TRANSPORTATION SITE IMPACT TRAINING

Estimating the Transportation Impacts of Growth



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION SYSTEMS IMPLEMENTATION OFFICE

www.dot.state.fl.us/planning



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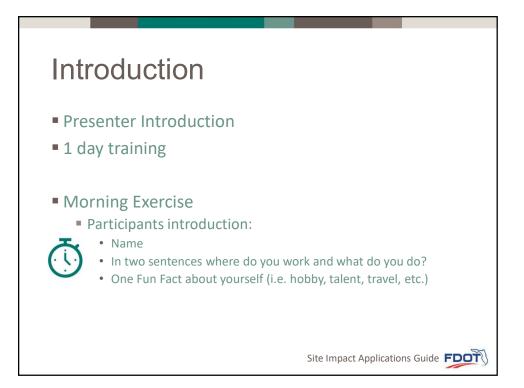
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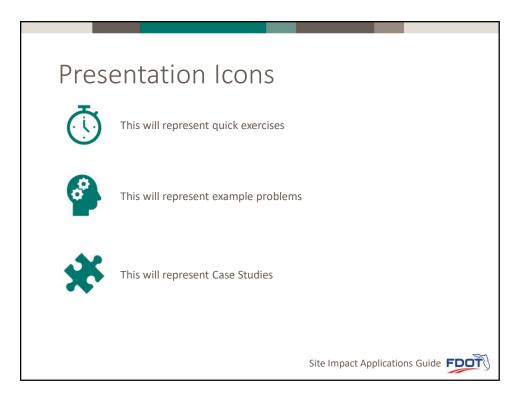
Tab 1. Presentation







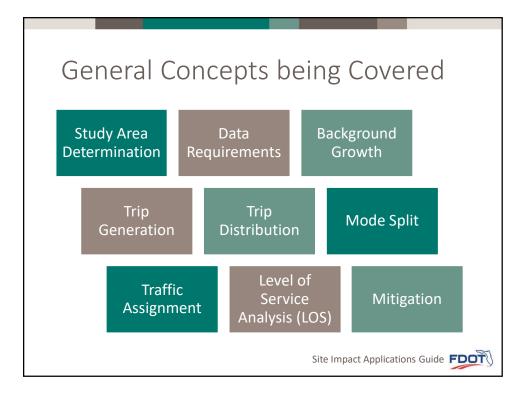




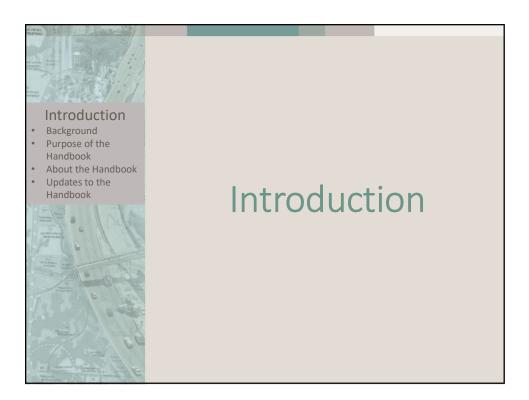


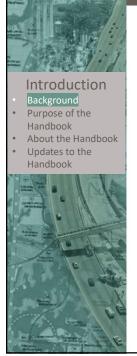
- To understand how to use the Site Impact Applications Guide for reviewing developments
- To understand FDOT's guidance for reviewing various documents
- To demonstrate concepts discussed in the Transportation Site Impact Handbook through realworld examples
- To understand the thought process behind the decisions that go into a traffic study

Site Impact Applications Guide FDOT









Background

Protect the integrity of the transportation system for the general public and to minimize degradation of both the regional and local transportation networks

- Provide public agencies with a mechanism for managing transportation impacts
- Provide applicants with recommendations for effective site transportation planning
- Establish a framework for negotiation of mitigation measures for the impacts created by development
- Coordinate with local governments when a state facility will be impacted by a proposed development
- Promote multimodal transportation systems where appropriate



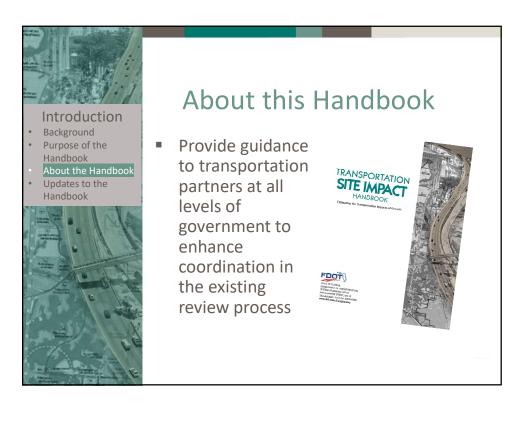
Introduction

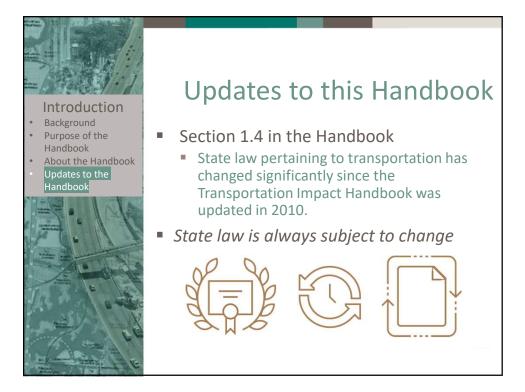
- Background
 Purpose of the
- HandbookAbout the Handbook
- Updates to the Handbook

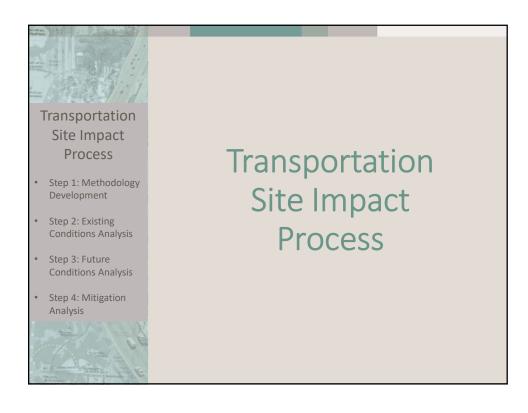


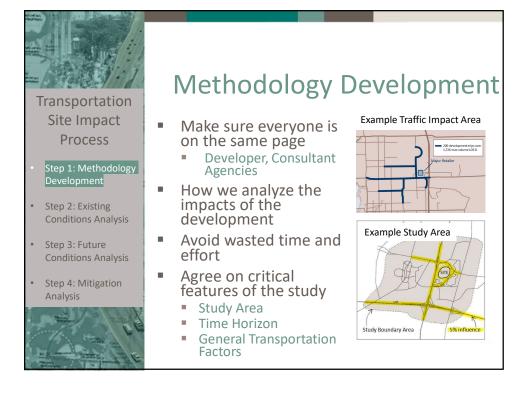
Purpose of Handbook

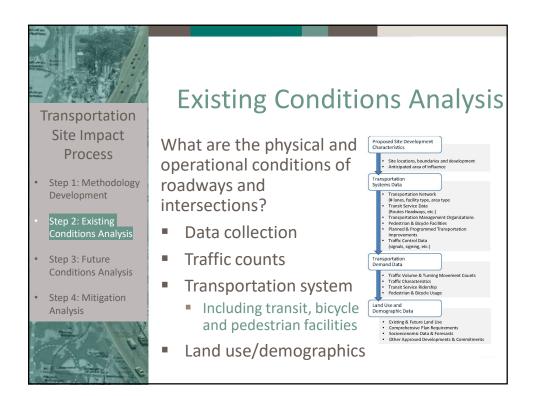
- Assist FDOT staff in their review of developments
- Who is this for?
 - FDOT
 - Local Governments
 - Other Transportation Partners
- WHY?
 - Communicate the FDOT's guidance for reviewing various documents
 - Provide consistent guidelines and methodology

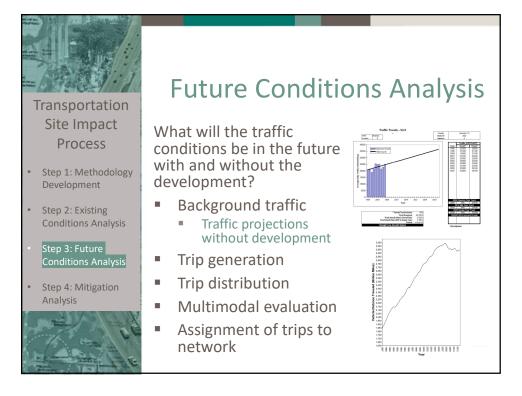


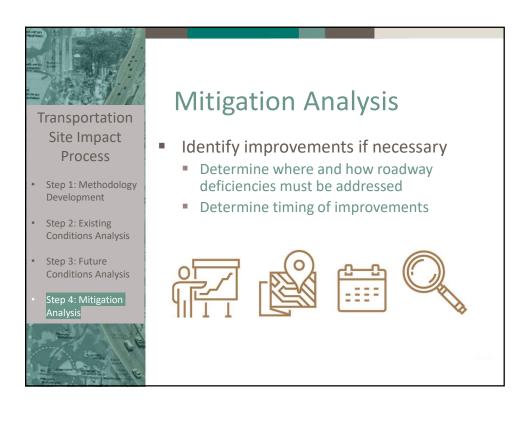


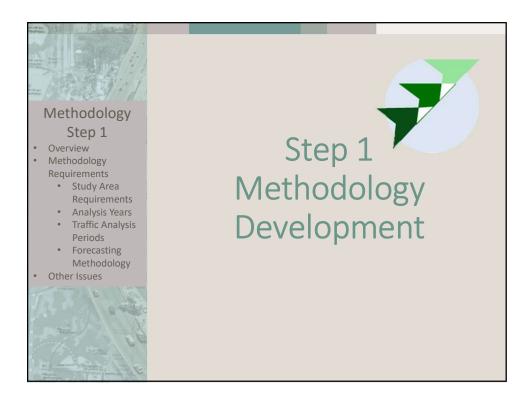


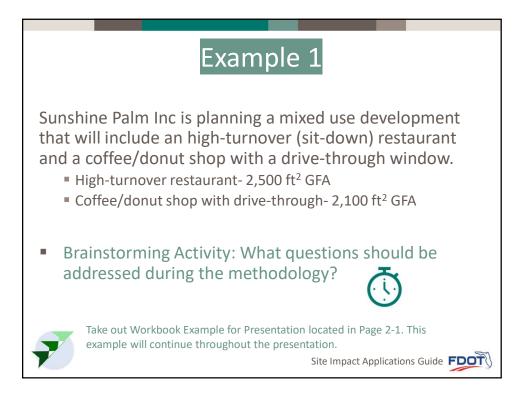


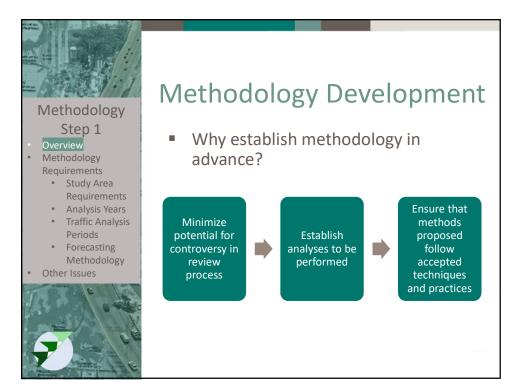


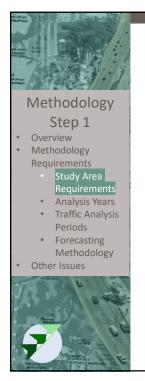






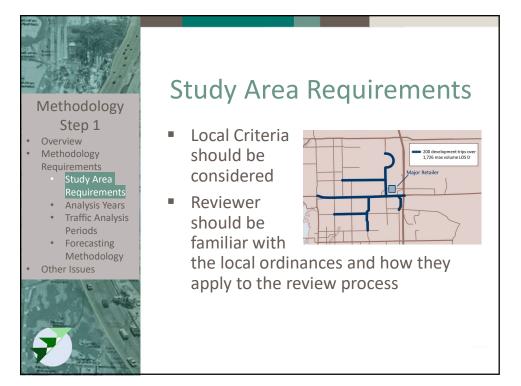


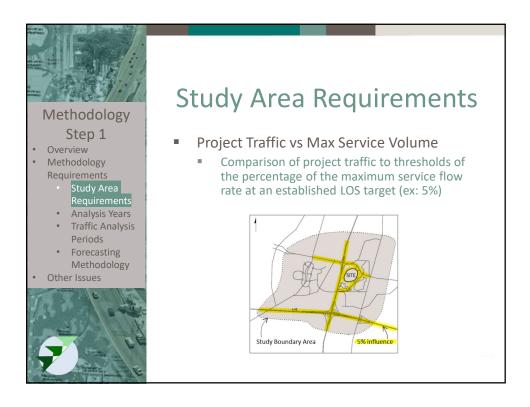


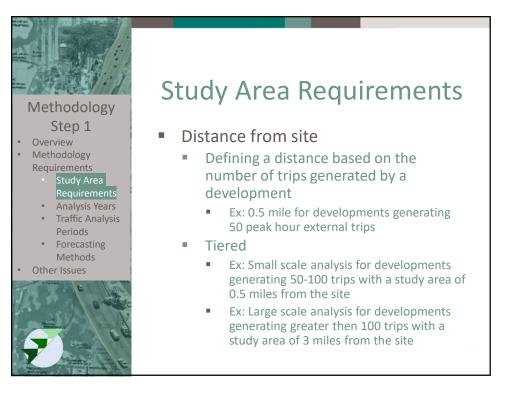


Study Area Requirements

- Determining the "traffic impact area" or simply the "impact area"
 - Local, regional, or state critical
- What is needed:
 - Site map
 - Initial trip generation
 - Maximum Service Volume and existing volume of surrounding facilities
 - Maximum Service Volume is the maximum volume a roadway segment can support before the LOS target is exceeded

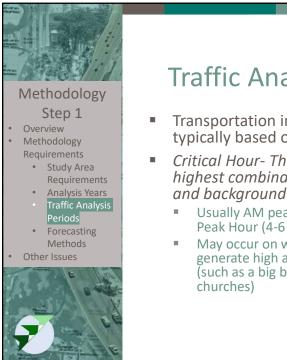






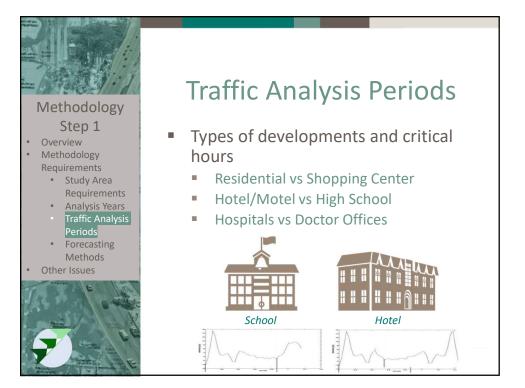


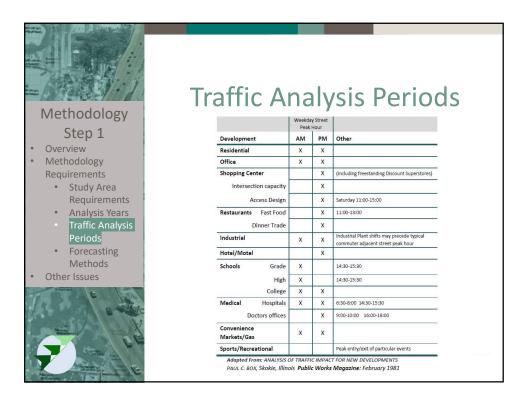


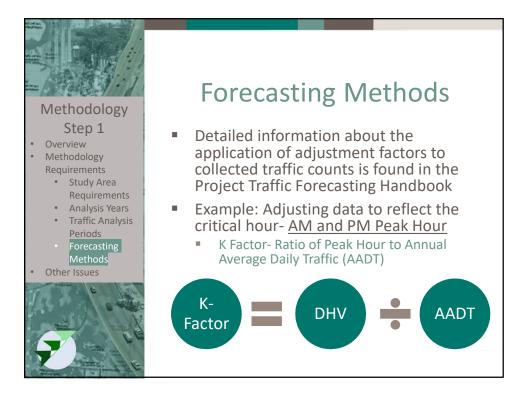


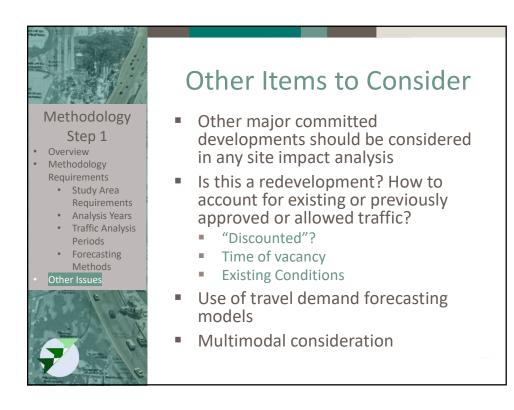
Traffic Analysis Periods

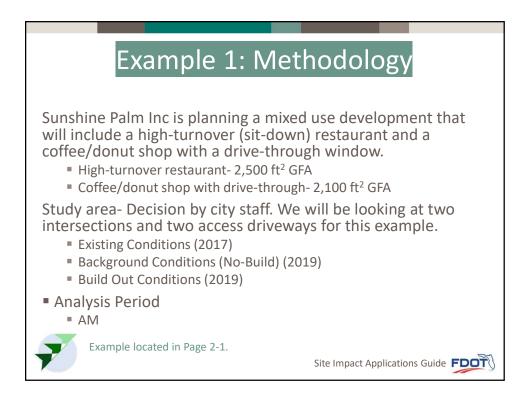
- Transportation impact analyses are typically based on peak-hour analysis
- Critical Hour- The period that has the highest combination of development and background traffic
 - Usually AM peak hour (7-9 AM) and the PM Peak Hour (4-6 PM) on a typical weekday
 - May occur on weekends for land uses that generate high amounts of weekend trips (such as a big box stores, grocery stores, or churches)

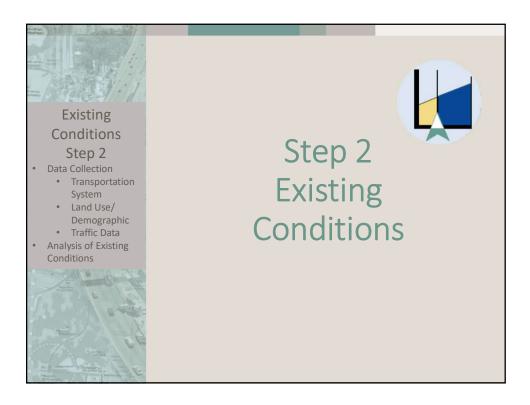


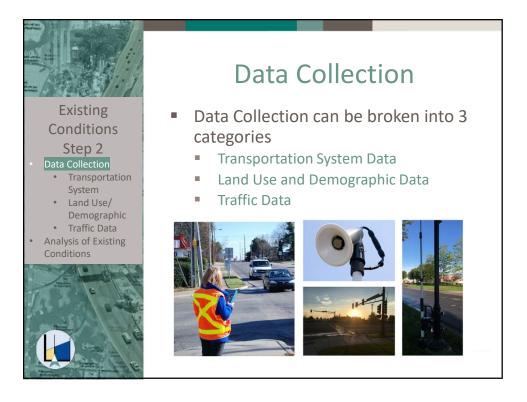






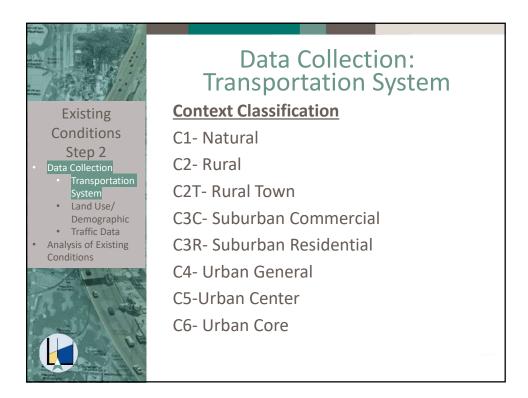


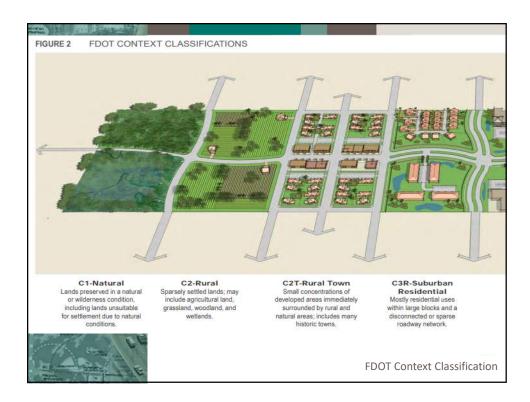


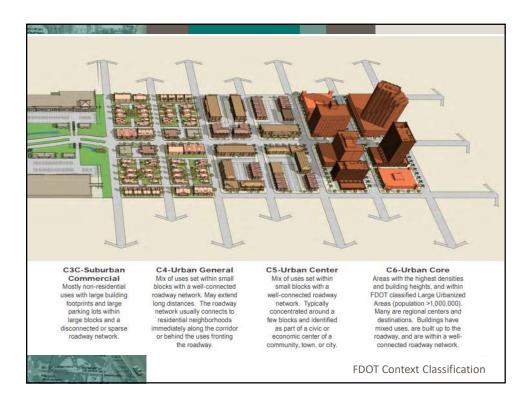












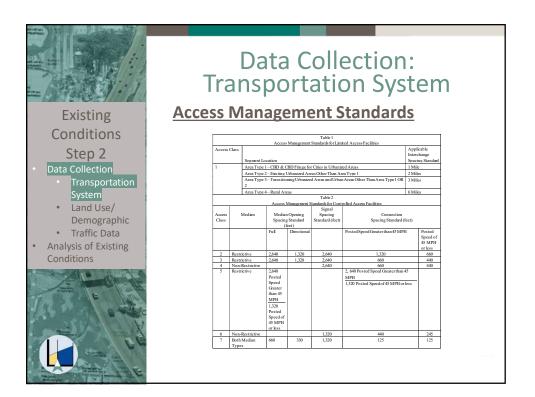
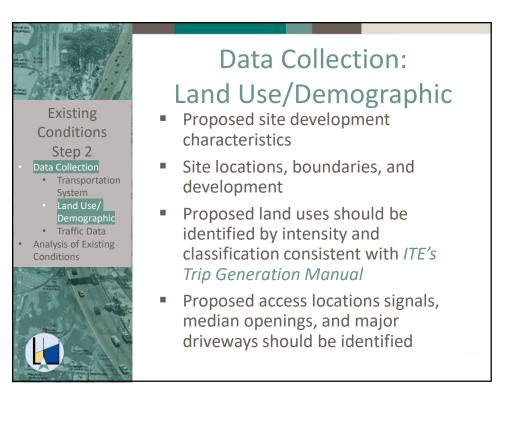
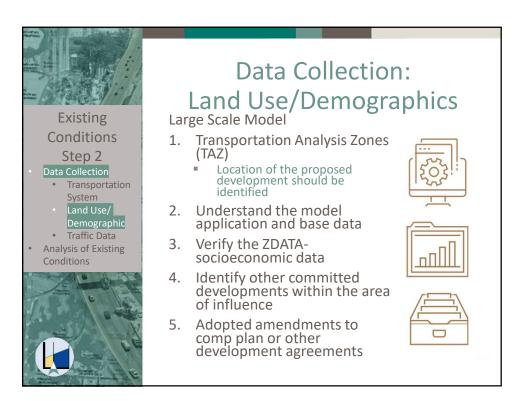
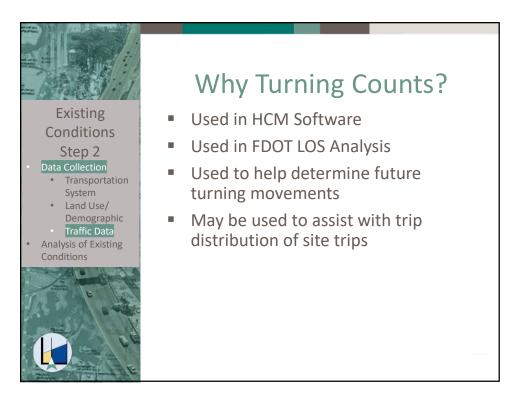


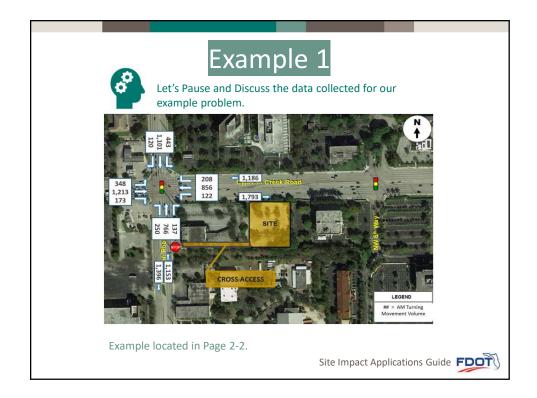
				Table 1		
		Access	s Management	Standards for Lim	ited Access Facilities	
Access (Class Segment Lo	ocation				Applicable Interchange Spacing Standa
1			"DD Eringa fo	r Cities in Urbaniz	rad A mass	1 Mile
1				eas Other Than Ar		2 Miles
					n Areas Other Than Area Type 1 OR	3 Miles
	A rea Type	4– Rural An	eas			6 Miles
	[Indu Type			Table 2		
		Access	Mana gement S	Standards for Cont	rolled Access Facilities	
			-	Signal		
Access Median Class		Median Opening Spacing Standard (feet)		Spacing Standard (feet)	Connection Spacing Standard (f	
		Full	Directional		Posted Speed Greater than 45 MPF	I Posted Speed of 45 MPH or less
2	Restrictive	2,640	1,320	2,640	1,320	660
3	Restrictive	2,640	1,320	2,640	660	440
4	Non-Restrictive			2,640	660	440
5	Restrictive	2,640 Posted Speed			2, 640 Posted Speed Greater than 4 MPH 1,320 Posted Speed of 45 MPH or	
		Greater than 45 <u>MPH</u> 1,320 Posted Speed of 45 MPH			1,520 FOSTCA Speciality MPHOI	N 3 3
		or less				
6	Non-Restrictive	1		1,320	440	245
7	Both Median Types	660	330	1,320	125 Site Impact App	125

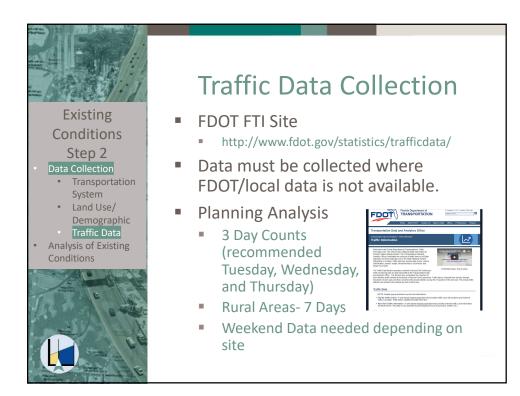


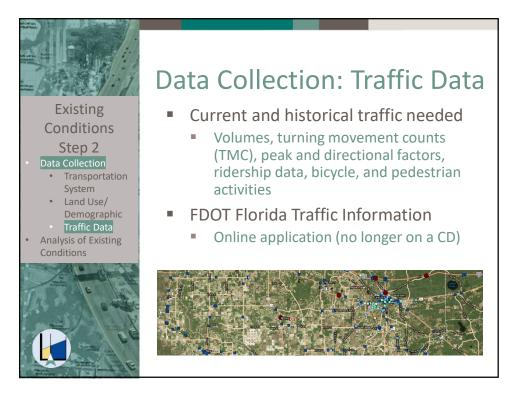


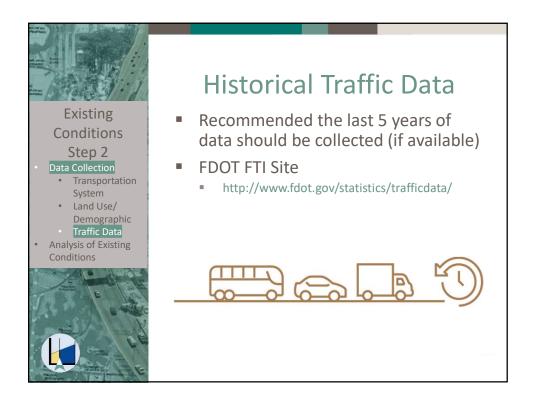


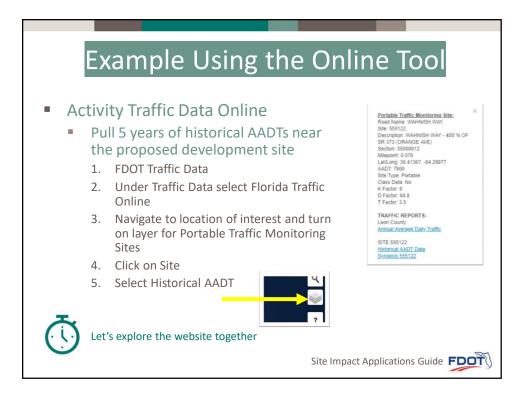


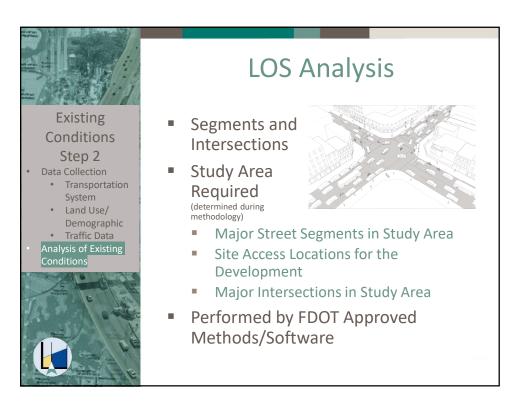












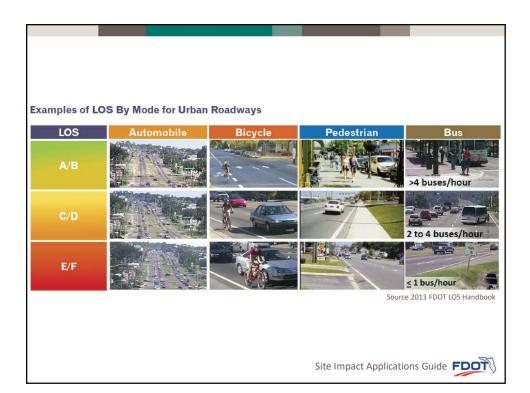


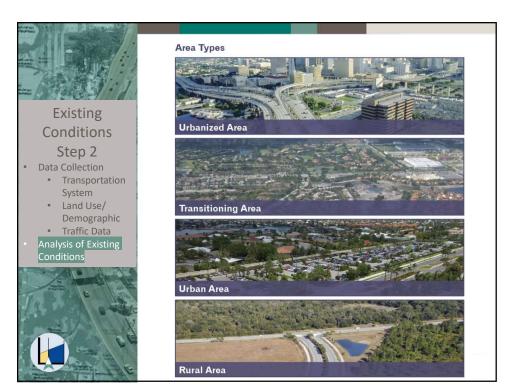
	TABLE 1				Urb	anized	Areas			12/18/12
	INTERR	UPTED F	LOW FAC	ILITIES			UNINTE	RRUPTED I	FLOW FACILI	
	STATE SI	GNALI	ZED ART	ERIAL	5			FREEV	VAYS	
	Class I (40 m	her posted speed limit)			Core Urbanized					
Lanes 2 4 6 8	Median Undivided Divided Divided Divided	B * * *	C 16,800 37,900 58,400 78,800	D 17,700 39,800 59,900 80,100	E ** ** **	Lanes 4 6 8 10	B 47,400 69,900 92,500 115,100	C 64,00 95,20 126,40 159,70	0 77,90 0 116,60 0 154,30	0 130,600 0 176,600
	Class II (35 n Median	nph or slo B *	C	D	E	12	162,400	216,70 Urban	ized	
2 4 6 8	Undivided Divided Divided Divided	:	7,300 14,500 23,300 32,000	14,800 32,400 50,000 67,300	15,600 33,800 50,900 68,100	Lanes 4 6 8 10	B 45,800 68,100 91,500 114,800	C 61,50 93,00 123,50 156,00	0 111,80 0 148,70	0 123,300 166,800
	5	correspond y the indica	Roadway 2 ing state volu ted percent.) Roadways	mes	ats	Pres	F Auxiliary Lan ent in Both Dir + 20,000		R Me	amp tering 5%
Lanes 2	Median Divided	Exclusive Left Lane Yes	s Right I No	sive A Lanes o	djustment Factors +5%	Lanes 2	Median Undivided	B 8,600		D E 4,200 33,30
2 Multi Multi	Undivided Undivided Undivided	No Yes No	No No No Ye	0	-20% -5% -25% + 5%	4	Divided Divided	36,700 55,000	77,700 9	5,600 72,60 8,300 108,80
-		Vay Facil	ity Adjust	ment	+ 576	Lanes 2	Median Divided	Exclusive Ye	5	djustment factor +5%
			nding two-di is table by 0.			Multi Multi	Undivided Undivided	Ye		-5% -25%

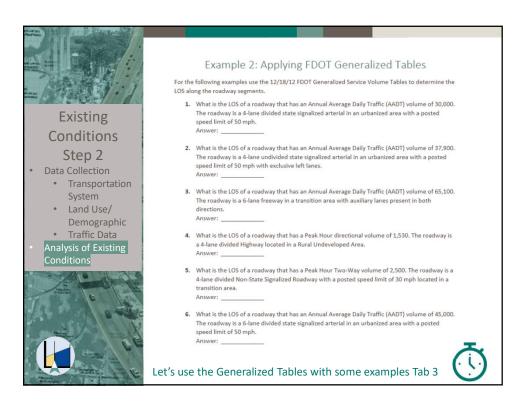




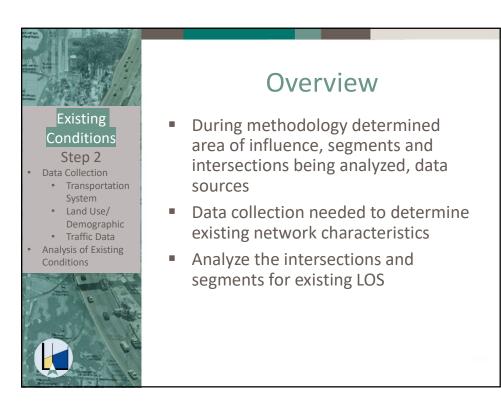
Area Types

- Urbanized Areas minimum population 50,000.
- Transition/Urban areas- The fringe areas. Anticipated to become urbanized in the next 20 years.
- Urban area- population between 5,000 and 50,000 and not within urbanized areas.
- Rural
 - Rural undeveloped- no or minimal population or development.
 - Rural developed- cities and other populated areas with less than 5,000 or coastal roadways.





_		rmation below			
Intersection	e <i>lay and L</i> Control	Analysis Level	Time	2017 E	LOS
Cypress Creek Road & Powerline Road	Signal	Intersection	AM	73.4	E
Cypress Creek Road & NW 6 th Way	Signal	Intersection	AM	37.4	D
Powerline Road & Bank Driveway	Stop	Westbound Approach	AM	17.9	С
Cypress Creek Road & Bank Driveway	Stop	Northbound Approach	AM	25.7	D
& BUIK DI WEWUY		Westbound Left	AM	< 1.0	А







Future Conditions

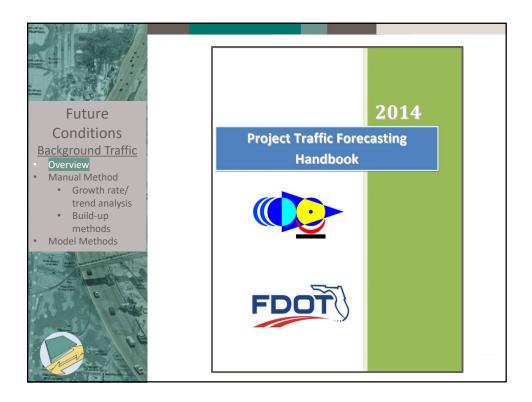
What will the traffic conditions be in the future with and without the development?

