

2014
Quality/Level of Service Training

July 15
Chipley

FDOT

Introductions

- Brian Smalkoski
- William Reynolds
- Class Participants

FDOT

2014 Q/LOS Training

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Housekeeping

- Set phones to vibrate/silent
- Questions—ask lots of them at any time!
- Snacks available in the room



Agenda

- 8:30 AM Introduction and Key Concepts
- 9:15 AM Data Sources
- ◀ 10:00 AM Break
- 10:15 AM Generalized Service Volume Tables
- 11:15 AM Introduction to LOSPLAN
- ◀ 11:30 PM Lunch
- 1:00 PM HIGHPLAN
- 1:30 PM FREEPLAN
- ◀ 2:15 PM Break
- 2:30 PM ARTPLAN
- ◀ 4:30 PM Adjourn



Format of the Training Modules

- Explain the program's uses
- Identify strengths and limitations
- Identify when other tools should be used
- Required inputs
- Example problem(s)
 - Sensitivity example
- Workshops

Course Objectives



Course Objectives

- Move from understanding basic traffic concepts to hands-on capacity analysis
- Gain proficiency in planning analysis
- Understand the factors that have the greatest impact on the results
- Identify key differences between LOSPLAN and other tools

Overview of Course Material

1. Traffic Concepts and Key Variables Affecting Level of Service (LOS)
2. Data Sources
3. Generalized Service Volume Tables
4. HIGHPLAN
5. FREEPLAN
6. ARTPLAN

LOS and Capacity

- **Level of Service (LOS)** – As defined by the 2010 Highway Capacity Manual, level of service is “a quantitative stratification of a performance measure or measures that represent quality of service, measured on an A-F scale, with LOS A representing the best operating conditions from the traveler’s perspective and LOS F the worst.”
- Level of service is used to evaluate multiple modes of transportation:
 - Auto
 - Bicycle
 - Pedestrian
 - Bus/Transit



LOS and Capacity

LOS	Automobile	Bicycle	Pedestrian	Bus
A/B				
C/D				
E/F				

2013 Q/LOS Handbook - Pg. 28



LOS and Capacity

- **Capacity** – The maximum number of vehicles that can pass a point during a specified time period under prevailing roadway, traffic, and control conditions



Important Terminology

- **Quality of Service** – A description of how well a transportation facility or service operates from a *traveler's perspective*
- **Multimodal** – Used by more than one travel mode (auto, bicycle, transit, pedestrian)



Important Terminology

- **Arterial Street** – A street interrupted by traffic control devices (e.g. signals, STOP signs, or YIELD signs) with average signalized intersection spacing less than or equal to two miles



Important Terminology

- **Highway** – Generally uninterrupted flow roadways (may have driveways and isolated traffic signals) which may be further categorized as two-lane or multilane
- Average signalized intersection spacing greater than two miles and are not freeways



Important Terminology

- **Freeway** – A fully access-controlled, divided highway with a minimum of two lanes (and typically more) in each direction



Area Types



Urbanized Area



Transitioning Area



Urban Area



Rural Area

Large Urbanized
1,000,000+

Other Urbanized
50,000 - 1,000,000

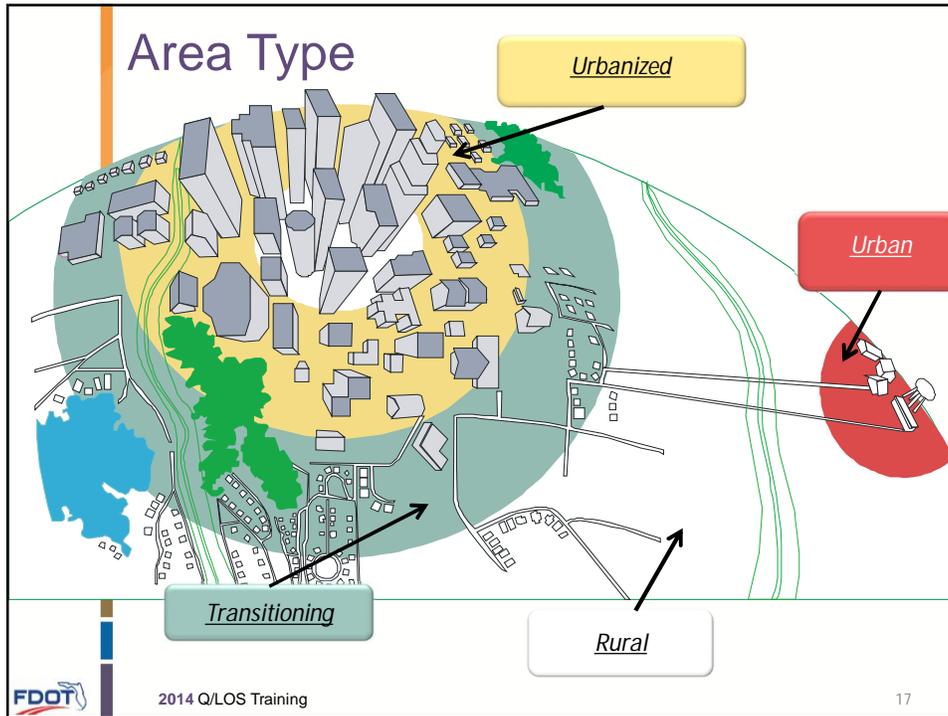
Transitioning
Urban fringe,
urbanized within 20
years

