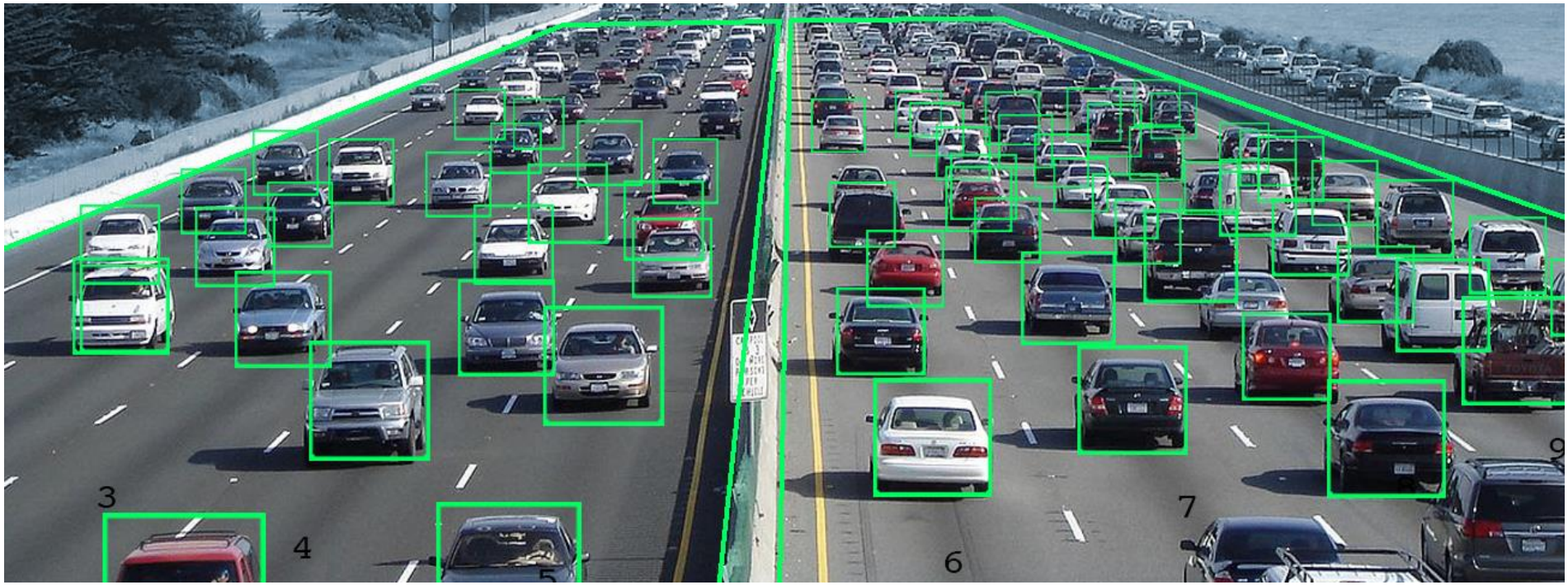
Pedestrian Safety and Technology

Pedestrian Exposure Data

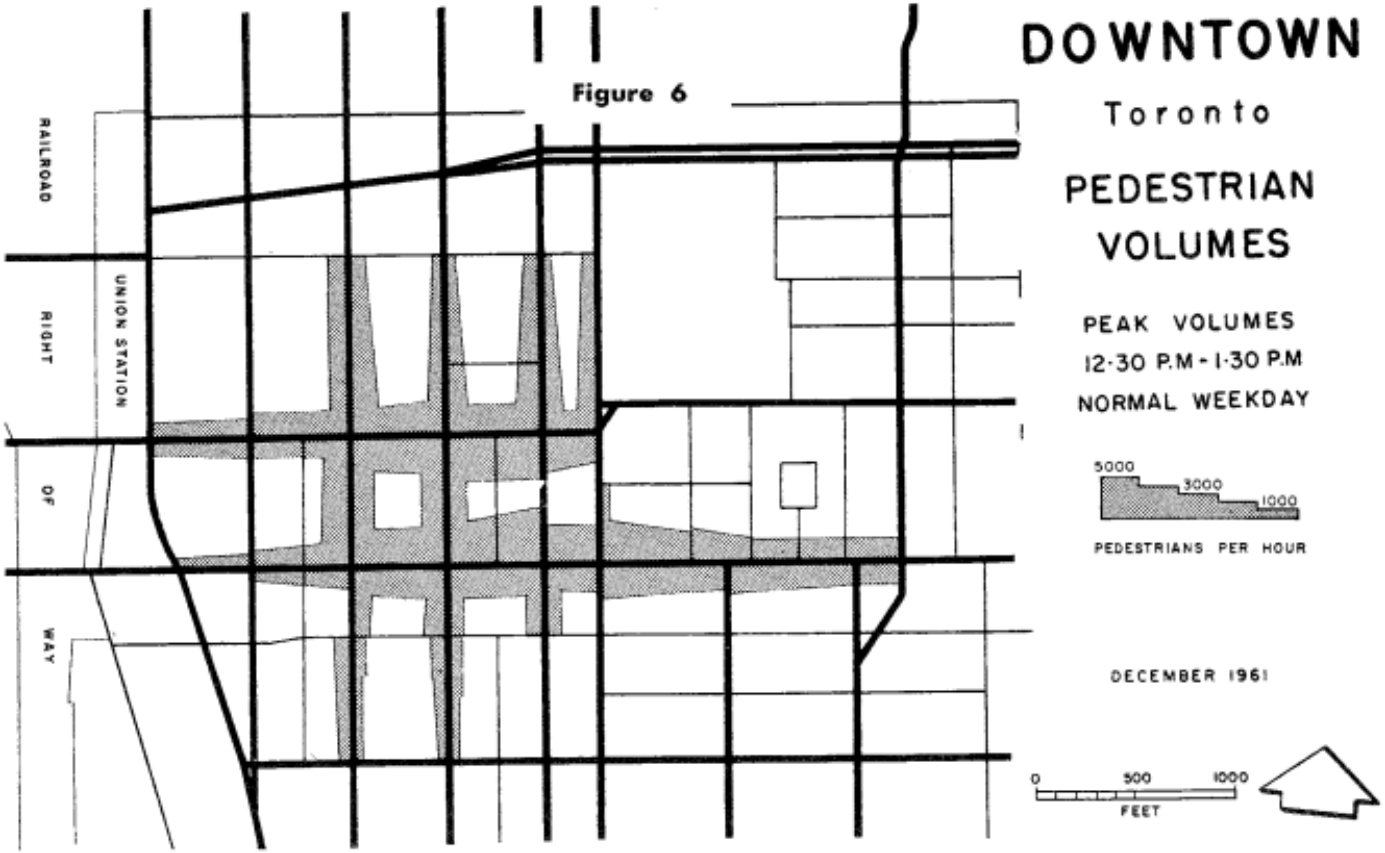
CARSP Conference – Toronto June 20th

Jean-Francois Rheault

Motorized Traffic - Decades of Data Collection



Pedestrian Counts in 1961



SOURCE: Downtown Planning District Appraisal, Toronto Planning Board, 1961, p. 10a.

