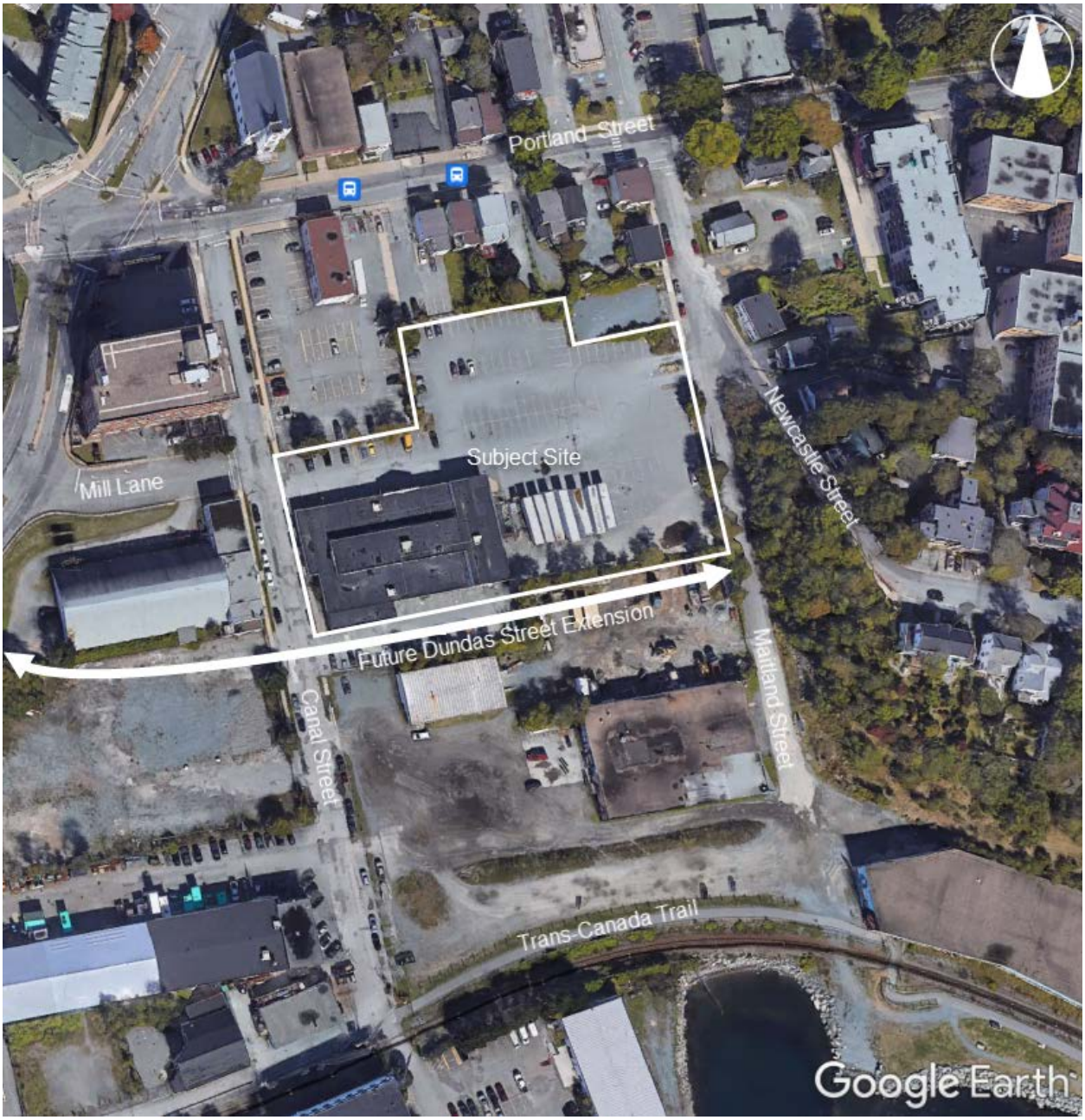

Figure 1 Site Context

3 Existing Transportation Network

Canal Street is a local cul-de-sac street that runs north-south from Portland Street and connects to the Trans-Canada Trail by Dartmouth Cove. Canal Street has a two-lane cross-section with on-street parking on both sides of the roadway and sidewalks on both sides of the street. The Canal Street cross section near the subject site is shown in Figure 2.

