



**HAJEC ASSOCIATES**

Transportation Engineering  
and Planning

ATTACHMENT 4  
ITE TRIP GENERATION INFORMATION  
FOR  
RESIDENTIAL CONDOMINIUM/TOWNHOUSE

■  
Hajec Associates, Inc.

375 Common Street  
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# Land Use: 230

## Residential Condominium/Townhouse

### Description

Residential condominiums/townhouses are defined as ownership units that have at least one other owned unit within the same building structure. Both condominiums and townhouses are included in this land use. The studies in this land use did not identify whether the condominiums/townhouses were low-rise or high-rise. Low-rise residential condominium/townhouse (Land Use 231), high-rise residential condominium/townhouse (Land Use 232) and luxury condominium/townhouse (Land Use 233) are related land uses.

### Additional Data

The number of vehicles and the number of residents had a high correlation with average weekday vehicle trip ends. The use of these variables was limited, however, because the number of vehicles and residents was often difficult to obtain or predict. The number of dwelling units was generally used as the independent variable of choice because it is usually readily available, easy to project and had a high correlation with average weekday vehicle trip ends.

The peak hour of the generator typically coincided with the peak hour of the adjacent street traffic.

The sites were surveyed from the mid-1970s to the 2000s throughout the United States and Canada.

### Source Numbers

4, 92, 94, 95, 97, 100, 105, 106, 114, 168, 186, 204, 237, 253, 293, 319, 320, 321, 390, 412, 418, 561, 562, 583

# Residential Condominium/Townhouse (230)

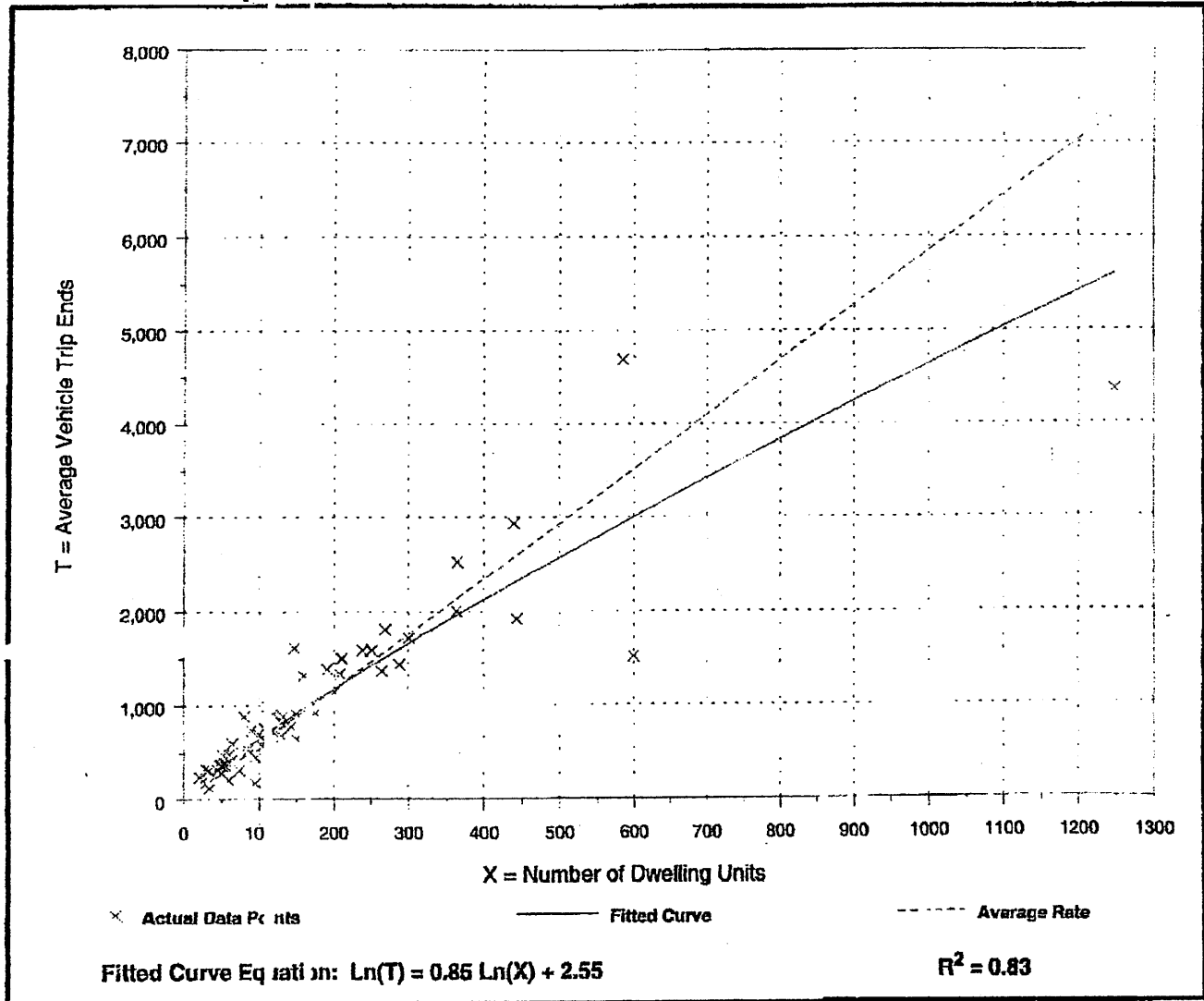
**Average Vehicle Trip Ends vs: Dwelling Units  
On a: Weekday**