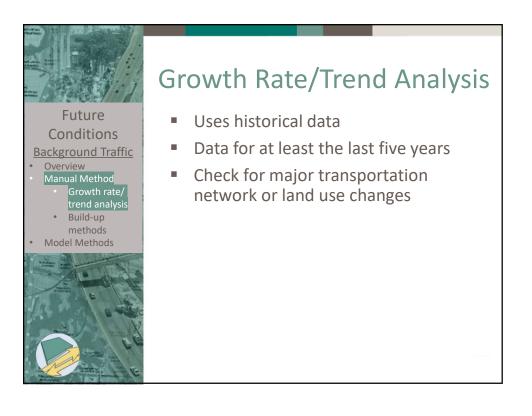
- Background traffic
 - Development traffic projections without development
- Trip generation
- Trip distribution
- Multimodal evaluation
- Assignment of trips to network

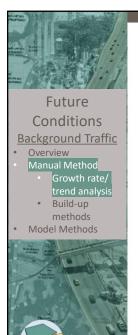


Future Background Traffic

- Expected increase in traffic from natural growth and traffic from other approved developments
 - But not the one you are analyzing
- Manual method
 - Traffic trend analysis
- Travel demand
 - Background traffic can be from travel demand modeling efforts

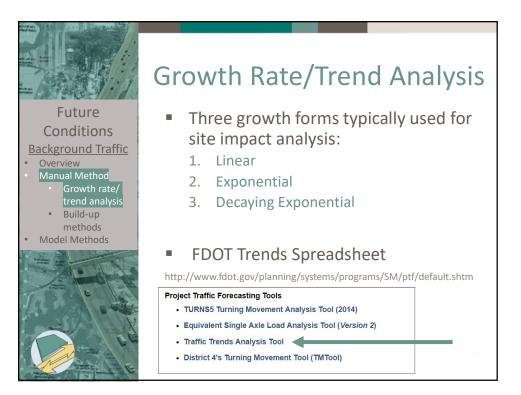


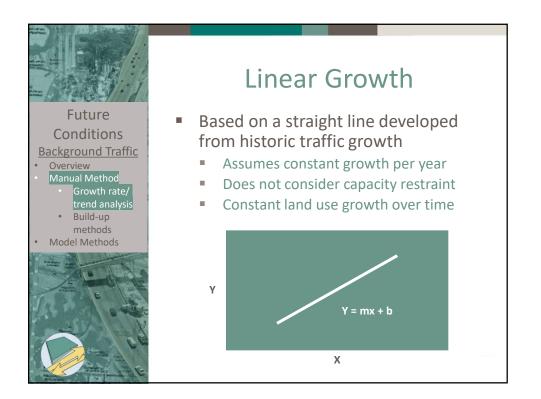


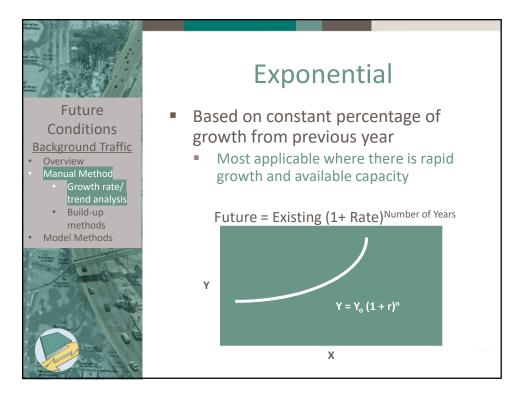


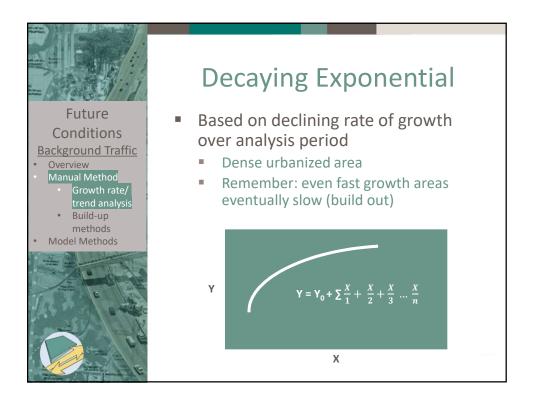
Growth Rate/Trend Analysis

- Identify the data that is required based on the study area and the sources of relevant data
- Obtain the historic traffic-count data for the existing locations(s) or demographic data
- Perform a growth trend analysis using one of three growth forms and plot the patterns of traffic growth rates for the existing location(s)





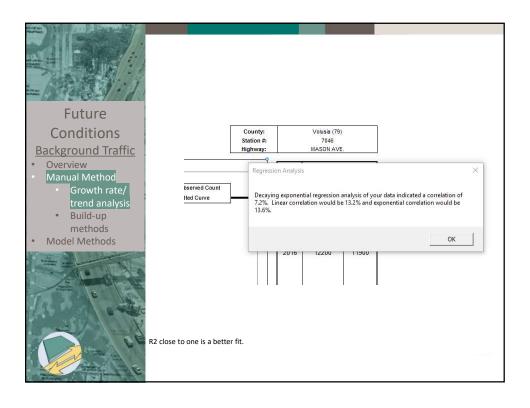


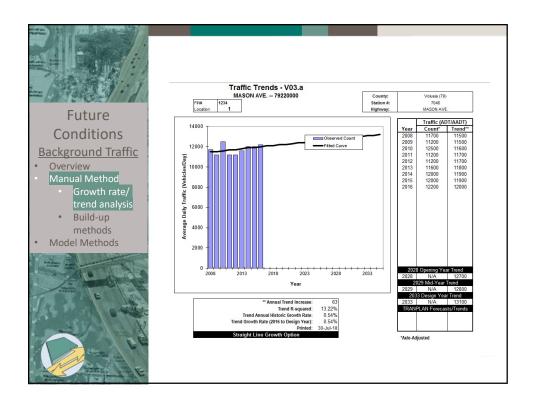


The second second	
	We will now go through an example using the available spreadsheet.
Future	Traffic Trends Analysis Tool - V03.a Main Menu
Conditions Background Traffic • Overview • Manual Method • Growth rate/ trend analysis • Build-up methods • Model Methods	Enter Data Preview Print Graph Save Data File Export XML

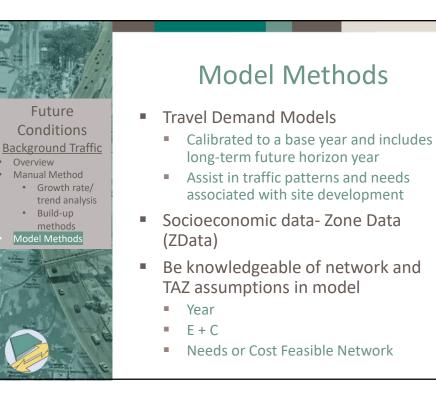
	Traffic Counts Analysis Input - Page 1 of 2 X Traffic Count Analysis Input - Page 1 of 2
Future	*EIN Number 1234 Location To FTI Database Bronze Help/Instructions
Conditions	*Select Cognty Volusia (79) Valusia (79) MapIT Station # 7046 Vinport Data
Background Traffic • Overview • Manual Method • Growth rate/ trend analysis • Build-up methods • Model Methods	Station Information Readway ID# Project Information Site HP 0.454 Site Type P Site Location MAXON AVE: Site Location Pack Site Site Site Site Site Site Site Site

	Traffic Counts Analysis - Page 2 of 2 Traffic Count Analysis Input -	X
Future	Historical Traffic Data	Help/Instructions
Conditions <u>Background Traffic</u> • Overview Manual Method Growth rate/ trend analysis • Build-up methods • Model Methods	Year Traffic Count 2008 11700 2010 12200 2011 11200 2012 11200 2013 11600 2014 12000 2015 12200 2016 12200 2016 12200 Based on the years indicated on the previous screen, enter the volumes in the boxes for each year. Enter zero for any years for which data are not available. Honeyer, the last and first years must be non-zero values.	Import AADT From FTI CD
	OK Bac	k to Page 1











Future Conditions

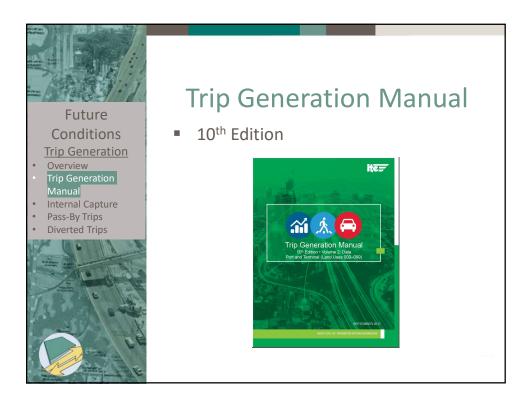
What will the traffic conditions be in the future with and without the development?

- Background traffic
 - Development traffic projections without development
- Trip generation
- Trip distribution
- Multimodal evaluation
- Assignment of trips to network



Trip Generation

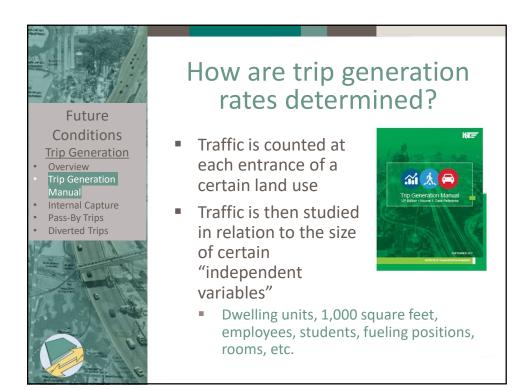
- Trip generation estimates the number of trips originating or destined for a TAZ, or in our case, a site
- Trip generation calculation needed even when large scale models are used
 - Large scale regional models are not intended for small areas (ex: Site Impact Analysis)

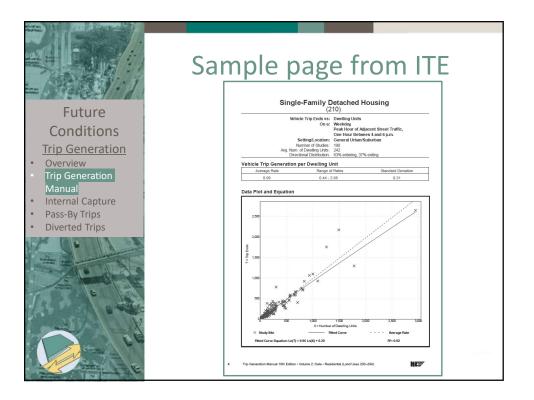


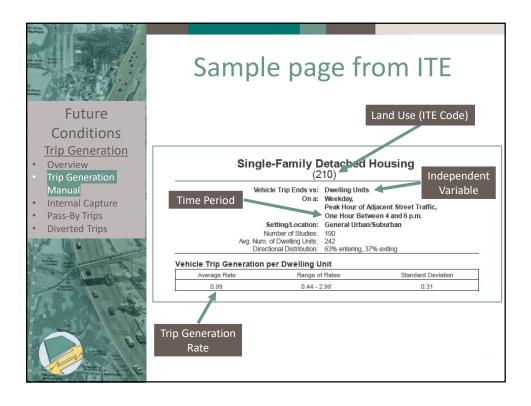


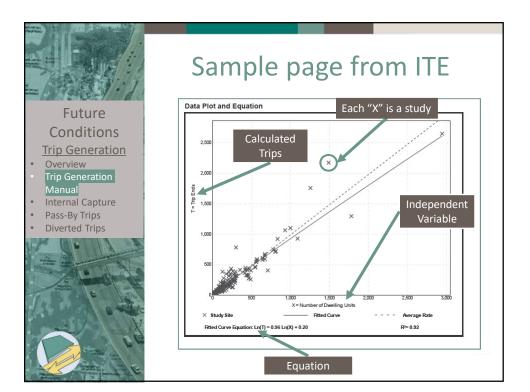


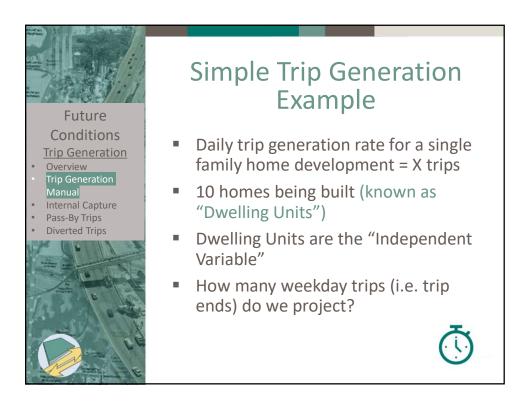
with either the origin or destination (exiting or entering) inside the study

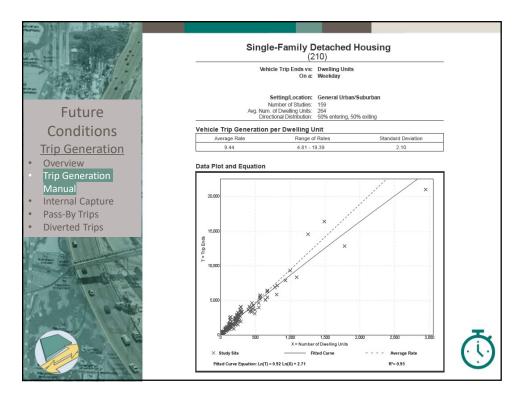


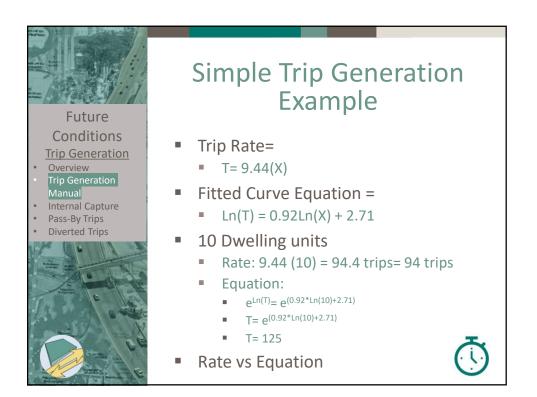


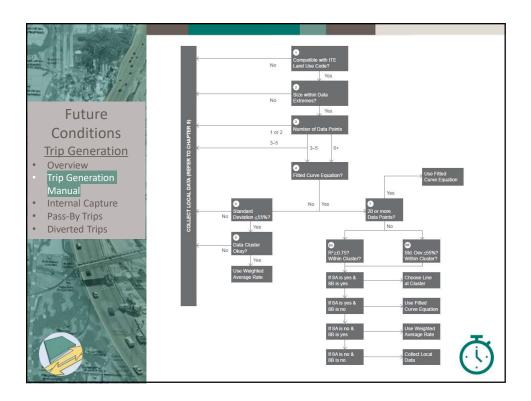












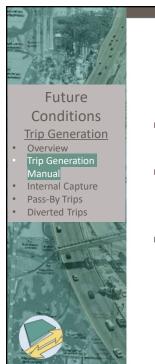


EXAMPLE 3: RATE VS EQUATION EXAMPLES

For the following examples use the flow chart from the ITE Trip Generation Handbook to determine for each case study if the fitted curve (equation) or average rate should be used to estimate trips, or if local data should be collected. Then calculate the trips.

- Estimate the trip generation for Land Use Code 140 (Manufacturing) on a weekday during the PM peak hour of adjacent street traffic as a function of gross floor area (GFA). Assume the site will have 800,000 sq, ft. of GFA.
 Method: Answer
- Estimate trip generation for Land Use Code 310 (Hotel) on weekday during the PM peak hour of the adjacent street traffic as a function of employees. For this example, assume the hotel will have 100 employees.
 Method: Answer:
- Estimate trip generation for Land Use Code 210 (Single-Family Detached Housing) on a weekday during the PM peak hour of adjacent street traffic as a function of Dwelling Units. For this example, assume the number of units is 300.
 Method: _______ Answer: _______
- Estimate trip generation for Land Use Code 090 (Park-and-Ride Lot with Bus or Light Rail Service) on a weekday during the AM peak hour of adjacent street traffic as a function of Parking Spaces. For this example, assume the number of spaces to be 50. Method: Answer:
- Estimate trip generation for Land Use Code 445 (Multiplex Movie Theater) on a weekday during the PM peak hour of adjacent street traffic as a function of Screens. For this example, assume the number of screens to be 20.
 Method: Answer:

Let's work through these to determine what should be used. Example located in Page 4-2. See Tab 8 for ITE tables



What's Peak Hour?

- Any 4 consecutive 15-minute periods that equal the highest 1-hour volume
- There are usually morning and evening peaks
 - Some lunch time peaks are important
- We are usually using peak hour of Adjacent Street Traffic
 - Highest volume on roadway including site traffic

		Trip Generation AM Peo	k Period Calculation	1		
Land use	Land Use Code	Independent Variable	Average Rate	Total Trips	Entering Trips	Exiting Trips
High-Turnover (Sit-Down) Restaurant	932	2,500 ft ²		25		
offee/Donut Shop with Drive- Through Window	937	2,100 ft ²	88.99		95	92





Mixed Use Development

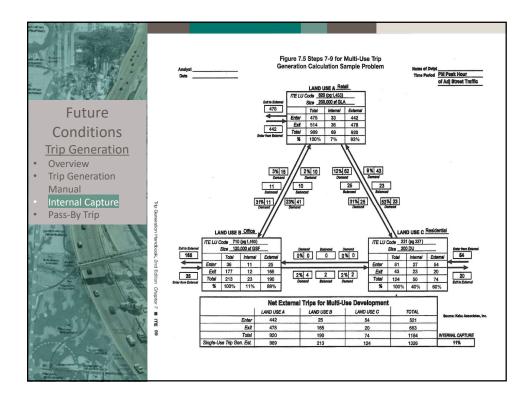
- Developments that contain two or more land use components
- Trip generation is calculated separately for each land use component
- Total development trip generation (external + internal) is determined by summing components

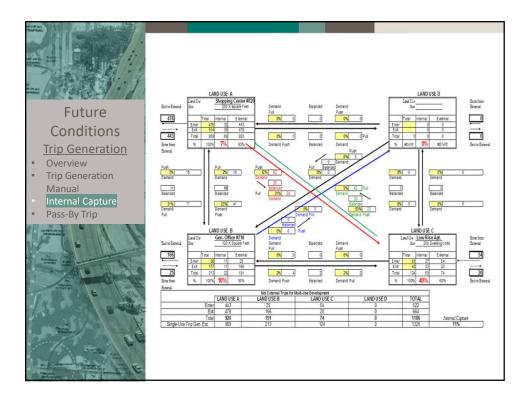


Internal Capture Consideration

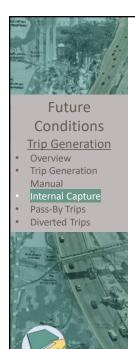
- Residential and employment centers should be compatible (with respect to income levels) to allow internal capture
- Trips that cross or use the public road system should not typically be subtracted with the internal trip component

Total Trip Generation – Internal Trips = External Trips





			WEE	KDAY
			AM Peak Hour	PM Peak Hour
And the second second	From OFFICE	To Retail	28%	20%
		To Restaurant	63%	4%
		To Cinema/Entertainment	0%	0%
Euturo		To Residential	1%	2%
Future	127	To Hotel	0%	0%
Conditions	From RETAIL	To Office	29%	2%
conditions		To Restaurant	13%	29%
ip Generation		To Cinema/Entertainment	0%	4%
		To Residential	14%	26%
verview		To Hotel	0%	5%
rip Generation	From RESTAURANT	To Office	31%	3%
lanual		To Retail	14%	41%
i anno an		To Cinema/Entertainment	0%	8%
ternal Capture		To Residential	4%	18%
ass-By Trips	8 <u>0.</u>	To Hotel	3%	7%
iverted Trips	From	To Office	0%	2%
iverteu mps	CINEMA/ENTERTAINMENT	To Retail	0%	21%
		To Restaurant	0%	31%
- All - Comment		To Residential	0%	8%
	-	To Hotel	0%	2%
	From RESIDENTIAL	To Office	2%	4%
15 AMARTAN - THE		To Retail	1%	42%
E Lint		To Restaurant	20%	21%
		To Cinema/Entertainment	0%	0%
C C	V	To Hotel	0%	3%
3812 11	From HOTEL	To Office	75%	0%
		To Retail	14%	16%
CE CE		To Restaurant	9%	68%
The second second		To Cinema/Entertainment	0%	0%
		To Residential	0%	2%



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		Wee	ekday
		AM Peak Hour	PM Peak Hour
TO OFFICE	From Retail	4%	31%
	From Restaurant	14%	30%
	From Cinema/Entertainment	0%	6%
	From Residential	3%	57%
	From Hotel	3%	0%
TO RETAIL	From Office	32%	8%
	From Restaurant	8%	50%
	From Cinema/Entertainment	0%	4%
	From Residential	17%	10%
	From Hotel	4%	2%
To RESTAURANT	From Office	23%	2%
	From Retail	50%	29%
	From Cinema/Entertainment	0%	3%
	From Residential	20%	14%
	From Hotel	6%	5%
Ĩ0	From Office	0%	1%
CINEMA/ENTERTAINMENT	From Retail	0%	26%
	From Restaurant	0%	32%
	From Residential	0%	0%
	From Hotel	0%	0%
TO RESIDENTIAL	From Office	0%	4%
	From Retail	2%	46%
	From Restaurant	5%	16%
	From Cinema/Entertainment	0%	4%
	From Hotel	0%	0%
To HOTEL	From Office	0%	0%
	From Retail	0%	17%
	From Restaurant	4%	71%
	From Cinema/Entertainment	0%	1%
	From Residential	0%	12%

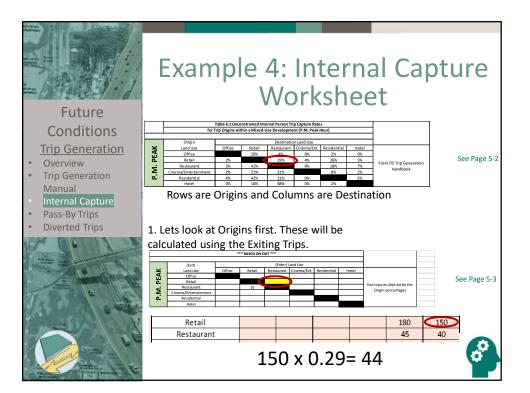
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Instrument Memory Present Memory Pres	Scenario Description:				Date:				Table	7-A: Conve	rsion of Vehicle			
	Analysis Year: Analysis Year:	A.	Street Pea	k Hour				LandUse						
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		de 1-A: Bas	e Vehicle-1	Trip Generation	s Estimates (Single-U	se Site Estimate)								
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Number of the second	Cinema/Entertainment													
arrow (arrow (base)) arrow (base) arro								Ta	able 8-A (O):	Internal Per	son-Trip Origin		omputed at Origin)	
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		Tat			hiele Occupancy Est						0			
One- material We (UC) A 1000 Non- material	LandUse		Entering Trip	ps .		Eviting Trips	1					0		
Bits Image: State in the state in the state is a		ven. Doo.	% iransk	ps mon-motorized	ven. Oco.	24 Transit	% non-motorized					0		
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Construment Table 1-6. Item of Percent Pig Other Destinant Name Total Percent Pig								Hotel	0	0	0	0	0	
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Determine Table 1-4. Science / Free of Construction / Science / Sc	Residential							N 2 1922				al Trips Summary (Crite		
Table 7-hours Table 7-hours Constrained Document	Hotel						4 999999999999999				Total	Vehicles ¹		Non-Motorized ²
Deprind Open and base of the state of the s		Tab	e 4-A: Inter	nal Person-Tri		Matrix								
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Name 0	Drigin (From)	Office												
$ \frac{C_{max}C_{max}max}{C_{max}} \frac{1}{0} \frac{1}{$	Office			0					0		0	0		
Packet number O <	Office Retail	0	0	0	0	0	0	Residential	0	0	0	0	0	0
$ \frac{1}{\frac{1}{2} \frac{1}{2} \frac{1}{2$	Office Retail Restaurant	0	0	0	0	0	0	Residential Hotel	0	0	0	0	0	0
Image: Learning for any formers of the second formers of the seco	Office Retail Restaurant Cinsema/Entectainment Residential	0	0 0 0 0 0		0	0	0	Residential Hotel	0 0 0	0	0	0	0	0
Improvide procession Improvide	Office Retail Restaurant Cinsema/Entectainment Residential	0	0 0 0 0 0		0	0	0	Residential Hotel	0 0 0 Table	0 0 0 9-A (O): Inte	0 0 0 ernal and Extern	0	0 0 0 ing Trips)	0
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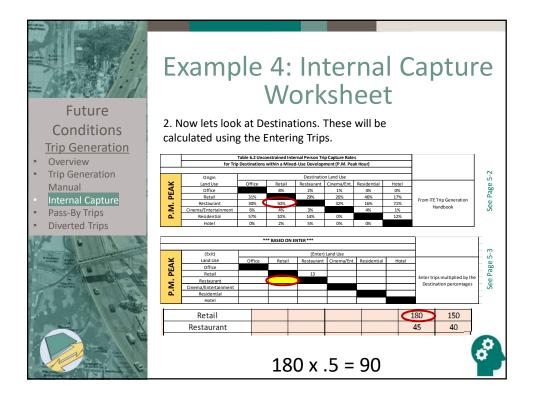
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Project Location:				Performed Ba:			Analysis Period:	PM	Street Peak	nour	-		
Scenario Description:			_	Date:				Table 7	-P: Convers	ion of Vehicle-	Trip Ends to Person-Tr	ip Ends	
Analysis Year: Analysis Period		Street Pea		Checked By: Date:			LandUse		7-P (D) Enterin			Table 7-P (O): Exiting Trip	8
										Person-Trips"	Veh. Oco.	Vehicle-Trips	Person-Trips
Та	ble 1-P: Ba	se ¥ehicle-T	rip Generation	n Estimates (Single-U	se Site Estimate)		Office Retail	100	0	0	100	0	0
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Office	THELOUS	Quantity	Units	0	Entering	Entry	CinemalEntertainment	100	0	0	100	Ŭ.	0
Petall				0			Residential	100	0	0	100	0	0
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All Other Land Uses ¹				0			Origin (From)	Office	Retail	Restaurant	CinemalEntertainment	Residential	Hotel
Total	100000000000			0	0	0	Office	INCOMPANY:	0	0	0	0	0
	Ta	le 2-P: Mor	e Split and ¥e	hicle Occupancy Esti	imates		Retail	0	0380388	0	0	0	0
Land Use		Entering Tri	p8		Exiting Trips		Restaurant	0	0		0	0	0
	Yeh Occ.	% Transit	Non-Motorized	d Veh Occ.	% Transk	% Non-Motorized	CinemalEntertainment	0	0	0		0	0
Office Retail							Residential Hotel	0	0	0	0	0	0
Prestaurant							FICON	J	. 0	1 0	0	0	101000000000000000000000000000000000000
CinemalEntertainment							Tal	ole 8-P (D): Inter	nal Person-	Trip Origin-Des	tination Matrix (Compu	ted at Destination)	
Presidential											Destination (To)		
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Pacisterial Head Head Alcoser had bend Corgin (From) Origin (From) Origin Parta and Corgin (From) Origin Parta Corgin (From) Origin Corgin (From) Origin Corgin Corgin (From) Origin Corgin (From) Origin (From) O	Difice Difice Tab Difice 0 0 0 0 0 0 0 Computat Total 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Pietai Pieta	Prestaurant	Destination (To) Creme #Exert annues (Creme #Exert annues (Creme #Exert annues (Creme #Exert annues) (Creme #Exert annues (Creme #Exert annues) (Creme #Exert annues (Creme #Exert annues) (Creme #Exe	Persidential Persi	Hoce 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Origin Fund Origin Contact Parataret Crease Revealences Pressional Tool Origination Contact Pressional Contact Pressional Contact Pressional Contact Pressional Contact Pressional Contact Pressional Contact Contact Pressional Contact Contact Pressional Contact Co	Office Of	Pertal 0 <td>Restauran 0</td> <td>Constant (1) - Constant (1) - Consta</td> <td>Peedenal 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>	Restauran 0	Constant (1) - Consta	Peedenal 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

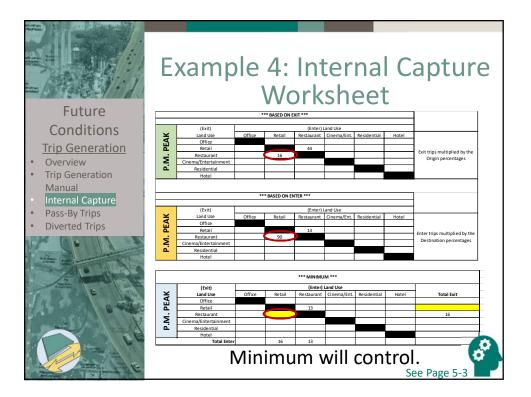
Land U					ximity		p Capture Rates for Trip Origins with		
	Jse Pairs		rkday		stment	Land L	Jse Pairs		kday
	To Office	AM Peak Hour 0%	PM Peak Hour 0%		PM 1.000		T- 040	AM Peak Hour 0.0%	0.0%
		28%					To Office		
	To Retail To Restaurant	28%	20% 4%	1.000			To Retail To Restaurant	28.0%	20.0%
From OFFICE	To Restaurant To Cinema/Entertainment	0%	4%		1.000	From OFFICE	To Restaurant To Cinema/Entertainment	0.0%	4.0%
	To Residential	1%	2%	1.000			To Cinema/Entertainment	1.0%	2.0%
	To Hotel	0%	2%		1.000		To Hotel	0.0%	0.0%
	To Office	29%	2%		1.000		To Office	29.0%	2.0%
	To Retail	29%	2%	1.000			To Retail	0.0%	0.0%
		13%	29%		1.000	2000 1000 mm	To Restaurant	13.0%	29.0%
From RETAIL	To Restaurant	0%	29%		1.000	From RETAIL		0.0%	4.0%
	To Cinema/Entertainment To Residential	14%	26%	1.000			To Cinema/Entertainment To Residential	14.0%	26.0%
	To Hotel	0%	20%		1.000		To Hotel	0.0%	5.0%
	To Office	31%	3%	1.000			To Office	31.0%	3.0%
	To Retail	14%	41%		1.000		To Retail	14.0%	41.0%
	To Restaurant	0%	41%		1.000		To Restaurant	0.0%	0.0%
From RESTAURANT	To Cinema/Entertainment	0%	8%		1.000	From RESTAURANT	To Cinema/Entertainment	0.0%	8.0%
	To Residential	4%	18%	1.000			To Residential	4.0%	18.0%
	To Hotel	3%	7%	1.000			To Hotel	3.0%	7.0%
	To Office	0%	2%	1.000			To Office	0.0%	2.0%
	To Retail	0%	21%		1.000		To Retail	0.0%	21.0%
	To Restaurant	0%	31%	1.000			To Restaurant	0.0%	31.0%
From CINEMA/ENTERTAINMENT	To Cinema/Entertainment	0%	0%		1.000	From CINEMA/ENTERTAINMENT	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0%	8%	1.000			To Residential	0.0%	8.0%
	To Hotel	0%	2%		1.000		To Hotel	0.0%	2.0%
	To Office	2%	4%		1.000	-	To Office	2.0%	4.0%
	To Retail	1%	42%	1.000			To Retail	1.0%	42.0%
	To Restaurant	20%	21%	1.000		and a stand for some start	To Restaurant	20.0%	21.0%
From RESIDENTIAL	To Cinema/Entertainment	0%	0%		1.000	From RESIDENTIAL	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0%	0%	1.000			To Residential	0.0%	0.0%
	To Hotel	0%	3%		1.000		To Hotel	0.0%	3.0%
	To Office	75%	0%	1.000			To Office	75.0%	0.0%
	To Retail	14%	16%		1.000		To Retail	14.0%	16.0%
	To Restaurant	9%	68%		1.000		To Restaurant	9.0%	68.0%
From HOTEL	To Cinema/Entertainment	0%	0%	1.000		From HOTEL	To Cinema/Entertainment	0.0%	0.0%
	To Residential	0%	2%	1.000			To Residential	0.0%	2.0%
	To Hotel	0%	0%		1.000		To Hotel	0.0%	0.0%

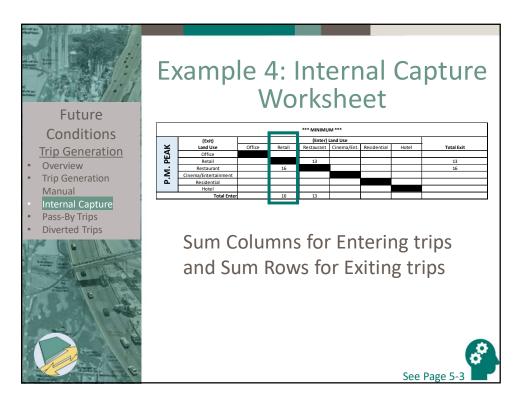
	aptore reaction in the Destinations i		e Development		Table 7.2a Adjusted Internal Trip C	apture Rates for Trip Destinations		
Land Use	Pairs	Wee AM Peak Hour		Adjustment r AM PM	Land Us	e Pairs	Weel AM Peak Hour	
	From Office	0%	0%	1.000 1.000		From Office	0.0%	0.0%
	From Retail	4%	31%	1.000 1.000		From Retail	4.0%	31.0%
	From Restaurant	14%	30%	1.000 1.000		From Restaurant	14.0%	30.0%
To OFFICE	From Cinema/Entertainment	0%	6%	1.000 1.000	To OFFICE	From Cinema/Entertainment	0.0%	6.0%
	From Residential	3%	57%	1.000 1.000		From Residential	3.0%	57.0%
	From Hotel	3%	0%	1.000 1.000		From Hotel	3.0%	0.0%
	From Office	32%	8%	1.000 1.000		From Office	32.0%	8.0%
	From Retail	0%	0%	1.000 1.000		From Retail	0.0%	0.0%
To RETAIL	From Restaurant	8%	50%	1.000 1.000	To RETAIL	From Restaurant	8.0%	50.0%
TO RETAIL	From Cinema/Entertainment	0%	4%	1.000 1.000	TORETAIL	From Cinema/Entertainment	0.0%	4.0%
	From Residential	17%	10%	1.000 1.000		From Residential	17.0%	10.0%
	From Hotel	4%	2%	1.000 1.000		From Hotel	4.0%	2.0%
	From Office	23%	2%	1.000 1.000		From Office	23.0%	2.0%
	From Retail	50%	29%	1.000 1.000		From Retail	50.0%	29.0%
To RESTAURANT	From Restaurant	0%	0%	1.000 1.000	To RESTAURANT	From Restaurant	0.0%	0.0%
1011201/1010101	From Cinema/Entertainment	0%	3%	1.000 1.000	TO TRED IN IDITION	From Cinema/Entertainment	0.0%	3.0%
	From Residential	20%	1496	1.000 1.000		From Residential	20.0%	14.0%
	From Hotel	6%	5%	1.000 1.000		From Hotel	6.0%	5.0%
	From Office	0%	1%	1.000 1.000		From Office	0.0%	1.0%
	From Retail	0%	26%	1.000 1.000		From Retail	0.0%	26.0%
To CINEMA/ENTERTAINMENT	From Restaurant	0%	32%	1.000 1.000	To CINEMA/ENTERTAINMENT	From Restaurant	0.0%	32.0%
	From Cinema/Entertainment	0%	0%	1.000 1.000		From Cinema/Entertainment	0.0%	0.0%
	From Residential	0%	0%	1.000 1.000		From Residential	0.0%	0.0%
	From Hotel	0%	0%	1.000 1.000	-	From Hotel	0.0%	0.0%
	From Office	0%	4%	1.000 1.000		From Office	0.0%	4.0%
	From Retail	2%	46%	1.000 1.000	Contraction of Contract	From Retail	2.0%	46.0%
To RESIDENTIAL	From Restaurant From Cinema/Entertainment	5% 0%	16% 4%	1.000 1.000	To RESIDENTIAL	From Restaurant From Cinema/Entertainment	5.0%	16.0%
	From Cinema/Entertainment	0%	4%	1.000 1.000		From Cinema/Ententainment	0.0%	4.0%
	From Hotel	0%	0%	1.000 1.000		From Hotel	0.0%	0.0%
	From Office	0%	0%	1.000 1.000		From Office	0.0%	0.0%
	From Retail	0%	17%	1.000 1.000		From Retail	0.0%	17.0%
	From Restaurant	4%	71%	1.000 1.000		From Restaurant	4.0%	71.0%
To HOTEL	From Cinema/Entertainment	0%	196	1.000 1.000	To HOTEL	From Cinema/Entertainment	0.0%	1.0%
	From Residential	0%	12%	1.000 1.000		From Residential	0.0%	12.0%
	From Hotel	0%	0%	1.000 1.000		From Hotel	0.0%	0.0%

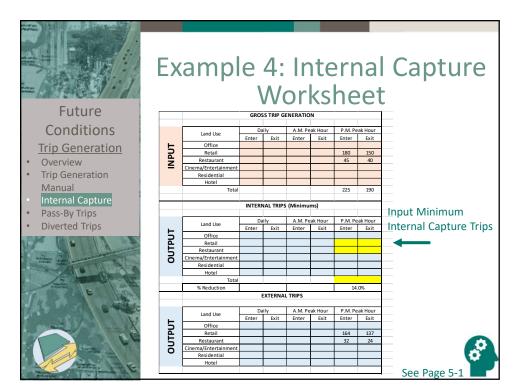
Future Conditions	Exa	mple 4 W			rna		apt	ure
		N						
Trip Generation			De	aily	A.M. Pe	ali Haur	P.M.Pe	ak Haur
Overview		Land Use	Enter	Exit	Enter	Exit	Enter	Exit
Trip Generation	—	Office	Linter	LAIL	Linter	LAIL	Linter	LAIL
Manual	INPUT	Retail					180	150
Internal Capture	₫	Restaurant					45	40
Pass-By Trips		Cinema/Entertainment						
Diverted Trips		Residential						
Diverted mps		Hotel						
		Total					225	190
		For this example capture reductic contains Retail a	on for a	a mixed	-use de	evelopi		hat