The intersection of Canal Street with Portland Street is unsignalized with stop control on the Canal Street approach. The Canal Street approach is restricted to right turn only due to its proximity to the signalized intersection of Portland Street and Alderney Street.

Figure 2: Canal Street

Maitland Street is a local cul-de-sac street that runs north-south from Portland Street and connects to Trans-Canada Trail by the Dartmouth Cove. The segment of Maitland Street from Portland Street to Newcastle Street has a two-lane cross section with on-street parking on both sides of the roadway and sidewalk on the west side of the roadway. The Maitland Street cross section near the subject site is shown in Figure 3.

The intersection of Maitland Street with Portland Street is unsignalized with stop control on the Maitland Street approach.

Figure 3: Maitland Street

The *Regional Centre Secondary Municipal Planning Strategy*[1] established a transporation reserve in the area for the future extension of Dundas Street from Alderney Drive to Maitland Street. The Dundas Street extension will run along the southern boundary of the subject site and is identified in the site plans as HRM Street Extension.

4 Transit

The area is serviced by Halifax Transit Route 5-Portland, 6A-Woodside, 6B-Eastern Passage and 6C-Heritage Hills. There are bus stops in both directions on Portland Street within a 200 metre walking distance of the subject site.

[1] Regional Centre Secondary Municipal Planning Strategy, Halifax Regional Municipality, November 2022.

5 Proposed Development

The proposed development plan consists of two mid-rise and one high-rise building that incorporate both commercial and residential units. The site contains a total of 390 residential units and 28,822 square feet of ground floor commercial space. The three buildings will be connected through two levels of underground parking which will include 320 vehicle parking spaces. The proposed site development plan is shown in Figure 4.