Urban
5,000 - 50,000

Rural Developed
< 5,000 with dev.

Rural Undeveloped
Little to no dev.





Important Variables

Large Urbanized

- 1,000,000+ population
- Covered by MPOs

1. Ft. Lauderdale
2. Jacksonville
3. Miami
4. Orlando
5. St. Petersburg
6. Tampa
7. West Palm Beach



Miami

Other Urbanized

- Population: 50,000 - 1,000,000
- Covered by MPOs other than those overseeing large urbanized areas



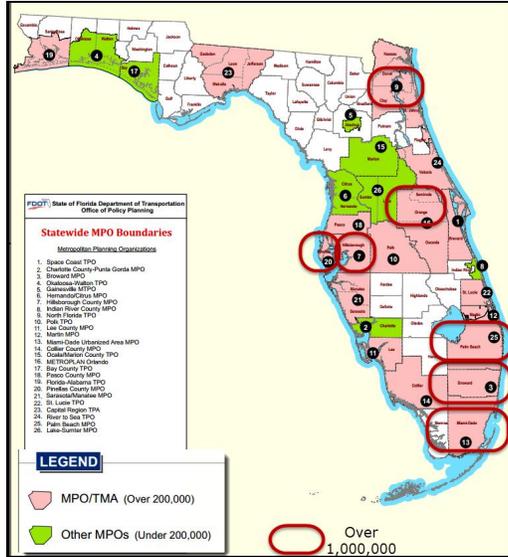
Tallahassee

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Important Variables

Large Urbanized

1. Ft. Lauderdale
2. Jacksonville
3. Miami
4. Orlando
5. St. Petersburg
6. Tampa
7. West Palm Beach



Important Variables

Transitioning

- Area outside of, but contiguous to, an urbanized area
- Expected to be urbanized or urban within the next 20 years based on growth characteristics



Example Transitioning Area from Metro Plan Orlando



Important Variables

Urban

- Areas with populations between 5,000 - 50,000 and not an urbanized area



Historic Downtown Marianna



Important Variables

Rural Developed

- Population less than 5,000
- Exhibit some development, such as small cities



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Rural Undeveloped

- Contain little to no development



St. Leo



Steinhatchee Area



Important Variables

Terrain

- **Level** – Relatively flat terrain that allows heavy vehicles to maintain the same speed as passenger cars
- **Rolling** – Terrain with varying elevations that cause heavy vehicles to reduce their speeds substantially below those of passenger cars



Important Variables

- **Number of Lanes** – In ARTPLAN and FREEPLAN, the number of through lanes in the analysis direction is an input; in HIGHPLAN the total number of lanes in both directions is an input



Important Variables

- **Left Turn Lanes** – The number of exclusive left turn lanes provided at an intersection at the approach of the study direction