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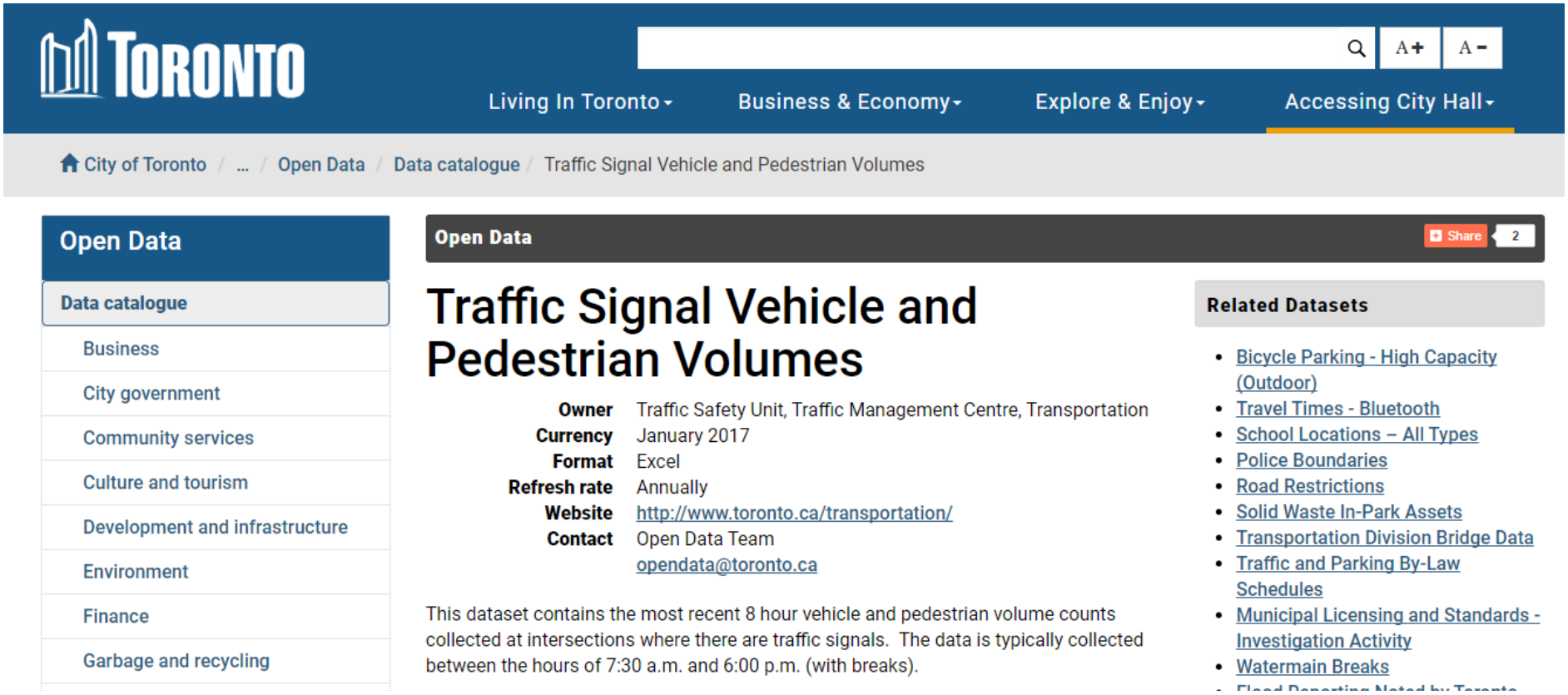
Source: https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/pas/at60/pdf/report199.pdf

Pedestrian Counts in 2017



Source: https://planning-org-uploaded-media.s3.amazonaws.com/legacy_resources/pas/at60/pdf/report199.pdf

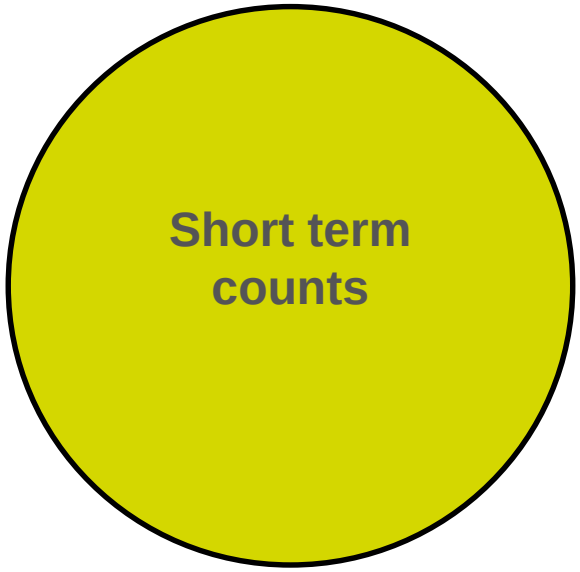
Typical Pedestrian Count Today

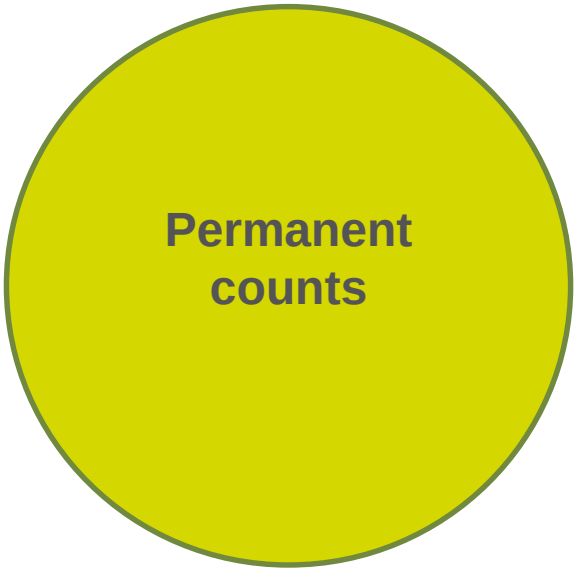
This is a typical 2 hour, 8 hour or 12 hour pedestrian count
It can be done manually or semi-automatically.