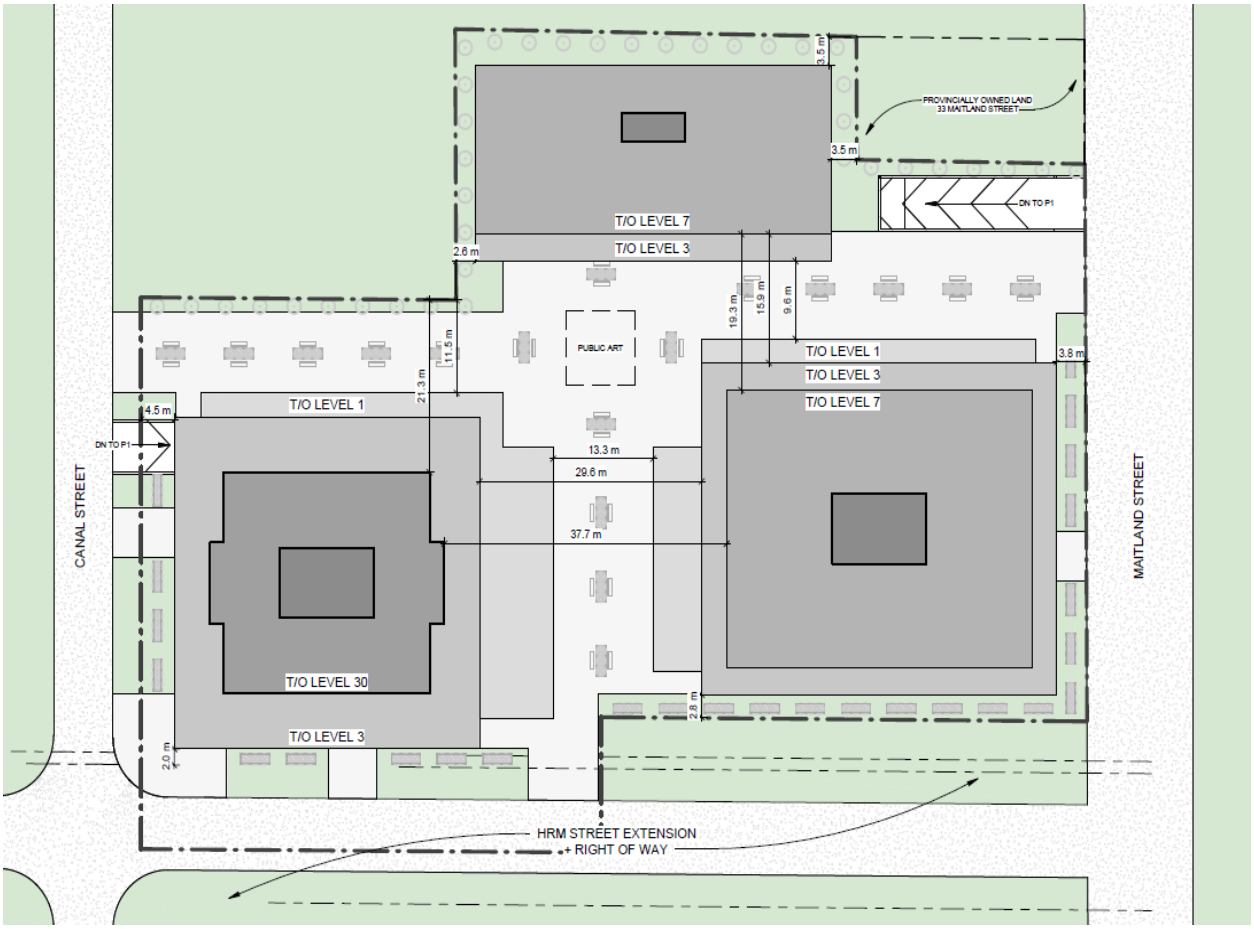

Figure 4: Site Development Plan

6 Site Access

Vehicle access to the underground parking levels will be provided from Canal Street and Maitland Street. The development will relocate the existing access points on Canal Street and Maitland Street.

A sight distance review was completed at the proposed underground parking access locations to confirm that the sight lines meet the minimum stopping and turning sight distance requirements of the Transportation Association of Canada's (TAC) *Geometric Design Guide for Canadian*

Roads[2]. The minimum stopping and turning sight distance requirements for a two-lane roadway with a design speed of 50 km/h are:

- Minimum stopping sight distance = 65 metres;
- Minimum turning sight distance – left-turn from stop = 105 metres; and
- Minimum turning sight distance – right-turn from stop = 95 metres.

The sight line north of the access on Canal Street (looking to the right) is shown in Figure 5. The sight line extends to the intersection with Portland Street where Canal Street terminates indicating that there is approximately 85 metres of sight distance available. The minimum stopping sight distance is met, however, the minimum turning sight distance can not be met north of the access on Canal Street.

Figure 5: Canal Sight Line West of Access (Looking to the Right)

[2] Geometric Design Guide for Canadian Roads, Transportation Association of Canada, June 2017.

The sight line south of the access (looking to the left) is shown in Figure 6. The sight line extends to the end of Canal Street indicating that there is approximately 150 metres of sight distance available. The minimum stopping and turning sight distance requirements are met south of the access on Canal Street.

Figure 6: Canal Sight Line South of Access (Looking to the Left)

The sight line north of the access on Maitland Street (looking to the left) is shown in Figure 7. The sight line extends to the intersection with Portland Street where Maitland Street terminates indicating that there is approximately 65 metres of sight distance available. The minimum stopping sight distance is met, however the minimum turning sight distance cannot be met north of the access on Maitland Street.

Figure 7 Maitland Sight Line North of Access (Looking to the Left)

The sight line south of the access on Maitland Street (looking to the right) is shown in Figure 8. The sight line extends to the end of Maitland Street indicating that there is approximately 170 metres of sight distance available. The minimum stopping and turning sight distance requirements are met south of the access on Maitland Street.