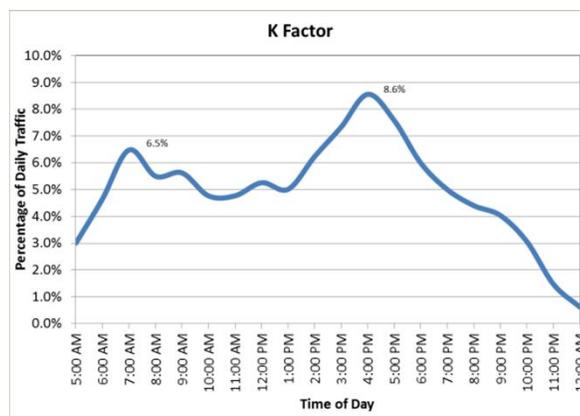


Important Variables

- **AADT** – Annual average daily traffic; a traffic statistic representing the total number of vehicles passing a point or segment of a facility in both directions for one year divided by the number of days in the year

Important Variables

- **K-factor** – The proportion of AADT that occurs during the peak hour



Important Variables

- **K-factor (continued)** – Standard K is an FDOT policy that sets the K-factor as a fixed parameter rather than a variable
- Standard K is set based on area type and facility type

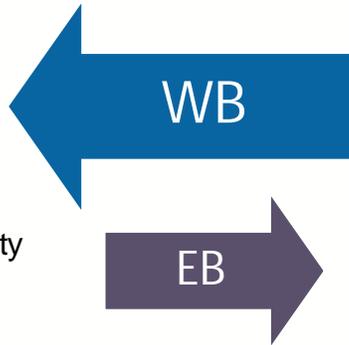
Roadway Type	Standard K-Factor					
	Urbanized		Transitioning/Urban		Rural	
	Large	Other	Transitioning	Urban	Developed	Undeveloped
Arterials	0.08-0.09	0.09	0.09	0.09		0.095
Freeways	0.08-0.09	0.09	0.09	0.09		0.095
Highways	0.08-0.09	0.09	0.09	0.105		0.105

- Core freeways have a lower K-factor



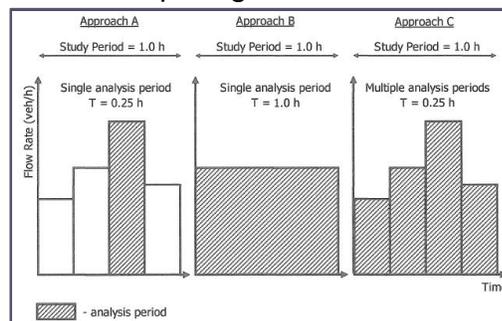
Important Variables

- **D-factor** – The proportion of traffic moving in the peak direction of travel on a given roadway during the peak hour
- The minimum allowable D-factor is 0.51 for all area types
- The D-factor has a sensitivity such that a 1% increase in D-factor produces a 2% decrease in allowable daily service volume



Important Variables

- **Peak Hour Factor (PHF)** – A measure of traffic demand fluctuation within the analysis hour. The formula for computing PHF is the following:



- FDOT recommends using a PHF of 1.0 for all planning level analyses

Important Variables

- **Percent (%) Heavy Vehicles** – The percent of trucks and other heavy vehicles with more than four wheels touching the pavement during normal operation.



Important Variables

- **Local Adjustment Factor** – Accounts for driver aggression, hurriedness, and familiarity with the facility. It is used to reflect lower capacities for different area types.



Important Variables

- **Peak Direction** – The direction of travel for the greater amount of traffic in the two directions
- **Off-Peak Direction** – The direction of travel for the lesser amount of traffic in the two directions

*LOSPLAN currently only supports peak direction analysis



Important Variables

- **Study Period** – The time frame for which the traffic demand on the roadway is being studied
- LOSPLAN offers three options for the study period:
 - **Standard K** – Florida's Standard K-factor based on area type and facility type
 - **K_{other}** – A study period other than that represented by Florida's Standard K-Factor
 - **Dir Hr Demand Vol** – Allows the analyst to enter directional hourly demand volumes

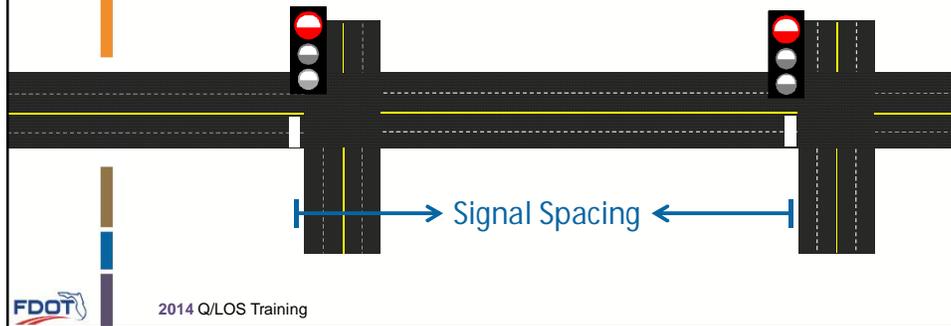


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Important Variables

- **Signal Spacing** – The distance between consecutive traffic signals along a facility, measured from stop bar to stop bar in the direction of analysis