Typical Pedestrian Count Today

What do we need to build pedestrian exposure data?

Modeling Pedestrian Exposure



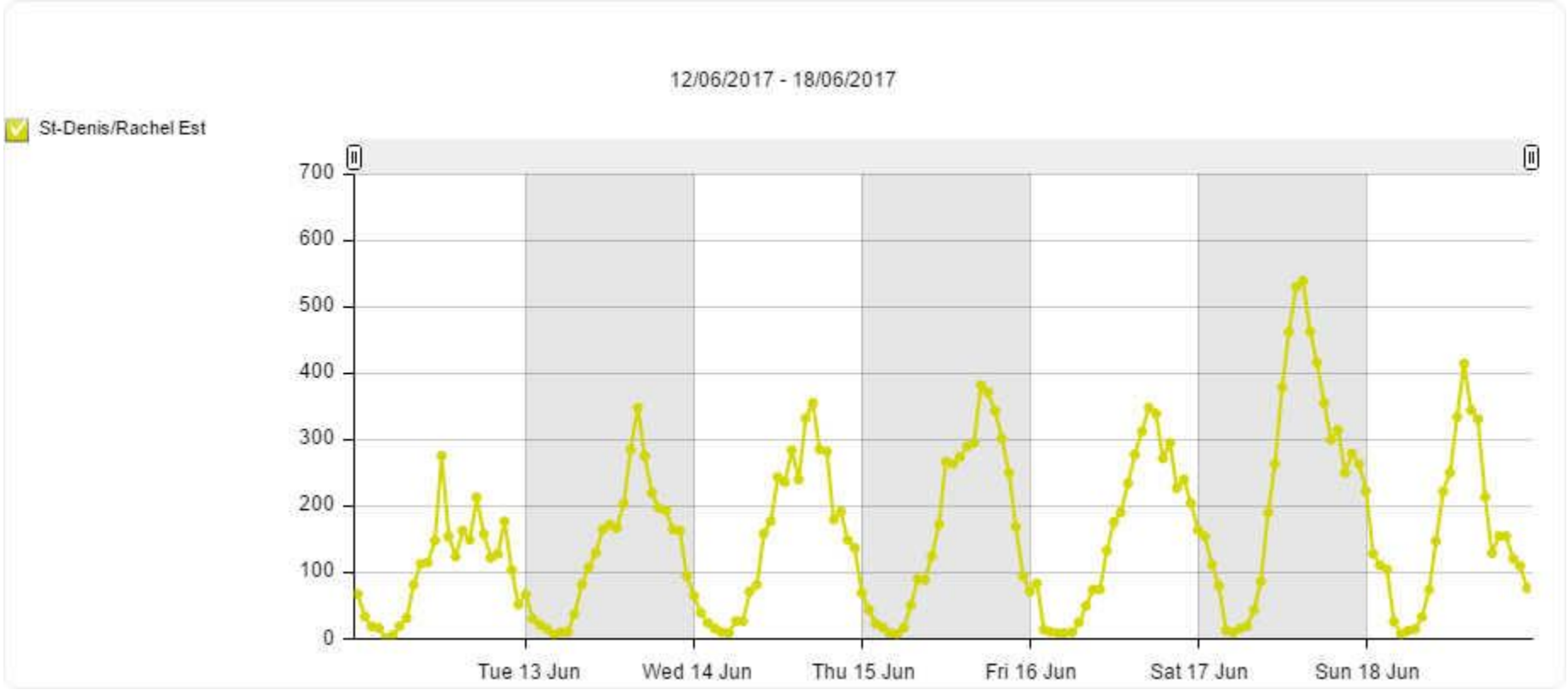


Spatial coverage

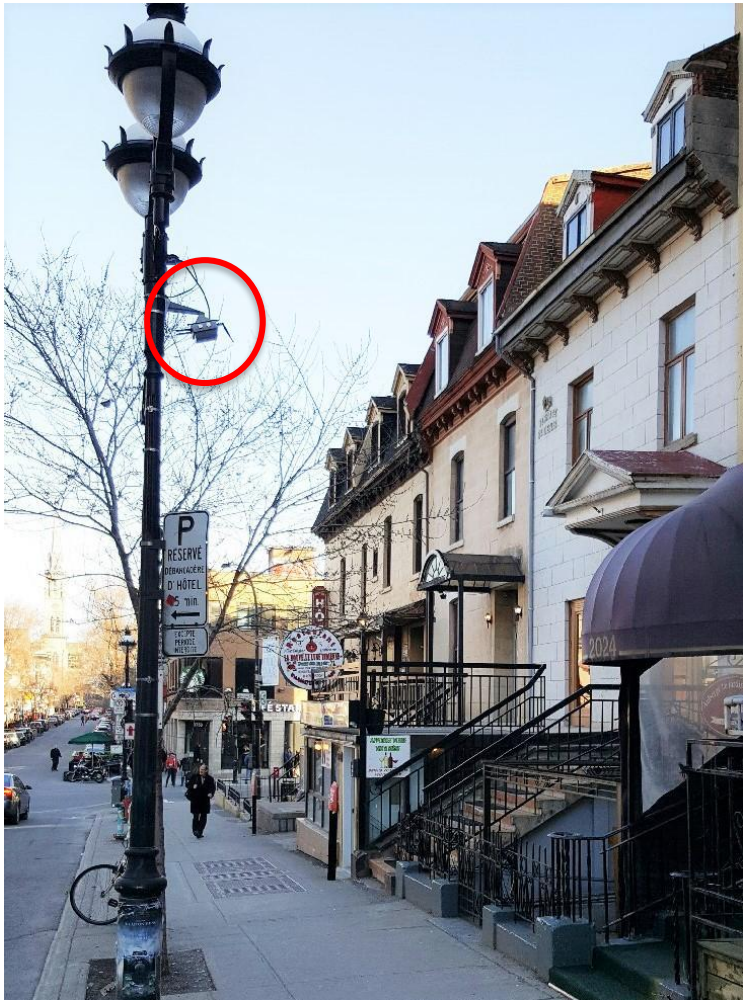
Build expansion factors

Short-Term Pedestrian Count Data