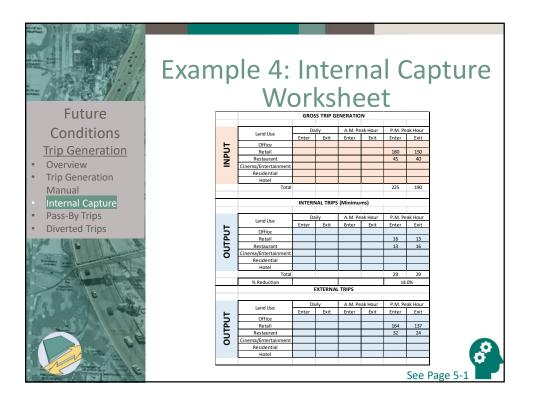


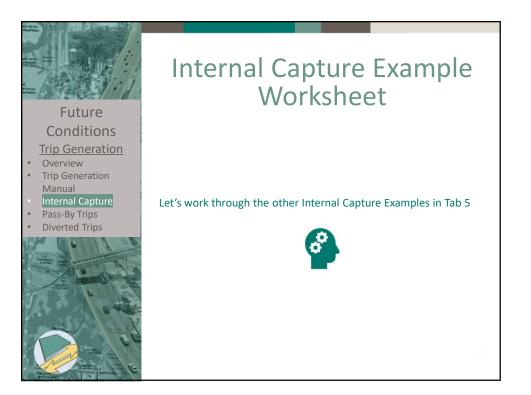


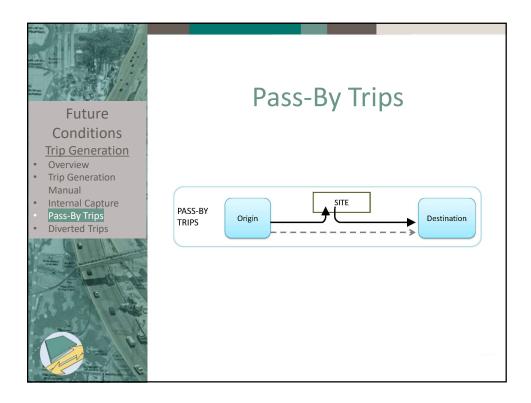


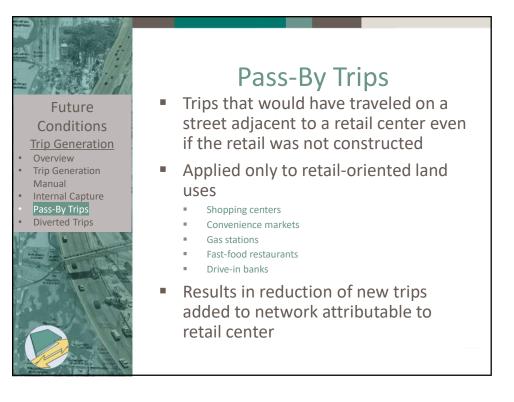


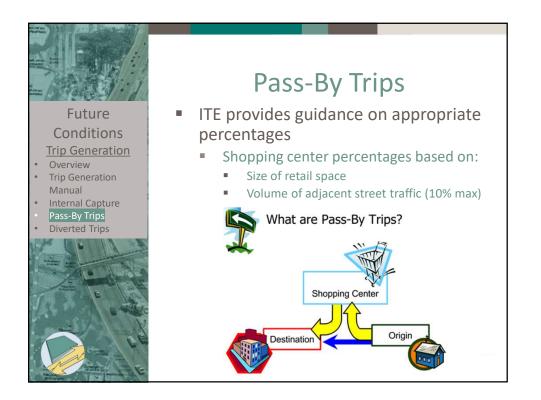






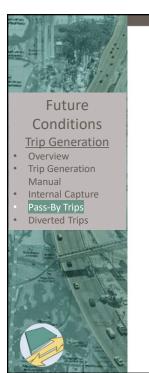






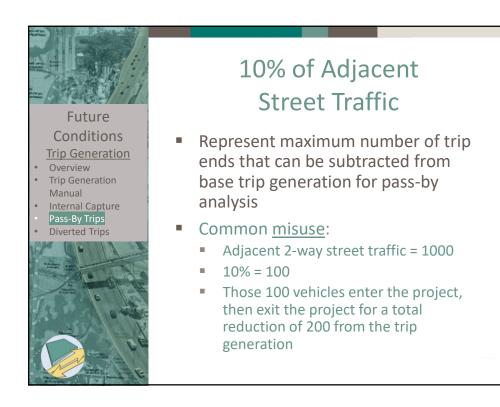
				Pa	ISS-	-By	, T	rip)S			
Future Conditions Trip Generation					d Non-P Isoline/							
Overview	SIZE (1,000 SQ. FT.	VEHICLE		WEEKDAY SURVEY	NO. OF		PASS-BY	NON-F	ASS-BY TRIPS	(%)	ADJ. STREET PEAK HOUR	
Trip Generation	GFA) 0.8	POSITIONS 8	LOCATION Louisville area, KY	DATE 1993	INTERVIEWS 83	11ME PERIOD 4:00-6:00 p.m.	TRIP (%)	PRIMARY 8	DIVERTED 40	TOTAL 48	VOLUME 4,965	Barton- Aschman Assoc.
Manual Internal Capture	0.6	8	Louisville, KY	1993	60	4:00-6:00 p.m.	53	20	27	47	1,491	Barton- Aschman Assoc.
Pass-By Trips	0.7	10	Louisville, KY	1993	-	4:006:00 p.m.	57	19	24	43	1,812	Barton- Aschman Assoc.
Diverted Trips	0.7	8	Louisville area, KY	1993		4:00-6:00 p.m.	72	7	21	28	2,657	Barton- Aschman Assoc.
	0.7	10	Louisville area, KY	1993	-	4:00-6:00 p.m.	55	16	29	45	2,657	Barton- Aschman Assoc.
	0.8	8	Silver Spring, MD	1992	36	4:00-6:00 p.m.	67	14	19	33	3,095	RBA
1 1 - Longhower	0.4	8	Derwood, MD	1992	46	4:00-6:00 p.m.	46	11	43	54	3,770	RBA
E	2.1	8	Kensington, MD	1992	31	4:00-6:00 p.m.	52	13	35	48	1,785	RBA
IR A call	3	8	Silver Spring, MD	1992	35	4:00-6:00 p.m.	54	3	43	46	7,080	RBA
			ip Percent were provi									- an Lin

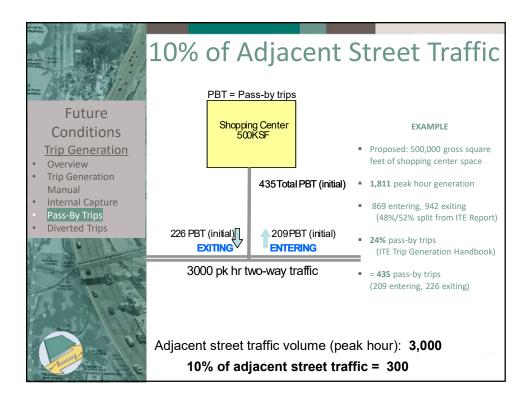
	_			_	_			
	Example 8: Pass-By-Trips For the following examples use the provided pass-by pages from the ITE handbook to determine the pass-by percentage.							
Future	 Land Use Code 813 – Answer: 		ig Discount Supe	erstore, Satu	day, Mid-Da	y Peak Period	Ĺ.	
Conditions <u>Trip Generation</u> • Overview • Trip Generation Manual • Internal Capture • Pass-By Trips	 Land Use Code 853 – Answer:	- Fast-Food R 	estaurant with D)rive – Throu	gh Window, Y	Weekday, PN	I Peak	
Diverted Trips	For the following example ap window. The PM peak hour of Land Use Fast-Food Restaurant with						lgh Exiting Trips	
All of a sector	Drive-Through							
Pass By External Trips New to the System								
	Let's practice with pass by in Tab 6							



Pass-By Reasonableness Checks

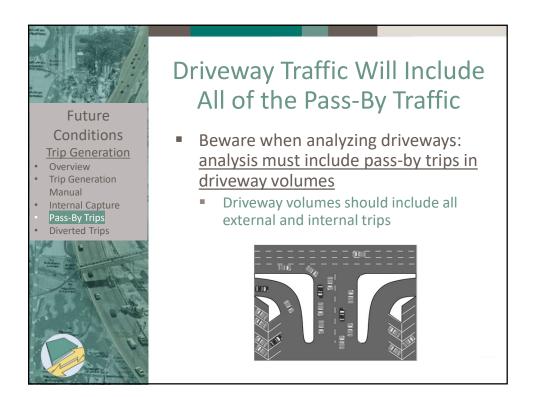
- FDOT Guidelines: The number of pass-by trips should not exceed 10 percent of the adjacent street traffic during peak hour
- Strong justification must be provided to document pass-by rates greater than 25 percent of the total external trip generation of the development's retail portion
 - Ensure proposed development displays characteristics to generate pass-by trips

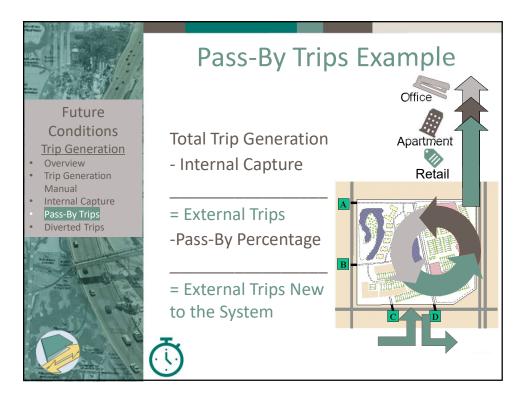


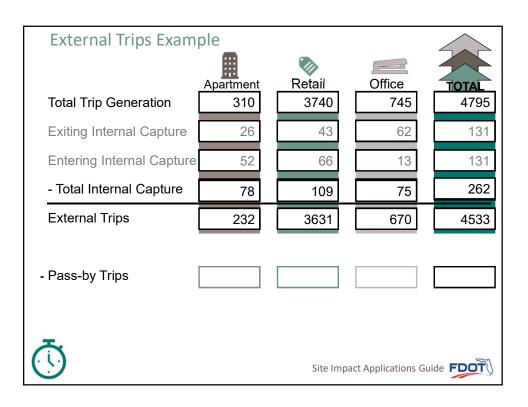


The second second		
	PBT = Pac	correct Method
Future Conditions <u>Trip Generation</u>		ng Center KSF Initial Calculation
Trip Generation		435Total PBT (initial) Base pk hr gen 1811
Manual		Pass-by (24% of gen) - 435
 Internal Capture Pass-By Trips Diverted Trips 	226 PBT (initial)	New trips generated 1376 209 PBT (initial) ENTERING
the second second	3000 pk hr tv	vo-way traffic
	10% = 300 Max PBT reduction from Base Trip Ge	

	Correct Method							
	PBT = Pa	ss-by trips	l					
Future	Shoppir 500	ng Center IKSF						
Conditions Trip Generation			3	000 pk hr two-way traffic				
 Overview Trip Generation		435Tota	l PBT (initial)					
Manual Internal Capture Pass-By Trips 				10% = 300 Max PBT reduction				
Diverted Trips	226 PBT (initial)	209P	BT (initial) RING	from Base Trip Gen				
		Initial	Adjusted					
A Calle	<u>(</u>	Calculation	<u>Calculation</u>	Correct method:				
C Le	Base pk hr ge		1811 - 300	 Adjust pass-by trips to equal 300 				
E	Pass-by (24% of gen <u>New</u> trips generate		- 300 1511	(144 in, 156 out)				

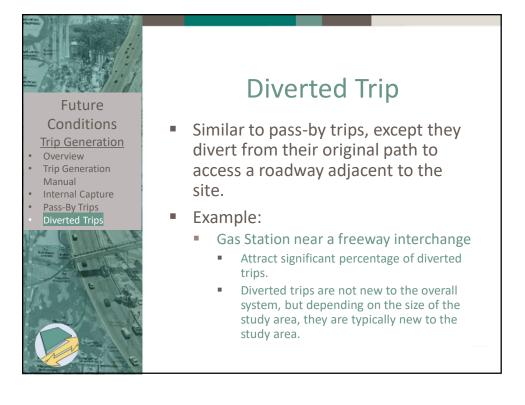


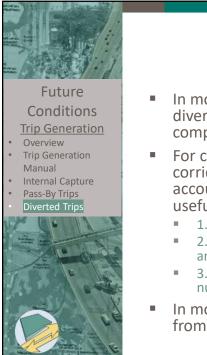




Pass-by Trips Example							
	■						
	Apartment	Retail	Office	TOTAL			
Total Trip Generation	310	3740	745	4795			
Exiting Internal Capture	26	43	62	131			
Entering Internal Capture	52	66	13	131			
- Total Internal Capture	78	109	75	262			
External Trips	232	3631	670	4533			
Pass-by Percent	0%	20%	0%				
Pass-by Trips	0	726	0	726			
External Trips New to System							
Ō							

External Trips New to	the Syster	n Example		
Total Trip Generation	Apartment 310	Retail 3740	Office 745	TOTAL 4795
Exiting Internal Capture	26	43	62	131
Entering Internal Capture	52	66	13	131
- Total Internal Capture	78	109	75	262
External Trips	232	3631	670	4533
Pass-by Percent	0%	20%	0%	
- Pass-by Trips	0	726	0	726
External Trips New to System	232	2905	670	3807





Diverted Trip

- In most cases, attempting to account for diverted trips presents an unnecessary complication in the analysis.
- For cases which a heavily traveled corridor is the following things accounting for diverted trips may be useful:
 - 1. Within the study area,
 - 2. Not immediately adjacent to the site, and
 - 3. Expected to serve as the source for a number of retail trips
- In most cases, separating diverted trips from new trips is not necessary

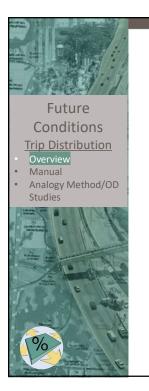
8		Exam	ole 1			
		Trip Generation AM Peo	ak Period Calculat	ion		
Land use	Land Use Code	Independent Variable	Average Rate	Total Trips	Entering Trips	Exiting Trips
High-Turnover (Sit-Down) Restaurant	932	2,500 ft ²	9.94	25	14	11
Coffee/Donut Shop with Drive-Through Window	937	2,100 ft ²	88.99	187	95	92
			Total	212	109	103
		Pass	,			
5 1		Restaurant (50% AM Pass		12		
Coffee/Donut Shop w	ith Drive-T	hrough Widow (50% AM	Pass By) Ital Pass by Trips	94 106	53	53
		-10	tai Pass by Trips	106	53	53
		External Trips Ne	w to the System			
Example located	d in Pa	ge 2-5.	Sit	te Impact /	Applicatio	ns Guide F



Future Conditions

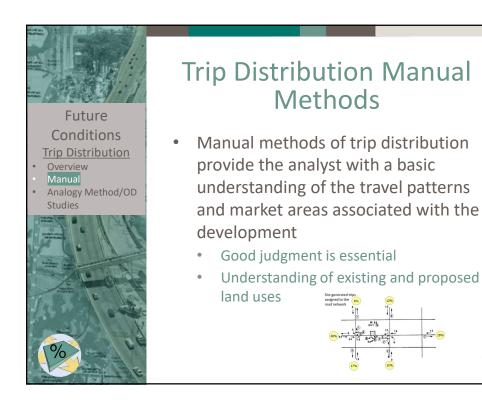
What will the traffic conditions be in the future with and without the development?

- Background traffic
 - Development traffic projections without development
- Trip generation
- Trip distribution
- Multimodal evaluation
- Assignment of trips to network



Trip Distribution Overview

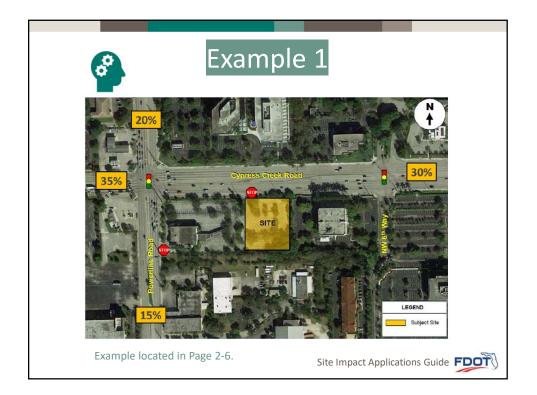
- Purpose of trip distribution is to determine the final destination and origin transportation analysis zones of the traffic studied in the impact analysis
- Trip distribution should be summarized in a figure that clearly shows the distribution of external trips from the site





Trip Distribution Analogy Method/OD Studies

- The analogy method derives the trip distribution of a proposed development based on existing data collected at sites that are similar to the subject development
 - Traffic counts and turning movement data
 - License plate O-D survey
 - Home zip codes for employment centers





Future Conditions

What will the traffic conditions be in the future with and without the development?

- Background traffic
 - Development traffic projections without development
- Trip generation
- Trip distribution
- Multimodal evaluation
- Assignment of trips to network



Multimodal Evaluation

- Estimating the number of travelers between zones that are anticipated to use modes other than automobiles in the TIA (transit, bicycle, walking, etc.)
- Provide justification on any transit, bicycle, or pedestrian adjustment reducing vehicle trips
- FDOT's Transit Office has developed the transit analysis tool TBST (The Transit Boarding Estimation and Simulation Tool) used in transit assessment



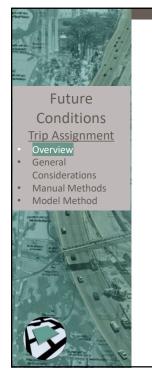
Future Conditions

What will the traffic conditions be in the future with and without the development?

- Background traffic
 - Development traffic projections without development
- Trip generation
- Trip distribution

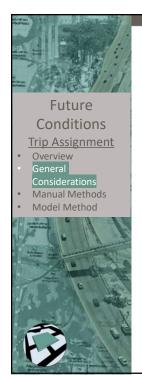
.

- Multimodal evaluation
 - Assignment of trips to network



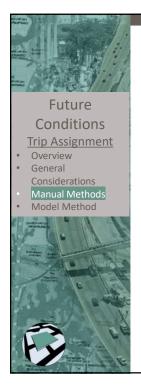
Trip Assignment Overview

- Trip distribution and assignment are two related but distinct activities
- Trip assignment is determining the amount of traffic that will use each route on the roadway network



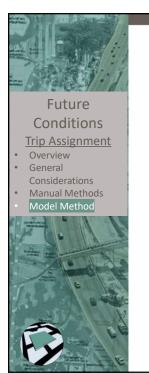
General Considerations

- Trip assignment should begin by identifying multiple paths between origins and destinations
- Potential for using these paths can be evaluated on a comparative basis which is outlined in section 2.8.1 of the Handbook
 - For example, drivers often will use the first convenient driveway they reach to access a site with multiple driveways



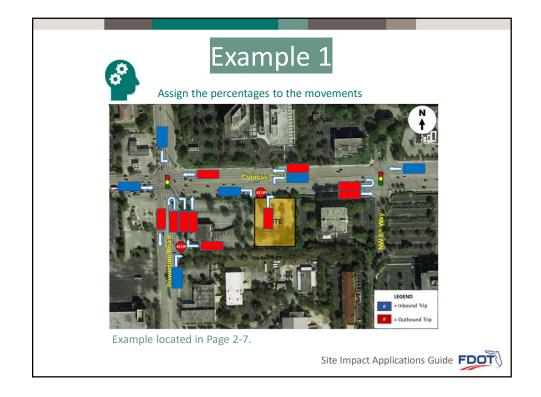
Manual Methods

- Manual trip assignment assigns traffic based on existing or anticipated future turning and through movement percentages
- Trips may be added and subtracted to the roadway network between major intersections and corridors to reflect local area origins and destinations
- Assigned trips such as primary, pass-by, and diverted trips are distinguishable and can be easily reviewed

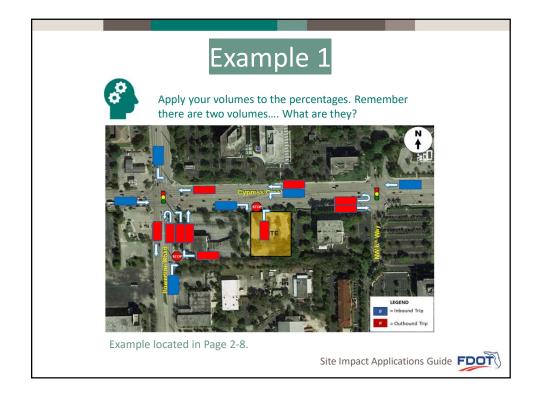


Model Methods

- Large scale travel demand models such as FSUTMS use a capacity restrained routine, known as user equilibrium, to perform the final highway assignment
- The model shifts traffic between routes until equilibrium is achieved
 - Selected zone is the preferred technique







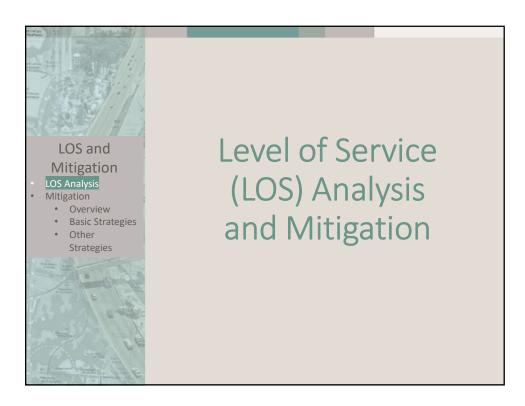


Pass-By Trips Example

Total Trip Generation - Internal Capture

= External Trips -Pass-By Percentage

= External Trips New to the System





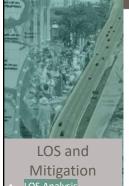
LOS Analysis and Mitigation

- LOS analysis for all modes
 - Automobile
 - Transit
 - Bicycle
 - Pedestrian
 - Mitigation
 - Overview
 - Basic Strategies
 - Other Strategies



LOS Analysis

- There are several tools that are available for LOS analysis for a particular location
 - Highway Capacity Manual (HCM)
 - Highway Capacity Software (HCS)
 - FDOT Quality/Level of Service (Q/LOS) Handbook
 - Generalized Service Volume Tables



Mitigation

Overview Basic Strategies

Strategies

Other

Bicycle and Pedestrian LOS

- Bicycle and Pedestrian LOS assesses bicycling and walking conditions from the bicyclist's and/or and pedestrian's point-of-view
- Bicycle LOS based on five variables:
 - Average effective width of the outside thru lane
 - Motorized vehicle volumes
 - Motorized vehicle speeds
 - Heavy vehicle (truck) volumes
 - Pavement condition



Bicycle and Pedestrian LOS

- Pedestrian LOS based on four variables:
 - Existence of a sidewalk
 - Lateral separation of pedestrians from motorized vehicles
 - Motorized vehicle volumes
 - Motorized vehicle speeds

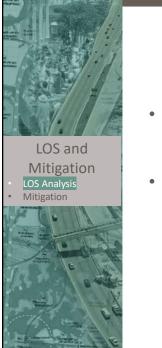






Transit LOS

- Transit quality of service assesses transit performance from the passenger pointof-view
 - LOS is used to quantify transit quality of service
- Three national resource documents most frequently used to assess transit LOS
 - Transit Capacity and Quality of Service Manual, 3rd Edition (TCQSM)
 - National Cooperative Highway Research Program (NCHRP) Report 616: Multimodal Level of Service Analysis for Urban Streets
 - Highway Capacity Manual, 6th Edition



LOS Overview

- Each local and state government establishes a LOS standard for each public facility
- Establishing the comparison of existing and future (for all analysis years) estimated LOS of the study area is critical

Delay and LOS Table 2017 Existing 2019 No Build 2019 Build										
Intersection	Contr ol	Analysis Level	Time	Delay LOS	LOS	Delay LOS	LOS	Delay LOS	LOS	
Cypress Creek Road & Powerline Road	Signal	Intersection	AM	73.4	E	80.9	F	85.2	F	
Cypress Creek Road & NW 6 th Way	Signal	Intersection	AM	37.4	D	37.3	D	37.4	D	
Powerline Road & Bank Driveway	Stop	Westbound Approach	AM	17.9	с	18.3	с	26.3	D	
Cypress Creek Road &	Char	Northbound Approach	AM	25.7	D	26.7	D	38.3	E	
Bank Driveway	Stop	Westbound Left	AM	< 1.0	А	< 1.0	А	3.9	A	



Mitigation

- If LOS is found to be unacceptable, improvements should be suggested and modeled to show the improvements needed to accommodate the proposed development traffic
- Planned improvements should be vetted with plans and programs from any applicable MPO and transportation authority, as well as the State Transportation Plan and applicable FDOT Work Program





Mitigation

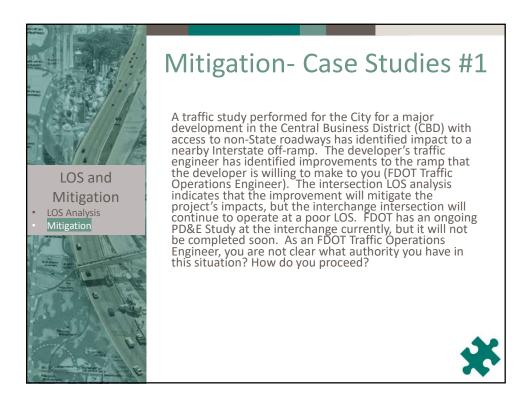
- Reducing transportation impacts can take many forms:
 - Enhancing operational efficiency
 - Reducing demand or increasing system capacity
 - Reduce level of development or phase development impacts with capital improvements
- When adverse transportation impacts are expected on Strategic Intermodal System (SIS) facilities, FDOT should work with local governments and other transportation agencies to identify and agree upon mitigation measures



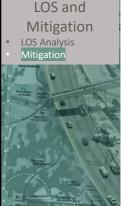


Mitigation-Impact and **Mobility Fee**

- **Impact Fee**
 - One-time charges imposed on new development as a condition of approval
- **Mobility Fee**
 - Charge on new development as a form of mitigation for its impact on a local transportation system.
 - Mobility fees can be used to help establish multimodal friendly land use patterns
 - Ex: Pasco County mobility-fee system assess improvement costs for roadway, transit, and bicycle/pedestrian infrastructure.







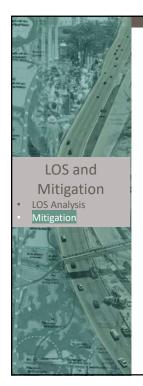
Mitigation- Case Studies #2

A traffic study was performed for the City for the redevelopment of adjacent two (2) parcels separated by a canal along significantly congested arterial (Doral Boulevard & NW 87th Avenue). The study identified several LOS deficiencies and turn lane length deficiencies for both parcels.

The west parcel (Doral Gateway) has an existing full access unsignalized intersection with no permitted westbound leftturn movement. All left-turn movements occur at a directional opening with a short turn lane to the east. The east parcel (Doral Corporate Center) also has an existing full access unsignalized intersection along Doral Boulevard close to Doral Gateway's access point) with another short left-turn lane into the site. Doral Corporate Center has a secondary existing full access unsignalized intersection along NW 87th Avenue that operates poorly.

Although the sites are being redeveloped by the same developer, the sites are owned by separate entities and are require access to the roadway network. The operational analysis clearly indicates that the current access plan will create operational and safety issues once constructed. How does the reviewer proceed?



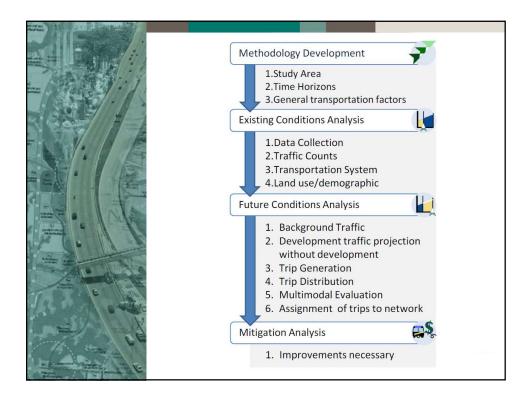


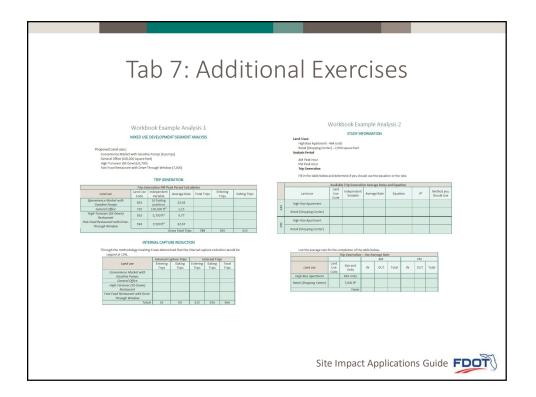
Mitigation- Case Studies #3

A traffic study was performed for the City for a redevelopment of a mixed-use development into a strictly warehousing. The proposed redevelopment is expected to be a decrease in trip generation given the change in uses. However, a traffic study was performed to address proposed changes in access. The traffic study indicates that the adjacent signalized intersection LOS does not meet local standards. Additionally, the northbound through lane drops at the intersection forcing vehicles to make a right-turn. It is apparent from the traffic study that an exclusive northbound right-turn lane would significantly improve operations. How does the reviewer proceed?









Tab 2. Example Problems



Workbook Example for Presentation

PRESENTATION EXAMPLE 1

Sunshine Palm Inc is planning a development that will include a high-turnover (sit-down) restaurant and a coffee/donut shop with a drive-through window.

2,500 ft²

2,100 ft²

Notes:

METHODOLOGY

Study Area Determination

For this example, the study area was determined and will include 2 intersections and 2 access driveways.

Scenarios

Existing Conditions (2017) Background Conditions (no-build) (2019) Buildout Conditions (2019)

Analysis Period

AM Notes:



EXISTING CONDITIONS ANALYSIS

Data Collection





Analysis of Existing Conditions

De	elay and LO	OS Table		2017 Existing			
Intersection	Control	Analysis Level	Time	Delay LOS	LOS		
Cypress Creek Road & Powerline Road	Signal	Intersection	AM	73.4	E		
Cypress Creek Road & NW 6 th Way	Signal	Intersection	AM	37.4	D		
Powerline Road & Bank Driveway	Stop	Westbound Approach	AM	17.9	С		
Cypress Creek Road & Bank Driveway	Stop	Northbound Approach	AM	25.7	D		
a builk Driveway		Westbound Left	AM	< 1.0	A		



FUTURE CONDITIONS ANALYSIS

Growth Rate- For this analysis we will use a 1% growth rate

Trip Generation

Attached are the Trip Generation Tables.

	Т	rip Generation AM Peo	ak Period Calcul	ation		
Land use	Land Use Code	Independent Variable	Average Rate	Total Trips	Entering Trips	Exiting Trips
High-Turnover (Sit-Down) Restaurant	932	2,500 ft ²		25		
Coffee/Donut Shop with Drive-Through Window	937	2,100 ft ²	88.99		95	92

Notes:

Pass-by is not available for these land uses in the AM peak period. For this example, we will use the passby of 50% for the restaurant and 50% for the coffee/donut shop.

1. 10% Rule

Look back on our data collection

- North-Side Roadway: 1,396 + 1,153 = 2,549
- East-West Roadway: 1,186 + 1,793 = 2,979
- Adjustment Shared Volume: 122 + 137 = 259
- o 2,549 + 2,979 259 = 5,269
- 5,269 x 0.01 = **530**



	T	rip Generation AM Peo	ak Period Calcul	ation			
Land use	Land Use Code	Independent Variable	Average Rate	Total Trips	Entering Trips	Exiting Trips	
High-Turnover (Sit-Down) Restaurant	932	2,500 ft ²	9.94	25	14	11	
Coffee/Donut Shop with Drive-Through Window	937	2,100 ft ²	88.99	187	95	92	
			Total	212	109	103	
		Pass	by				
High-Turnover (Sit	t-Down) R	estaurant (50% AM Pa	ss By)	12			
Coffee/Donut Shop wit	h Drive-Tl	hrough Widow (50% Al	И Pass By)	94			
		*Toto	al Pass by Trips	106	53	53	
		External Trips New	v to the System				

2. Calculate pass by and New External Trips

Total Pass by Calculated is 106 which is less than the 10% cap of 530 Because this is not a mixed-use development internal capture is not considered.



Trip Distribution

Distribution of trips to and from the site was determined manually, based on knowledge of the local network, current traffic volumes, and discussion with City staff. The following general assumptions were made:

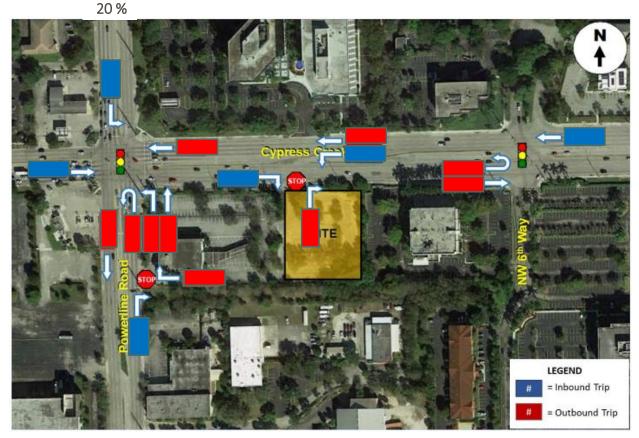




Trip Assignment

Consider:

- Driver tendencies and local behavior (such as the percentage of drivers who choose the first available driveway when multiple options exist, and whether the use will draw local, daily users or regional drivers who are not likely to be familiar with the network).
- Internal circulation design (outbound trips tend to be more evenly distributed amount multiple exits comparted to inbound trips).
- Congestion and travel times by time of day (drivers familiarity with the area may consider avoid a congested left turn, for example).
- Planned network improvements that could modify assignment in one or more horizon years.
- One-way street or other factors that would lead to different inbound and outbound paths.



35 %

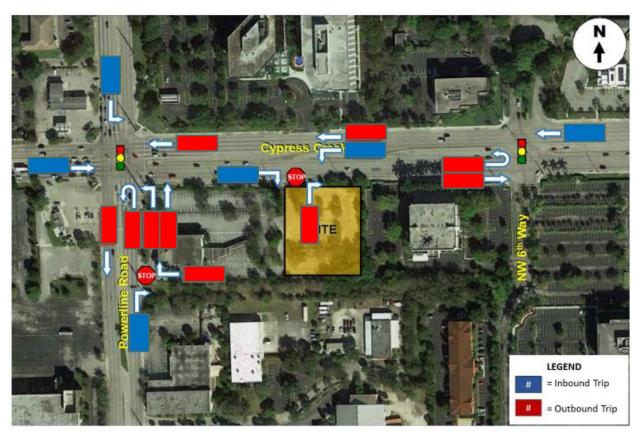
15 %



30 %







Calculate the project volume for each movement using the distribution and the trip generation.



Analysis of Future Conditions

Delay	and LOS	Table		2017 Existing 2019 No Build			uild	2019 Build		
Intersection	Control	Analysis Level	Time	Delay LOS	LOS	Delay LOS	LOS	Delay LOS	LOS	
Cypress Creek Road & Powerline Road	Signal	Intersection	AM	73.4	E	80.9	F	85.2	F	
Cypress Creek Road & NW 6 th Way	Signal	Intersection	AM	37.4	D	37.3	D	37.4	D	
Powerline Road & Bank Driveway	Stop	Westbound Approach	AM	17.9	С	18.3	С	26.3	D	
Cypress Creek Road & Bank Driveway	Stop	Northbound Approach	AM	25.7	D	26.7	D	38.3	E	
bulik Drivewuy		Westbound Left	AM	< 1.0	А	< 1.0	А	3.9	Α	





MITIGATION

- Mitigation is required at locations that are found to operate unacceptable. Agencies set their own criteria for unacceptable operations, and these may vary by agency type and geographic location.
- Typically, individual turning movements or overall intersections operating at LOS E or LOS F are considered to operate unacceptably, and require mitigations.
- Mitigation strategies for locations that are determined to operate unacceptably should be discussed with the review agency.
- When trips from a proposed development cause a deficiency, the proportionate share contribution shall be calculated using the formula below.

Proportionate		Construction cost of the improvement		Number of trips from the proposed development expected to reach roadways during the peak hour from the stage or phase being approved
Share Contribution	=	to maintain or achieve the adopted LOS	Х	Change in the peak hour maximum service volume or roadways resulting from construction of an improvement necessary to maintain or achieve the adopted LOS

If the road is determined to have a deficiency without the project traffic, the improvements necessary to correct the deficiency is the funding responsibility of the entity which maintains the roadway, and the costs to correct that deficiency shall be removed from the project's proportionate-share calculation. The development's proportionate share is then based only on the needed transportation improvements that are greater than that identified deficiency with the necessary improvements in place.

Results of Case Study

In this case study, although LOS F operations were identified at one intersection, it was determined that the deficiencies of this intersection will be addressed as part of the County's Transit Oriented Concurrency system.

Additionally, although LOS E can be expected for each driveway during at least one peak period, this was deemed acceptable as queuing would be contained on site.

No mitigation measures were recommended as part of the study.



Tab 3. FDOT Generalized Tables



Example 2: Applying FDOT Generalized Tables

For the following examples use the 12/18/12 FDOT Generalized Service Volume Tables to determine the LOS along the roadway segments.

 What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 30,000. The roadway is a 4-lane divided state signalized arterial in an urbanized area with a posted speed limit of 50 mph.

Answer:		

- 2. What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 37,900. The roadway is a 4-lane undivided state signalized arterial in an urbanized area with a posted speed limit of 50 mph with exclusive left lanes. Answer: ______
- What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 65,100. The roadway is a 6-lane freeway in a transition area with auxiliary lanes present in both directions. Answer: ______
- What is the LOS of a roadway that has a Peak Hour directional volume of 1,530. The roadway is a 4-lane divided Highway located in a Rural Undeveloped Area.
 Answer: ______
- 5. What is the LOS of a roadway that has a Peak Hour Two-Way volume of 2,500. The roadway is a 4-lane divided Non-State Signalized Roadway with a posted speed limit of 30 mph located in a transition area.

Answer: _____

6. What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 45,000. The roadway is a 6-lane divided state signalized arterial in an urbanized area with a posted speed limit of 50 mph.