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Important Variables

- **Median** – A separating barrier between opposing directions of traffic
 - Restrictive – A raised or grassed area at least 10' wide
 - Non-restrictive – A painted at-grade area at least 10' wide

* "Undivided" refers to no median; "Divided" can include either a restrictive or non-restrictive median



Restrictive



Non-Restrictive



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Important Variables

- **Paved Shoulder / Bicycle Lane** – A bicycling area at least three feet wide* and separated from the outer motorized vehicle through lane by a solid pavement marking

* ARTPLAN assumes a width of 5' if selected



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Important Variables

- **Bus Frequency** – the number of scheduled fixed route buses which have a potential to stop on a given roadway segment in one direction of flow in a one-hour time period. Express buses with no potential of stopping along a roadway are not included.



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Data Sources

Data Sources

- The key planning parameters for the LOSPLAN modules can be located using free online sources
- All required area-specific information can be obtained from the following sources:
 - Florida Traffic Online
<http://www2.dot.state.fl.us/FloridaTrafficOnline/viewer.html>
 - Google
 - Google Maps / Google Earth
 - Road Characteristics Inventory
<http://www.dot.state.fl.us/planning/statistics/gis/>

→ The goal of this segment of training is to successfully obtain the input parameters for a given roadway ←

Most Important Variables - Reminder

Area Type



Auto

- AADT
- K-Factor
- D-Factor
- Number of Lanes
- Left Turn Lanes
- Signal Spacing
- g/C

Multimodal

- Paved Shoulder/
Bicycle Lane
- Sidewalk
- Bus Frequency

Data Sources

Area Type

1. Ask District LOS Coordinator
or
1. Determine the city and/or MPO
2. If available, obtain area type GIS data
3. Determine if your study roadway is within the urbanized boundary of an MPO using Florida's MPO Website (<http://www.mpoac.org/mpos/>)
4. If within MPO but outside the urbanized boundary, confirm location using this interactive MPO/Urban area map (<http://transport.cfgis.org/>). Turn on Urban areas 2012 and MPO Boundaries under RCI 2012 and Jurisdictional Boundaries, found under the base data tab

Data Sources

Area Type (Continued)

- Transitioning areas are adjacent and contiguous to an urbanized area and may become urbanized in the next 20 years based on growth characteristics
- Urban areas are developed cities that are not within contiguous to an urbanized area, and have a population between 5,000-50,000



Data Sources

Area Type (Continued)

If the population is less than 5,000:

- View the area on an aerial software (Google Maps)
- If there is little or no development present, the area type is rural undeveloped
- If the area appears to be developed with residential or commercial developments, the area type is rural developed

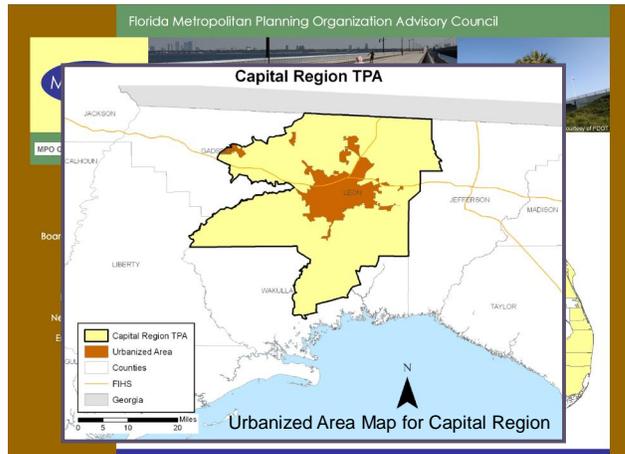


Data Sources

Area Type (mpoac.org)