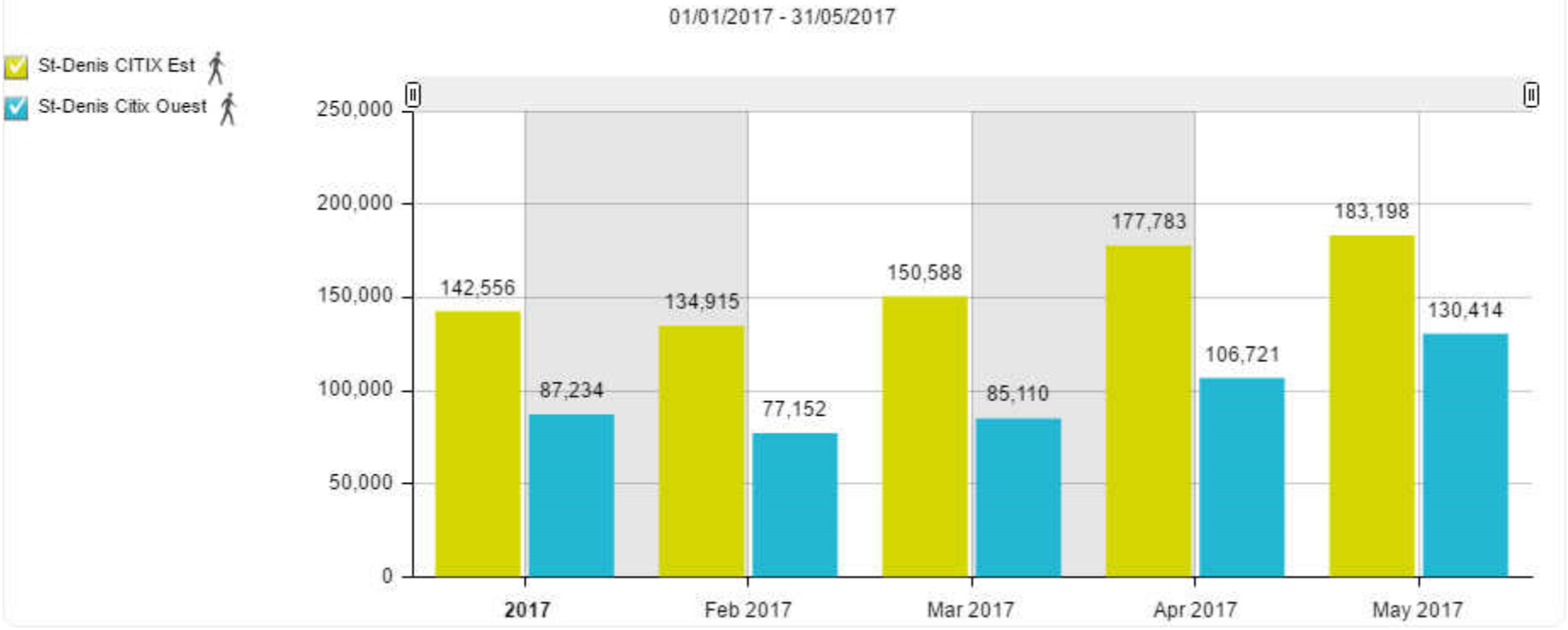
Short-Term Pedestrian Count Data



Permanent Pedestrian Count Data - Montreal

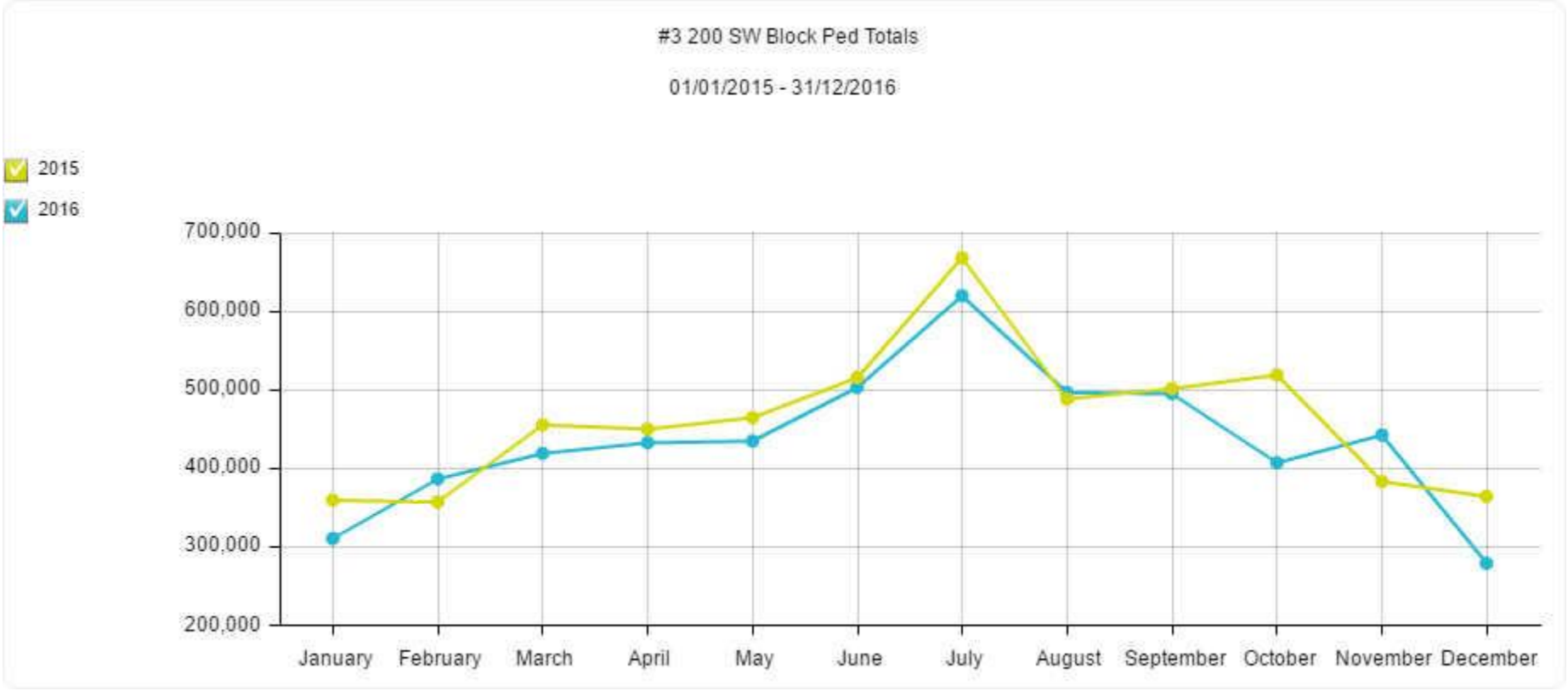


Permanent Pedestrian Count Data



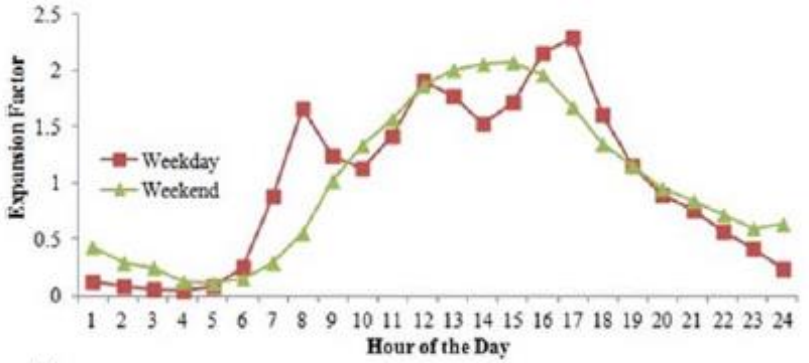
Permanent Pedestrian Count Data - Calgary