Answer: _____



Generalized Annual Average Daily Volumes for Florida's **Urbanized Areas**

'					Urb	anizeu	Areas			
	INTERF	UPTED F	LOW FAC	ILITIES			UNINTE	RRUPTED	FLOW F	ACILITIES
	STATE S	IGNALIZ	ZED ART	FERIAL	S			FREEV	VAYS	
	Class I (40 r	nph or hig	her posted	speed lim	it)			Core Url	oanized	
Lanes	Median	В	С	D	Е	Lanes	В	С		D
2	Undivided	*	16,800	17,700	**	4	47,400	64,00		77,900
4	Divided	*	37,900	39,800	**	6	69,900	95,20		16,600
6	Divided	*	58,400	59,900	**	8	92,500	126,40		54,300
8	Divided	*	78,800	80,100	**	10	115,100	159,70		94,500
	Class II (35 1	nph or slo	wer posted	speed lin	nit)	12	162,400	216,70	0 25	56,600
Lanes	Median	В	C	D	É			Urbar	nized	
2	Undivided	*	7,300	14,800	15,600	Lanes	В	С		D
4	Divided	*	14,500	32,400	33,800	4	45,800	61,50	0 7	74,400
6	Divided	*	23,300	50,000	50,900	6	68,100	93,00		11,800
8	Divided	*	32,000	67,300	68,100	8	91,500	123,50		48,700
			,	,	,	10	114,800	156,00		87,100
	Non-State Si	gnalized	Roadway A	Adjustme	nts		F	Freeway Ad	liustmen	ıts
	(Alte	r correspondi	ing state volu				Auxiliary Lan	les		Ramp
		by the indicat Signalized	ted percent.) Roadways	- 10%		Pres	ent in Both Din + 20.000	rections		Metering + 5%
		-	-				+ 20,000			+ 3%
	Median	Exclusive	2 ane Adju Exclu		djustment	τ	J NINTERF	RUPTED I	FLOW	HIGHWA
Lanes	Median	Left Lane			Factors	Lanes	Median	В	С	D
2	Divided	Yes	N		+5%	2	Undivided	8,600	17,000	24,200
2	Undivided	No	N	0	-20%	4	Divided	36,700	51,800	65,600
Multi	Undivided	Yes	N	0	-5%	6	Divided	55,000	77,700	98,300
Multi	Undivided	No	N		-25%					
-	-	-	Ye	es	+ 5%		Uninterrup	ted Flow H	lighway .	Adjustmen
						Lanes	Median	Exclusive	left lanes	Adjustm
			ity Adjust			2	Divided	Ye	es	+
			nding two-di is table by 0.			Multi	Undivided	Ye		
	VC		is table by 0.	0		Multi	Undivided	N	0	-2
			E MODE ²				shown are presente			
	ultiply motorized ctional roadway					does not	nd are for the autor constitute a standa	rd and should be	used only fo	or general planni
and	citonar road way	volur		, maximulli	501 1100		ons. The computer cific planning appl			
	Paved					not be us	ed for corridor or i	ntersection desig	gn, where mo	ore refined techn
	lder/Bicycle						ons are based on p sit Capacity and Qu			ighway Capacity
	e Coverage	В	С	D	Е					
	0-49%	*	2,900	7,600	19,700		f service for the bi			
	60- 4 9%	2,100	2,900 6,700	19,700	>19,700	of motori	ized vehicles, not r	umber of bicycl	ists or pedest	the first the fi
	5-100%			>19,700	**	³ Buses pe flow.	er hour shown are of	nly for the peak he	our in the sing	le direction of the
			AN MODI				t be achieved using	g table input valu	ie defaults.	
	ultiply motorized ctional roadway					** Not ar	pplicable for that le	evel of service le	tter grade. Fo	or the automobi
une	ctional load way	volur			service	volumes	greater than level of the bic yc	of service D beco	ome F becaus	se intersection c
Sidews	alk Coverage	В	С	D	Е	achievab	le because there is			
	0-49%	ъ *	*	2,800	9,500	value def	faults.			
	60-49% 60-84%	*	1,600	2,800 8,700	15,800					
	5-100%	3,800	10,700	17,400	>19,700					
	BUS MOI		luled Fixe							
Sidews	alk Coverage	B B	C C	D	Е		Department of Tran	sportation		
	0-84%	> 5	≥ 4	≥ 3	≥ 2		Planning Office t.state.fl.us/plannin	a/eveteme/em/le	c/default.cht	m
	5-100%	> 4	≥ 3	≥ 2	≥ 1	www.dot		g/systems/sm/10	sruerauit.Siiti	<u></u>
0.	5 100/0	× T	_ 5	<u> </u>	_ 1					

anes	В	С		D	E
4	45,800	61,50	0 7	4,400	79,900
6	68,100	93,00	0 11	1,800	123,300
8	91,500	123,50	0 14	8,700	166,800
10	114,800	156,00	0 18	7,100	210,300
	F	reeway Ad	ljustmen	ts	
	Freeway AdjustmentsAuxiliary LanesRampPresent in Both DirectionsMetering+ 20,000+ 5%				
Prese	ent in Both Dir	ections		Meterin	g
	+20,000			+ 5%	
U	ININTERR	UPTED 1	FLOW I	HGHW	AYS
anes	Median	В	С	D	E
2	Undivided	8,600	17,000	24,200	33,300
4	Divided	36,700	51,800	65,600	72,600
6	Divided	55,000	77,700	98,300	0 108,800

12/18/12

Ε

84,600

130,600

176,600

222,700

268,900

w Highway Adjustments

Lanes	Median	Exclusive left lanes	Adjustment factors
2	Divided	Yes	+5%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ay annual average daily volumes for levels of k modes unless specifically stated. This table uld be used only for general planning om which this table is derived should be used for The table and deriving computer models should design, where more refined techniques exist. plications of the Highway Capacity Manual and rvice Manual.

edestrian modes in this table is based on number bicyclists or pedestrians using the facility.

eak hour in the single direction of the higher traffic

rice letter grade. For the automobile mode, D become F because intersection capacities have e level of service letter grade (including F) is not um vehicle volume threshold using table input

TABLE 1 (continued)

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

12/18/12

	1					T4	onmunted 1	Flow Fact	itios	12/18/12
	Unin	terrupted	Flow Faci	lities	Interrupted Flow Facilities State Arterials Class I					
INPUT VALUE ASSUMPTIONS						State P			Cla	155 1
	Freeways	Core Freeways	High	ways	Cla	iss I	Cla	ass II	Bicycle	Pedestrian
ROADWAY CHARACTERISTICS										
Area type (u,lu)	lu	lu	u	u	u	u	u	u	u	u
Number of through lanes (both dir.)	4-10	4-12	2	4-6	2	4-8	2	4-8	4	4
Posted speed (mph)	70	65	50	50	45	50	30	30	45	45
Free flow speed (mph)	75	70	55	55	50	55	35	35	50	50
Auxiliary Lanes (n,y)	n	n								
Median (n, nr, r)			n	r	n	r	n	r	r	r
Terrain (l,r)	1	1	1	1	1	1	1	1	1	1
% no passing zone			80							
Exclusive left turn lane impact (n, y)			[n]	у	у	у	у	у	у	у
Exclusive right turn lanes (n, y)					n	n	n	n	n	n
Facility length (mi)	4	4	5	5	2	2	1.9	1.8	2	2
Number of basic segments	4	4								
TRAFFIC CHARACTERISTICS		1				I			1	I
Planning analysis hour factor (K)	0.090	0.085	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
Directional distribution factor (D)	0.547	0.547	0.550	0.550	0.550	0.560	0.565	0.560	0.565	0.565
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)			1,700	2,100	1,950	1,950	1,950	1,950	1,950	1,950
Heavy vehicle percent	4.0	4.0	2.0	2.0	1.0	1.0	1.0	1.0	2.5	2.0
Local adjustment factor	0.91	0.91	0.97	0.98						
% left turns					12	12	12	12	12	12
% right turns					12	12	12	12	12	12
CONTROL CHARACTERISTICS	1									
Number of signals					4	4	10	10	4	6
Arrival type (1-6)					3	3	4	4	4	4
Signal type (a, c, p)					c	c	c	с	c	c
Cycle length (C)					120	150	120	120	120	120
Effective green ratio (g/C)					0.44	0.45	0.44	0.44	0.44	0.44
					0.11	0.15	0.11	0.11	0.11	0.11
MULTIMODAL CHARACTERIST Paved shoulder/bicycle lane (n, y)									n 50% v	n
Outside lane width (n, t, w)									n, 50%, y	n
									t	t
Pavement condition (d, t, u) On-street parking (n, y)									t	
Sidewalk (n, y) Sidewalk/roadway separation(a, t, w)										n, 50%, y
Sidewalk/roadway separation(a, t, w) Sidewalk protective barrier (n, y)										t
Sidewark protective barrier (ii, y)			OF CEDU							n
	T	1	OF SERV	ICE THR				D'1-	D. 1	D
	Freeways	0	-			rials	TI	Bicycle	Ped	Bus
Level of	Density	Two-Lane %ffs	Multilane Density		ts I		ss II	Score	Score	Buses/hr.
Service			2		ts		ts			
В	≤17	> 83.3	≤17	> 31	mph		mph	≤ 2.75	≤ 2.75	≤ 6
С	≤24	> 75.0	≤24	> 23	mph	> 17	mph	≤ 3.50	≤ 3.50	≤ 4
D	≤ 31	> 66.7	≤ 31	> 18	mph	> 13	mph	≤ 4.25	≤4.25	< 3
E	\leq 39	> 58.3	≤ 35	> 15	mph	> 10	mph	≤ 5.00	≤ 5.00	< 2

% ffs = Percent free flow speed ats = Average travel speed

TABLE 2

Generalized Annual Average Daily Volumes for Florida's Transitioning Areas and

TABLE 2	•					Areas and				
		Ar	eas Ov	/er 5,00	0 Not Ir	n Urbanizo	ed Area	s ¹		12/18/12
INTER	RUPTED FLC	OW FACIL	ITIES			UNINTER	RUPTED	FLOW FA	CILITIES	
STATE S	IGNALIZE	ED ARTI	ERIALS	:			FREEV	VAYS		
) mph or highe B * *			E ** **	Lanes 4 6 8 10	B 44,100 65,100 85,100 106,200	C 57,60 85,60 113,70 141,70	0 68 0 102 0 135	D ,900 ,200 ,200 ,800	E 71,700 111,000 150,000 189,000
Lanes Median 2 Undivided 4 Divided 6 Divided Non-State S (Alter		C 6,500 9,900 16,000 Dadway A state volum percent.)	D 13,300 28,800 44,900 djustmen	E 14,200 31,600 47,600	Pres	F Auxiliary Land ent in Both Dir + 20,000		ljustments	Ramp Metering + 5%	
Lanes Median 2 Divided 2 Undivided Multi Undivided Multi Undivided	& Turn Lan Exclusive Left Lanes Yes No Yes No - Way Facility	Exclusi Right La No No No Yes	ive Acones	ljustment Factors +5% -20% -5% -25% + 5%	Lanes 2 4 6 Lanes	JNINTERR Median Undivided Divided Divided Uninterrupt Median	B 9,200 35,300 52,800 ted Flow H Exclusive	C 17,300 49,600 74,500 (ighway A left lanes	D 24,400 62,900 94,300 djustmen Adjustm	E 33,300 69,600 104,500 ts ent factors
Multiply	the correspondi olumes in this ta	ing two-dire			2 Multi Multi	Divided Undivided Undivided	Ye Ye N	es	-4	5% 5% 5%
I (Multiply motorized directional roadway) Paved Shoulder/Bicycle Lane Coverage 0-49% 50-84% 85-100%	lanes to determi volumes B * 1,900	es shown bel ine two-way s.) C 2,600 5,500			service at does not applicatic more spe not be us Calculati the Trans ² Level o of motori	shown are presented nd are for the auton constitute a standar ons. The computer r cific planning appli ed for corridor or ir ons are based on pl it Capacity and Qu. f service for the bic zed vehicles, not n er hour shown are on	nobile/truck mod d and should be models from wh ications. The tal itersection desig anning applicati ality of Service ycle and pedest umber of bicycl	des unless spec used only for tich this table is ole and deriving gn, where more ions of the Higl Manual. rian modes in t ists or pedestria	ifically stated. general planning derived shou geomputer mo refined techninway Capacity his table is bas ans using the f	This table ng d be used for dels should ques exist. Manual and ed on number ac ility.
(Multiply motorized directional roadway Sidewalk Coverage		es shown bel ine two-way	ow by numl maximum s D	ervice E	** Not ap volumes been reac	t be achieved using oplicable for that lee greater than level o bed. For the bicycl le because there is r aults.	vel of service le f service D becc e mode, the leve	t ter grade . For ome F because el of service let	intersection ca ter grade (incl	pacities have iding F) is not
0-49% 50-84% 85-100%	* 3,800 1	1,600 0,500	2,800 8,600 17,100	9,400 15,600 >19,500						
	DE (Schedu s in peak hour in			3						
Sidewalk Coverage 0-84% 85-100%		$C \\ \ge 4 \\ \ge 3$	$\begin{array}{c} D\\ \geq 3\\ \geq 2 \end{array}$	$E \\ \ge 2 \\ \ge 1$	Systems	Department of Trans Planning Office .state.fl.us/planning	-	s/default.shtm		

TABLE 2 (continued)

Generalized Annual Average Daily Volumes for Florida's Transitioning and

Areas Over 5,000 Not In Urbanized Areas

12/18/12

		Interrupted Flow Facilities										
INPUT VALUE	Uninterro	Uninterrupted Flow Facilities				State Arterials						
ASSUMPTIONS	Freeways	High	nways	Cl	ass I			uss II	Bicycle	ess I Pedestriar		
	Tieeways	Ing	Iways	Cla	155 1		Cla	155 11	Dicycle	1 euesuitai		
ROADWAY CHARACTERISTICS								1		1		
Area type (t,uo)	t 10	t	t	t	t		t	t	t	t		
Number of through lanes (both dir.)	4-10	2	4-6	2	4-6		2	4-6	4	4		
Posted speed (mph)	70	50	50	45	50		30	30	45	45		
Free flow speed (mph)	75	55	55	50	55)	35	35	50	50		
Auxiliary lanes (n,y)	n	n	n									
Median (n, nr, r)		n	r	n	у		n	У	r	r		
Terrain (l,r)	1	1	1	1	1		1	1	1	1		
% no passing zone		60										
Exclusive left turn lane impact (n, y)		[n]	у	У	у		у	У	У	У		
Exclusive right turn lanes (n, y)				n	n		n	n	n	n		
Facility length (mi)	8	5	5	1.8	2		2	2	2	2		
Number of basic segments	4											
TRAFFIC CHARACTERISTICS												
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.09	90	0.090	0.090	0.090	0.090		
Directional distribution factor (D)	0.555	0.550	0.550	0.550	0.57	70	0.570	0.565	0.570	0.570		
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.00	00	1.000	1.000	1.000	1.000		
Base saturation flow rate (pcphpl)		1,700	2,100	1,950	1,95	50	1,950	1,950	1,950	1,950		
Heavy vehicle percent	9.0	4.0	4.0	2.0	3.0		2.0	3.0	3.0	3.0		
Local adjustment factor	0.85	0.97	0.95			-						
% left turns				12	12	2	12	12	12	12		
% right turns				12	12		12	12	12	12		
0												
CONTROL CHARACTERISTICS				~			10	10				
Number of signals				5	4		10	10	4	6		
Arrival type (1-6)				4	3		4	4	4	4		
Signal type (a, c, p)				С	c		с	с	С	с		
Cycle length (C)				120	150		120	150	120	120		
Effective green ratio (g/C)				0.44	0.4	5	0.44	0.45	0.44	0.44		
MULTIMODAL CHARACTERISTIC	S											
Paved shoulder/bicycle lane (n, y)									n, 50%, y	n		
Outside lane width (n, t, w)									t	t		
Pavement condition (d, t, u)									t			
On-street parking (n, y)									n	n		
Sidewalk (n, y)										n, 50%, y		
Sidewalk/roadway separation (a, t, w)		+			1			1		t		
Sidewalk protective barrier (n, y)												
Sucwaik protective battlet (II, y)		1			1					n		
		1	RVICE TI	HRESHOI					_	1		
Level of	Freeways	_	iways		Arter			Bicycle	Ped	Bus		
Service	Density	Two-Lane	Multilane	Class	I	Class II		Score	Score	Buses/hr.		
	_ 2115109	%ffs	Density	ats		ats						
В	≤ 17	> 83.3	≤ 17	> 31 m	ph	> 2	22 mph	\leq 2.75	≤ 2.75	≤ 6		
С	≤ 24	> 75.0	≤ 24	> 23 m	ph	> 1	l7 mph	≤ 3.50	≤ 3.50	≤4		
D	≤ 31	> 66.7	≤ 31	> 18 m	ph	> 1	13 mph	≤ 4.25	≤4.25	< 3		
 E	≤ 39	> 58.3	≤ 35	> 15 m	-		10 mph	≤ 5.00	≤ 5.00	< 2		
Ľ		/ 50.5	_ 55	~ 15 III	- Pri	/1	io mpn	_ 5.00	_ 5.00	~ 4		

% ffs = Percent free flow speed ats = Average travel speed

TABLE 3

Generalized Annual Average Daily Volumes for Florida's Rural Undeveloped Areas and Developed Areas Less Than 5.000 Population¹

			De	velope	ed Areas I	ess Th	an 5 <i>,</i> 000 l	Populat	ion¹		12/18/12		
	INTERR	UPTED F	LOW FAC	ILITIES			UNINTEI	RRUPTED	FLOW FA	CILITIES			
	STATE SI	GNALIZ	ZED AR	FERIAL	S			FREE	WAYS				
Lanes	Median	В	С	D	Е	Lanes	В	С		D	Е		
2	Undivided	*	12,900	14,200) **	4	28,800	43,00	0 52	2,300	60,000		
4	Divided	*	29,300	30,400) **	6	43,000	64,00	00 78	3,300	92,500		
6	Divided	*	45,200	45,800) **	8	57,500	85,40	00 104	,400	123,500		
		r correspondi	ing state volu ted percent.)		ents	Freeway Adjustments Auxiliary Lanes Present in Both Directions + 20,000							
	Median	& Turn L	ane Adiu	stments									
		Exclusive			Adjustment	L (JNINTERR	UPTED	FLOW H	IGHWA	YS		
Lanes	Median	Left Lane	s Right		Factors			Rural Und	leveloped				
2	Divided	Yes	N		+5%	Lanes	Median	B	С	D	Е		
2	Undivided	No	N		-20%	2	Undivided	4,700	8,400	14,300	28,600		
Multi	Undivided	Yes	N		-5%	4	Divided	25,700	40,300	51,000	57,900		
Multi	Undivided	No _	N Ye		-25% + 5%	6	Divided	38,800	60,400	76,700	86,800		
			1	28	1 570			Davalana	JAnoog				
	One-V	Vay Facil	itv Adiust	tment		Lanes	Median	Develope B	C Areas	D	Е		
		he correspon				Lalles 2	Undivided	в 8,700	16,400	23,100	31,500		
	vo	lumes in thi	s table by 0.	.6		4	Divided	25,900	40,700	23,100 52,400	59,600		
						6	Divided	38,800	40,700 61,000	78,400	89,500		
						0	Divided	30,000	01,000	78,400	89,500		
	B ultiply motorized actional roadway l		mes shown t mine two-wa	below by nu		Alter L	OS B-D volum	nes in propos e highway se	egment lengt	passing lane th djustmen t	-		
	_					2	Divided		es	6	5%		
		Rural Uno	leveloped			Multi	Undivided		es		5%		
	Paved					Multi	Undivided	N N			5%		
	lder/Bicycle	р	C	р	Б								
	e Coverage	B *	C 1,300	D	E 3,200	¹ Values of	shown are presented	1 as two-way ar	nual average d	aily volumes fo	or levels of		
	0-49% 50-84%	1,000	2,100	2,000 3,200	,	service a	nd are for the autor	nobile/truck mo	des unless spec	ifically stated.	This table		
	5-100%	2,600	2,100 3,900	18,500			constitute a standar ons. The computer						
0.	5 10070	Develope	,	10,500	10,000	not be us	cific planning appl ed for corridor or in ons are based on pl	ntersection desi	gn, where more	refined techni	ques exist.		
	Paved						sit Capacity and Qu				and and		
	lder/Bicycle					² Level o	f service for the bic	vole and nedeo	trian modes in t	his table is bas	ed on number		
	e Coverage	В	С	D	E		ized vehicles, not n						
	0-49%	*	2,300	4,900		* Conro	t be achieved using	table input us	ue defaulto				
	50-84%	1,700		13,300	18,500	Canno	e de achieved using	, table input val	ue derauns.				
8:	5-100%	5,900	18,500	>18,500	**		pplicable for that le greater than level of						
	PEI ultiply motorized ectional roadway l		mes shown t mine two-wa	below by nu		been read	whed. For the bic yell le because there is	le mode, the lev	el of service let	ter grade (inclu	uding F) is not		
Sidewa	alk Coverage	В	С	D	Е								
	0-49%	*	*	2,700	9,200	Source:							
	50-84%	*	1,500	8,400	14,900		Department of Trans Planning Office	sportation					
	5-100%	3,600	10,200	16,700			t.state.fl.us/planning	g/systems/sm/lc	s/default.shtm				
8	5-100%	3,000	10,200	10,700	>19,200	www.do	state.ri.us/plannin	g/systems/sm/lo	s/derault.shtm				

TABLE 3 (continued)

Generalized Annual Average Daily Volumes for Florida's Rural Undeveloped Areas and

Developed Areas Less Than 5,000 Population

12/18/12

INPUT VALUE		Uninterru	pted Flow	Facilities	Interrupted Flow Facilities						
ASSUMPTIONS	Freeways		High	ways		Arte	rials	Bicy	vcle	Pedestria	
ROADWAY CHARACTERISTIC	S										
Area type (ru, rd)	rural	ru	ru	rd	rd	rd	rd	ru	rd	rd	
Number of through lanes (both dir.)	4-8	2	4-6	2	4-6	2	4-6	4	4	2	
Posted speed (mph)	70	55	65	50	55	45	45	55	45	45	
Free flow speed (mph)	75	60	70	55	60	50	50	60	50	50	
Auxiliary lanes (n,y)	n										
Median (n, nr, r)		n	r	n	r	n	r	r	r	n	
Terrain (l,r)	1	1	1	1	1	1	1	1	1	1	
% no passing zone		20		60							
Exclusive left turn lanes (n, y)		[n]	у	[n]	у	у	у	у	у	у	
Exclusive right turn lanes (n, y)						n	n	n	n	n	
Facility length (mi)	14	10	10	5	5	1.9	2.2	4	2	2	
Number of basic segments	4	-		-	-						
FRAFFIC CHARACTERISTICS	II.		II					11		1	
Planning analysis hour factor (K)	0.105	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.09	
Directional distribution factor (D)	0.555	0.550	0.550	0.550	0.550	0.550	0.550	0.570	0.570	0.550	
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Base saturation flow rate (pcphpl)	1.000	1,700	2,300	1,700	2,200	1,950	1,950	1,950	1,950	1,950	
Heavy vehicle percent	12.0	5.0	12.0	4.0	4.0	3.0	3.0	6.0	3.5	3.0	
Local adjustment factor	0.84	0.88	0.73	0.97	0.82	5.0	5.0	0.0	5.5	5.0	
% left turns	0.04	0.00	0.75	0.77	0.82	12	12		12	12	
% right turns						12	12		12	12	
						12	12		12	12	
CONTROL CHARACTERISTICS						5	6	2	4	4	
Number of signals						3	6	3	4	4	
Arrival type (1-6)							-		-	_	
Signal type (a, c, p) Cycle length (C)						с 90	<u>с</u> 90	a 60	a 90	a 90	
Effective green ratio (g/C)						0.44	0.44	0.37	0.44	0.44	
						0.44	0.44	0.57	0.44	0.44	
MULTIMODAL CHARACTERIS	TICS							500/	500/		
Paved shoulder/bicycle lane (n, y)								n,50%,y	n,50%,y		
Outside lane width (n, t, w)								t	t	t	
Pavement condition (d, t, u)								t	t		
Sidewalk (n, y)										n,50%	
Sidewalk/roadway separation(a, t,w)										t	
Sidewalk protective barrier (n, y)										n	
		LEVEI	OF SERV	VICE THE	RESHOLD						
Level of	Free	ways	Two-L	0 20 21	Two-L	High		lane ru	Multi	lane rd	
Service	Dens	ity	%tsf	ats	1 w0-L %f			nsity		nsity	
В	≤ 1	,	≤ 50	< 55	> 83			,		14	
<u>С</u>	≤ 1 ≤ 2		≤ 50 ≤ 65	<u><</u> 50	> 7:					22	
CD	≤ 2		≤ 0.0 ≤ 80	<u>< 30</u> < 45	> 60					22	
<u> </u>	≤ 2 ≤ 3		≥ 80 > 80	<u><43</u> <u><40</u>	> 58		<u> </u>			34	
2		~	2.00	<u> </u>	- 50						
Level of		Arteria	s		Bic	ycle		Pe	destrian		
Service	Ma	jor City/C			Score			Scor			
В		> 31 mp			≤ 2				≤ 2.75		
С		> 23 mp			≤ 3				≤ 3.50		
D		> 18 mp			≤ 4				≤ 4.25		
E		> 15 mp			 ≤ 5				≤ 5.00		

%tsf = Percent time spent following %ffs = Percent of free flow speed ats = Average travel speed ru = Rural undeveloped rd = Rural developed

Generalized **Peak Hour Two-Way** Volumes for Florida's **Urbanized Areas**¹

	ADLL 4				Urb	anizeu	Areas				
	INTERR			ITIES							12/18/12
					~		UNINTER			CILITILS	
	STATE SI Class I (40	IGNALIZI mph or highe				Lanes 4	в 4,120	FREEV C 5,54		D 5,700	Е 7,190
Lanes	Median	B	C C	D	E	6	4,120 6,130	8,37),060	11,100
2	Undivided	*	1,510	1,600	**	8	8,230	11,10		3,390	15,010
4	Divided	*	3,420	3,580	**	10	10,330	14,04		5,840	18,930
6	Divided	*	5,250	5,390	**	12	14,450	18,88		2,030	22,860
8	Divided	*	7,090	7,210	**	12	11,100	10,00	0	,000	22,000
	Class II (35	mph or slow	er posted s	peed limit)			reeway Ad	justment	5	
Lanes	Median	В	С	D	E		Auxiliary Lane			Ramp	
2	Undivided	*	660	1,330	1,410	Pres	ent in Both Dire	ections		Metering	
4	Divided	*	1,310	2,920	3,040		+1,800			+ 5%	
6	Divided	*	2,090	4,500	4,590						
8	Divided	*	2,880	6,060	6,130						
	1	gnalized Ro r corresponding by the indicated Signalized Ro	g state volum l percent.)		nts						
	Median	& Turn La				Ιī	UNINTERR	UPTED F	TOW H	IGHWA	YS
T	Madian	Exclusive	Exclus		djustment	Lanes	Median	B	C	D	E
Lanes 2	Median Divided	Left Lanes Yes	Right La No	anes	Factors +5%	2	Undivided	770	1,530	2,170	2,990
2	Undivided	No	No		+3% -20%	4	Divided	3,300	4,660	5,900	6,530
Multi	Undivided	Yes	No		-5%	6	Divided	4,950	6,990	8,840	9,790
Multi	Undivided	No	No		-25%	Ŭ	Diffacta	1,200	0,770	0,010	,,,,,
-	-	-	Yes		+ 5%		Uninterrupt	ed Flow H	ighway A	djustment	S
						Lanes	Median	Exclusive			ent factors
		Nay Facility				2	Divided	Ye	s	+5	5%
		he correspond		ectional		Multi	Undivided	Ye	s	-5	%
	vo	olumes in this t	able by 0.6			Multi	Undivided	No	D	-25	5%
direc	B Itiply motorized ctional roadway I Shoulder/Bicy	lanes to determ volume	es shown bel ine two-way			are for the constitute computer planning corridor	shown are presented ne automobile/truck e a standard and sho r models from whicl g applications. The ta or intersection desig	modes unless sp uld be used only n this table is de and deriving n, where more n	becifically state y for general perived should b g computer more refined technic	ed. This table de lanning applicate used for more odels should not use exist. Calcu	oes not ations. The e specific t be used for ulations are
	ne Coverage	B	С	D	Е		planning applicatio		ay Capacity N	Ianual and the	Fransit
La	0-49%	В *	260	680	1,770		and Quality of Serv				
	50-84%	190	200 600	1,770	>1,770		of service for the bic rized vehicles, not m				
	85-100%	830		>1,770	**				•	0	
	DF	DESTRIA				flow.	er hour shown are on	ly for the peak ho	our in the single	direction of the	higher traffic
(Mu	ltiply motorized				ber of	* Canno	ot be achieved using	table input valu	e defaults.		
· · ·	ctional roadway l	lanes to determ	ine two-way	2			-	-			
		volume	s.)				pplicable for that le greater than level of				
Sidev	walk Coverag	e B	С	D	Е		ched. For the bic ycl				
	0-49%	*	*	250	850	achievab	le because there is r				
	50-84%	*	150	780	1,420	value det	raults.				
	85-100%	340	960	1,560	>1,770						
	BUS MOD	E (Schedu in peak hour in) ³						
C:da-		-	-		F	Source:					
Sidev	walk Coverag 0-84%	e B > 5	C	D	E		Department of Trans Planning Office	portation			
	0-84% 85-100%		≥ 4	≥ 3	≥ 2		t.state.fl.us/planning	/systems/sm/los	s/default.shtm		
	03-100%	>4	≥ 3	≥ 2	≥ 1						

TABLE 4 (continued)

Generalized **Peak Hour Two-Way** Volumes for Florida's **Urbanized Areas**

	Uninterri	ipted Flow	/ Facilities				terrupted F	low Facili		
INPUT VALUE ASSUMPTIONS	Ommerre		racintics		S	tate A	Arterials		Cla	ss I
	Freeways	High	Highways		Class I			Class II		Pedestrian
ROADWAY CHARACTERISTICS										
Area type (lu, u)	lu	u	u	u	u		u	u	u	u
Number of through lanes (both dir.)	4-12	2	4-6	2	4-	8	2	4-8	4	4
Posted speed (mph)	70	50	50	45	50)	30	30	45	45
Free flow speed (mph)	75	55	55	50	55	5	35	35	50	50
Auxiliary lanes (n,y)	n									
Median (n, nr, r)		n	r	n	r		n	r	r	r
Terrain (l,r)	1	1	1	1	1		1	1	1	1
% no passing zone		80								
Exclusive left turn lane impact (n, y)		[n]	у	у	у	,	у	у	у	у
Exclusive right turn lanes (n, y)				n	n	l	n	n	n	n
Facility length (mi)	4	5	5	2	2		1.9	1.8	2	2
Number of basic segments	4									
TRAFFIC CHARACTERISTICS										
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.0	90	0.090	0.090	0.090	0.090
Directional distribution factor (D)	0.547	0.550	0.550	0.550	0.5	60	0.565	0.560	0.565	0.565
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.0	00	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)		1,700	2,100	1,950	1,9	50	1,950	1,950	1,950	1,950
Heavy vehicle percent	4.0	2.0	2.0	1.0	1.	0	1.0	1.0	2.5	2.0
Local adjustment factor	0.91	0.97	0.98							
% left turns				12	12	2	12	12	12	12
% right turns				12	12	2	12	12	12	12
CONTROL CHARACTERISTICS										
Number of signals				4	4		10	10	4	6
Arrival type (1-6)				3	3		4	4	4	4
Signal type (a, c, p)				с	с		с	с	с	с
Cycle length (C)				120	15		120	120	120	120
Effective green ratio (g/C)				0.44	0.4		0.44	0.44	0.44	0.44
MULTIMODAL CHARACTERISTIC	S	1					1	I	1	I
Paved shoulder/bicycle lane (n, y)	5								n, 50%, y	n
Outside lane width (n, t, w)									t	t
Pavement condition (d, t, u)									t	
On-street parking (n, y)									n	n
Sidewalk (n, y)										n, 50%, y
Sidewalk/roadway separation (a, t, w)										t
Sidewalk protective barrier (n, y)										n
	IF	VEL OF S	ERVICE T	HRESHO					1	
	Freeways		iways		Arte	rials		Bicycle	Ped	Bus
Level of Service	Density	Two-Lane %ffs	Multilane Density	Class	I	(Class II ats	Score	Score	Buses/hr.
B	≤ 17	> 83.3	≤ 17	> 31 m	ph	>	22 mph	≤ 2.75	≤ 2.75	≤6
C	≤ 24	> 75.0	≤ 24	> 23 m	-		17 mph	≤ 3.50	≤ 3.50	0 ≤4
D	<u>≤ 24</u> ≤ 31	> 66.7	≤ 24 ≤ 31	> 23 m > 18 m	-		13 mph	≤ 3.50 ≤ 4.25	≤ 3.30 ≤ 4.25	< 3
B	≤ 39	> 58.3	≤ 31 ≤ 35	> 10 m	-		10 mph	≤ 4.23 ≤ 5.00	≤ 4.23 ≤ 5.00	<2
E	<u>> 39</u>	> 30.3	\geq 33	> 13 m	Ып	>	10 mpn	≥ 3.00	≥ 3.00	< 2

% ffs = Percent free flow speed ats = Average travel speed

TABLE 5

Generalized **Peak Hour Two-Way** Volumes for Florida's **Transitioning** and

7	TABLE 5				Trar	sitioni	ng and				
			Α	reas O	ver 5,00	0 Not Ir	n Urbanize	ed Area	s ¹		12/18/12
	INTERR	UPTED FLC						RUPTED			1 -1
	STATE SI	GNALIZI	ED ART	ERIALS	5			FREEV	WAYS		
Lanes 2 4 6 Lanes 2 4 6	Class I (40 Median Undivided Divided Class II (35 Median Undivided Divided Divided	mph or highe B * * * mph or slow B * *	er posted sp C 1,300 3,060 4,690 er posted sp C 580 890 1,440	beed limit) D 1,460 3,200 4,820 peed limit) D 1,200 2,590 4,040	E *** ** E 1,280 2,850 4,280	Lanes 4 6 8 10 Pres	B 3,970 5,860 7,660 9,550 F Auxiliary Land ent in Both Dird + 1,800	C 5,19 7,71 10,23 12,75 reeway Ad	00 6 0 9 30 12 30 15	D 5,200 9,190 2,170 5,190 S Ramp Metering + 5%	E 6,460 9,990 13,500 17,010
	È	corresponding by the indicated Signalized Ro	g state volum l percent.)		115						
Lanes 2 2 Multi Multi -	Median Divided Undivided Undivided – One-V Multiply tl	& Turn La Exclusive Left Lanes Yes No Yes No - Vay Facility he correspond lumes in this t	Exclus Right La No No No Yes y Adjustn ing two-dire	ive Adanes	djustment Factors +5% -20% -5% -25% + 5%	Lanes 2 4 6 Lanes 2 Multi	JNINTERR Median Undivided Divided Divided Uninterrupt Median Divided Undivided	B 820 3,170 4,750 ed Flow H Exclusive Yo Yo	C 1,550 4,460 6,700 (lighway A left lanes es es	D 2,190 5,660 8,480 djustments Adjustments -59	E 2,990 6,260 9,400 5 nt factors %
dire Paved La (M dire	B aultiply motorized ectional roadway 1 Shoulder/Bicy me Coverage 0-49% 50-84% 85-100% PEI aultiply motorized ectional roadway 1 ewalk Coverage 0-49% 50-84% 85-100%	ICYCLE vehicle volume volume volume volume rcle B * 170 670 DESTRIA vehicle volume anes to determ volume e B * * 340	MODE ² es shown be ine two-way s.) C 140 500 1,760 N MODI es shown be ine two-way s.) C * 150 950	maximum s D 550 1,650 >1,760 E^2 low by number maximum s D 250 780 1,540	E 1,760 >1,760 ** ber of service E 850 1,410 >1,760	are for th constitut computer planning corridor based on Capacity ² Level o of motor ³ Buses p flow. * Canno ** Not aj volumes been read	Undivided shown are presented te automobile/truck e a standard and sho r models from which applications. The ta or intersection desig planning applicatio and Quality of Serv f service for the bic ized vehicles, not nu er hour shown are only t be achieved using pplicable for that level greater than level of the content of the bic year le because there is r faults.	modes unless s vuld be used onl h this table is du ble and derivin n, where more ns of the Highwice Manual. ycle and pedest umber of bicycl ly for the peak h table input value vel of service le f service D becc e mode, the leve	wo-way volum pecifically stat ly for general p erived should b g computer me refined technic way Capacity M rian modes in t lists or pedestri our in the single ne defaults. etter grade. For ome F because el of service let	ed. This table do planning applicat be used for more odels should not ques exist. Calcu Aanual and the T this table is base ans using the fac direction of the h the automobile intersection cap tter grade (includ	ervice and es not ions. The specific be used for lations are ransit d on number ility. igher traffic mode, acities have ling F) is not
Side	BUS MOD (Buses) walk Coverage 0-84% 85-100%	in peak hour in			$ \begin{array}{c} E \\ \geq 2 \\ \geq 1 \end{array} $	Systems	Department of Trans Planning Office t.state.fl.us/planning	-	s/default.shtm		

TABLE 5 (continued)

Generalized **Peak Hour Two-Way** Volumes for Florida's Transitioning Areas and Areas Over 5,000 Not In Urbanized Areas

12/18/12

	Uninterr	upted Flow	Facilities	Interrupted Flow Facilities							
INPUT VALUE ASSUMPTIONS						tate A	rterials	Cl		lass I	
	Freeways	High	nways	Cla	ass I		Cla	ss II	Bicycle	Pedestria	
ROADWAY CHARACTERISTICS											
Area type (t,uo)	t	t	t	t	t		t	t	t	t	
Number of through lanes (both dir.)	4-10	2	4-6	2	4-	6	2	4-6	4	4	
Posted speed (mph)	70	50	50	45	5	0	30	30	45	45	
Free flow speed (mph)	75	55	55	50	5	5	35	35	50	50	
Auxiliary lanes (n,y)	n	n	n								
Median (n, nr, r)		n	r	n	У	/	n	у	r	r	
Terrain (l,r)	1	1	1	1	1		1	1	1	1	
% no passing zone		60									
Exclusive left turn lane impact (n, y)		[n]	у	у	У	/	у	у	у	у	
Exclusive right turn lanes (n, y)				n	r		n	n	n	n	
Facility length (mi)	8	5	5	1.8	2	2	2	2	2	2	
Number of basic segments	4										
TRAFFIC CHARACTERISTICS											
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.0	90	0.090	0.090	0.090	0.090	
Directional distribution factor (D)	0.555	0.550	0.550	0.550	0.5	70	0.570	0.565	0.570	0.570	
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.0	00	1.000	1.000	1.000	1.000	
Base saturation flow rate (pcphpl)		1,700	2,100	1,950	1,9	50	1,950	1,950	1,950	1,950	
Heavy vehicle percent	9.0	4.0	4.0	2.0	3.	0	2.0	3.0	3.0	3.0	
Local adjustment factor	0.85	0.97	0.95								
% left turns				12	12	2	12	12	12	12	
% right turns				12	12	2	12	12	12	12	
CONTROL CHARACTERISTICS											
Number of signals				5	4	ŀ	10	10	4	6	
Arrival type (1-6)				4	3	3	4	4	4	4	
Signal type (a, c, p)				с	c	;	с	с	с	с	
Cycle length (C)				120	15	50	120	150	120	120	
Effective green ratio (g/C)				0.44	0.4	45	0.44	0.45	0.44	0.44	
MULTIMODAL CHARACTERISTIC	S										
Paved shoulder/bicycle lane (n, y)									n, 50%, y	n	
Outside lane width (n, t, w)									t	t	
Pavement condition (d, t, u)									t		
On-street parking (n, y)									n	n	
Sidewalk (n, y)										n, 50%, y	
Sidewalk/roadway separation (a, t, w)		+			1				+	t	
Sidewalk protective barrier (n, y)										n	
Shewark protective burner (ii, y)										п	
			RVICE TI	HRESHOI				D!1-	D-J	D	
Level of	Freeways	-	iways	~	Arte		a. 	Bicycle	Ped	Bus	
Service	Density	Two-Lane	Multilane	Class	1	(Class II	Score	Score	Buses/hr.	
В	≤ 17	%ffs > 83.3	Density ≤ 17	ats > 31 m	nh	~	ats 22 mph	≤ 2.75	≤ 2.75	≤6	
C	≤ 17 ≤ 24	> 75.0	≤ 17 ≤ 24	> 31 m	-		17 mph	≤ 2.73 ≤ 3.50	≤ 2.73 ≤ 3.50		
C					-		-			≤ 4	
ν	≤ 3 1	> 66.7	≤ 31	> 18 m	рп	>	13 mph	≤4.25	≤4.25	< 3	