Example: Mahan Dr. & Dempsey Mayo Rd. (Tallahassee)

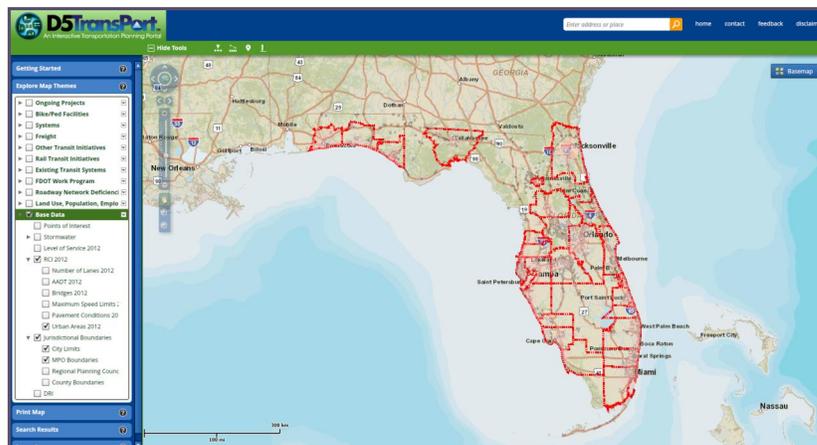
Appears to be within the urbanized area, but use TransPort to check



Data Sources

Area Type (TransPort)

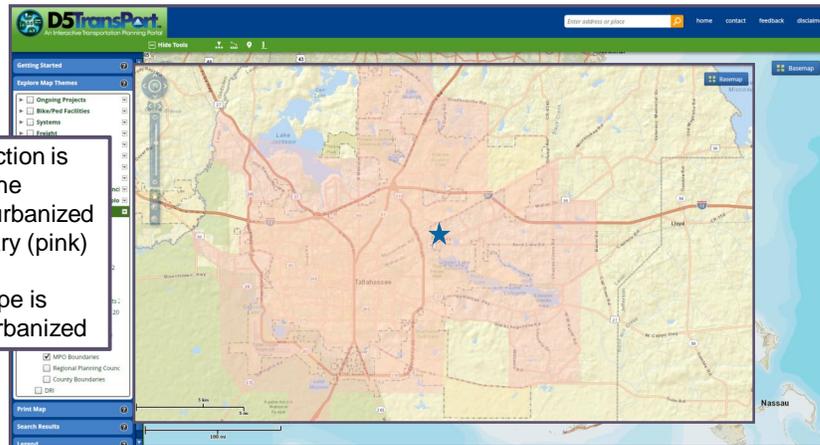
Example: Mahan Dr. & Dempsey Mayo Rd. (Tallahassee)



Data Sources

Area Type (TransPort)

Example: Mahan Dr. & Dempsey Mayo Rd. (Tallahassee)

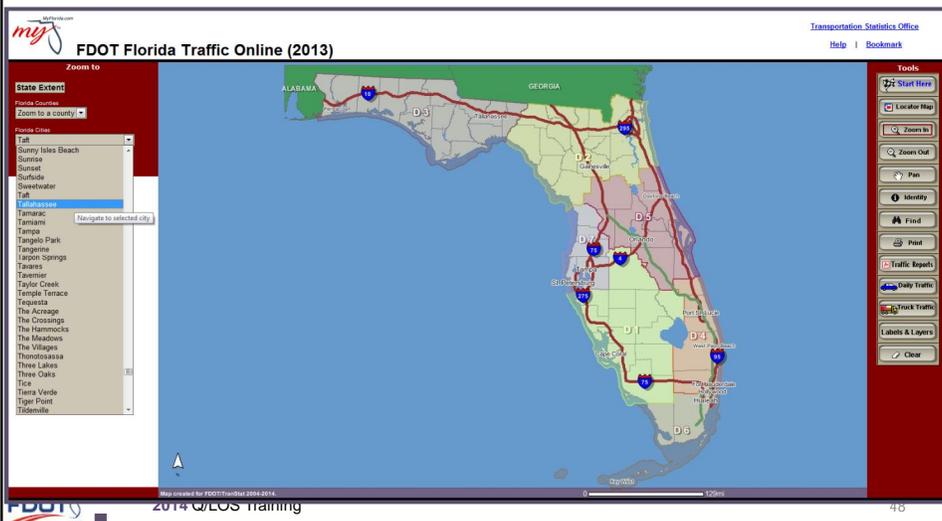


Intersection is within the urban/urbanized boundary (pink)
Area type is other urbanized