Permanent Pedestrian Count Data

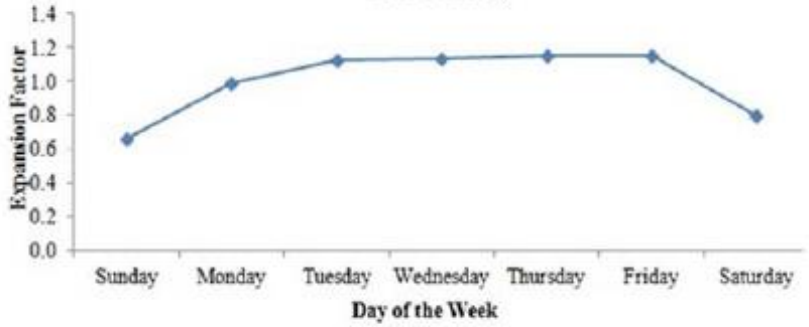


Expansion Factors for Montreal

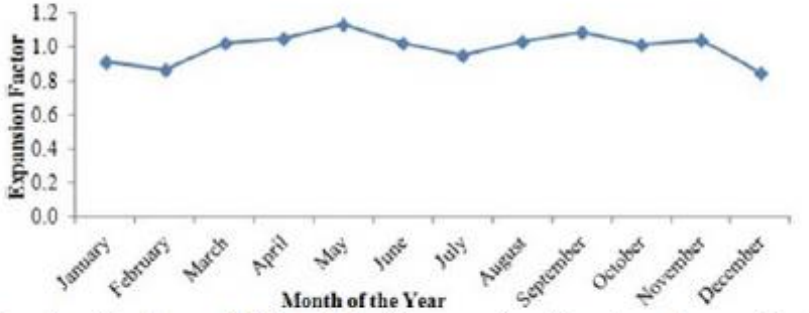
McGill



Daily

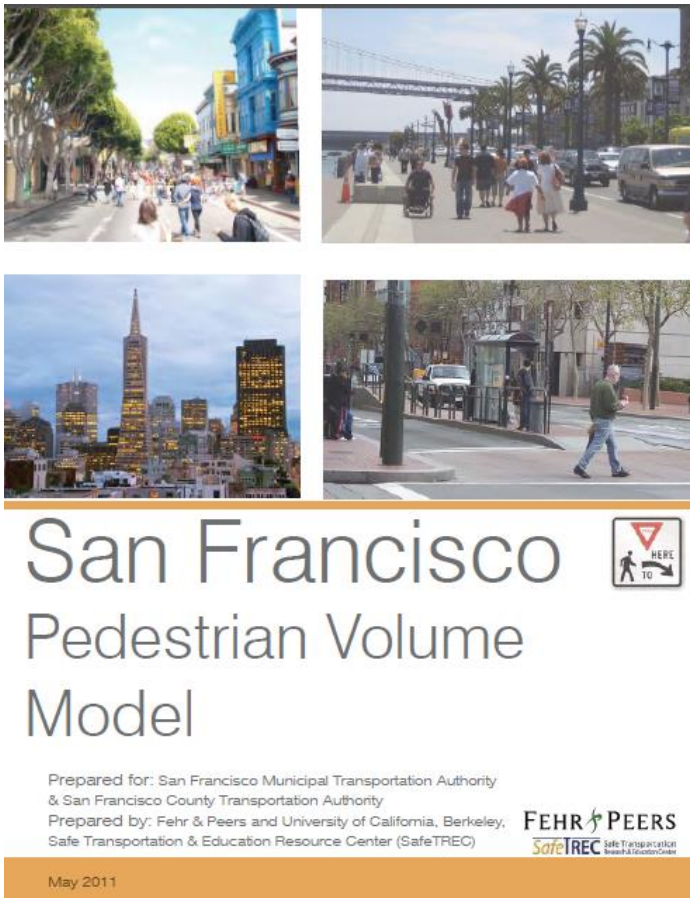


Weekly



Yearly

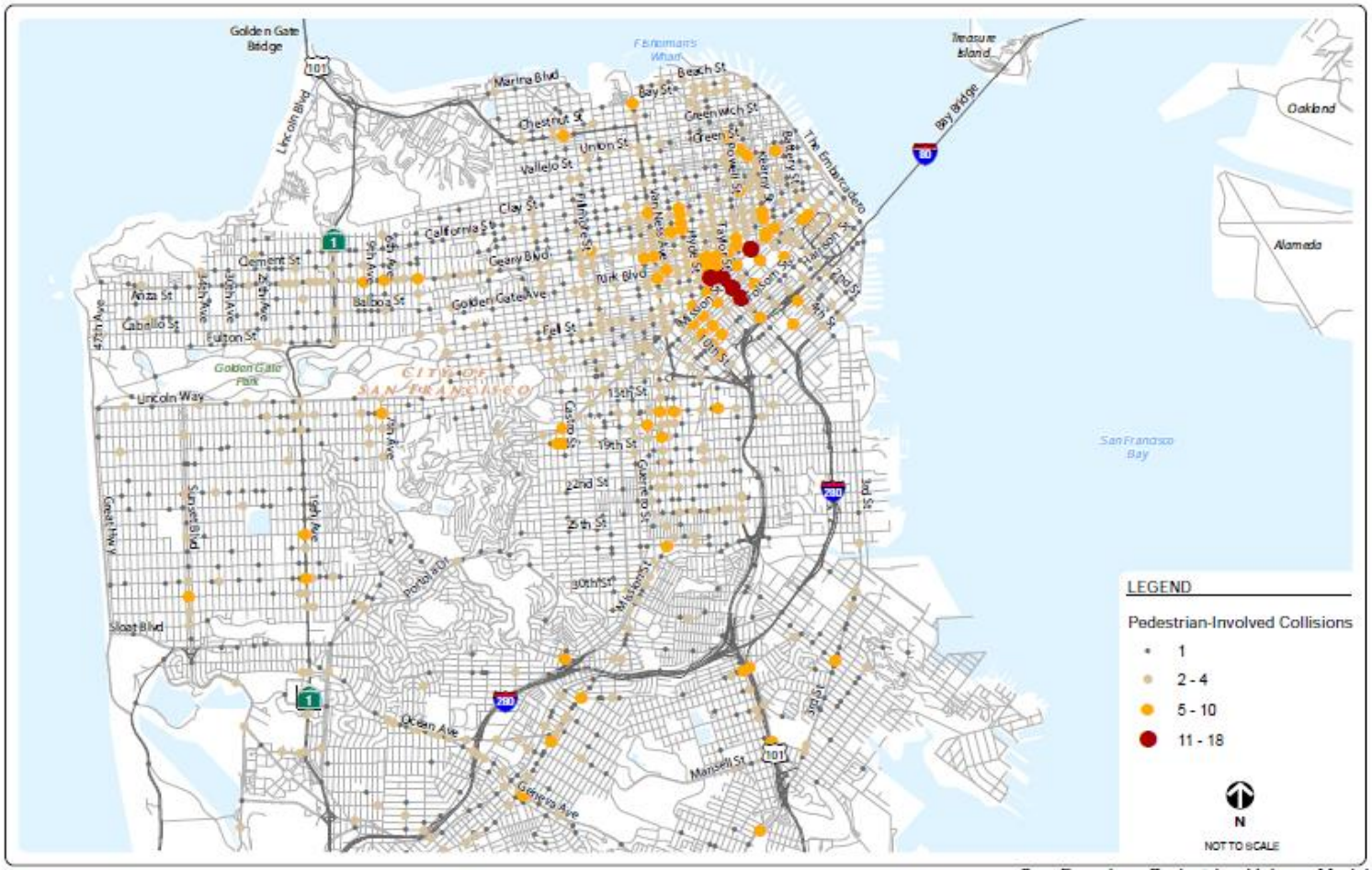
Figure 2 Hourly, Daily and Monthly Expansion Factors for pedestrian counts



Case Study

San Francisco

San Francisco – Pedestrian Involved Collisions



San Francisco Pedestrian Volume Model