% ffs = Percent free flow speed ats = Average travel speed

 \leq 39

> 58.3

 \leq 35

> 15 mph

Е

 ≤ 5.00

 \leq 5.00

> 10 mph

< 2

TABLE 6

Generalized **Peak Hour Two-Way** Volumes for Florida's **Rural Undeveloped Areas** and **Developed Areas Less Than 5,000 Population**¹

-			Dev	veloped	d Areas I	ess Th	an 5 <i>,</i> 000 P	opulati	ion ¹	:	12/18/12
	INTERR	UPTED FLC	OW FACI	LITIES			UNINTER	RUPTED	FLOW FA	CILITIES	
	STATE SI	GNALIZI	ED ART	ERIALS	5			FREEV	VAYS		
Lanes	Median	В	С	D	Е	Lanes	В	С		D	Е
2	Undivided	*	1,220	1,350	**	4	3,020	4,51	0 5	,490	6,300
4	Divided	*	2,790	2,890	**	6	4,510	6,72	8 8	,220	9,720
6	Divided	*	4,300	4,350	**	8	6,040	8,97	0 10	,960	12,970
	b	gnalized Ro corresponding y the indicated Signalized Ro	state volui percent.)		nts			Auxiliary	h Directions		
	Median a	& Turn La Exclusive	ne Adjus Exclu		djustment	τ	J NINTERR	UPTED I	FLOW H	IGHWAY	YS
Lanes	Median	Left Lanes	Right L		Factors		1	Dunal Und	lovalanad		
2	Divided	Yes	Ň		+5%	Lanes	Median	Rural Und B	C	D	Е
2	Undivided	No	No		-20%	2	Undivided	440	790	1,350	2,710
Multi	Undivided	Yes	No		-5%	4	Divided	2,440	3,820	4,840	5,500
Multi	Undivided	No _	No Ye		-25% + 5%	6	Divided	3,680	5,730	7,280	8,240
_	_	_	10	5	+ 570				,	- ,	- 7 -
	One-W	ay Facility	Adjusti	ment		Lanes	Median	Develope B	C C	D	Е
	Multiply th	e correspond	ing two-dii	rectional		2	Undivided	820	1,550	2,190	2,990
	vol	umes in this t	able by 0.6	5		4	Divided	2,460	3,860	4,970	5,660
						6	Divided	3,680	5,790	7,440	8,500
						Ŭ	Divided	2,000	5,770	7,110	0,200
	B	ICYCLE	MODE ²	2		Alter L	OS B-D volum	es in propoi	Adjustment tion to the programmed to the programmed by the second second second second second second second second second s the second	assing lane	length to
	ultiply motorized	vehicle volume	es shown be	elow by num			uie	ingiiway se	ginent lengt	11	
dire	ctional roadway la	nes to determi volumes		y maximum s	service		Uninterrupt				
			~ • • •			Lanes	Median	Exclusive		Adjustme	
	R	Rural Unde	veloped			2	Divided	Ye		+59	
	Shoulder/Bicy	cle				Multi	Undivided	Ye		-59	
La	ne Coverage	В	С	D	E	Multi	Undivided	N	0	-25	%
	0-49%	*	120	190	300	1.7.1			1	C 1 1 C	· ,
	50-84%	100	200	310	>1,010	are for th	shown are presented a automobile/truck	as peak hour t modes unless s	wo-way volume pecifically state	es for levels of s ed. This table do	ervice and
	85-100%	250	370	1,760	>1,760		e a standard and sho				
		Developed	Areas				r models from which applications. The ta				
Paved S	Shoulder/Bicy						or intersection desig planning application				
La	ne Coverage	В	С	D	Е		and Quality of Serv		way Capacity M	anuar and the 1	i diis it
	0-49%	*	220	460	1,480				rion modes is a	his table is to	d on ruml
	50-84%	170	430	1,270	>1,760		f service for the bicy				
	85-100%	560	1,760	>1,760	**	* Come	t be achieved using	table input val	10 defaulto		
	PFI	DESTRIA	ΝΜΟΡ	\mathbf{E}^2				-			
(Mı	ultiply motorized				ber of		pplicable for that lev greater than level of				
	ctional roadway la		ine two-way			been read achievab	ched. For the bicycle le because there is n	e mode, the leve	el of service let	ter grade (includ	ling F) is not
Side	walk Coverage	в	С	D	Е	value del	auits.				
	0-49%	*	*	220	840	Source:					
	50-84%	*	120	780	1,390		Department of Trans	portation			
						0	Planning Office				
Side		• B *	C *	220	840	value det <i>Source:</i>	faults. Department of Transj				

TABLE 6 (continued)

Generalized **Peak Hour Two-Way** Volumes for Florida's **Rural Undeveloped Areas** and **Developed Areas Less Than 5,000 Population**

12/18/12

INPUT VALUE	י	Uninterru	pted Flow	Facilities		Interrupted Flow Facilities					
ASSUMPTIONS	Freeways		High	ways		Arte	rials	Bic	ycle	Pedestrian	
ROADWAY CHARACTERISTIC	S										
Area type (ru, rd)	rural	ru	ru	rd	rd	rd	rd	ru	rd	rd	
Number of through lanes (both dir.)	4-8	2	4-6	2	4-6	2	4-6	4	4	2	
Posted speed (mph)	70	55	65	50	55	45	45	55	45	45	
Free flow speed (mph)	75	60	70	55	60	50	50	60	50	50	
Auxiliary lanes (n,y)	n										
Median (n, nr, r)		n	r	n	r	n	r	r	r	n	
Terrain (l,r)	1	1	1	1	1	1	1	1	1	1	
% no passing zone		20		60							
Exclusive left turn lanes (n, y)		[n]	у	[n]	у	у	у	у	у	у	
Exclusive right turn lanes (n, y)		[]	5	[]	5	n	n	n	n	n	
Facility length (mi)	14	10	10	5	5	1.9	2.2	4	2	2	
Number of basic segments	4	10	10	5	5	1.7	2.2		2	2	
_	4										
TRAFFIC CHARACTERISTICS	0.107		0.005	0.007	0.007	0.007		0.007		0.007	
Planning analysis hour factor (K)	0.105	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	
Directional distribution factor (D)	0.555	0.550	0.550	0.550	0.550	0.550	0.550	0.570	0.570	0.550	
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	
Base saturation flow rate (pcphpl)		1,700	2,300	1,700	2,200	1,950	1,950	1,950	1,950	1,950	
Heavy vehicle percent	12.0	5.0	12.0	4.0	4.0	3.0	3.0	6.0	3.5	3.0	
Local adjustment factor	0.84	0.88	0.73	0.97	0.82						
% left turns						12	12		12	12	
% right turns						12	12		12	12	
CONTROL CHARACTERISTICS	5										
Number of signals						5	6	2	4	4	
Arrival type (1-6)						3	3	3	3	3	
Signal type (a, c, p)						с	с	а	а	а	
Cycle length (C)						90	90	60	90	90	
Effective green ratio (g/C)						0.44	0.44	0.37	0.44	0.44	
· · · · · ·	TICS										
MULTIMODAL CHARACTERIS								n 500/ m	m 500/		
Paved shoulder/bicycle lane (n, y)								n,50%,y	n,50%,y	n	
Outside lane width (n, t, w)								t	t	t	
Pavement condition (d, t, w)								t	t	500/	
Sidewalk (n, y)										n,50%,y	
Sidewalk/roadway separation(a, t,w)										t	
Sidewalk protective barrier (n, y)										n	
		LEVEI	L OF SER	VICE THE	RESHOLI						
Level of	Freev	VOVC				High	ways				
Service	The	vays	Two-L	ane ru	Two-L	ane rd	Multi	lane ru		lane rd	
Service	Dens	-	%tsf	ats		ffs		nsity		nsity	
В	≤ 1		≤ 50	<u><</u> 55	> 8.		\leq			14	
С	≤ 2		≤65	<u><</u> 50	> 7:	5.0	≤ 1			22	
D	≤ 2	9	≤ 80	<u><</u> 45	> 6	6.7	≤ 2			29	
Е	≤ 36		> 80	<u><</u> 40	> 53	8.3	≤ 1	34	≤	34	
Level of	<u> </u>	Antonia	le.		Dia	velo		D.	edestrian		
Level of Service	Ma	Arterial			Bic	ore		P	Score		
B	IVIA					.75			≤ 2.75		
<u> </u>		> 31 mp									
	<u> </u>	> 23 mp				.50			≤ 3.50		
D		> 18 mp				.25			≤ 4.25		
E	1	>15 mp	n		≤ 5	.00			≤ 5.00		

%tsf = Percent time spent following %ffs = Percent of free flow speed ats = Average travel speed ru = Rural undeveloped rd = Rural developed

Generalized **Peak Hour Directional** Volumes for Florida's **Urbanized Areas**¹

UNITERUPTED FLOW FACILITIESUNITERUPTED FLOW FACILITIESSTATE SIGNALIZED ARTERIALSClass I (40 mpi or higher postel speed limit)Lartes Median B CEDivided * 8 80 880 **22.260 3.020 3.660 3.0403.330 4.580 5.560 7.680 9.2.20Divided * 2.940 3.020 **6 3.970 4.040 **Tereway AdjustmentsClass II (53 mph or shower posted speed limit)Lartes Median B C D EDivided * 7.30 1.630 1.700One-State Signalized Roadways AdjustmentsChase II (53 mph or shower posted speed limit)Class II (53 mph or shower posted speed limit)Lartes Median B C D EDivided * 1.610 3.390 3.420Non-State Signalized Roadways AdjustmentsChase I Signalized Roadways AdjustmentsMedian & Turp Lare AdjustmentsMedian & Turp Lare Adjustment AdjustmentMedian & Turp Lare Adjustment at backwire Adjustment for the NoNon-State Signalized Roadways - 10%BitYCL Lartes Not DE'SDivided NoNon-State Signalized Roadways - 10%Conserver Acting Adjustment at backwire Adjustment at backwire to the state wire to the state w	•	,				015		/				
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		INTERR		OW FACI	LITIES			UNINTE	RRUPTED I	FLOW FA		12/18/12
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		STATE SI	GNALIZI	FD ART	FRIALS				FRFEV	VAVS		
Lances Median B C D E E $3.3600 3.0200 5.000 6,080 9.220 10,360 12.500 13.000 4.010$							Lanes	В		AID	D	Е
1Undivided $*$ 3 3.500 4.780 5.7300 6.980 2Divided* 1.910 2.000 ** 4 4.500 6.7680 7.320 8.220 10.360 3Divided* 2.940 3.020 ** 5 5.660 7.680 9.220 10.360 4Divided* 3.970 4.040 ** 5 5.660 7.680 9.220 10.360 2Divided* 7.750 800 ** 6 7.900 10.320 12.060 12.500 3Divided* 1.610 3.30 3.420 4.100 4.100 4.100 4.100 4.100 4.100 4.100 4.100 4.100 4.100 4.100 4.100 4.10000 4.10000 <	Longo					Б		2,260	3,02	0 3	3,660	3,940
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				-								
$\begin{array}{c c c c c c c c c c c c c c c c c c c $,			
4Divided $3,970$ $4,040$ $**$ Class II (35 mph or slower posted speed limit)The stars $M(sin B \ C \ D \ E \ Target Mark and $			*			**						
Lanes Median B C D D E 1 Undivided * 370 1,630 1,700 3 Divided * 1,170 2,520 2,560 4 Divided * 1,170 2,520 2,560 4 Divided * 1,170 2,520 2,560 4 Divided * 1,170 2,520 2,560 5 Wettinger Corresponding state volumes by the indicated precent.) Non-State Signalized Roadway Adjustments Exclusive Exclusive Adjustment Exclusive Adjustment Exclusive Adjustment Multi Undivided No No -25% Yes + 5% Multi Undivided Yes No -5% Multi Undivided Yes + 5% Multi Undivided Yes + 100 340 1,000 > 1,000 ** PEDESTRIAM MDDE ² MultiSMDE (Scheduled Fixed Route) ³ BISMODE (Scheduled Fixed Route) ³ Bidewalk Coverage B C D E G.49% * 140 480 800 85-100% 200 540 880 > 1,000 BUS MDDE (Scheduled Fixed Route) ³ Bidewalk Coverage B C D E G.49% * 140 480 800 85-100% 200 540 880 > 1,000 BISMODE (Scheduled Fixed Route) ³ Bidewalk Coverage B C D E G.49% * 140 480 800 85-100% 200 540 880 > 1,000 BISMODE (Scheduled Fixed Route) ³ Bidewalk Coverage B C D E G.49% * 140 480 800 BISMODE (Scheduled Fixed Route) ³ Bidex P			*			**	6	7,900	10,32	0 12	2,060	12,500
Lances Median B C D D E 1 Undivided ** 370 1,630 1,700 3 Divided ** 1,170 2,520 2,560 4 Divided ** 1,170 2,520 2,560 4 Divided ** 1,170 2,520 2,560 5 Divided ** 1,170 2,520 2,560 4 Divided ** 1,170 2,520 2,560 5 Divided ** 1,170 2,520 2,560 4 Divided ** 1,170 2,520 2,560 5 Divided ** 1,170 2,520 2,560 4 Divided ** 1,100 $+5\%$ Median C Turt Lane Adjustments Exclusive Exclusive Adjustments Exclusive Exclusive Adjustments Exclusive Exclusive Adjustments Exclusive Exclusive Adjustments Exclusive Exclusive Adjustment Exclusive Adjustment Index Multi Undivided No No -25% Yes + 5% Multi Undivided Yes No -5% Multi Undivided No No -25% Yes + 5% Multi Undivided Yes + 5% Multi Undivided No No -25% Yes + 5% Multi Undivided Yes + 100 340 1,000 >1,000 ** PEDESTRIAM MDDE ² MultiSMDE (Scheduled Fixed Route) 3 Stelewalk Coverage B C D E O-49% * 100 340 1,000 >1,000 ** PEDESTRIAM MDDE ² MultiSMDE (Scheduled Fixed Route) 3 BIS MODE (Scheduled Fixed Route) 3 BUS MODE (Scheduled Keduled Scheduled Addivided No + 100 for the byck and polations of the Highwark is the bias derived for the byck and polations of the Highwark is the bias derived for the byck and polations of the Highwark is the bias derived for the the hyck and polations of the Highwark is the bias had on another of the the hyck and polations of the H		Class II (35	mph or slow	ver posted s	peed limit)			F	reeway Ad	justment	s	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Lanes				-	E		Auxiliary	· ·	0		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1	Undivided	*	370	750	800						
4 Divided * 1,610 3,390 3,420 Non-State Signalized Roadway Adjustments (Alter corresponding state volumes by the indicated percent)) Non-State Signalized Roadways $\rightarrow 10\%$ Image: Control of the state volumes by the indicated percent) Image: Control of the state volumes by the indicated percent) Image: Control of the state volumes by the indicated percent) Non-State Signalized Roadways $\rightarrow 10\%$ Median Control of the state Signalized Roadways $\rightarrow 10\%$ Image: Control of the state s								+ 1,000			+ 5%	
Non-State Signalized Roadway Adjustment. Mater corresponding state volumes by the indicated precent.) Non-State Signalized Roadways - 10%Median & Turn Lane Adjustments Exclusive Exclusive Adjustment Mater and Exclusive Adjustments Exclusive Manale Adjustment												
$\begin{tabular}{l lllllllllllllllllllllllllllllllllll$	4	Divided	*	1,610	3,390	3,420						
$\begin{tabular}{l l l l l l l l l l l l l l l l l l l $		Non-State Si	gnalized Re	oadway A	djustmen	ts						
Non-State Signalized Roadways -10% Median & Turr Lane Adjustment Exclusive Exclusive Adjustment FactorsLanesMedian Left Lanes NividedYesNo -5% 1UndividedYesNo -5% 1UndividedYesNo -5% MultiUndividedYesNo -25% MultiUndividedYes -5% MultiUndividedYes -5% MultiUndividedYes -5% MultiUndividedYes -5% MultiUndividedYes $+5\%$ Lane CoverageBCDE0Adys $1.000 > 1.000$ $*1.000 > 1.000$ $*1.000 > 1.000$ 5084%110 340 $1.000 > 1.000$ $*1.000 > 1.000$ 50BUS MODE (Schedulee Fix					nes							
Median & Turn Lane Adjustments Exclusive Exclusive Adjustment Lanes Median Left Lanes Right Lanes Factors 1 Divided Yes No $+5\%$ 1 Undivided No No -20% Multi Undivided No No -25% Multi Undivided Yes No $+5\%$ Multipy the corresponding functional volumes in this table by 1.2UNINTERRUPTED FLOW HIGHWAYS Lanes Median B C D E 1 Undivided 420 840 1,190 1,640 2 Divided 2,720 3,840 4,860 5,380Uninterrupted Flow Highway Adjustments Lanes Median Exclusive left lanes Adjustment factors 1 Divided Yes -5% Multi Undivided Yes -25% Paved Shoulder/Bicycle Lane Coverage B C D E 0.49% $* 150 390 1,000$ $50-84\%$ $110 340 1,000 >1,000 **Divided 27\% 1200 exvice for the break one's clear and a divide worked forcontract, modes undow bleved only for the pretrai planning applications. The table and dual worked forcontract, workers, or the beye land fightway Explaints of the table to be used forcontract whiche volumes. Show below the number ofdirectional roadway lanes to determine two-way maximum servicevolumes.)Sidewalk Coverage B C D E0.49\% * 140 43\%0.000 >1,000 **0.49\% * 8 140 43\%0.900 >1,000 **0.49\% * 8 140 43\%0.900 >200 540 880 >1,0000.900 85.100\% 200 540 880 >1,000800 >100050.94\% 8 0 440 800800 >1,000 85.100\% 200 524 880 > 4100 800800 >100050.94\% 8 0 4400 8000.900 85.100\% 200 524 880 > 1,000800 $					- 10%							
ExclusiveExclusiveAdjustment Factors1DividedYesNo $+5\%$ 1UndividedNoNo -20% 1UndividedNoNo -20% 1UndividedNoNo -20% MultiUndividedNoNo -20% MultiUndividedNoNo -25% MultiUndividedNo -25% MultiUndividedYes -5% MultiUndividedYes -5% Multiply the corresponding directional volumes in this table by 1.2Uninterrupted Flow Highway Adjustments LanesBICYCLE MODE ² Image: State of the state o			-	-	tments							
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		meunun				ljustment						
1 Undivided No 100 1 Undivided No 100 Multi Undivided Yes 3 Divided 1,810 2,560 3,240 3,590 Multi Undivided Yes 100 25% 3 Divided 2,720 3,840 4,860 5,380 One-Way Facility Adjustment Multi Undivided Yes +5% Multiply the corresponding directional volumes in this table by 1.2 Uninterrupted Flow Highway Adjustments Uninterrupted Flow Highway Adjustments Uninterrupted Flow Highway Adjustments Uninterrupted Flow Highway Adjustments Uninterrupted Flow Highway Adjustment factors Multi Undivided Yes +5% Multi Undivided Yes -5% Multi Undivided Yes -5% Multi Undivided Yes -5% Multi Undivided No -25% Wather shown are presented as peak hour directional volumes for tevels of service let <t< td=""><td>Lanes</td><td></td><td></td><td></td><td>anes l</td><td>Factors</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Lanes				anes l	Factors						
MultiUndividedYesNo -5% -5% MultiUndividedNo -25% Yes $+5\%$ One-Way Facility Adjustment Multiple corresponding directional volumes in this table by 1.2 Uninterrupted Flow Highway Adjustment Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)Paved Shoulder/Bicycle Lane CoverageBCDE E orday 2 Chultiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)Values shown are presented as peak hour directional volumes for the automobileruck modes unless specifically stated. This table does not computer models final stated. This table and doring computer models final stated. This table does not computer models final stated. This table and doring computer models final stated. This table is doet or tornaid the table and final computer models final does not computer models final does not computer models final do											,	
MultiUndividedNo -25% $ -$ Yes $+5\%$ Understanding directionalMultiply the corresponding directionalvolumes in this table by 1.2Image: Constraint of the second s												
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$							5	Divided	2,720	5,840	4,800	3,380
One-Way Facility Adjustment Multiply the corresponding directional volumes in this table by 1.2Lanes Median Exclusive left lanes Adjustment factors 1 Divided Yes -5% Multi Undivided Yes -5% Multi Undivided Yes -5% Multi Undivided No -25% BICY CLE MODE 2(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)Paved Shoulder/Bicycle Lane Coverage BCDLane Coverage BCDE0.49% * 1503901,00050-84%1103401,000>1,00050-84%1003401,000>1,00050-84%8044080050-84% * 14048050-84% * 8044050-84% * 8044050-84% * 8044050-84% * 8044050-84% * 8044050-84% * * BUS MODE (Schedul-der Ericet Route) ³ (Buses in peak hour in peak direction) * Sidewalk Coverage BCDE $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * $0-49\%$ * * <		-						Uninterrun	ted Flow H	iohwav A	diustment	s
Multiply the corresponding directional volumes in this table by 1.2Multiply the corresponding directional volumes in this table by 1.2BICYCLE MODE ² Multi UndividedNo5% MultiBICYCLE MODE ² Multi UndividedNo25%Multi UndividedYes5% MultiMulti UndividedYes5% MultiBICYCLE MODE ² Multi UndividedNo25%Multi UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% MultiMulti UndividedYes5% Multi UndividedParticleBCDEOutputModelStable does not counters.ParticleBCDEMulti UndividedYes5% Multi UndividedMulti UndividedYes5% Multi UndividedNotareBCDEOutputModelStable does not counters.ParticleCDEMulti UndividedYes5%Multi UndividedYes5%Multi UndividedYes5%Multi UndividedYes5% <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td>Lanes</td><td></td><td></td><td></td><td></td><td></td></th<>							Lanes					
Wolumes in this table by 1.2 Interview in this table is p1.2 Interview in this table is p1.2 Interview in this table is p1.2 BICYCLE MODE ² Multi Undivided No -25% (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.) Interview inte							1	Divided	Ye	s	+5	%
$\begin{array}{c c c c c c c c c c c c c c c c c c c $												
(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)Summer for the automobile/truck modes unless specifically stated. This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should how used for more refined techniques exist. Calculations are based on planning applications. The table and deriving computer models should how used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications. The table and deriving computer models should how used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications. The table and deriving computer models from which this table is based on number of corridor or intersection design, where more refined techniques exist. * Lane Coverage May 2 1,000 >1,000 *1,000 *** * PEDESTELAN MODE'Sidewalk Coverage B CCDE E DSidewalk Coverage B 0-49%CDE Source: Fiorida Department of Transportation Systems Planning OfficeSurve: BUS MODE (Scheduler Fixed Fourte.Sidewalk Coverage B 0-84%BCDE B CSource: Florida Department of Tran		vo	fumes in this	tuble by 1.2			Multi	Undivided	No	D	-25	5%
directional roadway lanes to determine two-way maximum service volumes.) Paved Shoulder/Bicycle Lane Coverage B C D E 0-49% * 150 390 1,000 50-84% 110 340 1,000 >1,000 85-100% 470 1,000 >1,000 *** PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.) Sidewalk Coverage B C D E 0-49% * 140 480 50-84% * 80 440 800 85-100% 200 540 880 >1,000 BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction) Sidewalk Coverage B C D E 0-49% * 140 480 50-84% * 80 440 800 85-100% 200 540 880 >1,000 BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction) Sidewalk Coverage B C D E 0-49% * 140 480 50-84% * 80 440 800 85-100% 200 540 880 >1,000 BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction) Sidewalk Coverage B C D E $0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2	(Mi				low by numb	per of	are for th	ne automobile/truck	modes unless sp	becifically stat	ed. This table do	bes not
volumes.)planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Calculations are based on planning applications of the Highway Capacity Manual and the Transit Capacity and Quality of Service Manual.Paned Shoulder/BicycleLane CoverageBCDE $0-49\%$ *1503901,000 $50-84\%$ 1103401,000>1,000Source: The DEESTRIAN WODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)Sidewalk CoverageBCDE $0-49\%$ *140480 $50-84\%$ *80440800 $85-100\%$ 200540880>1,000BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction)EDSidewalk CoverageBCDE $0-84\%$ > 5 ≤ 4 ≥ 3 ≥ 2												
Paved Shoulder/BicycleLane CoverageBCDE0-49%*1503901,00050-84%1103401,000>1,00085-100%4701,000>1,000** PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)*Sidewalk CoverageBCDE0-49%*14048050-84%*8044080085-100%200540880>1,000BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction)EDSidewalk CoverageBCDE0-84%> 5 ≥ 4 ≥ 3 ≥ 2			volume	es.)			planning	applications. The t	able and deriving	g computer me	odels should not	be used for
$ \begin{array}{c ccccc} 0-49\% & * & 150 & 390 & 1,000 \\ 50-84\% & 110 & 340 & 1,000 & >1,000 \\ 85-100\% & 470 & 1,000 & >1,000 & ** \\ \hline $		•										
$50-84\%$ 110 340 $1,000$ $>1,000$ $>1,000$ $>1,000$ $>1,000$ $>1,000$ $**$ PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.) 3 Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.Sidewalk CoverageBCDE $0-49\%$ ** 1400 4800 $50-84\%$ * 800 4400 8000 $85-100\%$ 2000 540 8800 $>1,0000$ BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction)Suidewalk CoverageBCDE $0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2 Source: Florida Department of Transportation Systems Planning Office	La						Capacity	and Quality of Ser	vice Manual.			
$85-100\%$ 470 $1,000$ $>1,000$ $**$ PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.) 3 Buses per hour shown are only for the peak hour in the single direction of the higher traffic flow.Sidewalk CoverageBCDE $0-49\%$ $*$ 1400 480 $50-84\%$ $*$ 1400 480 $50-84\%$ $*$ 800 4400 $85-100\%$ 2000 540 8800 8100% 2000 540 8800 8100% 8000 $85-100\%$ 8000 8100% 8000 8500% 81000% 810% 810% 8100% 810% 810% 8100% <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>												
 PEDESTRIAN MODE² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.) Sidewalk Coverage B C D E 0-49% * 140 480 50-84% * 80 4440 800 85-100% 200 540 880 >1,000 BUS MODE (Scheduled Fixed Route)³ (Buses in peak hour in peak direction) Sidewalk Coverage B C D E 0-84% > 5 ≥ 4 ≥ 3 ≥2 ^{Source:} Florida Department of Transportation Systems Planning Office 							of motor.	ized vehicles, not n	umber of bicycli	sts or pedestri	ans using the fa	cility.
PEDES I KIAN WODE(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)* Cannot be achieved using table input value defaults.Sidewalk CoverageBCDE0-49%**14048050-84%*8044080085-100%200540880>1,000BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction)Sidewalk CoverageBCDE0-84%> 5 ≥ 4 ≥ 3 ≥ 2								er hour shown are or	nly for the peak ho	our in the single	direction of the l	nigher traffic
directional roadway lanes to determine two-way maximum service volumes.) Sidewalk Coverage B C D E 0-49% * * 140 480 50-84% * 80 440 800 85-100% 200 540 880 >1,000 BUS MODE (Scheduled Fixed Route)^3 (Buses in peak hour in peak direction) Sidewalk Coverage B C D E $0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2 Source: Florida Department of Transportation Systems Planning Office	(Mi					or of		4 h = h ² = h = h = h	table in and such	. 1.6		
Sidewalk CoverageBCDE $0-49\%$ *140480 $50-84\%$ *80440 $50-84\%$ *80440 $85-100\%$ 200540880 $85-100\%$ 200540880 $85-100\%$ 200540880 $85-100\%$ 200540880 $85-100\%$ 200540880 800 8001,000Source:Guses in peak hour in peak direction)Sidewalk CoverageBCD $0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2 ≥ 3 ≥ 2			anes to determ	ine two-way			** Not a	pplicable for that le	vel of service let	tter grade. For		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Side	walk Coverag	e B	С	D	Е						
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$							achievab	le because there is			-	-
BUS MODE (Scheduled Fixed Route) ³ (Buses in peak hour in peak direction)Sidewalk CoverageBCDE $0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2 Source: Florida Department of Transportation Systems Planning Office			*	80			value dei	taults.				
(Buses in peak hour in peak direction)Source:Sidewalk CoverageBCDE $0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2 Systems Planning Office		85-100%	200	540	880	>1,000						
Sidewalk Coverage $0-84\%$ BCDE ≥ 3 Source: Florida Department of Transportation Systems Planning Office						3						
$0-84\%$ > 5 ≥ 4 ≥ 3 ≥ 2 Systems Planning Office	Side		-	-		F		Demostration of The	and of the			
$85-100\% > 4 \ge 3 \ge 2 \ge 1$ www.dot.state.fl.us/planning/systems/sm/los/default.shtm	Side								sportation			
						$> \frac{2}{1}$			g/systems/sm/los	/default.shtm		
		00 10070	~ '			_ 1						

TABLE 7
(continued)

Generalized **Peak Hour Directional** Volumes for Florida's **Urbanized Areas**

(continued)	Urbanized Areas 12/18/12											
INPUT VALUE	Uninterr	upted Flow	Facilities		Ste	Inter: ate Arte	-	Flow Facili	ities Class I			
ASSUMPTIONS					50		11015		Ch	33 1		
	Freeways	High	nways	Cla	ass I		Cla	iss II	Bicycle	Pedestria		
ROADWAY CHARACTERISTICS												
Area type (lu, u)	lu	u	u	u	u		u	u	u	u		
Number of through lanes (both dir.)	4-12	2	4-6	2	4-8		2	4-8	4	4		
Posted speed (mph)	70	50	50	45	50		30	30	45	45		
Free flow speed (mph)	75	55	55	50	55		35	35	50	50		
Auxiliary lanes (n,y)	n											
Median (n, nr, r)		n	r	n	r		n	r	r	r		
Terrain (l,r)	1	1	1	1	1		1	1	1	1		
% no passing zone		80										
Exclusive left turn lane impact (n, y)		[n]	у	у	У		у	у	у	у		
Exclusive right turn lanes (n, y)				n	n		n	n	n	n		
Facility length (mi)	4	5	5	2	2		1.9	1.8	2	2		
Number of basic segments	4											
TRAFFIC CHARACTERISTICS												
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.09	0	0.090	0.090	0.090	0.090		
Directional distribution factor (D)	0.547	0.550	0.550	0.550	0.56	0	0.565	0.560	0.565	0.565		
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.00	0	1.000	1.000	1.000	1.000		
Base saturation flow rate (pcphpl)		1,700	2,100	1,950	1,95	0	1,950	1,950	1,950	1,950		
Heavy vehicle percent	4.0	2.0	2.0	1.0	1.0		1.0	1.0	2.5	2.0		
Local adjustment factor	0.91	0.97	0.98									
% left turns				12	12		12	12	12	12		
% right turns				12	12		12	12	12	12		
CONTROL CHARACTERISTICS												
Number of signals				4	4		10	10	4	6		
Arrival type (1-6)				3	3		4	4	4	4		
Signal type (a, c, p)				с	с		с	с	с	с		
Cycle length (C)				120	150)	120	120	120	120		
Effective green ratio (g/C)				0.44	0.45	5	0.44	0.44	0.44	0.44		
MULTIMODAL CHARACTERISTIC	S											
Paved shoulder/bicycle lane (n, y)	~								n, 50%, y	n		
Outside lane width (n, t, w)									t	t		
Pavement condition (d, t, w)									t			
On-street parking (n, y)									n	n		
Sidewalk (n, y)										n, 50%, y		
Sidewalk/roadway separation (a, t, w)										t		
Sidewalk protective barrier (n, y)										n		
	LE	VEL OF S	ERVICE T	HRESHO	LDS							
	Freeways		iways		Arteri	ials		Bicycle	Ped	Bus		
Level of Service	Density	Two-Lane %ffs	Multilane Density	Class	I		ss II ts	Score	Score	Buses/hr.		
B	≤17	> 83.3	≤ 17	> 31 m	nh		mph	≤ 2.75	≤ 2.75	≤6		
					-		-					
С	≤ 24	> 75.0	≤ 24	> 23 m	-		mph	≤ 3.50	≤ 3.50	≤ 4		
D	≤ 31	> 66.7	≤ 31	> 18 m	-		mph	≤ 4.25	≤ 4.25	< 3		
Е	\leq 39	> 58.3	≤ 35	> 15 m	ph	> 10	mph	≤ 5.00	≤ 5.00	< 2		

% ffs = Percent free flow speed ats = Average travel speed

TABLE 8

Generalized **Peak Hour Directional** Volumes for Florida's

Transitioning and

I	ADLE O								1		
					/er 5,00	U NOT II	n Urbanize				12/18/12
	INTERF			ILITIES			UNINTEF	RUPTED	FLOW FA	CILITIES	
	STATE S	IGNALIZ	ZED ART	TERIALS	5			FREEV	VAYS		
						Lanes	В	С		D	Е
T	Class I (40				Б	2	2,200	2,88	0 3	3,440	3,580
Lanes	Median Undivided	B *	C 710	D 800	E **	3	3,260	4,28		5,100	5,540
2	Divided	*	1,740	1,820	**	4	4,260	5,68		6,760	7,500
3	Divided	*	2,670	2,740	**	5	5,300	7,08	0 8	8,440	9,440
_			,				Б		• • •		
Lanes	Class II (35 Median	mph or slo B	wer posted C		Е		F Auxiliary	reeway Ad	justment	s Ramp	
Lanes 1	Undivided	D *	330	D 680	E 720		Lane			Metering	
2	Divided	*	500	1,460	1,600		+ 1,000			+ 5%	
3	Divided	*	810	2,280	2,420						
	. 1	ignalized I r correspondi by the indicat Signalized I	ng state volu ed percent.)		nts						
	Median	& Turn L	ane Adius	stments							
		Exclusive			ljustment						
Lanes	Median	Left Lanes	•		Factors	Lanes	Median	B	C	D	E
1	Divided	Yes	No		+5%	1	Undivided Divided	450	850	1,200	1,640
2 Multi	Undivided Undivided	No Yes	No No		-20% -5%	23	Divided	1,740 2,610	2,450 3,680	3,110 4,660	3,440 5,170
Multi	Undivided	No	No		-25%	5	Divided	2,010	5,000	4,000	5,170
-	_	_	Ye	s	+ 5%		Uninterrupt	ed Flow H	ighway A	diustment	ts
						Lanes	Median	Exclusive			ent factors
		Way Facili				1	Divided	Ye	s	5	5%
		y the corresp olumes in this				Multi	Undivided	Ye	s	-5	5%
	ve			<i>L</i>		Multi	Undivided	N	0	-2:	5%
direo	ultiply motorized ctional roadway Paved Ilder/Bicycle	lanes to deter volun	mes shown b mine two-wa nes.)	elow by num y maximum s	ervice	are for th constitut compute planning corridor based on	shown are presented he automobile/truck te a standard and sho r models from whic g applications. The te or intersection desig planning application / and Quality of Service	modes unless sp puld be used onl h this table is de able and derivin gn, where more ns of the Highw	pecifically stat y for general perived should be g computer me refined technic	ted. This table d planning applicate be used for more odels should no ques exist. Calc	oes not ations. The e specific t be used for ulations are
	e Coverage	B *	C	D 220	E	² Level o	of service for the bic	ycle and pedest	rian modes in	this table is bas	ed on number
	0-49% 50-84%	* 100	140 280	320 940	1,000 >1,000	of motor	rized vehicles, not m	umber of bicycl	sts or pedestri	ans using the fa	acılity.
	30-84% 35-100%	380	1,000	>1,000	>1,000 **	³ Buses p flow.	er hour shown are on	ly for the peak he	our in the single	e direction of the	higher traffic
c		DESTRIA						(1) I. I.	. 1.6 h		
	ultiply motorized	l vehicle volu	mes shown b mine two-wa	elow by num		** Not a volumes	ot be achieved using pplicable for that le greater than level o ched. For the bicycl	vel of service le f service D becc	tter grade. For ome F because	intersection cap	pacities have
Sidew	alk Coverage	B	С	D	Е	achievab	ble because there is a				
	0-49%	*	*	140	480	value de	raults.				
	50-84%	*	80	440	800						
8	35-100%	200	540	880	>1,000						
	BUS MOD (Buses	E (Sched			3						
Sidew	alk Coverage		С	D	Е	Source: Florida I	Department of Trans	portation			
	0-84%	> 5	\geq 4	\geq 3	≥ 2	Systems	Planning Office	-			
c	35-100%	>4	\geq 3	≥ 2	≥ 1	www.do	t.state.fl.us/planning	g/systems/sm/los	s/default.shtm	•	

TABLE 8 (continued)

Generalized **Peak Hour Directional** Volumes for Florida's **Transitioning** and