Data Sources

AADT, K-Factor, D-Factor (FTO)



Data Sources

AADT, K, D (FTO)

Site Information	
Feature	1
Site	553060
Description	SR 10 (US90) - 1000' E OF BUCK LAKE RD
Section	55020000
Milepoint	4.395
AADT	18900
Site Type	Portable
Class Data	Yes
K Factor	9
D Factor	65.9
T Factor	4.6
TRAFFIC REPORTS (provided in format)	
Leon County	Annual Average Daily Traffic Annual Vehicle Classification Historical AADT Data Synopsis 553060CL-20130424 Vehicle Class History

Data Sources

Peak Direction

Site Information	
Feature	1
Site	553060
Description	SR 10 (US90) - 1000' E OF BUCK LAKE RD
Section	55020000
Milepoint	4.395
AADT	18900
Site Type	Portable
Class Data	Yes
K Factor	9
D Factor	65.9
T Factor	4.6
TRAFFIC REPORTS (provided in format)	
Leon County	Annual Average Daily Traffic Annual Vehicle Classification Historical AADT Data Synopsis 553060CL-20130424 Vehicle Class History

Data Sources

Peak Direction (Synopsis Report)

FDOT Florida Traffic Online (2013)

TRANSPORTATION STATISTICS OFFICE
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Site Information

County: 55
 Station: 3060
 Description: SR 10 (US90) - 1000' E OF BUCK LAKE RD
 Start Date: 04/24/2013
 Start Time: 2100

Legend

- Highlighted Features
- Possible Traffic Monitoring Sites
- Telemetered Traffic Monitoring Sites
- Toll Roads
- Interstates
- Roads
- Rivers
- Lakes
- County Lines
- Airports
- Class and Tones
- FDOT Urban Areas
- County Boundaries

TIME	DIRECTION: E				TOTAL	DIRECTION: W				COMBINED TOTAL	
	1ST	2ND	3RD	4TH		1ST	2ND	3RD	4TH		
0000	20	10	5	11	46	9	12	8	11	40	86
0100	18	9	8	7	42	13	9	4	5	31	73
0200	4	8	6	11	29	5	5	8	4	22	51
0300	5	3	9	7	24	5	8	7	10	30	54
0400	5	4	9	11	29	6	4	13	16	39	68
0500	17	8	13	19	57	17	22	33	46	118	175
0600	21	29	38	42	127	40	77	108	296	491	618
0700	71	103	131	172	477	294	279	335	296	1204	1681
0800	124	150	165	162	481	293	263	184	210	950	1381
0900	78	103	85	77	343	167	165	166	133	631	872
1000	107	99	107	110	423	123	127	133	163	546	969
1100	106	132	113	129	480	164	127	184	159	634	1084
1200	133	156	157	169	615	154	192	145	132	623	1238
1300	153	160	139	154	606	133	127	132	130	522	1128
1400	197	212	205	187	801	133	151	141	171	596	1397
1500	203	184	177	180	744	136	175	157	116	644	1388
1600	188	237	199	263	887	153	125	140	153	571	1458
1700	265	253	309	253	1080	178	175	161	178	693	1773
1800	198	199	179	178	754	162	124	133	109	528	1282
1900	146	126	140	123	535	128	103	82	107	419	952
2000	122	98	89	119	428	76	77	70	61	284	712
2100	120	100	72	60	352	74	54	39	37	204	546
2200	63	54	50	19	186	45	30	20	26	121	307
2300	56	15	21	92	184	17	25	19	13	74	266
24-HOUR TOTALS:					9421					9935	19556

PEAK VOLUME INFORMATION

A.M.	DIRECTION: E				COMBINED	DIRECTION: W			
	HOUR	VOLUME	HOUR	VOLUME		HOUR	VOLUME	HOUR	VOLUME
P.M.	1645	1090	1445	659	1700	1773			
DAILY	1645	1090	700	3204	1700	1773			

TRUCK PERCENTAGE

E: 4.68 W: 4.52 COMBINED: 4.60

CLASSIFICATION SUMMARY DATABASE

DIR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTTER	TOTVOL
E	27	7372	1712	67	253	19	0	57	51	4	0	0	0	0	0	450	3621
W	36	7645	1805	86	207	24	0	65	63	4	0	0	0	0	0	449	3935

GENERATED BY SPS 5.0.26

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Data Sources

Peak Direction (Telemetered Traffic Monitors)

FDOT Florida Traffic Online (2013)

TRANSPORTATION STATISTICS OFFICE
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Site Information

Feature: 1

Site: 730263

Description: SR-5/US-1,1.3 MI N OF CR-202, FLAGLER C O.