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PEDESTRIAN-INVOLVED COLLISIONS (2004 - 2009)

FIGURE 9

Identifying Collision Rate

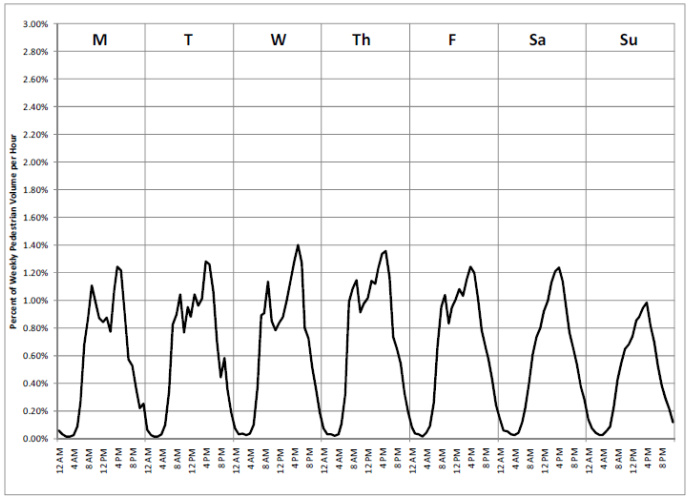
$$\text{Collision rate} = \frac{\text{Number of collisions in a specified time and place}}{\text{Amount of exposure in a specified time and place}} \quad (1)$$

Table 5. Alameda County Pedestrian Model Applied to San Francisco Study Intersections