Areas Over 5,000 Not In Urbanized Areas

12/18/12

	T T • <i>i</i>	(15)	F	Interrupted Flow Facilities							
INPUT VALUE	Uninterru	pted Flow	Facilities		St	ate Ai	rterials		Class I		
ASSUMPTIONS	Freeways	High	iways	Cla	uss I		Cla	ss II	Bicycle	Pedestrian	
ROADWAY CHARACTERISTICS									1		
Area type (t,uo)	t	t	t	t	t		t	t	t	t	
Number of through lanes (both dir.)	4-10	2	4-6	2	4-0		2	4-6	4	4	
Posted speed (mph)	70	50	50	45	50		30	30	45	45	
Free flow speed (mph)	75	55	55	50	55	5	35	35	50	50	
Auxiliary lanes (n,y)	n	n	n								
Median (n, nr, r)		n	r	n	У		n	У	r	r	
Terrain (l,r)	1	1	1	1	1		1	1	1	1	
% no passing zone		60									
Exclusive left turn lane impact (n, y)		[n]	у	у	у		у	у	у	У	
Exclusive right turn lanes (n, y)				n	n		n	n	n	n	
Facility length (mi)	8	5	5	1.8	2		2	2	2	2	
Number of basic segments	4										
TRAFFIC CHARACTERISTICS											
Planning analysis hour factor (K)	0.090	0.090	0.090	0.090	0.09	90	0.090	0.090	0.090	0.090	
Directional distribution factor (D)	0.555	0.550	0.550	0.550	0.5		0.570	0.565	0.570	0.570	
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.00		1.000	1.000	1.000	1.000	
Base saturation flow rate (pcphpl)		1,700	2,100	1,950	1,9		1,950	1,950	1,950	1,950	
Heavy vehicle percent	9.0	4.0	4.0	2.0	3.0		2.0	3.0	3.0	3.0	
Local adjustment factor	0.85	0.97	0.95								
% left turns				12	12	2	12	12	12	12	
% right turns				12	12	2	12	12	12	12	
CONTROL CHARACTERISTICS	1							1	1		
Number of signals				5	4		10	10	4	6	
Arrival type (1-6)				4	3		4	4	4	4	
Signal type (a, c, p)				c	c		c	c	c	c	
Cycle length (C)				120	15		120	150	120	120	
Effective green ratio (g/C)				0.44	0.4		0.44	0.45	0.44	0.44	
				0111	011	0	0111	0110	0111	0	
CONTROL CHARACTERISTICS					1				500/		
Paved shoulder/bicycle lane (n, y)									n, 50%, y	n	
Outside lane width (n, t, w)									t	t	
Pavement condition (d, t, u)									t		
On-street parking (n, y)									n	n	
Sidewalk (n, y)										n, 50%, y	
Sidewalk/roadway separation (a, t, w)										t	
Sidewalk protective barrier (n, y)										n	
	LEV	<u>EL O</u> F SE	RVICE TH	IRESHOI	DS						
T 1 6	Freeways		ways		Arte	ials		Bicycle	Ped	Bus	
Level of Service	Density	Two-Lane	Multilane	Class	I	C	Class II	Score	Score	Buses/hr.	
		%ffs	Density								
В	≤ 17	> 83.3	≤17	> 31 mph > 22 mph			≤ 2.75	≤ 2.75	≤ 6		
С	≤ 24	> 75.0	≤ 24	> 23 mj	ph	> 1	17 mph	\leq 3.50	≤ 3.50	≤ 4	
	< 21	> 66 7	< 21	. 10	1-	. 1	12 1	- 1.05	< 1.05	. 2	
D	≤ 31	> 66.7	\leq 31	> 18 m	pn	>	13 mph	≤4.25	≤ 4.25	< 3	

% ffs = Percent free flow speed ats = Average travel speed

TABLE 9

Generalized **Peak Hour Directional** Volumes for Florida's Rural Undeveloped Areas and

Developed Areas Less Than 5,000 Population¹

			Dev	veloped	l Areas I	Less Tha	an 5 <i>,</i> 000 F	Populat	ion ¹		12/18/12
	INTERF	RUPTED FLO						RUPTED			
	STATE S	IGNALIZI	ED ART	ERIALS	1			FREEV	WAYS		
Lanes	Median	В	C	D	E	Lanes	В	C		D	Е
1	Undivided	*	670	740	**	2	1,680	2,50		3,040	3,500
2	Divided	*	1,530	1,580	**	3	2,500	3,72		4,560	5,400
3	Divided	*	2,360	2,400	**	4	2,300 3,360	4,98		5,080	7,200
U	2111000		2,000	_,			0,000	.,, , ,		,	,,_00
		ignalized Re er corresponding by the indicated Signalized Re	g state volur l percent.)		nts			reeway Ac Auxiliar esent in Bot + 1,0	y Lanes th Direction		
	Median	& Turn La			divertment	τ	J NINTERR	UPTED	FLOW H	IGHWAY	ΥS
Lanes	Median	Exclusive Left Lanes	Exclus Right L		djustment Factors						
1	Divided	Yes	No		+5%			Rural Und	-	5	
1	Undivided	No	No		-20%	Lanes	Median	B	C	D	E
Multi	Undivided	Yes	No		-5%	1	Undivided	240	430	740	1,490
Multi	Undivided	No	No		-25%	2	Divided	1,340	2,100	2,660	3,020
-	_	-	Yes	5	+ 5%	3	Divided	2,020	3,150	4,000	4,530
	<u> </u>							Develope	ed Areas		
	One-	Way Facility	y Adjusti	nent		Lanes	Median	В	С	D	Е
		y the correspo				1	Undivided	450	850	1,200	1,640
	V	plumes in this t	able by 1.2	2		2	Divided	1,350	2,120	2,730	3,110
						3	Divided	2,020	3,180	4,090	4,670
	I ultiply motorized ectional roadway		es shown be	elow by num		Alter L	OS B-D volum the	highway se	rtion to the gement leng	passing lane i th	-
une	chonar road way	volume		, maximum .		Lanes	Uninterrupt Median		lighway A left lanes	djustments Adjustme	
						Lanes	Divided		es	+5	
D		Rural Unde	veloped			Multi	Undivided	Y		-59	
	Shoulder/Bic		G	P	Б	Multi	Undivided	N		-25	
La	ine Coverage	B	C	D	E					-23	/ 5
	0-49%	*	70	110	170	1 Value	hown or	on pools how	lineational and	mag for lavel	f convince ou l
	50-84%	60	120	180	580		shown are presented ie automobile/truck				
	85-100%	140	210	1,000	>1,000		e a standard and sho r models from whic				
		Developed	Areas			planning	applications. The ta	able and derivir	ng computer me	odels should not	be used for
	Shoulder/Bic						or intersection design planning application				
La	ine Coverage	В	С	D	Е		and Quality of Ser		, <u>, , , , , , , , , , , , , , , , , , </u>		
	0-49%	*	120	260	840	² Level o	f service for the bic	vele and nadas	trian modes in	this table is been	d on number
	50-84%	100	240	720	1,000		ized vehicles, not m				
	85-100%	320	1,000	>1,000	**		t be achieved using		•	C C	
	PE	DESTRIA	N MOD	\mathbf{E}^{2}			-	-			
dire	ultiply motorized ectional roadway	l vehicle volum lanes to determ volume	es shown be ine two-way	elow by num		volumes been read	pplicable for that le greater than level o ched. For the bicycl le because there is n faults.	f service D bec e mode, the lev	ome F because el of service le	intersection cap tter grade (inclue	acities have ding F) is no
Side	walk Coverag		С	D	E	Source:					
	0-49%	*	*	120	460	Source.					
	50-84%	*	80	430	770	Florida I	Department of Trans	portation			
	85-100%	180	520	860	>1,000	Systems	Planning Office	-			
						www.do	t.state.fl.us/planning	g/systems/sm/lo	s/default.shtm		

TABLE 9 (continued)

Generalized **Peak Hour Directional** Volumes for Florida's **Rural Undeveloped Areas** and **Developed Areas Less Than 5,000 Population**

12/18/12

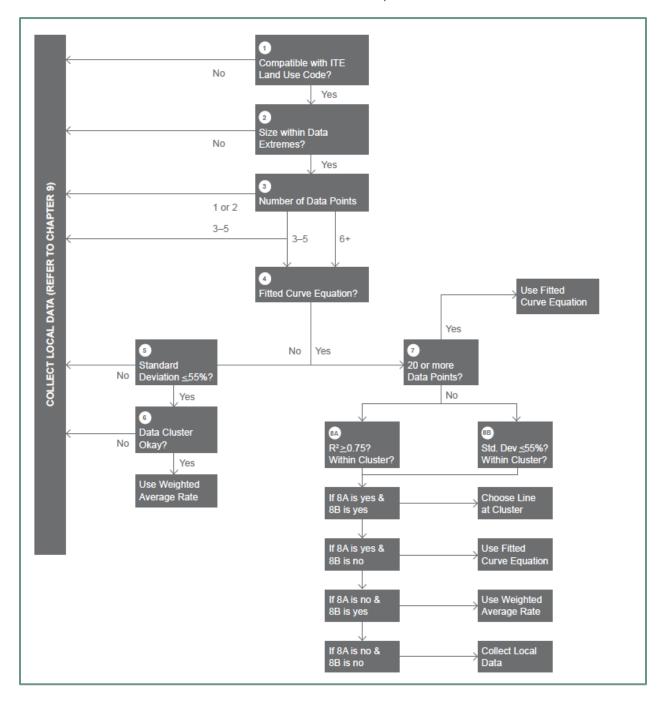
INPUT VALUE	ו	Uninterru	pted Flow	Facilities			Interruj	oted Flow	Facilities	
ASSUMPTIONS	Freeways		High	ways		Arter	rials	Bic	ycle	Pedestria
ROADWAY CHARACTERISTIC	S									
Area type (ru, rd)	rural	ru	ru	rd	rd	rd	rd	ru	rd	rd
Number of through lanes (both dir.)	4-8	2	4-6	2	4-6	2	4-6	4	4	2
Posted speed (mph)	70	55	65	50	55	45	45	55	45	45
Free flow speed (mph)	75	60	70	55	60	50	50	60	50	50
Auxiliary lanes (n,y)	n									
Median (n, nr, r)		n	r	n	r	n	r	r	r	n
Terrain (l,r)	1	1	1	1	1	1	1	1	1	1
% no passing zone		20		60						
Exclusive left turn lanes (n, y)		[n]	у	[n]	у	у	у	у	у	у
Exclusive right turn lanes (n, y)						n	n	n	n	n
Facility length (mi)	14	10	10	5	5	1.9	2.2	4	2	2
Number of basic segments	4			-	-					
FRAFFIC CHARACTERISTICS										
Planning analysis hour factor (K)	0.105	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095
Directional distribution factor (D)	0.105	0.550	0.550	0.550	0.550	0.095	0.550	0.570	0.570	0.09
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	1.000									
Base saturation flow rate (pcphpl)	12.0	1,700	2,300	1,700	2,200	1,950	1,950	1,950	1,950	1,950
Heavy vehicle percent	12.0	5.0	12.0	4.0	4.0	3.0	3.0	6.0	3.5	3.0
Local adjustment factor	0.84	0.88	0.73	0.97	0.82	10	10		10	10
% left turns						12	12		12	12
% right turns						12	12		12	12
CONTROL CHARACTERISTICS										
Number of signals						5	6	2	4	4
Arrival type (1-6)						3	3	3	3	3
Signal type (a, c, p)						с	c	а	а	а
Cycle length (C)						90	90	60	90	90
Effective green ratio (g/C)						0.44	0.44	0.37	0.44	0.44
MULTIMODAL CHARACTERIS	TICS									
Paved shoulder/bicycle lane (n, y)								n,50%,y	n,50%,y	n
Outside lane width (n, t, w)								t	t	t
Pavement condition (d, t, u)								t	t	
Sidewalk (n, y)								-	-	n,50%
Sidewalk/roadway separation(a, t,w)										t
Sidewalk protective barrier (n, y)										n
blac want protective barrier (ii, y)			OF CED							
		LEVEL	OF SERV	VICE THE	ESHOLL	75 High	wavs			
Level of	Freev	vays	Two-L	ane m	Two-L	0	•	lane ru	Multi	lane rd
Service	Dens	ity	%tsf	ats	1 wo-1			nsity		nsity
В	≤ 1	,	≤ 50	< 55	> 8.			14		14
<u> </u>	≤ 2		≤ 65	<u><</u> 50	> 7:		 			22
<u>D</u>	≤ 2		≤ 80	<u><</u> 30 < <u>45</u>	> 6			29		29
E	≤ 3		> 80	<u><40</u>	> 50			34		34
						-	_			
Level of		Arterial	s		Bic	ycle		P	edestrian	
Service	M	ajor City/Co	o.(ats)			ore			Score	
В		> 31 mp			≤2	.75			≤ 2.75	
С		> 23 mp			≤ 3				≤ 3.50	
D		> 18 mp			 ≤4				≤ 4.25	
E		> 15 mp			 ≤ 5				≤ 5.00	

%tsf = Percent time spent following %ffs = Percent of free flow speed ats = Average travel speed ru = Rural undeveloped rd = Rural developed

Tab 4. Rate vs Equation



Process for Selecting Average Rate or Equation in Trip Generation Manual Data (ITE Trip Generation Handbook 3rd Edition)





EXAMPLE 3: RATE VS EQUATION EXAMPLES

For the following examples use the flow chart from the ITE Trip Generation Handbook to determine for each case study if the fitted curve (equation) or average rate should be used to estimate trips, or if local data should be collected. Then calculate the trips.

Estimate the trip generation for Land Use Code 140 (Manufacturing) on a weekday during the PM peak hour of adjacent street traffic as a function of gross floor area (GFA). Assume the site will have 800,000 sq. ft. of GFA.

Method: _____ Answer: _____

 Estimate trip generation for Land Use Code 310 (Hotel) on weekday during the PM peak hour of the adjacent street traffic as a function of employees. For this example, assume the hotel will have 100 employees.

Method: _____ Answer: _____

- Estimate trip generation for Land Use Code 813 (Free-Standing Discount Superstore) on a weekday during the AM peak hour of adjacent street traffic as a function of gross floor area. For this example, assume the store size will be 180,000 sq. ft. of GFA.
 Method: ______ Answer: ______
- 4. Estimate trip generation for Land Use Code 210 (Single-Family Detached Housing) on a weekday during the PM peak hour of adjacent street traffic as a function of Dwelling Units. For this example, assume the number of units is 300. Method: ______ Answer: ______
- 5. Estimate trip generation for Land Use Code 090 (Park-and-Ride Lot with Bus or Light Rail Service) on a weekday during the AM peak hour of adjacent street traffic as a function of Parking Spaces. For this example, assume the number of spaces to be 50. Method: ______ Answer: ______
- 6. Estimate trip generation for Land Use Code 445 (Multiplex Movie Theater) on a weekday during the PM peak hour of adjacent street traffic as a function of Screens. For this example, assume the number of screens to be 20.

Method: _____ Answer: _____



BRIEF MATH LESSON

Defining Variables

- T= Trips
- X= Independent Variable

Using Rate

- Example: Average Rate is 1.16
- Calculate the estimated number of trips by multiplying the average rate by the independent variable. <u>T=1.16 (X)</u>

Using Fitted Curve Equation

- T= 0.94(X) + 26.49
 - Solve this equation by simply replacing X with your variable.
- Ln(T)=0.95 Ln (X) + 0.36
 - Steps for solving natural log equations
 - 1. Take the exponential of both sides of the equations (Assume X=10)
 - e^{Ln(T)=} e^{(0.95*Ln(10)+0.36)}
 - **2.** The exponential of a natural log is 1 therefore:
 - T= e ^{(0.95*Ln (10) +0.36)}
 - T= 13 Trips



Tab 5. Internal Captures



Example 4: Internal Capture | 2 Land Uses

	GROSS TF	RIP GENE	RATIO	N			
	Land Use	Dail	-	A.M. P Hou		P.M. P Hou	
L		Enter	Exit	Enter	Exit	Enter	Exit
5	Office						
INPUT	Retail					180	150
Z	Restaurant					45	40
	Cinema/Entertainment						
	Residential						
	Hotel						
	Total					225	190
	INTERNAL [®]	TRIPS (M	linimu	ms)			
	Land Use	Dail	у	A.M. P Hou		P.M. P Hou	
L	Land Ose	Enter	Exit	Enter	Exit	Enter	Exit
ουτρυτ	Office	Enter	Exit	Enter	Exit	Enter	EAR
J.	Retail						
	Restaurant						
0	Cinema/Entertainment						
	Residential						
	Hotel						
	Total						
	% Reduction					14.0	%
		RNAL TR	IPS				,.
	Land Use	Dail	у	A.M. P Hou		P.M. P Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
	Office						
ουτρυτ	Retail					164	137
5	Restaurant					32	24
ō	Cinema/Entertainment						
-	Residential						
	Hotel						

	Table 6	5.1 Uncon	strained	Internal Persor	n Trip Capture R	ates		
	for Trip Or	igins with	in a Mixe	d-Use Develop	oment (P.M. Pea	ık Hour)		-
	Origin			Destina	ition Land Use			
$\mathbf{\Sigma}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office		20%	4%	0%	2%	0%	
L	Retail	2%		29%	4%	26%	5%	From ITE
-	Restaurant	3%	41%		8%	18%	7%	Trip
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Generation Handbook
<u> </u>	Residential	4%	42%	21%	0%		3%	
	Hotel	0%	16%	68%	0%	2%		

	Table 6	5.2 Uncon	strained I	Internal Persor	n Trip Capture R	ates		
	for Trip Desti	nations w	ithin a M	ixed-Use Deve	lopment (P.M. I	Peak Hour)		
	Origin			Destina	ition Land Use			
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office		8%	2%	1%	4%	0%	
Б	Retail	31%		29%	26%	46%	17%	From ITE
	Restaurant	30%	50%		32%	16%	71%	Trip Generation
Σ̈́	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook
ď	Residential	57%	10%	14%	0%		12%	Handbook
	Hotel	0%	2%	5%	0%	0%		



		**	* BASED O	N EXIT ***				
	(Exit)			(Ente	r) Land Use			
$\mathbf{\times}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office							Evit tripc
Б	Retail			44				Exit trips multiplied
_	Restaurant		16					by the
P.M.	Cinema/Entertainment							Origin
٩	Residential							percentages
	Hotel							
		***	BASED ON	I ENTER ***				
		***	BASED ON					-
	(Exit)			(Ente	r) Land Use			-
X	Land Use	*** Office	BASED ON		r) Land Use Cinema/Ent.	Residential	Hotel	
EAK	Land Use Office			(Ente		Residential	Hotel	Enter trips
PEAK	Land Use Office Retail		Retail	(Ente		Residential	Hotel	multiplied
A. PEAK	Land Use Office Retail Restaurant			(Ente		Residential	Hotel	multiplied by the
.M. PEAK	Land Use Office Retail Restaurant Cinema/Entertainment		Retail	(Ente		Residential	Hotel	multiplied by the Destination
P.M. PEAK	Land Use Office Retail Restaurant		Retail	(Ente		Residential	Hotel	multiplied by the

			**	** MINIMUM *	***			
	(Exit)			(Ente	er) Land Use			Total Exit
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office							
L L	Retail			13				
-	Restaurant							16
Σ	Cinema/Entertainment							
	Residential							
	Hotel							
	Total Enter		16	13				



Example 5: Internal Capture | 2 Land Uses

	GROSS TI	RIP GENE	RATIO	N			
	Land Use	Dail	у	A.M. P Hou		P.M. F Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
5	Office					18	98
INPUT	Retail						
Z	Restaurant						
	Cinema/Entertainment						
	Residential					315	185
	Hotel						
	Total					333	283
	INTERNAL	TRIPS (M	linimu	ms)			
				A.M. F	eak	P.M. F	Peak
	Land Use	Dail	у	Ηοι		Ηοι	
–		Enter	Exit	Enter	Exit	Enter	Exit
ОИТРИТ	Office						
4	Retail						
5	Restaurant						
ō	Cinema/Entertainment						
	Residential						
	Hotel						
	Total						
	% Reduction					2.99	%
	Land Use	Dail	y	A.M. F Hou		P.M. F Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
5	Office						
L L	Retail						
Ουτρυτ	Restaurant						
0	Cinema/Entertainment						
	Residential						
	Hotel						



	Table 6	5.1 Uncon	strained	Internal Persor	n Trip Capture R	ates		
	for Trip Or	igins with	in a Mixe	d-Use Develop	oment (P.M. Pea	ık Hour)		-
	Origin			Destina	ition Land Use			
$\mathbf{\Sigma}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office		20%	4%	0%	2%	0%	
L	Retail	2%		29%	4%	26%	5%	From ITE
-	Restaurant	3%	41%		8%	18%	7%	Trip
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Generation Handbook
<u> </u>	Residential	4%	42%	21%	0%		3%	
	Hotel	0%	16%	68%	0%	2%		

	Table 6	5.2 Uncon	strained I	nternal Persor	n Trip Capture R	ates		
	for Trip Desti	nations w	ithin a M	ixed-Use Deve	lopment (P.M. I	Peak Hour)		
	Origin			Destina	ition Land Use			
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office		8%	2%	1%	4%	0%	
Ы	Retail	31%		29%	26%	46%	17%	From ITE
-	Restaurant	30%	50%		32%	16%	71%	Trip Generation
Σ	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook
ط	Residential	57%	10%	14%	0%		12%	
	Hotel	0%	2%	5%	0%	0%		



		:	* BASED O	N EXIT *				-
	(Exit)			(Ente	r) Land Use			
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office							Exit trips
Ы	Retail							multiplied
-	Restaurant							by the
P.M. PEAK	Cinema/Entertainment							Origin
д	Residential							percentages
	Hotel							
		***	BASED ON	I ENTER ***				
		1						
	(Exit)			(Ente	r) Land Use		•	
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
Т Ц Д	Office							Enter trips
PEAK	Retail							multiplied
P.M.	Restaurant							by the
2	Cinema/Entertainment							Destination
D	Residential							percentages
	Hotel							

			**	** MINIMUM *	***			
	(Exit)			(Ente	er) Land Use			Total Exit
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office							
Ы	Retail							
-	Restaurant							
Σ̈́	Cinema/Entertainment							
<u>م</u>	Residential							
	Hotel							
	Total Enter							



Example 6: Internal Capture | 3 Land Uses

	GROSS TF	RIP GENE	RATIO	N			
	Land Use	Dail	-	A.M. P Hou		P.M. P Hou	ır
		Enter	Exit	Enter	Exit	Enter	Exit
5	Office					56	294
INPUT	Retail					186	178
Z	Restaurant						
_	Cinema/Entertainment						
	Residential					189	111
	Hotel						
	Total					431	583
	INTERNAL [®]	TRIPS (M	inimu	ms)			
		Deil		A.M. P	eak	P.M. P	eak
	Land Use	Dail	У	Hou	ır	Ηοι	ır
H		Enter	Exit	Enter	Exit	Enter	Exit
ОИТРИТ	Office						
ТР	Retail						
Ď	Restaurant						
Ο	Cinema/Entertainment						
	Residential						
	Hotel						
	Total						
	% Reduction					18.5	%
	EXTE	RNAL TR	IPS				
	Land Use	Dail	у	A.M. P Hou		P.M. P Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
D	Office		-		-	48	273
ОИТРИТ	Retail					152	128
5	Restaurant						_
IO	Cinema/Entertainment						
	Residential					137	88
	Hotel						

	Table 6	5.1 Uncon	strained	Internal Person	n Trip Capture R	ates		
	for Trip Or	igins with	in a Mixe	d-Use Develop	oment (P.M. Pea	ak Hour)		-
	Origin			Destina	tion Land Use			
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office		20%	4%	0%	2%	0%	
Ы	Retail	2%		29%	4%	26%	5%	From ITE
-	Restaurant	3%	41%		8%	18%	7%	Trip Generation
Σ̈́	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook
٦	Residential	4%	42%	21%	0%		3%	
	Hotel	0%	16%	68%	0%	2%		

	Table 6	5.2 Uncon	strained I	nternal Person	n Trip Capture R	ates						
	for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)											
	Origin			Destina	tion Land Use							
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
A	Office		8%	2%	1%	4%	0%					
PEAK	Retail	31%		29%	26%	46%	17%	From ITE				
	Restaurant	30%	50%		32%	16%	71%	Trip Generation				
Ξ	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook				
ط	Residential	57%	10%	14%	0%		12%	Handbook				
	Hotel	0%	2%	5%	0%	0%						

		:	* BASED (ON EXIT *				
	(Exit)			(Ente	er) Land Use			
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
Ā	Office							Exit trips
P.M. PEAK	Retail							multiplied
-	Restaurant							by the
2	Cinema/Entertainment							Origin
٩	Residential							percentages
	Hotel							
		***	BASED O	N ENTER ***				
		***	BASED O					_
	(Exit)		Γ	(Ente	r) Land Use			-
AK	Land Use	*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	-
EAK	Land Use Office		Γ	(Ente		Residential	Hotel	- Enter trips
PEAK	Land Use Office Retail		Γ	(Ente		Residential	Hotel	multiplied
M. PEAK	Land Use Office Retail Restaurant		Γ	(Ente		Residential	Hotel	multiplied by the
P.M. PEAK	Land Use Office Retail Restaurant Cinema/Entertainment		Γ	(Ente		Residential	Hotel	multiplied by the Destination
P.M. PEAK	Land Use Office Retail Restaurant		Γ	(Ente		Residential	Hotel	multiplied

	*** MINIMUM ***										
	(Exit)			(Ente	er) Land Use			Total Exit			
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
PEAK	Office										
L L	Retail										
	Restaurant										
Σ	Cinema/Entertainment										
	Residential										
	Hotel										
	Total Enter										

Example 7: Internal Capture | 3 Land Uses

	GROSS TF	RIP GENE	RATIO	N			
	Land Use	Dail	у	A.M. P Hou		P.M. P Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
INPUT	Office					56	60
Ы	Retail						
Z	Restaurant					40	20
	Cinema/Entertainment						
	Residential					284	217
	Hotel						
	Total					380	296
	INTERNAL ⁻	TRIPS (M	linimu	ms)			
	Land Use	Dail	У	A.M. P Hou		P.M. P Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
оитрит	Office						
ТР	Retail						
Ď	Restaurant						
Ο	Cinema/Entertainment						
	Residential						
	Hotel						
	Total						
	% Reduction					6.59	%
	EXTE	RNAL TR	RIPS				
	Land Use	Dail	У	A.M. P Hou		P.M. F Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
ουτρυτ	Office						
ГР	Retail						
5	Restaurant						
Ō	Cinema/Entertainment						
	Residential						
	Hotel						



	Table 6	Table 6.1 Unconstrained Internal Person Trip Capture Rates										
	for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)											
	Origin Destination Land Use											
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
EAK	Office		20%	4%	0%	2%	0%					
Ы	Retail	2%		29%	4%	26%	5%	From ITE				
-	Restaurant	3%	41%		8%	18%	7%	Trip Generation				
Σ̈́	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook				
٦	Residential	4%	42%	21%	0%		3%					
	Hotel	0%	16%	68%	0%	2%						

	Table 6	5.2 Uncon	strained I	Internal Persor	n Trip Capture R	ates						
	for Trip Desti											
	Origin Destination Land Use											
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
A	Office		8%	2%	1%	4%	0%					
PEAK	Retail	31%		29%	26%	46%	17%	From ITE				
	Restaurant	30%	50%		32%	16%	71%	Trip Generation				
Σ	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook				
ط	Residential 57% 10% 14% 0% 12%											
	Hotel	0%	2%	5%	0%	0%						



		**	* BASED	ON EXIT ***							
	(Exit) (Enter) Land Use										
×	Land Use	Office	Retail	Restaurant	, Cinema/Ent.	Residential	Hotel				
A	Office							Exit trips			
P.M. PEAK	Retail							multiplied			
-	Restaurant							by the			
≥.	Cinema/Entertainment							Origin			
Р	Residential							percentages			
	Hotel										
		I	I								
		***	BASED O	N ENTER ***							
		***	BASED O					-			
	(Exit)		Γ	(Ente	r) Land Use			-			
JK N	(Exit) Land Use	*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	-			
EAK	(Exit) Land Use Office		Γ	(Ente		Residential	Hotel	Enter trips			
. PEAK	(Exit) Land Use Office Retail		Γ	(Ente		Residential	Hotel	multiplied			
M. PEAK	(Exit) Land Use Office Retail Restaurant		Γ	(Ente		Residential	Hotel	multiplied by the			
P.M. PEAK	(Exit) Land Use Office Retail		Γ	(Ente		Residential	Hotel	multiplied			

	*** MINIMUM ***											
	(Exit)			(Ente	er) Land Use			Total Exit				
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
EAK	Office											
L L	Retail											
-	Restaurant											
Σ	Cinema/Entertainment											
	Residential											
	Hotel											
	Total Enter											



Tab 6. Pass-By-Trips



Example 8: Pass-By-Trips

For the following examples use the provided pass-by pages from the ITE handbook to determine the passby percentage.

- Land Use Code 813 Free Standing Discount Superstore, Saturday, Mid-Day Peak Period. Answer: ______
- 2. Land Use Code 853 Convenience Market with Gasoline Pumps, Weekday, PM Peak Period. Answer: _____
- Land Use Code 934 Fast-Food Restaurant with Drive Through Window, Weekday, PM Peak Period. Answer: ______
- Land Use Code 945 Gasoline/Service Station with Convenience Market, Weekday, PM Peak Period. Answer: ______

For the following example apply pass by. The land use is a fast-food restaurant with a drive through window. The PM peak hour od adjacent street traffic is being analyzed. Fill in the blank:

Land Use	Land Use Code	Independent Variable	Average Rate	Total Trip	Entering Trips	Exiting Trips
Fast-Food Restaurant with Drive-Through	934	1,200 ft ²	32.67			
			Pass By			
	Exter	nal Trips New to	the System			



Tab 7. Final Exercises



Workbook Example Analysis 1

MIXED USE DEVELOPMENT SEGMENT ANALYSIS

Proposed Land uses:

Convenience Market with Gasoline Pumps (8 pumps) General Office (100,000 square feet) High-Turnover (Sit-Down) (5,700) Fast-Food Restaurant with Drive-Through Window (7,500)

TRIP GENERATION

	Trip Ge	neration PM Pe	ak Period Calcul	ation		
Land use	Land Use Code	Independent Variable	Average Rate	Total Trips	Entering Trips	Exiting Trips
Convenience Market with Gasoline Pumps	853	16 fueling positions	23.04			
General Office	710	100,000 ft ²	1.15			
High-Turnover (Sit-Down) Restaurant	932	5,700 ft ²	9.77			
Fast-Food Restaurant with Drive- Through Window	934	7,500 ft ²	32.67			
		(Gross Total Trips	784	365	419

INTERNAL CAPTURE REDUCTION

Through the methodology meeting it was determined that the internal capture reduction would be capped at 15%.

	Internal Ca	pture Trips	E	cternal Trip	os
Land use	Entering	Exiting	Entering	Exiting	Total
	Trips	Trips	Trips	Trips	Trips
Convenience Market with					
Gasoline Pumps					
General Office					
High-Turnover (Sit-Down)					
Restaurant					
Fast-Food Restaurant with Drive-					
Through Window					
Totals	55	63	310	356	666

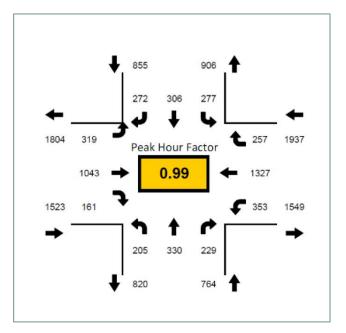


PASS-BY TRAFFIC

		Pass-By Reductior	1		
Land use	Land Use Code	Pass-By Trip Percentage	Total Pass-By Trips	Pass-By Entering Trips	Pass-By Exiting Trips
Convenience Market with Gasoline Pumps	853	66%			
General Office	710	-			
High-Turnover (Sit-Down) Restaurant	932	43%			
Fast-Food Restaurant with Drive- Through Window	934	50%			
	Total Co	alculated Pass-By			

Pass-By Check PM Peak:

North-South Roadway: 855+906 = 1,761 East-West Roadway: 1,523+1,804 = 3,327 Shared Volume: 319 + 272 = 591 1,761 + 3,327 - 591 = 4,497 10% of 4,497 = 450 The calculated pass-by is less/more?



Pr	oject Trip Sum	nmary							
Total Trips Entering Trips Exiting Trip									
Gross Total Trips	784	365	419						
Internal Capture Reduction									
External Trips									
Pass-By Reduction									
Net New External Trips									



SEGMENT ANALYSIS

Segments that are significantly impacted by the proposed development will be analyzed. For this example, the roadways where the development traffic makes up 3% or more of the maximum service volume at the adopted level-of-service target during the PM peak hour will be included in the analysis.

		Segme	nt Stua	ly Area	Detern	ninatio	n				
Roadway Segment	No. of	PHPD Serv.	Pro Di	ject st.	Proje	ct Dir.	Pro	ew ject ips		% ficant	
	Lanes	Vol	NB/	SB/	NB/	SB/	NB/	SB/	NB	SB/	Study Segment
			EB	WB	EB	WB	EB	WB	/EB	WB	
9 th Street											
SR 50/Colonial Drive to Story Road	2	713	1%	1%	Out	In					
Story Road to SR 438/Plant Street	2	713	3%	3%	Out	In					
Dillard Street											
Beard Road to SR 50	4	1,530	11%	11%	In	Out					
SR 50 to Project Entrance	4	1,530	15%	35%	In	Out					
Project Entrance to SR 438	4	1,530	25%	25%	Out	In					
SR 438 to Story Road	4	1,530	15%	15%	Out	In					
Story Road to Book Street	4	1,530	10%	10%	Out	In					

Segment Analysis											
		PHPD	20	20	New F	Project	Tota	l Trips			
Roadway Segment	No. of	Serv.	Backg	round.	Tr	ips			Deficiency		
Roddwdy Segment	Lanes	Vol	NB/	SB/	NB/	SB/	NB/EB	SB/WB	Denciency		
		VOI	EB	WB	EB	WB	ND/LD	30/ 10			
Dillard Street											
SR 50 to Project Entrance	4	1,530	1,000	1,021							
Project Entrance to SR 438	4	1,530	1,100	1,021							



Workbook Example Analysis 2

STUDY INFORMATION

Land Uses:

High Rise Apartment - 464 Units Retail (Shopping Center) – 7,000 square feet

Analysis Period

AM Peak Hour

PM Peak Hour

Trip Generation

Fill in the table below and determine if you should use the equation or the rate.

	Available Trip Generation Average Rates and Equation											
	Land use	Land Use Code	Independent Variable	Average Rate	Equation	R ²	Method you Should Use					
М	High-Rise Apartment											
AM	Retail (Shopping Center)											
Ν	High-Rise Apartment											
ΡM	Retail (Shopping Center)											

Use the average rate for the completion of the table below.

Trip Generation – Use Average Rate											
			AM				PM				
Land use	Land Use Code	Size and Units	IN	OUT	Total	IN	OUT	Total			
High-Rise Apartment		464 Units									
Retail (Shopping Center)		7,000 ft ²									
		Totals									



Use attached Internal Capture Sheets

	AM Inter	nal Trips	PM Internal Trip		
Land use	IN	OUT	IN	OUT	
High-Rise Apartment					
Retail (Shopping Center)					

External Trips

AM Trips	Trip Ge	neration	Interna	al Trips	E	External Trips		
Land use	IN	OUT	IN	OUT	IN	OUT	Total	
High-Rise Apartment								
Retail (Shopping Center)								
Totals								
PM Trips	Trip Ge	eneration	Interna	Internal Trips External Trip			rips	
Land use	IN	OUT	IN	OUT	IN	OUT	Total	
High-Rise Apartment								
Retail (Shopping Center)								
Totals								



Multimodal Reduction

Within the Central Business District (CBD) where the project is proposed, the recommended transit reduction is approximately 23 percent, and the recommended pedestrian reduction is 10 percent. Taken together, a 33 percent multimodal reduction was applied to the estimated number of external trips during both the morning and evening peak hours.