Section: 7301000

Milepoint: 3.29

AAIT: 10703

Site Type: Telemetered

Class Data: Yes

K Factor: 9

D Factor: 67.5

T Factor: 8.1

TRAFFIC REPORTS (provided in format)

Flagler County: [Annual Average Daily Traffic](#)

[Annual Vehicle Classification](#)

SITE 730263: [Directional AADTs](#)

[Highest 200 Hours](#)

[Historical AADT Data](#)

[Hourly Continuous Counts](#)

[Vehicle Class History](#)

Legend

- Highlighted Features
- Possible Traffic Monitoring Sites
- Telemetered Traffic Monitoring Sites
- Toll Roads
- Interstates
- Roads
- Rivers
- Lakes
- County Lines
- Airports
- Class and Tones
- FDOT Urban Areas
- County Boundaries

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Data Sources

Peak Direction (Telemetered Traffic Monitors)

DATE 03/26/14 FLORIDA DEPARTMENT OF TRANSPORTATION

COUNTY NAME: P
SECTION: 0000
LOCATION: 0000

DIRECTION: S

DY	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	DAILY
1	W	69	66	32	15	26	41	99	71	107	177	216	209	287	243	260	246	228	204	181	112	96	69	52	13	3139R
2	M	15	13	23	45	87	171	452	869	876	600	300	215	117	116	141	111	101	213	137	85	62	75	12	5479R	
3	F	19	11	22	24	100	155	420	651	535	374	357	348	324	332	323	344	354	385	212	97	81	64	72	28	5548R
4	F	14	20	32	92	156	428	636	956	401	385	373	343	324	325	374	360	359	246	178	91	60	64	42	5879R	
5	A	13	24	15	22	32	53	144	180	284	309	378	373	380	361	323	302	300	247	236	144	109	81	64	49	4485R
6	S	21	20	25	6	20	54	85	104	208	243	292	279	304	298	268	251	241	247	173	122	82	56	45	25	3415R
7	M	7	28	19	39	103	185	457	748	652	366	334	329	317	294	282	305	304	334	193	110	75	61	40	29	5535R
8	T	22	16	17	26	102	186	604	899	582	358	354	305	336	308	311	327	310	306	198	102	94	84	98	11	5453R
9	M	12	17	16	22	108	189	462	722	541	344	313	290	321	327	314	374	432	342	240	141	89	84	74	34	5245R
10	F	21	20	19	38	114	178	474	753	533	361	357	319	324	312	313	378	343	343	226	134	80	84	94	14	5793R
11	F	13	13	18	38	83	178	443	702	527	399	384	365	348	319	386	387	370	384	277	166	129	106	75	46	6035R
12	A	25	25	18	23	43	68	188	235	287	311	350	414	425	342	319	303	314	275	246	153	100	106	80	45	4693R
13	S	40	17	39	13	26	45	59	111	157	287	298	323	327	326	354	277	296	233	202	132	94	95	49	23	3842R
14	M	20	15	14	45	109	202	469	773	579	355	303	340	316	312	312	311	338	311	201	110	96	76	53	34	5264R
15	T	17	10	14	37	95	185	496	738	557	342	332	316	325	298	279	347	327	319	185	113	89	75	42	31	5570R
16	M	12	17	16	22	108	189	462	722	541	344	313	290	321	327	314	374	432	342	240	141	89	84	74	34	5245R
17	F	23	19	12	20	86	157	453	707	514	389	356	393	398	353	304	358	333	374	283	167	113	116	95	25	6128R
18	A	30	37	26	17	40	81	155	206	299	324	363	402	385	378	307	312	294	281	260	141	124	89	67	51	4658R
19	S	24	24	19	10	24	44	57	97	154	287	289	316	362	327	313	359	248	297	184	121	82	65	57	25	3635R
20	M	20	25	18	33	86	163	423	695	455	374	312	327	333	333	308	262	268	282	188	117	79	62	61	25	5035R
21	T	13	11	18	34	100	184	497	793	574	377	332	318	313	319	303	325	333	320	193	116	83	67	49	22	5602R
22	M	14	8	21	45	100	178	487	741	426	342	317	327	284	324	330	315	316	316	228	112	82	70	65	27	5548R
23	F	20	19	19	20	114	175	500	744	515	454	347	339	313	323	318	312	339	385	244	139	117	105	65	80	6181R
24	S	25	29	12	19	51	79	187	235	291	308	376	366	378	318	377	327	290	317	230	146	100	87	84	59	4695R
25	M	14	20	25	37	92	187	471	748	544	379	332	321	307	260	324	311	314	289	195	118	81	72	44	21	5532R
26	T	15	20	22	30	92	171	506	750	570	383	317	287	325	289	316	308	319	341	206	107	93	74	58	28	5618R
27	M	12	13	19	39	108	169	511	767	582	372	309	276	296	279	322	328	324	329	183	122	82	62	68	27	5525R
28	F	16	16	11	35	102	185	524	764	576	377	309	279	299	296	311	314	311	340	235	103	80	83	64	21	5740R