Number of Studies: 54  
Avg. Number of Dwelling Units: 183  
Directional Distribution: 50% entering, 50% exiting

### Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
5.86	1.83 - 11.79	3.09

### Data Plot and Equation



# Residential Condominium/Townhome use (230)

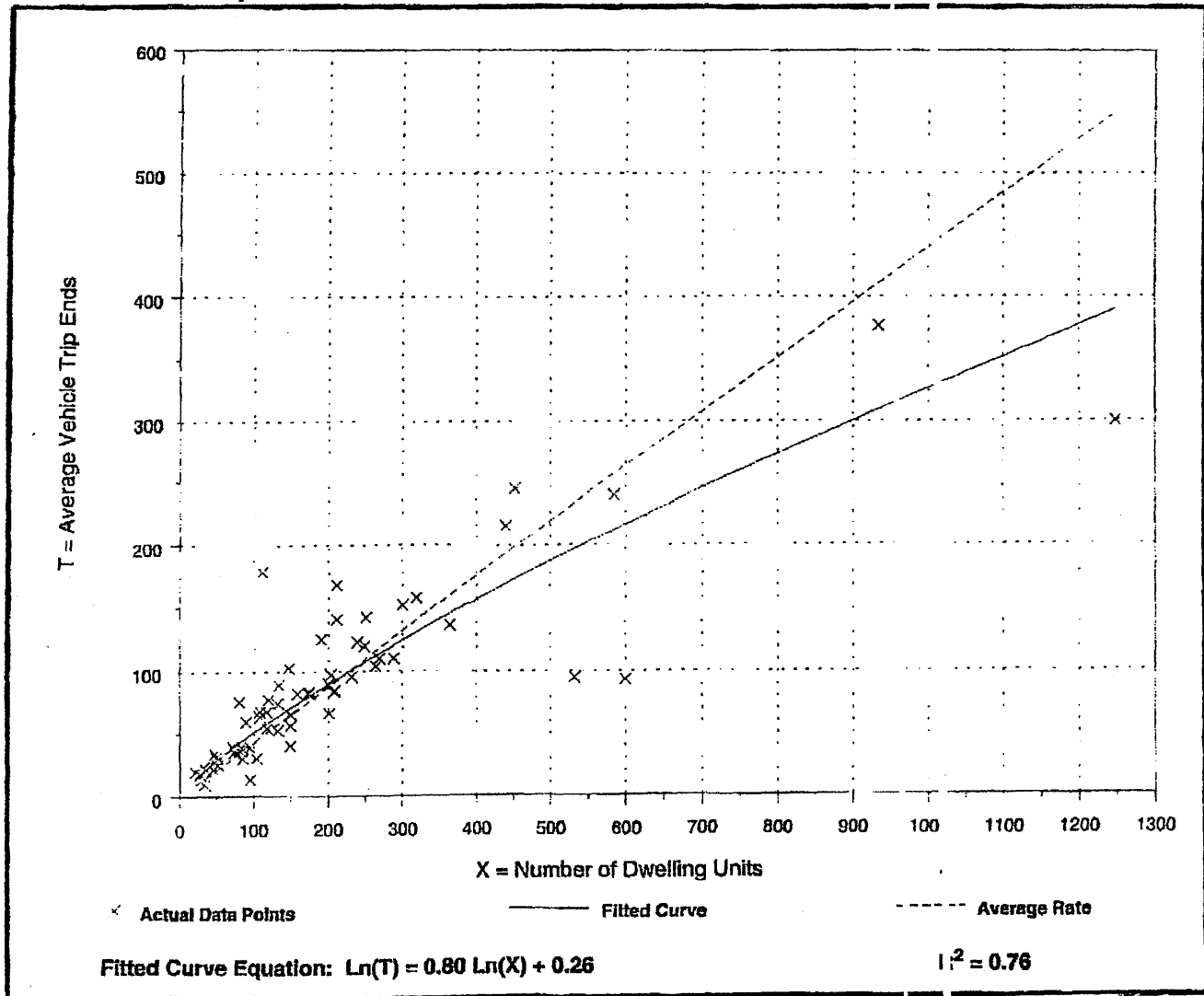
**Average Vehicle Trip Ends vs: Dwelling Units**  
**On a: Weekday,**  
**Peak Hour of Adjacent Street Traffic,**  
**One Hour Between 7 and 9 a.m.**