AM Trips	External Trips		Multim	odal Trips	Net New External Tri		
Land use	IN	OUT	IN	OUT	IN	OUT	Total
High-Rise Apartment							
Retail (Shopping Center)							
Totals							
PM Trips	Exterr	nal Trips	Multim	odal Trips	Net New External Trips		
Land use	IN	OUT	IN	OUT	IN	OUT	Total
High-Rise Apartment							
Retail (Shopping Center)							
Totals							



Workbook Example Analysis 2 | Internal Capture Sheets

	GROSS TF	RIP GENE	RATIO	N			
	Land Use		Daily		ır	P.M. Peak Hour	
_		Enter	Exit	Enter	Exit	Hou Enter	Exit
5		$\begin{tabular}{ c c c } \hline Daily & Hour & Ho \\ \hline Enter & Exit & Enter & Exit & Enter \\ \hline Office & I & I & I & I & I \\ \hline Retail & I & I & I & I & I \\ \hline Restaurant & I & I & I & I & I \\ \hline Residential & I & I & I & I & I \\ \hline Residential & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Hotel & I & I & I & I & I & I \\ \hline Restaurant & I & I & I & I & I \\ \hline Restaurant & I & I & I & I & I \\ \hline Residential & I & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I \\ \hline Hotel & I & I & I & I \\ \hline Hotel & I & I & I \\ \hline Hotel & I & I & $					
INPUT							
Z							
	Total						
	INTERNAL	TRIPS (M	inimu	ms)			
		Deile		A.M. P	Peak	P.M. Peak	
	Land Use	Dally		Hour		Hour	
F		Enter	Exit	Enter	Exit	Enter	Exit
Ουτρυτ	Office						
Ē	Retail						
$\sum_{i=1}^{n}$	Restaurant						
0	Cinema/Entertainment						
	Residential						
	Hotel						
	Total						
	% Reduction			2.3	%	14.5	%
	EXTE	RNAL TR	IPS				
	Land Use	Dail	у			P.M. F Hou	
F		Enter	Exit				Exit
ουτρυτ	Office						
ТР	Retail						
5	Restaurant						
Ō	Cinema/Entertainment						
	Residential						
	Hotel						



	Table 6.1 Unconstrained Internal Person Trip Capture Rates										
for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)											
Origin Destination Land Use											
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
EAK	Office		28%	63%	0%	1%	0%				
P	Retail	29%		13%	0%	14%	0%	From ITE			
Ξ	Restaurant	31%	14%		0%	4%	3%	Trip Generation			
2	Cinema/Entertainment	0%	0%	0%		0%	0%	Handbook			
A	Residential	2%	1%	20%	0%		0%				
	Hotel	75%	14%	9%	0%	0%					

	Table 6.2 Unconstrained Internal Person Trip Capture Rates										
for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)											
	Origin Destination Land Use										
$\mathbf{\mathbf{x}}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
EAI	Office		32%	23%	0%	0%	0%				
Ы	Retail	4%		50%	0%	2%	0%	From ITE			
	Restaurant	14%	8%		0%	5%	4%	Trip Generation			
Σ	Cinema/Entertainment	0%	0%	0%		0%	0%	Handbook			
A	Residential	3%	17%	20%	0%		0%	Handbook			
	Hotel	3%	4%	6%	0%	0%					



		**	* BASED	ON EXIT ***				-
	(Exit)			(Ente	r) Land Use			
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office							Exit trips
PEAK	Retail							multiplied
-	Restaurant							by the
A.M.	Cinema/Entertainment							Origin
۲	Residential							percentages
	Hotel							
		I	I					
		***	BASED O	N ENTER ***				
		***	BASED O	N ENTER ***				-
	(Exit)	***	BASED O		r) Land Use			_
×		*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	
EAK	(Exit)		I	(Ente		Residential	Hotel	- Enter trips
PEAK	(Exit) Land Use		I	(Ente		Residential	Hotel	Enter trips multiplied
л. РЕАК	(Exit) Land Use Office		I	(Ente		Residential	Hotel	by the
.M. PEAK	(Exit) Land Use Office Retail		I	(Ente		Residential	Hotel	multiplied by the Destination
A.M. PEAK	(Exit) Land Use Office Retail Restaurant		I	(Ente		Residential	Hotel	multiplied

	*** MINIMUM ***							
	(Exit)			(Ente	er) Land Use			Total Exit
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office							
L L	Retail							
Σ̈́	Restaurant							
2	Cinema/Entertainment							
A.I	Residential							
	Hotel							
	Total Enter							



	Table 6.1 Unconstrained Internal Person Trip Capture Rates							
	for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)							
	Origin			Destina	tion Land Use			
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office		20%	4%	0%	2%	0%	
L L	Retail	2%		29%	4%	26%	5%	From ITE
-	Restaurant	3%	41%		8%	18%	7%	Trip Generation
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook
٦	Residential	4%	42%	21%	0%		3%	
	Hotel	0%	16%	68%	0%	2%		

	Table 6	Table 6.2 Unconstrained Internal Person Trip Capture Rates						
	for Trip Desti	nations w	ithin a M	ixed-Use Deve	lopment (P.M. I	Peak Hour)		
	[
	Origin			Destina	tion Land Use			
$\mathbf{\mathbf{x}}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office		8%	2%	1%	4%	0%	
B	Retail	31%		29%	26%	46%	17%	From ITE
-	Restaurant	30%	50%		32%	16%	71%	Trip Generation
Σ̈́	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook
٦	Residential	57%	10%	14%	0%		12%	
	Hotel	0%	2%	5%	0%	0%		



		**	* BASED	ON EXIT ***				
	(Exit)			(Ente	er) Land Use			
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
Ā	Office							Exit trips
PEAK	Retail							multiplied
-	Restaurant							by the
P.M.	Cinema/Entertainment							Origin
٩	Residential							percentages
	Hotel							
		***	BASEDO	N FNTER ***				1
		***	BASED O	N ENTER ***				-
	(Exit)	***	BASED O		r) Land Use			
×	(Exit) Land Use	*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	
EAK			I	(Ente		Residential	Hotel	
PEAK	Land Use		I	(Ente		Residential	Hotel	Enter trips multiplied
л. РЕАК	Land Use Office		I	(Ente		Residential	Hotel	multiplied by the
.M. PEAK	Land Use Office Retail		I	(Ente		Residential	Hotel	multiplied by the Destination
P.M. PEAK	Land Use Office Retail Restaurant		I	(Ente		Residential	Hotel	multiplied by the

	*** MINIMUM ***							
	(Exit)			(Ente	er) Land Use			Total Exit
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office							
Ы	Retail							
	Restaurant							
Σ.	Cinema/Entertainment							
٦ م	Residential							
	Hotel							
	Total Enter							



Tab 8. ITE Resources



Tab 8 | Table of Contents ITE Trip Generation Manual Tables

	Land Use ITE Code	Page
090	Park and Ride Lot with Bus or Light Rail Service	8-1
140	Manufacturing	8-2
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222	Multifamily Housing (High- Rise) One hour between 4 and 6pm	8-5
310	Hotel	8-6
445	Multiplex Movie Theater	8-7
520	Elementary School	8-8
710	General Office Building	8-9
813	Free- Standing Discount Superstore	8-10
820	Shopping Center One hour between 7 and 9am	8-11
820	Shopping Center One hour between 4 and 6pm	8-12
853	Convenience Market with Gasoline Pumps	8-13
932	High Turnover (Sit-Down) Restaurant	8-14
934	Fast Food Restaurant with Drive Through Window	8-15
937	Coffee/Donut Shop with Drive-Through Window	8-16
	ITE Pass By and Non-Pass By Trips	Page
813	Table E.4 Pass-By and Non-Pass-By Trips Saturday, Mid-Day Peak Period Land Use Code 813- Free Standing Discount Superstore	8-17
853	Table E.16 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 853-Convenience Market with Gasoline Pumps	8-18
934	Table E.32 Pass-By and Non-Pass By Trips Weekday, PM Peak Period Land Use Code 934-Fast Food Restaurant with Drive Through Window	8-19
945	Table E.38 Pass-By and Non-Pass By Trips Weekday, PM Peak Period Land Use Code 945-Gasoline/Service Station with Convenience Market	8-20

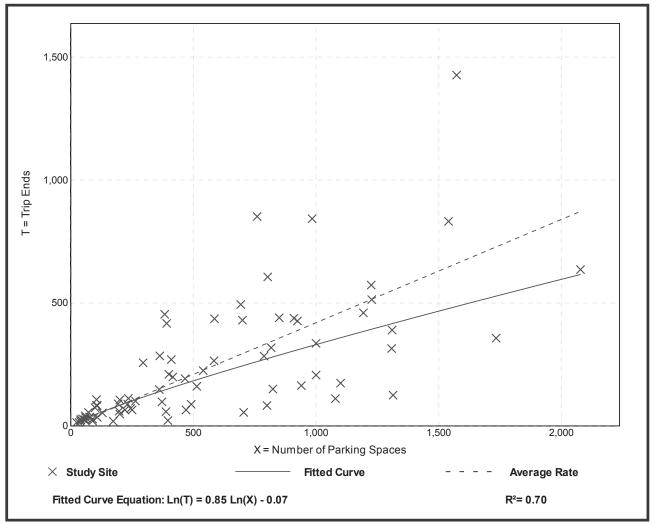
Park-and-Ride Lot with Bus or Light Rail Service

(090)

Vehicle Trip Ends vs: On a:	Parking Spaces Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	78
Avg. Num. of Parking Spaces:	
Directional Distribution:	79% entering, 21% exiting

Vehicle Trip Generation per Parking Space

Average Rate	Range of Rates	Standard Deviation
0.42	0.06 - 1.19	0.26

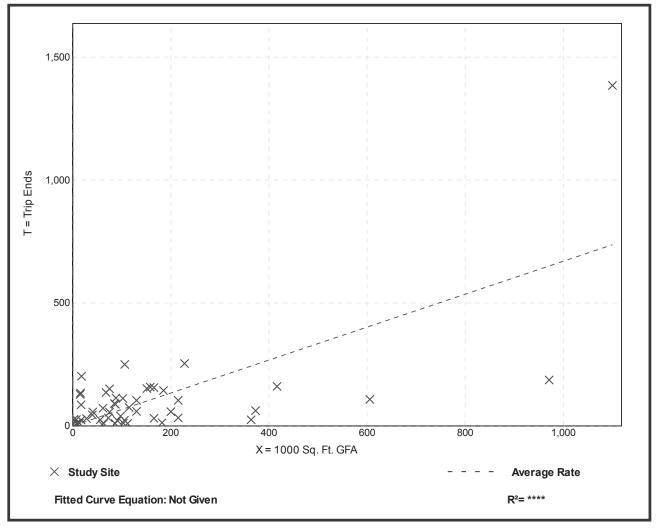




Manufacturing (140)				
Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.			
Setting/Location:	General Urban/Suburban			
Number of Studies:	52			
1000 Sq. Ft. GFA:	152			
Directional Distribution:	31% entering, 69% exiting			

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.67	0.07 - 11.37	0.94



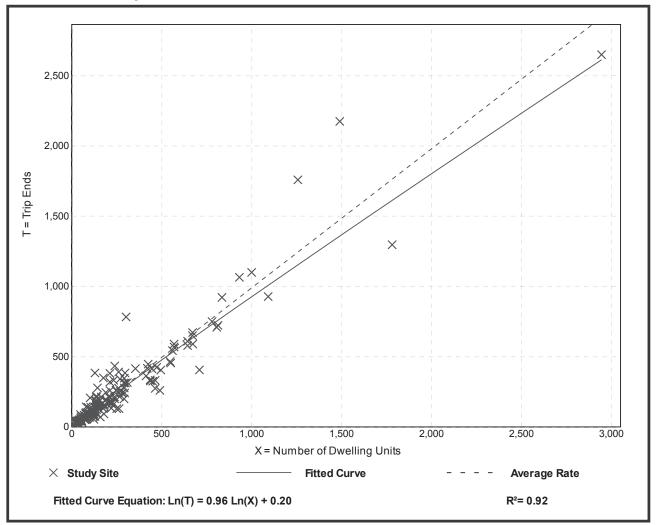


Single-Family Detached Housing (210)

Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	190
Avg. Num. of Dwelling Units:	242
Directional Distribution:	63% entering, 37% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31



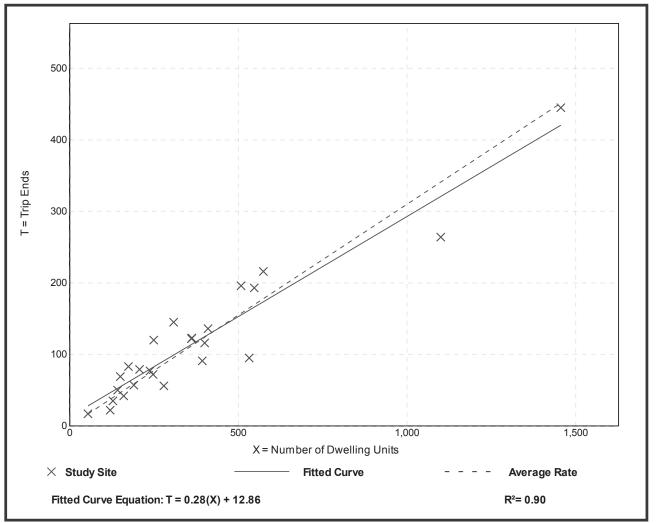


Multifamily Housing (High-Rise) (222)

Setting/Location:General Urban/SuburbanNumber of Studies:25Avg. Num. of Dwelling Units:372Directional Distribution:24% entering, 76% exiting	Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Avg. Num. of Dwelling Units: 372	Setting/Location:	General Urban/Suburban
	Number of Studies:	25
Directional Distribution: 24% optoring 76% oviting	Avg. Num. of Dwelling Units:	372
	Directional Distribution:	24% entering, 76% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.31	0.18 - 0.48	0.08

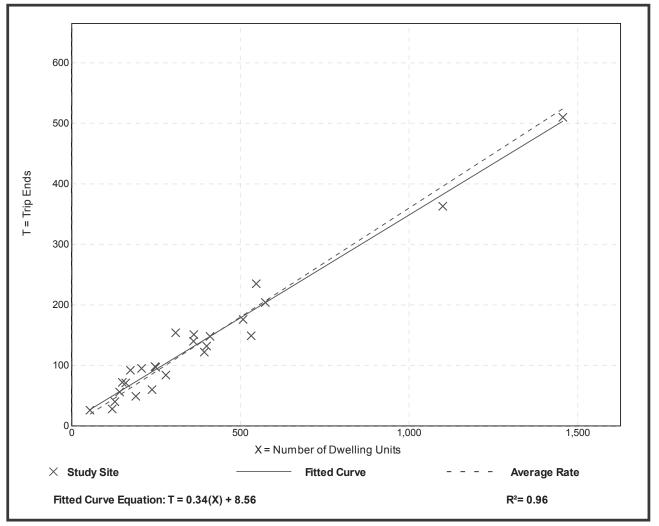


Multifamily Housing (High-Rise) (222)

Setting/Location:General Urban/SuburbanNumber of Studies:25Avg. Num. of Dwelling Units:372Directional Distribution:61% entering, 39% exiting	Vehicle Trip Ends vs: On a:	Dwelling Units Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Avg. Num. of Dwelling Units: 372	Setting/Location:	General Urban/Suburban
	Number of Studies:	25
Directional Distribution: 61% optoring 20% oviting	Avg. Num. of Dwelling Units:	372
	Directional Distribution:	61% entering, 39% exiting

Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.36	0.23 - 0.53	0.06

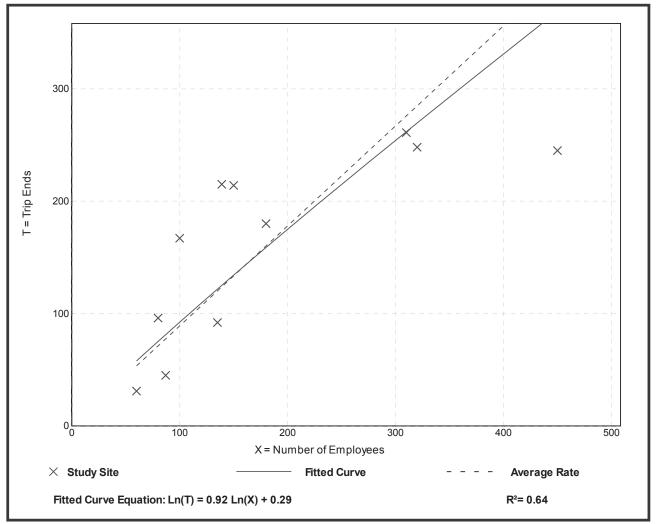




	otel (10)
Vehicle Trip Ends vs: On a:	Employees Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	11
Avg. Num. of Employees:	183
Directional Distribution:	54% entering, 46% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
0.89	0.52 - 1.67	0.38





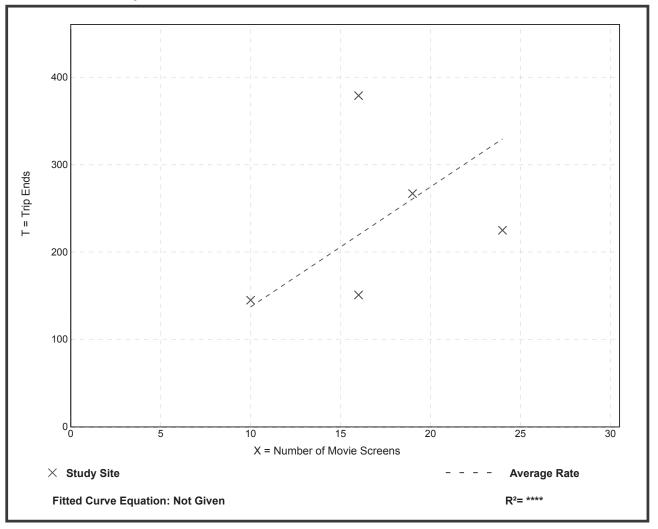
Multiplex Movie Theater (445)	
Vehicle Trip Ends vs:	
On a:	Weekday,
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	5
Avg. Num. of Movie Screens:	17
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per Movie Screen

Average Rate	Range of Rates	Standard Deviation
13.73	9.38 - 23.69	5.87

Data Plot and Equation

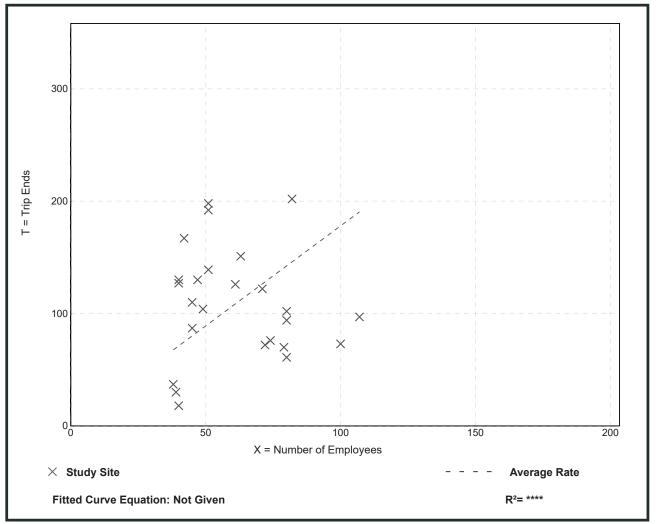
Caution – Small Sample Size



	ary School 20)
Vehicle Trip Ends vs: On a:	
Setting/Location:	General Urban/Suburban
Number of Studies:	25
Avg. Num. of Employees: Directional Distribution:	61 48% entering, 52% exiting

Vehicle Trip Generation per Employee

Average Rate	Range of Rates	Standard Deviation
1.78	0.45 - 3.98	1.04

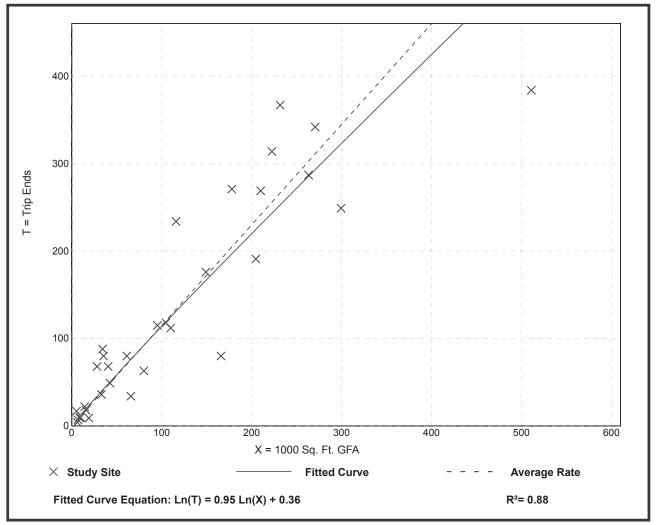


General Office Building (710)		
Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.	
Setting/Location:	General Urban/Suburban	
Number of Studies:	32	
1000 Sq. Ft. GFA:	114	
Directional Distribution:	16% entering, 84% exiting	

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.15	0.47 - 3.23	0.42

Data Plot and Equation





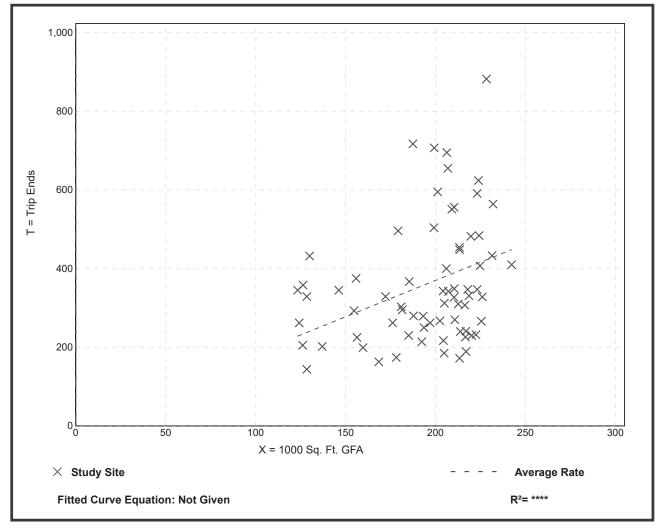
5

Free-Standing Discount Superstore (813)

Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	70
1000 Sq. Ft. GFA:	194
Directional Distribution:	56% entering, 44% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.85	0.81 - 3.86	0.76

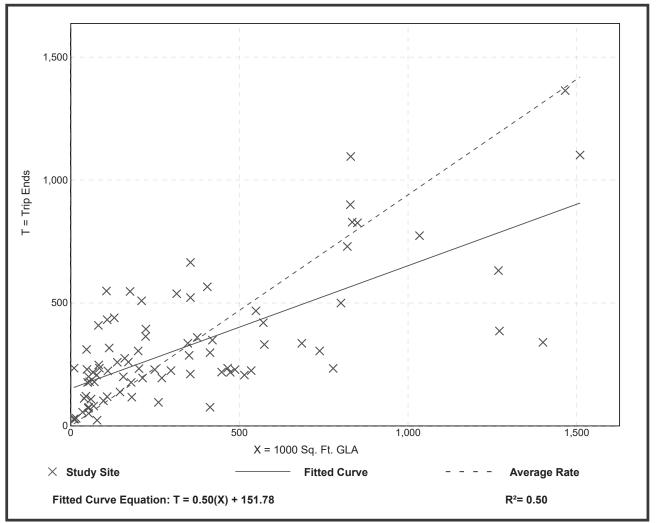




Shoppir (8)	n g Center 20)
Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GLA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	84
1000 Sq. Ft. GLA:	351
Directional Distribution:	62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

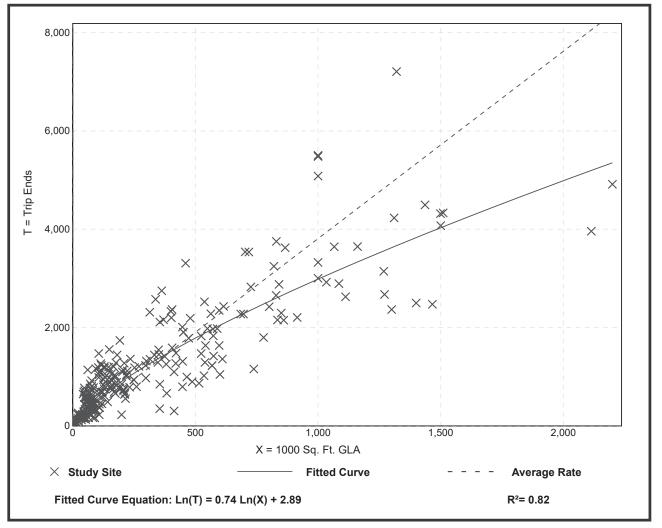




Shoppir (8)	n g Center 20)
Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GLA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	261
1000 Sq. Ft. GLA:	327
Directional Distribution:	48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04



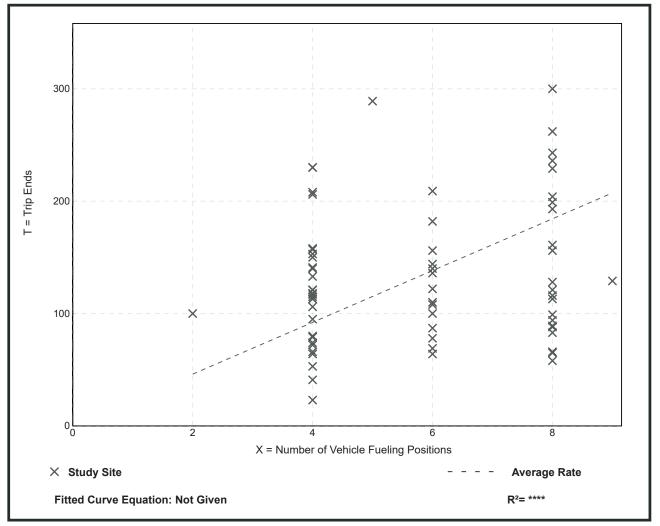


Convenience Market with Gasoline Pumps (853)

On a: Setting/Location: Number of Studies: Avg. Num. of Vehicle Fueling Positions:	

Vehicle Trip Generation per Vehicle Fueling Position

Average Rate	Range of Rates	Standard Deviation
23.04	5.75 - 57.80	11.91

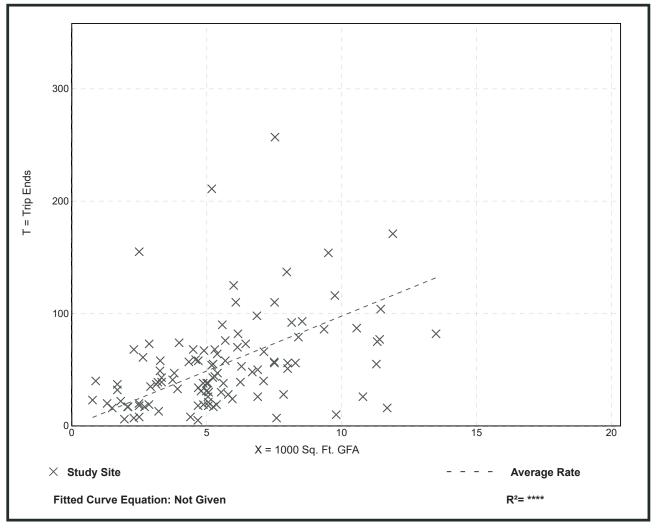


High-Turnover (Sit-Down) Restaurant (932)

Setting/Location: General Urban/Suburban Number of Studies: 107 1000 Sq. Ft. GFA: 6 Directional Distribution: 62% entering, 38% exiting	Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
1000 Sq. Ft. GFA: 6	Setting/Location:	General Urban/Suburban
	Number of Studies:	107
Directional Distribution: 62% entering, 38% exiting	1000 Sq. Ft. GFA:	6
	Directional Distribution:	62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
9.77	0.92 - 62.00	7.37





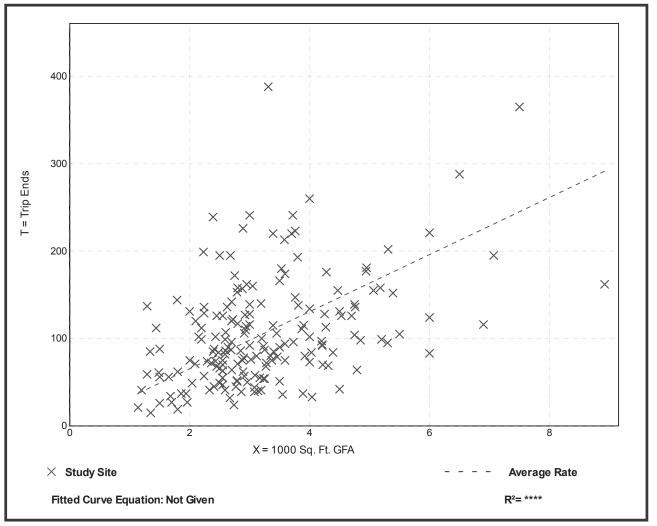
Fast-Food Restaurant with Drive-Through Window

l	O	2	Λ	1
l	J	J	4)

Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4 and 6 p.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	185
1000 Sq. Ft. GFA:	3
Directional Distribution:	52% entering, 48% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
32.67	8.17 - 117.22	17.87



Coffee/Donut Shop with Drive-Through Window (937)

Vehicle Trip Ends vs: On a:	1000 Sq. Ft. GFA Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7 and 9 a.m.
Setting/Location:	General Urban/Suburban
Number of Studies:	61
1000 Sq. Ft. GFA:	
Directional Distribution:	51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
88.99	18.32 - 353.57	48.19

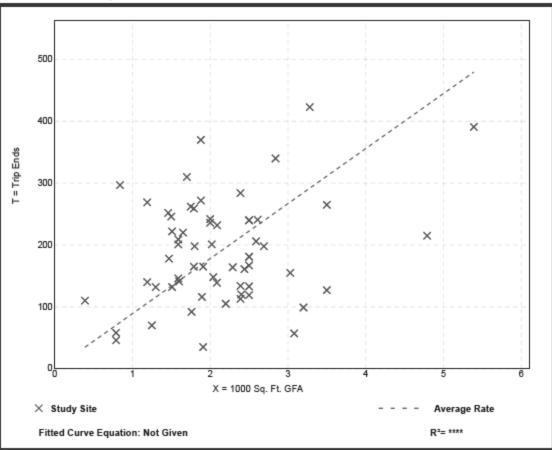


Table E.4 Pass-By and Non-Pass-By Trips Saturday, Mid-Day Peak PeriodLand Use Code 813—Free-Standing Discount Superstore

SIZE (1,000 SQ. FT. GFA)	LOCATION	SURVEY DATE	NO. OF	TIME PERIOD	PASS-BY TRIP (%)	NON-P	ASS-BY TRIP	· (%)	ADJ. STREET PEAK HOUR VOLUME	SOURCE
						PRIMARY	DIVERTED	TOTAL		
205	Louisville, KY	SeptNov. 2007	360	12:00–4:00 p.m.	28	_	_	72	6,144	651-652
216	Pasadena, TX	SeptNov. 2007	240	12:00–4:00 p.m.	16	_	_	84	11,898	651-652
213	Cedar Falls, IA	SeptNov. 2007	156	12:00–4:00 p.m.	13	_	_	87	7,484	651-652
204	Pueblo, CO	SeptNov. 2007	300	12:00–4:00 p.m.	11	—	-	89	4,764	651-652
185	Plano, IL	SeptNov. 2007	162	12:00–4:00 p.m.	18	-	-	82	3,871	651-652
217	Sheboygan, WI	SeptNov. 2007	441	12:00–4:00 p.m.	22	_	_	78	8,256	651-652
213	San Antonio, TX	SeptNov. 2007	748	12:00–4:00 p.m.	28	_	_	72	12,332	651-652
226	Colonial Heights, VA	SeptNov. 2007	270	12:00–4:00 p.m.	26	_	_	74	12,995	651-652
220	Milford, PA	SeptNov. 2007	123	12:00–4:00 p.m.	26	_	_	74	7,024	651-652
222	Marysville, CA	SeptNov. 2007	810	12:00–4:00 p.m.	25	_	_	75	5,429	651-652

Average Pass-By Trip Percentage: 21

"-" means no data were provided

180 Trip Generation Handbook, 3rd Edition



SIZE (1,000 SQ. FT.		WEEKDAY SURVEY	NO. OF		PASS-BY	NON-PA	ASS-BY TRIPS	(%)	ADJ. STREET PEAK HOUR	
GFA)	LOCATION	DATE	INTERVIEWS	TIME PERIOD	TRIP (%)	PRIMARY	DIVERTED	TOTAL	VOLUME	SOURCE
2.8	Louisville area, KY	1993	_	4:00–6:00 p.m.	62	11	27	38	2,875	Barton-Aschman Assoc.
2.4	Louisville area, KY	1993	_	4:00–6:00 p.m.	58	13	29	42	2,655	Barton-Aschman Assoc.
4.2	Louisville area, KY	1993	61	4:00–6:00 p.m.	58	26	16	42	2,300	Barton-Aschman Assoc.
2.6	Crestwood, KY	1993	68	4:00–6:00 p.m.	67	15	18	33	950	Barton-Aschman Assoc.
3.7	Louisville area, KY	1993	70	4:00–6:00 p.m.	61	16	23	39	2,175	Barton-Aschman Assoc.
3.0	New Albany, IN	1993	80	4:00–6:00 p.m.	65	15	20	35	1,165	Barton-Aschman Assoc.
2.3	Louisville, KY	1993	67	4:00–6:00 p.m.	57	16	27	43	1,954	Barton-Aschman Assoc.
2.2	New Albany, IN	1993	115	4:00–6:00 p.m.	48	16	36	52	820	Barton-Aschman Assoc.
3.6	Louisville area, KY	1993	60	4:00–6:00 p.m.	56	17	27	44	2,505	Barton-Aschman Assoc.
2.6	Seminole Co., FL	1989	82	4:00–6:00 p.m.	73	20	7	27	_	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	98	4:00–6:00 p.m.	81	15	4	19	_	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	115	4:00–6:00 p.m.	69	16	15	31	_	Tipton Associates Inc.
2.6	Volusia Co., FL	1989	98	4:00–6:00 p.m.	74	15	11	26	_	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	4:00–6:00 p.m.	74	24	2	26	_	Tipton Associates Inc.
2.7	Volusia Co., FL	1989	82	4:00–6:00 p.m.	87	8	5	13	_	Tipton Associates Inc.
2.6	Seminole Co., FL	1989	99	2:00–4:00 p.m.	64	28	8	36	_	Tipton Associates Inc.
2.4	Volusia Co., FL	1989	38	2:00–4:00 p.m.	68	21	11	32	-	Tipton Associates Inc.

Table E.16 Pass-By and Non-Pass-By Trips Weekday, PM Peak PeriodLand Use Code 853—Convenience Market with Gasoline Pumps

Average Pass-By Trip Percentage: 66

"---" means no data were provided

200 Trip Generation Handbook, 3rd Edition



	SIZE (1,000 SQ.		WEEKDAY			PASS- BY	NON-P.	ASS-BY TRIPS (%)	ADJ. STREET PEAK	
SEATS	FT. GFA)	LOCATION	SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	TRIP (%)	PRIMARY	DIVERTED	TOTAL	HOUR VOLUME	SOURCE
_	~2.6	Minn-St. Paul, MN	1987	50	3:00–7:00 p.m.	25	27	48	75	_	_
-	<5.0	Chicago suburbs, IL	1987	80	3:00–6:00 p.m.	38	_	_	62	_	Kenig, O'Hara, Humes, Flock
-	<5.0	Chicago suburbs, IL	1987	100	3:00–6:00 p.m.	55	_	_	45	_	Kenig, O'Hara, Humes, Flock
-	<5.0	Chicago suburbs, IL	1987	159	3:00–6:00 p.m.	56	_	_	44	_	Kenig, O'Hara, Humes, Flock
-	<5.0	Chicago suburbs, IL	1987	225	3:00–6:00 p.m.	48	_	_	52	_	Kenig, O'Hara, Humes, Flock
_	<5.0	Chicago suburbs, IL	1987	88	3:00–6:00 p.m.	35	—	_	65	_	Kenig, O'Hara, Humes, Flock
_	<5.0	Chicago suburbs, IL	1987	84	3:00–6:00 p.m.	44	—	_	56	—	Kenig, O'Hara, Humes, Flock
88	1.3	Louisville area, KY	1993	_	4:00–6:00 p.m.	68	22	10	32	2,055	Barton- Aschman Assoc.
120	1.9	Louisville area, KY	1993	33	4:00–6:00 p.m.	67	24	9	33	2,447	Barton- Aschman Assoc.
87	4.2	New Albany, IN	1993	_	4:00–6:00 p.m.	56	25	19	44	1,632	Barton- Aschman Assoc.
150	3.0	Louisville area, KY	1993	_	4:00–6:00 p.m.	31	31	38	69	4,250	Barton- Aschman Assoc.
_	3.1	Kissimmee, FL	1995	28	2:00–6:00 p.m.	71	—	_	29	_	TPD Inc.
-	3.1	Apopka, FL	1996	29	2:00–6:00 p.m.	38	—	_	62	—	TPD Inc.
-	2.8	Winter Springs, FL	1995	47	2:00–6:00 p.m.	66	_	_	34	_	TPD Inc.
_	4.3	Longwood, FL	1994	304	2:00–6:00 p.m.	62	_	_	38	_	TPD Inc.
_	3.2	Altamonte Springs, FL	1996	202	2:00–6:00 p.m.	40	39	21	60	_	TPD Inc.
_	2.9	Winter Park, FL	1996	271	2:00–6:00 p.m.	41	41	18	59	_	TPD Inc.
_	3.3*	several	1996	varies	4:00–6:00 p.m.	62	_	_	38	_	Oracle Engineering

Table E.32 Pass-By and Non-Pass-By Trips Weekday, PM Peak PeriodLand Use Code 934—Fast-Food Restaurant with Drive-Through Window

*Average of several combined studies.

Average Pass-By Trip Percentage: 50

"---" means no data were provided

Table E.38 Pass-By and Non-Pass-By Trips Weekday, PM Peak Period Land Use Code 945—Gasoline/Service Station with Convenience Market

SIZE (1,000	VEHICLE		WEEKDAY				NON-P	ASS-BY TRIPS	(%)	ADJ. STREET	
SQ. FT. GFA)	FUELING POSITIONS	LOCATION	SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PASS-BY TRIP (%)	PRIMARY	DIVERTED	TOTAL	PEAK HOUR VOLUME	SOURCE
0.8	8	Louisville area, KY	1993	83	4:00–6:00 p.m.	52	8	40	48	4,965	Barton- Aschman Assoc.
0.6	8	Louisville, KY	1993	60	4:00–6:00 p.m.	53	20	27	47	1,491	Barton- Aschman Assoc.
0.7	10	Louisville, KY	1993	_	4:00–6:00 p.m.	57	19	24	43	1,812	Barton- Aschman Assoc.
0.7	8	Louisville area, KY	1993	_	4:00–6:00 p.m.	72	7	21	28	2,657	Barton- Aschman Assoc.
0.7	10	Louisville area, KY	1993	_	4:00–6:00 p.m.	55	16	29	45	2,657	Barton- Aschman Assoc.
0.8	8	Silver Spring, MD	1992	36	4:00–6:00 p.m.	67	14	19	33	3,095	RBA
0.4	8	Derwood, MD	1992	46	4:00–6:00 p.m.	46	11	43	54	3,770	RBA
2.1	8	Kensington, MD	1992	31	4:00–6:00 p.m.	52	13	35	48	1,785	RBA
1	8	Silver Spring, MD	1992	35	4:00–6:00 p.m.	54	3	43	46	7,080	RBA

Average Pass-By Trip Percentage: 56 "—" means no data were provided

Tab 9. Answers



Example 2: Applying FDOT Generalized Tables

For the following examples use the 12/18/12 FDOT Generalized Service Volume Tables to determine the LOS along the roadway segments.

- What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 30,000. The roadway is a 4-lane divided state signalized arterial in an urbanized area with a posted speed limit of 50 mph. Answer: C
- 2. What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 37,900. The roadway is a 4-lane undivided state signalized arterial in an urbanized area with a posted speed limit of 50 mph with exclusive left lanes. Answer: F
- What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 65,100. The roadway is a 6-lane freeway in a transition area with auxiliary lanes present in both directions. Answer: B
- What is the LOS of a roadway that has a Peak Hour directional volume of 1,530. The roadway is a 4-lane divided Highway located in a Rural Undeveloped Area. Answer: C
- 5. What is the LOS of a roadway that has a Peak Hour Two-Way volume of 2,500. The roadway is a 4-lane divided Non-State Signalized Roadway with a posted speed limit of 30 mph located in a transition area. Answer: E
- 6. What is the LOS of a roadway that has an Annual Average Daily Traffic (AADT) volume of 45,000. The roadway is a 6-lane divided state signalized arterial in an urbanized area with a posted speed limit of 50 mph. Answer: C

Example 3: Rate Vs Equation

For the following examples use the flow chart from the ITE Trip Generation Handbook to determine for each case study if the fitted curve (equation) or average rate should be used to estimate trips, or if local data should be collected. Then calculate the trips.