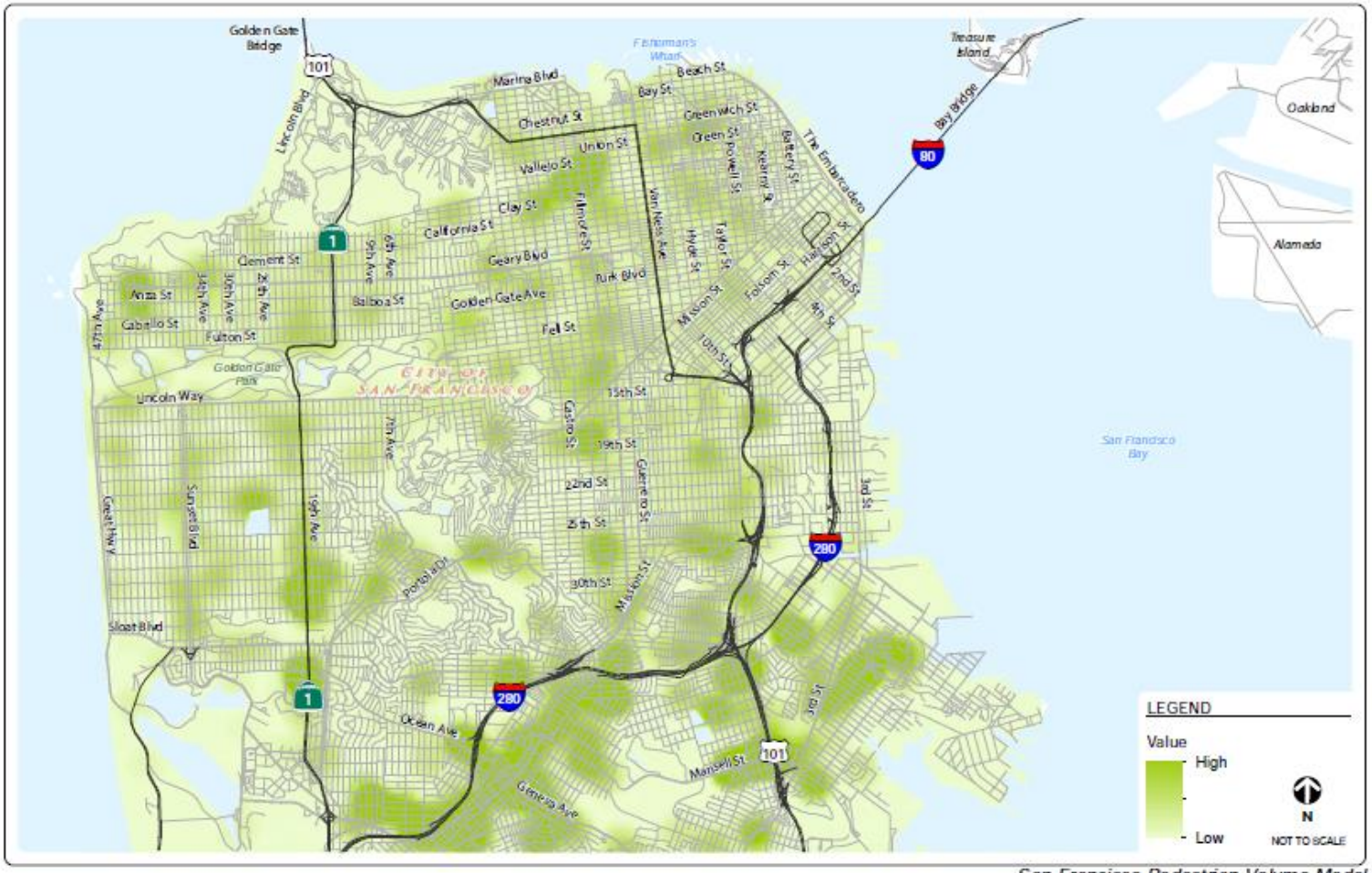
ID	Intersection	Population within 0.5 mi.	Employment within 0.25 mi.	Retail Employment within 0.25 mi.	Est. Comm. Properties within 0.25 mi. [1]	BART stations within 0.1 mi.	Est. Weekly Volume from Alameda County Model	Est. Weekly Volume from SF Counts	Absolute Difference (Observed - Predicted)
1005	CALIFORNIA & MONTGOMERY	20712	75346	4974	131	0	180,892	291,746	101,854
2	8TH & MARKET	32409	13719	757	20	1	107,896	268,450	160,554
27	4TH & MARKET	29366	28082	9794	257	0	103,928	746,121	642,192
10	16TH & MISSION	25289	3754	1094	29	1	79,675	229,266	149,590
1015	POWELL & JACKSON	44931	8622	2583	68	0	63,204	162,052	98,848
1008	POLK & PINE	49412	6941	1450	38	0	61,844	99,357	37,513
1	MARKET & 06TH	37917	11601	2055	54	0	61,833	352,524	290,706
29	03RD & HOWARD	8166	23753	2492	65	0	59,884	176,736	116,853
11	GOLDEN GATE & JONES	41386	9209	1241	33	0	58,484	73,910	15,426
26	MISSION & 06TH	32035	11524	1919	50	0	55,591	123,154	67,563
28	WASHINGTON & EMBARCADERO	3204	19999	1700	45	0	45,286	47,739	2,453
1034	COLUMBUS & UNION	37062	4034	1812	48	0	43,949	168,496	124,546
16	20TH & SOUTH VAN NE	30418	3203	1066	28	0	34,375	25,724	(8,651)
19	LAGUNA & GEARY	26868	4223	989	26	0	32,764	38,467	5,702
1033	PAGE & BUCHANAN	27586	2335	844	22	0	29,068	10,133	(18,935)
5	HARRISON & 25TH	28598	1300	284	7	0	27,149	22,146	(5,003)
23	DIVISADERO & GEARY	23385	3130	320	8	0	25,640	61,906	36,266
9	07TH & FOLSOM	15962	5208	754	20	0	23,718	85,145	61,426
13	CHESTNUT & STEINER	17708	3623	1648	43	0	23,641	150,714	127,074
24	25TH & GEARY	22874	1304	500	13	0	21,516	69,316	47,800
1026	PAGE & BAKER	23615	1132	267	7	0	21,436	10,706	(10,730)
7	18TH & CASTRO	17745	2210	1139	30	0	19,632	77,399	57,767
21	JFK & STANYAN	16888	3029	397	10	0	19,194	34,661	15,467
8	SAN JOSE & RANDALL	19995	894	286	8	0	17,377	18,275	898
1028	MOUNT VERNON & ALEMANY	19321	715	242	6	0	16,238	4,457	(11,781)
25	MISSION & SILVER	19003	896	163	4	0	16,173	64,331	48,158
15	24TH & CASTRO	16869	1510	524	14	0	16,085	85,140	69,055
4	BEACH & HYDE	9717	3664	1719	45	0	15,976	188,761	172,785
18	IRVING & 09TH	13704	2162	906	24	0	15,103	159,490	144,387
1014	WASHINGTON & WALNUT	12411	2035	894	15	0	12,592	3,586	(9,006)
1021	ATHENS & CORDOVA	15979	491	144	4	0	12,286	3,381	(8,885)
1011	34TH & KIRKHAM	15219	500	90	2	0	11,434	2,612	(8,822)
1029	SARGENT & VICTORIA	15320	371	80	2	0	11,233	2,704	(8,529)
1013	LAKE & 06TH	13030	1183	309	8	0	11,170	7,276	(3,893)
3	10TH & TARAVAL	13017	1025	225	6	0	10,868	28,054	17,186
1023	BURROWS & HAMILTON	14816	368	67	2	0	10,704	436	(10,268)
1031	CABRILLO & 30TH	14170	499	72	2	0	10,363	2,771	(7,592)
1016	BERRY & 04TH	1943	5589	392	10	0	10,040	73,989	63,949
9022	LELAND & RUTLAND	13801	475	104	3	0	10,006	9,252	(754)
1017	MARIPOSA & KANSAS	7286	3061	484	13	0	9,949	2,434	(7,515)
20	ULLOA & 34TH	12972	750	142	4	0	9,861	4,172	(5,689)
1024	BEVERLY & GARFIELD	13348	378	74	2	0	9,291	4,408	(4,882)
1032	43RD & ANZA	12852	552	229	6	0	9,285	2,088	(7,197)
910	OAKDALE & BAYSHORE	7410	2969	356	9	0	8,974	6,911	(2,063)
6	GENEVA & OCEAN	12490	434	115	3	0	8,643	50,888	42,245
17	PALOU & INGALLS	11287	866	68	2	0	8,314	1,465	(6,849)
14	3RD & JERROLD	8974	1203	131	3	0	6,887	5,844	(1,043)
1018	18TH & TEXAS	6357	2018	473	12	0	6,727	10,581	3,854
1030	PACHECO & CASTENADA	8809	438	64	2	0	4,923	1,609	(3,314)
1025	EVELYN & JUANITA	7316	607	215	6	0	4,102	2,511	(1,591)