Number of Studies: 59  
 Avg. Number of Dwelling Units: 213  
 Directional Distribution: 17% entering, 83% exiting

### Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.44	0.15 - 1.61	0.69

### Data Plot and Equation



# Residential Condominium/Townhouse (230)

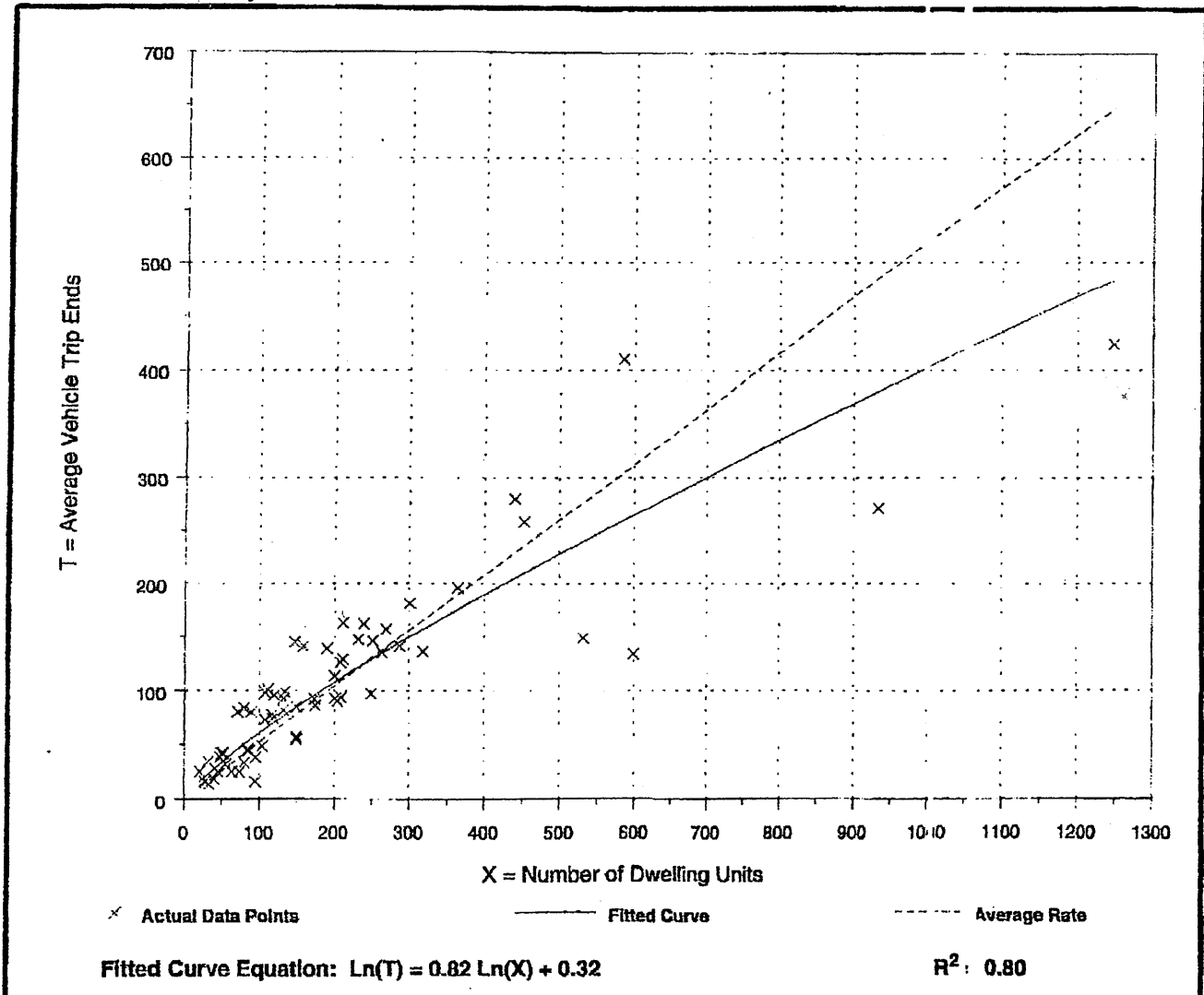
Average Vehicle Trip Ends vs: Dwelling Units  
 On a: Weekday,  
 Peak Hour of Adjacent Street Traffic,  
 One Hour Between 4 and 6 p.m.