- Estimate the trip generation for Land Use Code 140 (Manufacturing) on a weekday during the PM peak hour of adjacent street traffic as a function of gross floor area (GFA). Assume the site will have 800,000 sq. ft. of GFA. Method: Weighted Average Answer: =800 * 0.67 = 536
- Estimate trip generation for Land Use Code 310 (Hotel) on weekday during the PM peak hour of the adjacent street traffic as a function of employees. For this example, assume the hotel will have 100 employees.
 Method: Weighted Average Answer: 100*0.89 = 89
- Estimate the daily trip generation for Land Use Code 520 (Elementary School) on a weekday during the PM peak hour for adjacent street traffic as a function of employees. For this example, assume 70 employees.
 Method: Weighted Average Answer: = 70*1.78 = 125
- Estimate trip generation for Land Use Code 813 (Free-Standing Discount Superstore) on a weekday during the AM peak hour of adjacent street traffic as a function of gross floor area. For this example, assume the store size will be 180,000 sq. ft. of GFA.
 Method: Weighted Average Answer: = 1.85 * 180 = 333
- Estimate trip generation for Land Use Code 210 (Single-Family Detached Housing) on a weekday during the PM peak hour of adjacent street traffic as a function of Dwelling Units. For this example, assume the number of units is 300.
 Method: <u>Fitted Curve</u> Answer: <u>Ln(T) = 0.96 Ln(X) + 0.20 = 292</u>
- Estimate trip generation for Land Use Code 090 (Park-and-Ride Lot with Bus or Light Rail Service) on a weekday during the AM peak hour of adjacent street traffic as a function of Parking Spaces. For this example, assume the number of spaces to be 50.
 Method: <u>Fitted Curve</u> Answer: <u>Ln(T) =0.85 Ln(X) 0.07 = 26</u>
- Estimate trip generation for Land Use Code 445 (Multiplex Movie Theater) on a weekday during the PM peak hour of adjacent street traffic as a function of Screens. For this example, assume the number of screens to be 20.
 Method: <u>Collect Local Data</u> Answer: ______

Example 4: Internal Capture | 2 Land Uses

KEY

	GROSS TF	RIP GENE	RATIO	N			
	Land Use	Dail	-	A.M. P Hou	ır	P.M. P Hou	ır
		Enter	Exit	Enter	Exit	Enter	Exit
'	Office						
INPUT	Retail					180	150
\leq	Restaurant					45	40
	Cinema/Entertainment						
	Residential						
	Hotel						
	Total					225	190
	INTERNAL ⁻	TRIPS (M	inimu	ms)			
		Dail	v	A.M. F		P.M. F	
	Land Use		-	Ηοι		Ηοι	1
Ľ		Enter	Exit	Enter	Exit	Enter	Exit
ОИТРИТ	Office						
Ē	Retail					16	13
	Restaurant					13	16
0	Cinema/Entertainment						
	Residential						
	Hotel						
	Total					29	29
	% Reduction					14.0	1%
	EXTE	RNAL TR	IPS				
	Land Use	Dail	у	A.M. F Hou		P.M. F Hou	
H		Enter	Exit	Enter	Exit	Enter	Exit
D	Office						
ОИТРИТ	Retail					164	137
5	Restaurant					32	24
ō	Cinema/Entertainment						
	Residential						
	Hotel						

	Table 6	5.1 Uncon	strained	nternal Persor	n Trip Capture R	ates		
	for Trip Or	igins with	in a Mixe	d-Use Develop	oment (P.M. Pea	ık Hour)		
	Origin			Destina	tion Land Use			
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office		20%	4%	0%	2%	0%	
L L	Retail	2%		29%	4%	26%	5%	From ITE
	Restaurant	3%	41%		8%	18%	7%	Trip Generation
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook
٦	Residential	4%	42%	21%	0%		3%	
	Hotel	0%	16%	68%	0%	2%		

	Table 6	5.2 Uncon	strained I	nternal Person	n Trip Capture R	ates		
	for Trip Desti	nations w	vithin a M	ixed-Use Deve	lopment (P.M. I	Peak Hour)		
	Γ	r						
	Origin			Destina	tion Land Use			
$\mathbf{\mathbf{x}}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office		8%	2%	1%	4%	0%	
B	Retail	31%		29%	26%	46%	17%	From ITE
-	Restaurant	30%	50%		32%	16%	71%	Trip Generation
Σ̈́	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook
٦	Residential	57%	10%	14%	0%		12%	
	Hotel	0%	2%	5%	0%	0%		

		**	* BASED O	N EXIT ***				
	(Exit)			(Ente	r) Land Use			
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office							Exit trips
PEAK	Retail			44				multiplied
_	Restaurant		16					by the
P.M.	Cinema/Entertainment							Origin
٩	Residential							percentages
	Hotel							
	noter					I		
	noter	***	BASED ON	N ENTER ***				
		***	BASED ON		r) Land Lise			-
~	(Exit) Land Use			(Ente	r) Land Use Cinema/Ent.	Residential	Hotel	
AK	(Exit)	*** Office	BASED ON		r) Land Use Cinema/Ent.	Residential	Hotel	Entor trips
PEAK	(Exit) Land Use			(Ente	-	Residential	Hotel	Enter trips multiplied
1. PEAK	(Exit) Land Use Office			(Ente Restaurant	-	Residential	Hotel	Enter trips multiplied by the
.M. PEAK	(Exit) Land Use Office Retail		Retail	(Ente Restaurant	-	Residential	Hotel	multiplied by the Destination
P.M. PEAK	(Exit) Land Use Office Retail Restaurant		Retail	(Ente Restaurant	-	Residential	Hotel	multiplied by the

			**	** MINIMUM *	:**			
	(Exit)			(Ente	er) Land Use			Total Exit
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office							
Ы	Retail			13				13
Σ.	Restaurant		16					16
2	Cinema/Entertainment							
Ľ,	Residential							
	Hotel							
	Total Enter		16	13				

Example 5: Internal Capture | 2 Land Uses

	KE	Y					
	GROSS TI	RIP GENE	RATIO	Ν			
	Land Use	Dail	У	A.M. P Hou		P.M. P Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
Τſ	Office					18	98
INPUT	Retail						
Z	Restaurant						
—	Cinema/Entertainment						
	Residential					315	185
	Hotel						
	Total					333	283
	INTERNAL	TRIPS (M	linimu	ms)			
	Land Use	Dail	у	A.M. P Hou		P.M. P Hou	
L		Enter	Exit	Enter	Exit	Enter	Exit
Ουτρυτ	Office					7	2
ГР	Retail						
5	Restaurant						
Ō	Cinema/Entertainment						
	Residential					2	7
	Hotel						
	Total					9	9
	% Reduction					2.99	%
	EXTE	RNAL TR	RIPS				
	Land Use	Dail	У	A.M. P Hou		P.M. P Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
D	Office					11	96
ουτρυτ	Retail					0	0
D	Restaurant					0	0
0	Cinema/Entertainment					0	0
	Residential					313	178
	Hotel					0	0

	Table 6	5.1 Uncon	strained	nternal Persor	n Trip Capture R	ates					
	for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)										
	Origin			Destina	tion Land Use						
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
PEAK	Office		20%	4%	0%	2%	0%				
L L	Retail	2%		29%	4%	26%	5%	From ITE			
	Restaurant	3%	41%		8%	18%	7%	Trip Generation			
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook			
٦	Residential	4%	42%	21%	0%		3%				
	Hotel	0%	16%	68%	0%	2%					

	Table 6.2 Unconstrained Internal Person Trip Capture Rates											
	for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)											
	1											
	Origin		-	Destina	tion Land Use							
$\mathbf{\mathbf{x}}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
EAK	Office		8%	2%	1%	4%	0%					
B	Retail	31%		29%	26%	46%	17%	From ITE				
-	Restaurant	30%	50%		32%	16%	71%	Trip				
Σ̈́	Cinema/Entertainment	6%	4%	3%		4%	1%	Generation Handbook				
٦	Residential	57%	10%	14%	0%		12%					
	Hotel	0%	2%	5%	0%	0%						

		**	* BASED O	N EXIT ***				
	(Exit)			(Ente	r) Land Use			
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
P.M. PEAK	Office					2		Exit trips
Ы	Retail							multiplied
-	Restaurant							by the
2	Cinema/Entertainment							Origin
д_	Residential	7						percentages
	Hotel							
		***	BASED ON	I ENTER ***				
		1						
	(Exit)			(Ente	r) Land Use		ſ	
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office					13		Enter trips
PEAK	Retail							multiplied
P.M.	Restaurant							by the
2	Cinema/Entertainment							Destination
D	Residential	10						percentages
	Hotel							

	*** MINIMUM ***										
	(Exit)			(Ente	er) Land Use			Total Exit			
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
PEAK	Office					2		2			
Ы	Retail										
	Restaurant										
P.M.	Cinema/Entertainment										
<u>م</u>	Residential	7						7			
	Hotel										
	Total Enter	7				2					

Example 6: Internal Capture | 3 Land Uses

KEY

	GROSS TF		ΒΔΤΙΛ	N			
				14			
	Land Use	Dail	у	A.M. F Hou		P.M. P Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
	Office					56	294
P P	Retail					186	178
INPUT	Restaurant						
_	Cinema/Entertainment						
	Residential					189	111
	Hotel						
	Total					431	583
	INTERNAL	TRIPS (M	linimuı	ms)			
				A.M. F	Peak	P.M. P	Peak
	Land Use	Dail	у	Ηοι		Hour	
H		Enter	Exit	Enter	Exit	Enter	Exit
оитрит	Office					8	21
L D	Retail					34	50
	Restaurant						
0	Cinema/Entertainment						
	Residential					52	23
	Hotel						
	Total					94	94
	% Reduction					18.5	%
	EXTE	RNAL TR	RIPS				
	Land Use	Dail	у	A.M. F Hou		P.M. P Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
Ουτρυτ	Office					48	273
L L	Retail					152	128
5	Restaurant						
ō	Cinema/Entertainment						
	Residential					137	88
	Hotel						

	Table 6	5.1 Uncon	strained	nternal Persor	n Trip Capture R	ates					
	for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)										
	Origin			Destina	tion Land Use						
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
PEAK	Office		20%	4%	0%	2%	0%				
L L	Retail	2%		29%	4%	26%	5%	From ITE			
	Restaurant	3%	41%		8%	18%	7%	Trip Generation			
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook			
٦	Residential	4%	42%	21%	0%		3%				
	Hotel	0%	16%	68%	0%	2%					

	Table 6.2 Unconstrained Internal Person Trip Capture Rates											
	for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)											
	Origin			Destina	ition Land Use							
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
EAI	Office		8%	2%	1%	4%	0%					
B	Retail	31%		29%	26%	46%	17%	From ITE				
Σ̈́	Restaurant	30%	50%		32%	16%	71%	Trip Generation				
2	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook				
D	Residential	57%	10%	14%	0%		12%					
	Hotel	0%	2%	5%	0%	0%						

		**	* BASED	ON EXIT ***				_
	(Exit)			(Ente	er) Land Use			
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office		59			6		Exit trips
PEAK	Retail	4				46		multiplied
-	Restaurant							by the
P.M.	Cinema/Entertainment							Origin
٩	Residential	4	47					percentages
	Hotel							
	Hotel							
	Hotel	***	BASED O	N ENTER ***				
	Hotel (Exit)	***	BASED O		r) Land Use			-
		*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	-
AK	(Exit)			(Ente	-	Residential 8	Hotel	- Enter trips
PEAK	(Exit) Land Use		Retail	(Ente	-		Hotel	Enter trips multiplied
1. PEAK	(Exit) Land Use Office	Office	Retail	(Ente	-	8	Hotel	Enter trips multiplied by the
.M. PEAK	(Exit) Land Use Office Retail	Office	Retail	(Ente	-	8	Hotel	multiplied by the Destination
P.M. PEAK	(Exit) Land Use Office Retail Restaurant	Office	Retail	(Ente	-	8	Hotel	multiplied by the

	*** MINIMUM ***									
	(Exit)			(Ente	er) Land Use			Total Exit		
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel			
PEAK	Office		15			6		21		
L L	Retail	4				46		50		
	Restaurant									
Σ	Cinema/Entertainment									
	Residential	4	19					23		
	Hotel I I I I I I I I I I I I I I I I I I I									
	Total Enter	8	34			52				

Example 7: Internal Capture | 3 Land Uses

KEY

	GROSS TF		ΒΔΤΙΛ	N			
		NF ULINE		14			
				A.M. P	Peak	P.M. F	Peak
	Land Use	Dail	У	Ηοι	ır	Ηοι	ır
		Enter	Exit	Enter	Exit	Enter	Exit
INPUT	Office					56	60
μ	Retail						
Ζ	Restaurant					40	20
—	Cinema/Entertainment						
	Residential					284	217
	Hotel						
	Total					380	296
	INTERNAL ⁻	TRIPS (M	linimu	ns)			
		-		-			
		Dail	V	A.M. P	Peak	P.M. F	Peak
	Land Use	Dali	у	Ηοι	ır	Ηοι	ır
F		Enter	Exit	Enter	Exit	Enter	Exit
Ουτρυτ	Office					10	2
	Retail						
	Restaurant					7	5
0	Cinema/Entertainment						
	Residential					5	15
	Hotel						
	Total					22	22
	% Reduction					6.59	%
	EXTE	RNAL TR	RIPS				
		Dail	v	A.M. P		P.M. P	
	Land Use		-	Ηοι		Ηοι	1
F		Enter	Exit	Enter	Exit	Enter	Exit
ЪГ	Office					46	58
E	Retail						
Ουτρυτ	Restaurant					33	15
0	Cinema/Entertainment						
	Residential					279	202
	Hotel						

	Table 6	5.1 Uncon	strained	Internal Persor	n Trip Capture R	ates				
	for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)									
	Origin			Destina	tion Land Use					
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel			
PEAK	Office		20%	4%	0%	2%	0%			
L L	Retail	2%		29%	4%	26%	5%	From ITE		
	Restaurant	3%	41%		8%	18%	7%	Trip Generation		
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook		
٦	Residential	4%	42%	21%	0%		3%			
	Hotel	0%	16%	68%	0%	2%				

	Table 6	5.2 Uncon	strained	Internal Persor	n Trip Capture R	ates					
	for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour)										
	Origin Destination Land Use										
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
PEAK	Office		8%	2%	1%	4%	0%				
B	Retail	31%		29%	26%	46%	17%	From ITE			
	Restaurant	30%	50%		32%	16%	71%	Trip Generation			
Σ	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook			
ط											
	Hotel	0%	2%	5%	0%	0%					

		**	* BASED	ON EXIT ***				_
	(Exit)			(Ente	r) Land Use			
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office			2		1		Exit trips
PEAK	Retail							multiplied
-	Restaurant	1				4		by the
P.M.	Cinema/Entertainment							Origin
٩	Residential	9		45				percentages
	Hotel							
	Hotel							
	Hotel	***	BASED O	N ENTER ***		<u> </u>		-
	Hotel (Exit)	***	BASED O		r) Land Use			_
		*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	-
AK	(Exit)		Γ	(Ente		Residential	Hotel	- Enter trips
PEAK	(Exit) Land Use		Γ	(Ente Restaurant			Hotel	Enter trips multiplied
1. PEAK	(Exit) Land Use Office		Γ	(Ente Restaurant			Hotel	Enter trips multiplied by the
.M. PEAK	(Exit) Land Use Office Retail	Office	Γ	(Ente Restaurant		11	Hotel	multiplied by the Destination
P.M. PEAK	(Exit) Land Use Office Retail Restaurant	Office	Γ	(Ente Restaurant		11	Hotel	multiplied by the

	*** MINIMUM ***									
	(Exit)			(Ente	er) Land Use			Total Exit		
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel			
EAK	Office			1		1		2		
L L	Retail									
-	Restaurant	1				4		5		
Σ	Cinema/Entertainment									
L L	Residential	9		6				15		
	Hotel									
	Total Enter	10		7		5				

Example 8: Pass-By-Trips

For the following examples use the provided pass-by pages from the ITE handbook to determine the pass-by percentage.

- Land Use Code 813 Free Standing Discount Superstore, Saturday, Mid-Day Peak Period. Answer: <u>21%</u>
- Land Use Code 853 Convenience Market with Gasoline Pumps, Weekday, PM Peak Period. Answer: <u>66%</u>
- Land Use Code 934 Fast-Food Restaurant with Drive Through Window, Weekday, PM Peak Period. Answer: <u>50%</u>
- Land Use Code 945 Gasoline/Service Station with Convenience Market, Weekday, PM Peak Period. Answer: <u>56%</u>

For the following example apply pass by. The land use is a fast-food restaurant with a drive through window. The PM peak hour od adjacent street traffic is being analyzed. Fill in the blank:

Land Use	Land Use Code	Independent Variable	Average Rate	Total Trip	Entering Trips	Exiting Trips
Fast-Food Restaurant with Drive-Through	934	1,200 ft ²	32.67	39	20	19
	20	10	10			
External T	rips New to t	he System		19	10	9

Workbook Example Analysis 1

MIXED USE DEVELOPMENT SEGMENT ANALYSIS ANSWER KEY

Proposed Land uses:

Convenience Market with Gasoline Pumps (8 pumps)

General Office (100,000 square feet)

High-Turnover (Sit-Down) (5,700)

Fast-Food Restaurant with Drive-Through Window (7,500)

TRIP GENERATION

	Trip Generation PM Peak Period Calculation										
Land use	Land Use Code	Independent Variable	Average Rate	Total Trips	Entering Trips	Exiting Trips					
Convenience Market with Gasoline Pumps	853	16 fueling positions	23.04	368	184	184					
General Office	710	100,000 ft ²	1.15	115	19	96					
High-Turnover (Sit-Down) Restaurant	932	5,700 ft ²	9.77	56	35	21					
Fast-Food Restaurant with Drive- Through Window	934	7,500 ft ²	32.67	245	127	118					
		6	Gross Total Trips	784	365	419					

INTERNAL CAPTURE REDUCTION

Through the methodology meeting it was determined that the internal capture reduction would be capped at 15%.

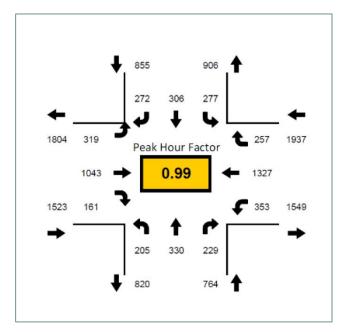
	Internal Ca	pture Trips	Ex	kternal Trip	DS
Land use	Entering	Exiting	Entering	Exiting	Total
	Trips	Trips	Trips	Trips	Trips
Convenience Market with Gasoline Pumps	28	28	156	156	312
General Office	3	14	16	82	98
High-Turnover (Sit-Down) Restaurant	5	3	30	18	48
Fast-Food Restaurant with Drive- Through Window	19	18	108	100	208
Totals	55	63	310	356	666

PASS-BY TRAFFIC

	Pass-By Reduction										
Land use	Land Use Code	Pass-By Trip Percentage	Total Pass-By Trips	Pass-By Entering Trips	Pass-By Exiting Trips						
Convenience Market with Gasoline Pumps	853	66%	206	103	103						
General Office	710	-	-	-	-						
High-Turnover (Sit-Down) Restaurant	932	43%	21	10	11						
Fast-Food Restaurant with Drive- Through Window	934	50%	104	52	52						
	Total Co	alculated Pass-By	331	165	166						

Pass-By Check PM Peak:

North-South Roadway: 855+906 = 1,761 East-West Roadway: 1,523+1,804 = 3,327 Shared Volume: 319 + 272 = 591 1,761 + 3,327 - 591 = 4,497 10% of 4,497 = 450 The calculated pass-by is less/more?



Project Trip Summary									
Total Trips Entering Trips Exiting Trips									
Gross Total Trips	784	365	419						
Internal Capture Reduction	118	55	63						
External Trips	666	310	356						
Pass-By Reduction	331	165	166						
Net New External Trips	335	145	190						

SEGMENT ANALYSIS

Segments that are significantly impacted by the proposed development will be analyzed. For this example, the roadways where the development traffic makes up 3% or more of the maximum service volume at the adopted level-of-service standard during the PM peak hour will be included in the analysis.

	Se	egment S	tudy Aı	rea Det	ermina	tion					
Roadway Segment	No. of	PHPD Serv.		ject st.	Proje	ct Dir.	Ne Proj Tri	ect		6 ficant	
	Lanes	Vol	NB/	SB/	NB/	SB/	NB/	SB/	NB/	SB/	Study
			EB	WB	EB	WB	EB	WB	EB	WB	Segment
9 th Street											
SR 50/Colonial Drive to Story Road	2	713	1%	1%	Out	In	2	1	0%	0%	No
Story Road to SR 438/Plant Street	2	713	3%	3%	Out	In	6	4	1%	1%	No
Dillard Street											
Beard Road to SR 50	4	1,530	11%	11%	In	Out	16	21	1%	1%	No
SR 50 to Project Entrance	4	1,530	15%	35%	In	Out	22	67	1%	4%	Yes
Project Entrance to SR 438	4	1,530	25%	25%	Out	In	48	36	3%	2%	Yes
SR 438 to Story Road	4	1,530	15%	15%	Out	In	29	22	2%	1%	No
Story Road to Book Street	4	1,530	10%	10%	Out	In	19	15	1%	1%	No

	Segment Analysis										
		PHPD	20	20	New F	Project	Tota	l Trips			
Roadway Segment	No. of	Serv.	Backgi	round.	Tr	ips			Deficiency		
Roddwdy Segment	Lanes	Vol	NB/	SB/	NB/	SB/	NB/EB	SB/WB	Denciency		
		VUI	EB	WB	EB	WB	ND/ED	30/ 10			
Dillard Street											
SR 50 to Project Entrance	4	1,530	1,000	1,021	22	67	1,022	1,088	No		
Project Entrance to SR 438	4	1,530	1,100	1,021	48	36	1,148	1,057	No		

Workbook Example Analysis 2

KEY

Land Uses:

High Rise Apartment - 464 Units Retail (Shopping Center) – 7,000 square feet

Analysis Period

AM Peak Hour

PM Peak Hour

Trip Generation

Fill in the table below and determine if you should use the equation or the rate and then calculate trip generation

		Availa	able Trip Genera	ation Average Ra	ates and Equation		
	Land use	Land Use Code	Independent Variable	Average Rate	Equation	R ²	Method Used
8	High-Rise Apartment	222	Units	0.31	T= 0.28(X) +12.86	0.90	Equation
AM	Retail (Shopping Center)	820	Square Feet	0.94	T= 0.50(X) +151.78	0.50	Equation
N	High-Rise Apartment	222	Units	0.36	T = 0.34(X) +8.56	0.96	Equation
ΡM	Retail (Shopping Center)	820	Square Feet	3.81	Ln(T) = 0.74LN(X) + 2.89	0.82	Equation

	Trip Ger	neration – Used	Rate for	these for s	implicity			
			AM			PM		
Land use	Land Use Code	Size and Units	IN	OUT	Total	IN	OUT	Total
High-Rise Apartment	222	464 Units	35	109	144	102	62	167
Retail (Shopping Center)	820	7,000 ft ²	4	3	7	13	14	27
Tota	ls		39	112	151	115	79	194

Use attached Internal Capture Sheets

	AM Inter	nal Trips	PM Inte	rnal Trips
Land use	IN	OUT	IN	OUT
High-Rise Apartment	1	1	5	14
Retail (Shopping Center)	1	1	14	5

External Trips

AM Trips	Trip Ge	eneration	Interna	al Trips	E	xternal Ti	rips
Land use	IN	OUT	IN	OUT	IN	OUT	Total
High-Rise Apartment	35	105	1	1	34	104	-
Retail (Shopping Center)	19	12	1	1	18	11	-
Totals	54	117	2	2	52	115	-
PM Trips	Trip Ge	eneration	Interna	al Trips	E	xternal Ti	rips
Land use	IN	OUT	IN	OUT	IN	OUT	Total
High-Rise Apartment	98	63	5	14	93	49	-
Retail (Shopping Center)	48	53	14	5	34	48	-
Totals	146	116	18	18	127	97	-

Multimodal Reduction

Within the Central Business District (CBD) where the project is proposed, the recommended transit reduction is approximately 23 percent, and the recommended pedestrian reduction is 10 percent. Taken together, a 33 percent multimodal reduction was applied to the estimated number of external trips during both the morning and evening peak hours.

AM Trips	Exterr	nal Trips	Multim	odal Trips	Net Ne	w Extern	al Trips
Land use	IN	OUT	IN	OUT	IN	OUT	Total
High-Rise Apartment	34	104	11	34	23	70	-
Retail (Shopping Center)	18	11	6	4	12	7	-
Totals	52	115	17	38	35	77	-
PM Trips	Exterr	nal Trips	Multim	odal Trips	Net Ne	w Extern	al Trips
Land use	IN	OUT	IN	OUT	IN	OUT	Total
High-Rise Apartment	93	49	31	16	62	33	-
Retail (Shopping Center)	34	48	11	16	23	32	-
Totals	127	97	42	32	85	65	-

Workbook Example Analysis 2 | Internal Capture

	GROSS TF	RIP GENE	RATIO	N			
	Land Use	Dai	ly	A.M. P Hou		P.M.P Hou	
		Enter	Exit	Enter	Exit	Enter	Exit
INPUT	Office						
Ы	Retail			19	12	48	53
Ζ	Restaurant						
	Cinema/Entertainment						
	Residential			35	105	98	63
	Hotel						
	Total			54	117	146	116
	INTERNAL ⁻	TRIPS (M	inimu	ms)			
	Land Use	Dai	ly	A.M. F Hou		P.M. P Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
ουτρυτ	Office						
ТР	Retail			1	1	5	14
Ū.	Restaurant						
0	Cinema/Entertainment						
	Residential			1	1	14	5
	Hotel						
	Total			2	2		
	% Reduction			2.3	%	14.5	%
	EXTE	RNAL TR	IPS				
	Land Use	Dai	ly	A.M. P Hou		P.M. P Hou	
F		Enter	Exit	Enter	Exit	Enter	Exit
оитрит	Office						
ТР	Retail			18	11	43	39
5	Restaurant						
Ō	Cinema/Entertainment						
	Residential			34	104	84	58
	Hotel						



	Table 6.1 Unconstrained Internal Person Trip Capture Rates										
	for Trip Origins within a Mixed-Use Development (P.M. Peak Hour)										
	Origin Destination Land Use										
$\mathbf{\Sigma}$	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
EAK	Office		28%	63%	0%	1%	0%				
Б	Retail	29%		13%	0%	14%	0%	From ITE			
-	Restaurant	31%	14%		0%	4%	3%	Trip Generation			
Σ	Cinema/Entertainment	0%	0%	0%		0%	0%	Handbook			
A	Residential	2%	1%	20%	0%		0%	handbook			
	Hotel	75%	14%	9%	0%	0%					

	Table 6	.2 Uncon	strained	Internal Perso	n Trip Capture R	ates					
	for Trip Destinations within a Mixed-Use Development (P.M. Peak Hour) Origin Destination Land Use										
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel				
EAK	Office		32%	23%	0%	0%	0%				
Ы	Retail	4%		50%	0%	2%	0%	From ITE			
-	Restaurant	14%	8%		0%	5%	4%	Trip Generation			
Σ	Cinema/Entertainment	0%	0%	0%		0%	0%	Handbook			
A	Residential	3%	17%	20%	0%		0%				
	Hotel	3%	4%	6%	0%	0%					



		**	* BASED	ON EXIT ***				
	(Exit)			(Ente	er) Land Use			
×	Land Use Office Retail	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
A	Office							Exit trips
PEAK	Retail					2		multiplied
-	Restaurant							by the
A.M.	Cinema/Entertainment							Origin
Ā	Residential		1					percentages
	Hotel							
		1	1					
		***	BASEDO	N ENTER ***				
		***	BASED O	N ENTER ***				-
	(Exit)	***	BASED O		r) Land Use			-
×	(Exit) Land Use	*** Office	BASED O Retail		er) Land Use Cinema/Ent.	Residential	Hotel	
EAK				(Ente	-	Residential	Hotel	- Enter trips
PEAK	Land Use			(Ente	-	Residential	Hotel	Enter trips multiplied
1. PEAK	Land Use Office			(Ente	-		Hotel	multiplied by the
.M. PEAK	Land Use Office Retail			(Ente	-		Hotel	multiplied by the Destination
A.M. PEAK	Land Use Office Retail Restaurant			(Ente	-		Hotel	multiplied

	*** MINIMUM ***											
	(Exit)			(Ente	er) Land Use			Total Exit				
×	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel					
PEAK	Office											
Ы	Retail					1		1				
	Restaurant											
Σ.	Cinema/Entertainment											
Ľ.	Residential		1					1				
	Hotel											
	Total Enter		1			1						



	Table 6	5.1 Uncon	strained	Internal Perso	n Trip Capture R	ates		
	for Trip Or	igins with	in a Mixe	d-Use Develo	pment (P.M. Pea	ak Hour)		
	Origin			Destina	ation Land Use			
\mathbf{X}	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office		20%	4%	0%	2%	0%	
Б	Retail	2%		29%	4%	26%	5%	From ITE
	Restaurant	3%	41%		8%	18%	7%	Trip Generation
Σ	Cinema/Entertainment	2%	21%	31%		8%	2%	Handbook
٩	Residential	4%	42%	21%	0%		3%	
	Hotel	0%	16%	68%	0%	2%		

		Table 6	.2 Uncon	strained	Internal Perso	n Trip Capture R	ates		
		for Trip Desti	nations w	/ithin a M	ixed-Use Deve	lopment (P.M. F	Peak Hour)		
		Origin			Destina	ition Land Use			
	2	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
<	EAK	Office		8%	2%	1%	4%	0%	
	2	Retail	31%		29%	26%	46%	17%	From ITE
	_	Restaurant	30%	50%		32%	16%	71%	Trip Generation
2	Ξ	Cinema/Entertainment	6%	4%	3%		4%	1%	Handbook
6	<u>ר</u>	Residential	57%	10%	14%	0%		12%	Handbook
		Hotel	0%	2%	5%	0%	0%		



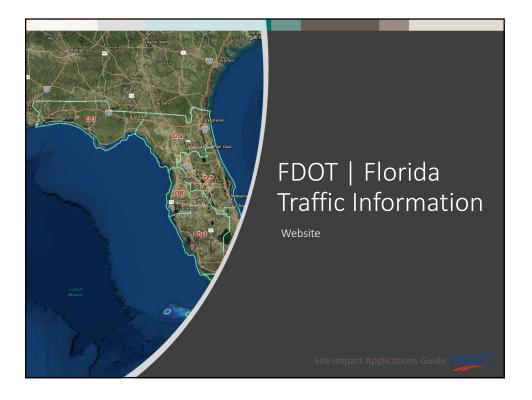
		**	* BASED	ON EXIT ***				
	(Exit)			(Ente	er) Land Use			
¥	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
PEAK	Office							Exit trips
Б	Retail					14		multiplied
_	Restaurant							by the
P.M.	Cinema/Entertainment							Origin
ط	Residential		26					percentages
	Hotel							
		***	BASED O	N ENTER ***				_
	(Exit)	***	BASED O		r) Land Use			-
×	(Exit) Land Use	*** Office	BASED O		r) Land Use Cinema/Ent.	Residential	Hotel	-
AK				(Ente		Residential	Hotel	- Enter trips
PEAK	Land Use			(Ente		Residential 45	Hotel	Enter trips multiplied
1. PEAK	Land Use Office			(Ente			Hotel	multiplied by the
.M. PEAK	Land Use Office Retail			(Ente			Hotel	multiplied by the Destination
P.M. PEAK	Land Use Office Retail Restaurant			(Ente			Hotel	multiplied by the

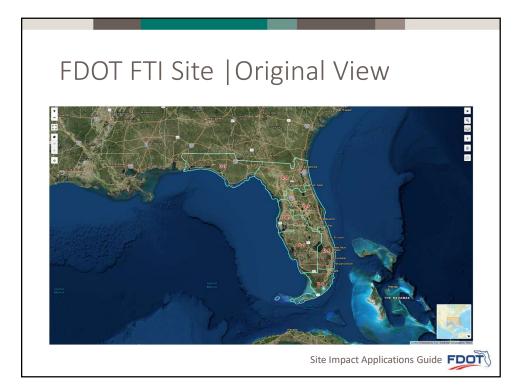
			**	** MINIMUM *	***			
	(Exit)			(Ente	er) Land Use			Total Exit
Y	Land Use	Office	Retail	Restaurant	Cinema/Ent.	Residential	Hotel	
EAK	Office							
Ы	Retail					14		14
	Restaurant							
P.M.	Cinema/Entertainment							
D	Residential		5					5
	Hotel							
	Total Enter		5			14		

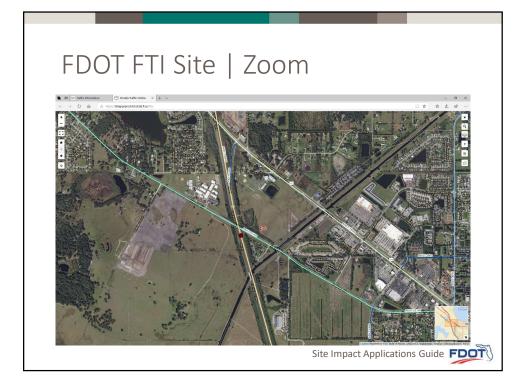


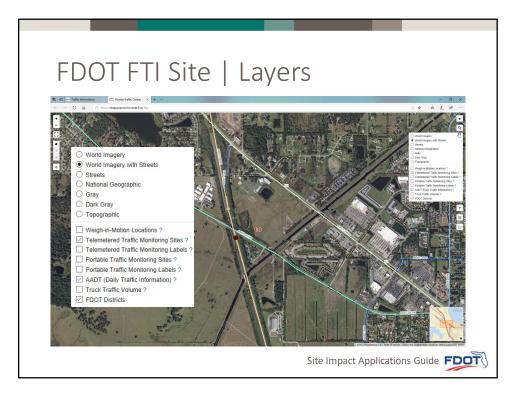
Tab 10. FDOT FTI Site

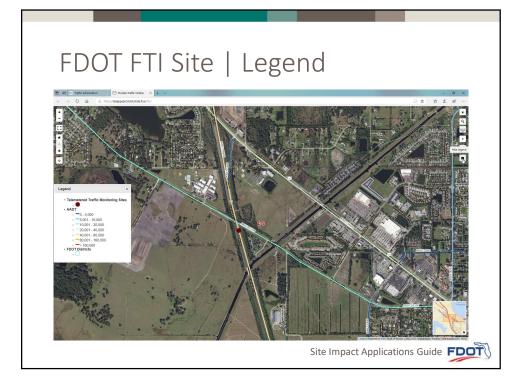


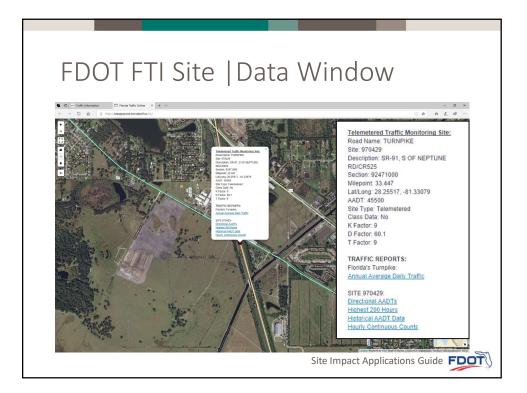












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	0011 HEFT NG CORE WAY FROM NE UD-1/200TH DIXIE MWW, M1 50 8420 0 8420 C 9.0 99.0W 7.0P
	0112 HEFT 180 OF HAMF FINGE 80 V0-1/SOUTH DIXIE MFK, ML 80 4100 0 4100 C 3.0 39., MF 7.0F 0118 HEFT 80 OF HAMF OF 800 U-1/SOUTH BUSIER MFK, ML 8 5850 0 5850 C 3.0 39., MF 7.0F
	014 MEFT 58 OFF FAMA TO SB US-1/SOUTH DIXTE MY, ML S 14500 0 14550 C 5.0 96.5W 7.0F
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	0123 HEFT NB ON HAMP FROM CAMPBELL DR/NF SIITH ST, NB N 11500 0 11500 C 9.0 99.9W 7.0P 0123 HEFT SE OF RAMP TO CAMPBELL DR/NF SIITH ST, NG S 11500 0 11500 C 9.0 99.9W 7.0P
	0524 NETT 58 ON RAMF FROM CAMPBELL D0/SW 312TH ST, M2 8 1660 0 1660 C 9.0 0.0 7.0F
	0051 HEFT HS OFF RAMP TO BISCLYRE DR/SN 205TH ST, HSA 50 2100 0 2100 C 9.0 0.0 7.0F
	0052 HETT NS ON HAAF THOM HE BICKATHE DE/MY SOUTH 57, W 5000 0 5000 C 5.0 59.0W 7.0F 0053 WETT NS ON HAAF THOM HE THOUSAND HE/MY SOUTH 57, W 1600 0 1600 C 5.0 59.0W 7.0F
	0054 NETT 28 OFF RAMP TO RISCAINE DR/SN 281TK 37, HSD 8 6460 0 64600 9.0 99.98 7.0F
	0055 HEFT DS ON RAME FROM BISCAINE DS/SH 235TH ST. HS 5 2100 0 2100 C 9.0 0.0 7.0F
	0041 HETT 18 OH HAMP FINGH TALLAASSEE NO/NE 1577K AVE 8 6400 0 6400 C 5.0 95.97 7.07 0142 HETT 18 OF FAMP FOR TALLAASSEE NO/NE 1571H AVE 8 6400 0 6460 C 5.0 95.97 7.07
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