Figure 8 Maitland Sight Line South of Access (Looking to the Right)

7 Site Trip Generation

The Institute of Transportation Engineers (ITE) *Trip Generation Manual*[3] was used to estimate the vehicle trip generation for the proposed site land uses. Three land use codes were used:

- 221 Multifamily Housing (Mid-Rise), Dense Multi-Use Urban;
- 222 Multifamily Housing (High-Rise), Dense Multi-Use Urban; and
- 822 Strip Retail Plaza (<40k), General Urban/Suburban.

Table 1 summarizes the trip generation rates for the land use code.

[3] Trip Generation Manual, 11th edition, Institute of Transportation Engineers, September 2021.

Table 1: Trip Generation Rates

Land Use	AM Peak Hour			PM Peak Hour		
	Rate	Entering	Exiting	Rate	Entering	Exiting
221 Multifamily Housing (Mid-Rise)	T = 0.25(X) + 5.35	14%	86%	T = 0.29(X) - 6.26	74%	26%
222 Multifamily Housing (High-Rise)	T = 0.28(X) - 7.17	25%	75%	Ln(T) = 0.95 Ln(X) - 1.36	73%	27%
822 Strip Retail Plaza (<40k)	Ln(T) = 0.66 Ln(X) + 1.84	60%	40%	Ln(T) = 0.71 Ln(X) + 2.72	50%	50%
Note: Rates are in vehicles per hour (vph)/dwelling unit for residential uses and vph/1000 ft^2 of GFA for commercial uses.						

The weekday morning (AM) and afternoon (PM) peak hour trip generation estimates for the site are summarized in Table 2. On a typical weekday, the site is estimated to generate 161 vehicle trips in the morning peak hour (57 trips entering and 104 trips exiting) and 248 vehicle trips in the afternoon peak hour (143 trips entering and 105 trips exiting).

The trip generation estimates were adjusted to reflect internal trips captures. Internal trips are trips generated by a mixed-use development that both begin and end within the development. The internal captures were calculated using the National Cooperative Highway Research Program's (NCHRP) methodology outlined in *Report 684 Enhancing Internal Trip Capture Estimation for Mixed Use Developments*[4]. The NCHRP worksheets are included in Appendix A.

On a typical weekday, the site is estimated to generate 159 vehicle trips in the morning peak hour (56 trips entering and 103 trips exiting) and 188 vehicle trips in the afternoon peak hour (113 trips entering and 75 trips exiting).

Table 2: Trip Generation Estimates

Land Use	Units	AM Peak Hour			PM Peak Hour		
		Total	Entering	Exiting	Total	Entering	Exiting
221 Multifamily Housing (Mid-Rise)	142	41	6	35	35	26	9
222 Multifamily Housing (High-Rise)	248	62	16	46	48	35	13
822 Strip Retail Plaza (<40k)	28.8	58	35	23	165	82	83
Total Trips Generated (vph)		161	57	104	248	143	105
Internal Trip Capture (vph)		2	1	1	60	30	30
Adjusted Vehicle Trips (vph)		159	56	103	188	113	75
Note: Units are in dwelling unit for residential uses and 1000 ft^2 of GFA for commercial uses.							

[44] NCHRP Report 684 Enhancing Internal Trip Capture Estimation for Mixed Use Developments, Transportation Research Board, 2011.

8 Conclusions and Recommendations

The HRM *Guidelines for the Preparation of Transportation Impact Studies*[5] indicate that a Traffic Impact Study will generally be required if the proposed development or redevelopment will add more than 100 peak-hour, peak-direction person trips to the transportation system.

The trip generation estimates indicate that the development will add up to 103 peak-direction trips in the AM peak hour and up to 113 peak-direction trips during the PM peak hour.