Number of Studies: 62  
 Avg. Number of Dwelling Units: 205  
 Directional Distribution: 67% entering, 33% exiting

### Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.52	0.18 - 1.24	0.75

### Data Plot and Equation



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**ATTACHMENT 5**

**LEVEL OF SERVICE CRITERIA**

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## LOS

The average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersection as a whole. LOS is directly related to the control delay value. The criteria are listed in Exhibit 16-2.

EXHIBIT 16-2. LOS CRITERIA FOR SIGNALIZED INTERSECTIONS

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	> 10–20
C	> 20–35
D	> 35–55
E	> 55–80
F	> 80

EXHIBIT 17-2. LEVEL-OF-SERVICE CRITERIA FOR TWSC INTERSECTIONS

Level of Service	Average Control Delay (s/veh)
A	0–10
B	> 10–15
C	> 15–25
D	> 25–35
E	> 35–50
F	> 50

Source: Highway Capacity Manual 2000

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**ATTACHMENT 6**

**AASHTO STOPPING SIGHT DISTANCE STANDARDS**

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Metric					US Customary				
Design speed (km/h)	Brake reaction distance (m)	Braking distance on level (m)	Stopping sight distance		Design speed (mph)	Brake reaction distance (ft)	Braking distance on level (ft)	Stopping sight distance	
			Calculated (m)	Design (m)				Calculated (ft)	Design (ft)
20	13.9	4.6	18.5	20	15	55.1	21.6	76.7	80
30	20.9	10.3	31.2	35	20	73.5	38.4	111.9	115
40	27.8	18.4	46.2	50	25	91.9	60.0	151.9	155
50	34.8	28.7	63.5	65	30	110.3	86.4	196.7	200
60	41.7	41.3	83.0	85	35	128.6	117.6	246.2	250
70	48.7	56.2	104.9	105	40	147.0	153.6	300.6	305
80	55.6	73.4	129.0	130	45	165.4	194.4	359.8	360
90	62.6	92.9	155.5	160	50	183.8	240.0	423.8	425
100	69.5	114.7	184.2	185	55	202.1	290.3	492.4	495
110	76.5	138.8	215.3	220	60	220.5	345.5	566.0	570
120	83.4	165.2	248.6	250	65	238.9	405.5	644.4	645
130	90.4	193.8	284.2	285	70	257.3	470.3	727.6	730
					75	275.6	539.9	815.5	820
					80	294.0	614.3	908.3	910

Note: Brake reaction distance predicated on a time of 2.5 s; deceleration rate of 3.4 m/s<sup>2</sup> [11.2 ft/s<sup>2</sup>] used to determine calculated sight distance.

Exhibit 3-1. Stopping Sight Distance



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**ATTACHMENT 7**

**RECOMMENDED SIGNS**

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R1-1  
(30" x 30")  
(WHITE ON RED)



SP-3  
(36" x 36")  
(BLACK ON YELLOW)

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