1) Number of commercial retail properties within 0.25 miles was estimated from the total retail employment within 0.25 miles of each study intersection. The number of commercial properties within 0.25 miles of the 50 study intersections in Alameda County ranged from 0 to 50 with an average of 25.8. Retail employment within 0.25 miles of the 50 study intersections in San Francisco ranged from 64 to 9,794, with an average of 963. The estimated number of commercial properties was calculated by

4th Street & Market Weekly Pedestrian Volume Pattern



San Francisco – Pedestrian Collision Risk



San Francisco Pedestrian Volume Model

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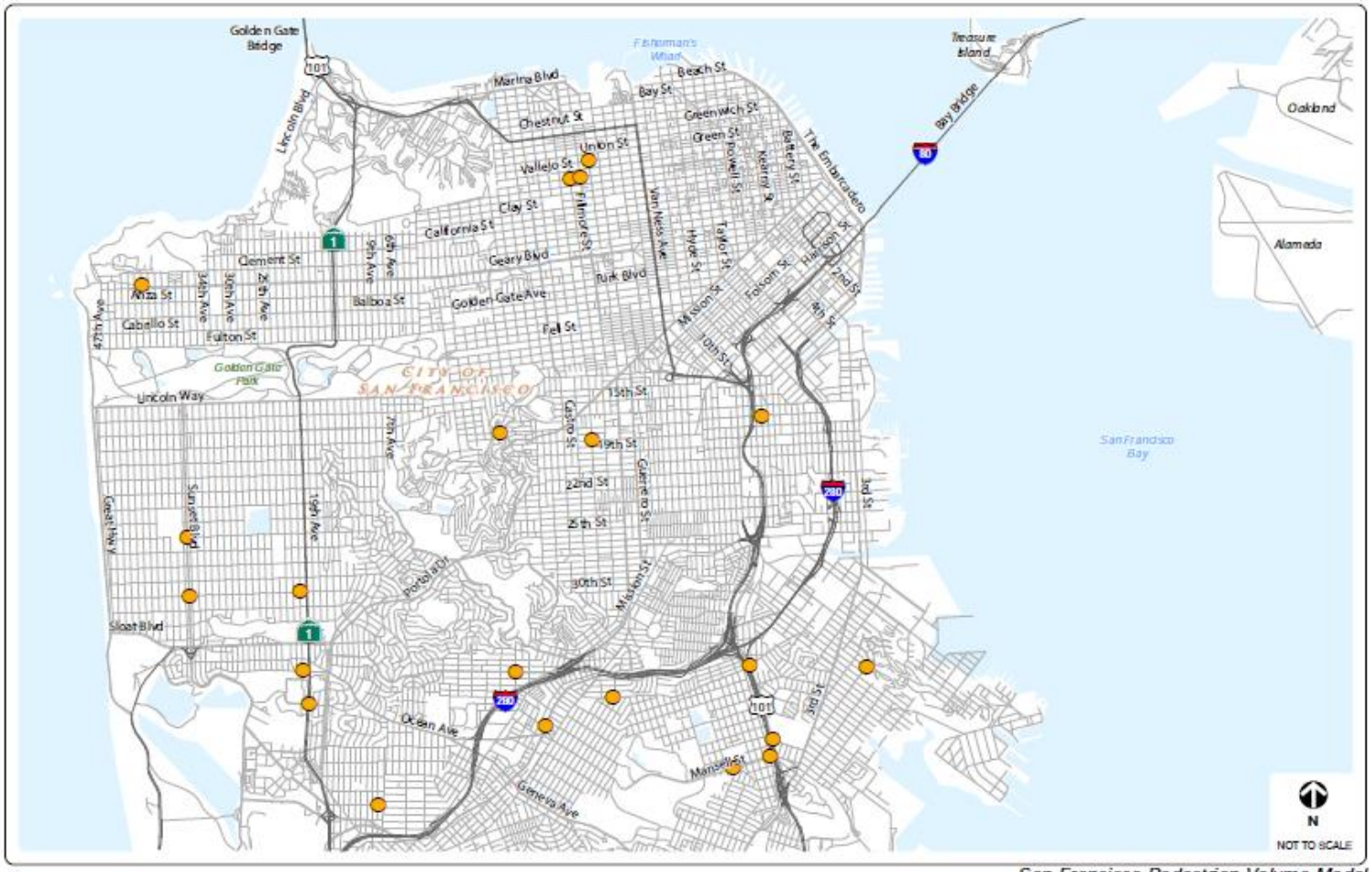
PEDESTRIAN COLLISION RISK (2004 - 2009)

FIGURE 10

San Francisco – Top 20 Intersections by Risk



San Francisco Pedestrian Volume Model

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TOP 20 INTERSECTIONS BY PEDESTRIAN COLLISION RISK

FIGURE 11

Thank you

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