

# Civil & Environmental Engineering 181 SENIOR DESIGN PROJECT



Project Site: **Planning Area 9A+**

*Irvine, California*

## PROJECTS:

- Community Center
- Concrete Building
- Sub-Division
- Pedestrian Bridge
- Ultrafiltration
- Storm Drain
- Wastewater Treatment
- Road Design
- Traffic Impact Analysis



Existing Site from Sand Canyon

# TRAFFIC IMPACT ANALYSIS

for Planning Area 9A+

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# TRAFFIC IMPACT ANALYSIS

- **Primary Elements:**

- Trip Generation
- Trip Distribution
- Intersection Capacity Utilization Method
- Mitigation

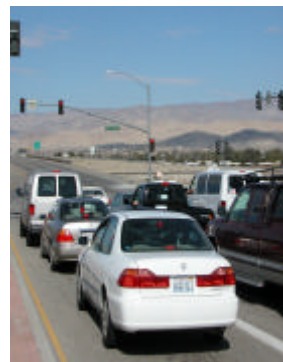
## TRIP GENERATION

### Definition

In planning, the determination of the number of trips produced by and attracted to each zone, mode or area.

### General Procedure

- Site Plan
  - Obtain exact areas for each land use
- ITE Trip Generation
  - Rate coefficients vary for different land uses
  - Average rate coefficient of AM and PM peak flow
  - In and Out percentage rates



# TRIP GENERATION

## Example of Trip Generation Calculations:

Residential (Medium Density)			
	Average Rate	IN	OUT
A.M. Peak Generator Rate :	0.77	25%	75%
P.M. Peak Generator Rate :	1.02	64%	36%
Assume 7 du/ac			
Plan #			
Reference # Acres	# DU		
Total	340	2380	

Land Use	Size	Units	A.M. Peak Hour			P.M. Peak Hour		
			In	Out	Total	In	Out	Total
Medium Density Residential (SFD)	2380	DU						
Trip Rate			0.19	0.58	0.77	0.65	0.37	1.02
Trip Generation			458.15	1,374.45	1,832.60	1,553.66	873.94	2,427.60

# TRIP DISTRIBUTION

- **Determining Trip Distribution Percentages**

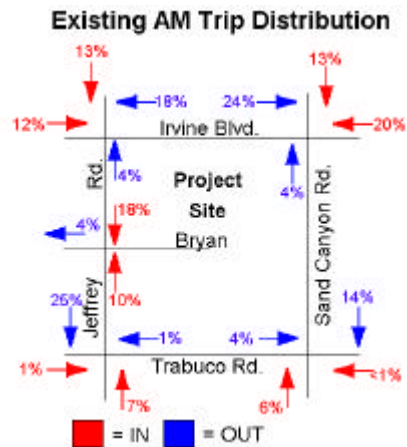
- Existing Counts

- **Assigning Project Volumes**

- Adding to Existing

- **Growth Rate**

- For the City of Irvine, 1% per year



# INTERSECTION CAPACITY UTILIZATION

- **ICU levels of service gives insight information**

- How an intersection is functioning (A, B, C...)
- How much additional capacity is available to handle traffic fluctuations and incidents

- **Calculation Method = Volume / Capacity**

- **Critical Movements**

- **LOS Scale**

- A ICU = 0.6
- B 0.6 = ICU = 0.7
- C 0.7 = ICU = 0.8
- D 0.8 = ICU = 0.9
- E 0.9 = ICU = 1.0
- F ICU = 1.0

# INTERSECTION CAPACITY UTILIZATION

PROJECT:	Planning Area 9A+							
INTERVAL:	PM Peak Hour							
INTERSECTION:	Jeffrey Road and Irvine Boulevard							
Movement	Exist. Lanes	Existing Capacity (VPHG)	Existing Volume (VPH)	Other Volume (VPH)	Project Volume (VPH)	Existing V/C	Existing + Other V/C	Ex. + Other + Project V/C
NL	2	2800	246	253	239	0.09 *	0.09 *	0.18 *
NT	3	4200	346	356	335	0.08	0.08	0.16
NR	1	1400	166	171	163	0.12	0.12	0.24
SL	2	2800	17	18	19	0.01	0.01	0.01
ST	3	4200	170	175	163	0.04 *	0.04 *	0.08 *
SR	1	1400	39	40	38	0.03	0.03	0.06
EL	1	1400	60	62	58	0.04 *	0.04 *	0.09 *
ET	2	2800	509	524	489	0.18	0.19	0.36
ER	1	1400	183	188	172	0.13	0.13	0.26
WL	2	2800	193	199	182	0.07	0.07	0.14
WT	2	2800	914	941	881	0.33 *	0.34 *	0.65 *
WR	1	1400	19	20	19	0.01	0.01	0.03
<b>LEGEND</b>		North/South Critical Sums =		0.13	0.13	0.26		
N =	Northbound	East/West Critical Sums =		0.37	0.38	0.74		
S =	Southbound	Clearance =		0.05	0.05	0.05		
E =	Eastbound	ICU Value =		0.55	0.56	1.04		
W =	Westbound	LOS =		A	A	F		
L =	Left							
T =	Through							
R =	Right							
N.S. = Not Signalized								
LOS = Level of Service								
* = Critical Movements								

# MITIGATION

## ● Adding lanes

PROJECT:	Planning Area 9A+													
INTERVAL:	PM Peak Hour													
INTERSECTION:	Jeffrey Road and Irvine Boulevard													
Movement	Exist. Lanes	Proposed Lanes	Existing Capacity (VPHG)	Proposed Capacity	Existing Volume (VPH)	Other Volume (VPH)	Project Volume (VPH)	Existing V/C	Existing + Other V/C	Ex. + Other + Project V/C	Ex. + Other + Project V/C - w/Improv.			
NL	2	2	2800	2800	246	253	239	0.09	0.09	0.18	0.18	*	*	
NT	3	3	4200	4200	346	356	335	0.08	0.08	0.16	0.16	*	*	
NR	1	1	1400	1400	166	171	163	0.12	0.12	0.24	0.24	*	*	
SL	2	2	2800	2800	17	18	19	0.01	0.01	0.01	0.01	*	*	
ST	3	3	4200	4200	170	175	163	0.04	0.04	0.08	0.08	*	*	
SR	1	1	1400	1400	39	40	38	0.03	0.03	0.06	0.06	*	*	
EL	1	1	1400	1400	60	62	58	0.04	0.04	0.09	0.09	*	*	
ET	2	2	2800	2800	509	524	489	0.18	0.19	0.36	0.36	*	*	
ER	1	1	1400	1400	183	188	172	0.13	0.13	0.26	0.26	*	*	
WL	2	2	2800	2800	193	199	182	0.07	0.07	0.14	0.14	*	*	
WT	2	3	2800	4200	914	941	881	0.33	0.34	0.65	0.43	*	*	
WR	1	1	1400	1400	19	20	19	0.01	0.01	0.03	0.03	*	*	
<b>LEGEND</b>					North/South Critical Sums =				0.13	0.13	0.26	0.26		
N = Northbound					East/West Critical Sums =				0.37	0.38	0.74	0.52		
S = Southbound					Clearance =				0.05	0.05	0.05	0.05		
E = Eastbound					ICU Value =				0.55	0.56	1.04	0.83		
W = Westbound					LOS =				A	A	F	D		
L = Left														
T = Through														
R = Right														
N.S. = Not Signalized														
LOS = Level of Service														
* = Critical Movements														

# THANK YOU!

### CEE 181 Professors

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### Corporate Affiliates

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### The Irvine Company