A Traffic Impact Study may be required to evaluate the impacts of the development and confirm that vehicle trips associated with the redevelopment can be accommodated on Canal Street and Maitland Street and at adjacent intersections.

If you have any questions or additional discussion, please feel free to contact the undersigned.

Regards,

Original Signed

Michael MacDonald, P. Eng.
Senior Transportation Engineer, Principal
Tel: 902-405-4655
Email: mmacdonald@harboursideengineering.ca

[5] Guidelines for the Preparation of Transportation Impact Studies, 8th revision, Halifax Regional Municipality, September 2007.

Appendix A NCHRP Internal Trip Capture Worksheets

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	Canal Street TIS	**Organization:**	Harbourside Transportation Consultants
Project Location:	Darmouth, NS	**Performed By:**	F.Allaire
Scenario Description:	Full Build	**Date:**	09-Jan-23
Analysis Year:	-	**Checked By:**	F.Allaire
Analysis Period:	**AM Street Peak Hour**	**Date:**	09-Jan-23

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	822	28,822	sq. ft.	58	35	23
Restaurant				0		
Cinema/Entertainment				0		
Residential	221, 222	390	units	103	22	81
Hotel				0		
All Other Land Uses[2]				0		
Total				161	57	104

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	1	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	161	57	104
Internal Capture Percentage	1%	2%	1%
External Vehicle-Trips[3]	159	56	103
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	3%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	1%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	Canal Street TIS
Analysis Period:	**AM Street Peak Hour**

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	35	35	1.00	23	23
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	22	22	1.00	81	81
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	7		3	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	2	1	16	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		11	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	3		0	1	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	1	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	1	34	35	34	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	22	22	22	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	0	23	23	23	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	1	80	81	80	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 8-51 Internal Trip Capture Estimation Tool			
Project Name:	Canal Street TIS	**Organization:**	Harbourside Transportation Consultants
Project Location:	Darmouth, NS	**Performed By:**	F.Allaire
Scenario Description:	Full Build	**Date:**	09-Jan-23
Analysis Year:	-	**Checked By:**	F.Allaire
Analysis Period:	**PM Street Peak Hour**	**Date:**	09-Jan-23

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (*For Information Only*)			Estimated Vehicle-Trips		
	ITE LUCs[1]	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	822	28,822	sq. ft.	165	82	83
Restaurant				0		
Cinema/Entertainment				0		
Residential	221, 222	390	units	83	61	22
Hotel				0		
All Other Land Uses[2]				0		
Total				248	143	105

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office	1.00	0%	0%	1.00	0%	0%
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant	1.00	0%	0%	1.00	0%	0%
Cinema/Entertainment	1.00	0%	0%	1.00	0%	0%
Residential	1.00	0%	0%	1.00	0%	0%
Hotel	1.00	0%	0%	1.00	0%	0%
All Other Land Uses[2]	1.00	0%	0%	1.00	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment					200	
Residential		200				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	22	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	8	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	248	143	105
Internal Capture Percentage	24%	21%	29%
External Vehicle-Trips[3]	188	113	75
External Transit-Trips[4]	0	0	0
External Non-Motorized Trips[4]	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	27%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	36%	36%
Hotel	N/A	N/A

[1]Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

[2]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

[3]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[4]Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas Transportation Institute

Project Name:	Canal Street TIS
Analysis Period:	**PM Street Peak Hour**

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	82	82	1.00	83	83
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	61	61	1.00	22	22
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	2		24	3	22	4
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	9	5	0		1
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		7	0	0	2	0
Retail	0		0	0	28	0
Restaurant	0	41		0	10	0
Cinema/Entertainment	0	3	0		2	0
Residential	0	8	0	0		0
Hotel	0	2	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	8	74	82	74	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	22	39	61	39	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles[1]	Transit[2]	Non-Motorized[2]
Office	0	0	0	0	0	0
Retail	22	61	83	61	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	8	14	22	14	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses[3]	0	0	0	0	0	0

[1]Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

[2]Person-Trips

[3]Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.