WEDNESDAY AVERAGE = 725 DAILY AVERAGE = 325 TOTAL MONTHLY COUNT = 161742

NOTE: ATYPICAL DAYS HAVE COUNTS THAT ARE HIGHER OR LOWER THAN NORMAL, BUT STILL REASONABLE, AND NO LOCAL SPECIAL EVENTS ARE KNOWN.

Data Sources

Peak Direction (Telemetered Traffic Monitors)

DATE 03/26/14 FLORIDA DEPARTMENT OF TRANSPORTATION

COUNTY NAME: P
SECTION: 0000
LOCATION: 0000

DIRECTION: N

DY	D	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	DAILY
1	W	121	103	64	54	27	28	41	71	80	109	124	165	244	263	262	321	264	276	233	166	124	110	90	85	3447R
2	M	84	31	29	17	84	121	316	511	211	214	210	219	216	216	216	216	216	216	216	216	216	216	216	216	216
3	F	42	44	25	27	85	123	209	224	203	270	293	343	375	413	519	637	715	728	423	241	190	163	156	111	5848R
4	F	42	44	25	27	85	123	209	224	203	270	293	343	375	413	519	637	715	728	423	241	190	163	156	111	5848R
5	A	69	56	50	25	10	31	75	92	139	163	208	242	256	347	388	441	415	406	307	209	204	144	116	101	4564R
6	S	45	44	36	28	20	54	86	92	217	168	213	268	273	315	295	263	263	293	284	180	141	99	75	23	3568R
7	M	39	18	13	20	28	53	144	192	234	179	214	276	292	360	350	208	658	732	359	242	172	133	111	85	5164R
8	T	24	24	28	21	17	59	142	241	243	202	284	270	289	341	403	533	651	771	378	221	203	142	112	92	5430R
9	M	42	32	28	21	15	45	149	204	210	217	249	289	349	368	384	493	610	702	436	277	182	116	119	79	5748R
10	F	55	44	29	27	25	49	130	171	223	269	296	343	404	464	563	699	705	472	303	230	210	157	123	103	6297R
11	F	55	44	29	27	25	49	130	171	223	269	296	343	404	464	563	699	705	472	303	230	210	157	123	103	6297R
12	A	75	61	40	30	23	36	63	103	191	175	248	274	336	356	400	445	444	376	312	261	198	183	168	111	4955R
13	S	76	44	42	23	20	21	50	94	89	159	186	211	242	265	276	324	327	327	246	213	162	113	94	70	4056R
14	M	34	17	16	11	29	44	128	217	224	221	219	249	299	383	390	553	597	777	380	242	184	177	91	77	5581R
15	T	46	28	31	26	16	49	124	211	243	204	285	288	322	359	387	541	687	769	397	236	191	168	115	36	5880R
16	M	42	32	28	21	15	45	149	204	210	217	249	289	349	368	483	620	616	702	436	277	182	116	119	79	5748R
17	F	37	39	38	28	17	47	120	212	218	223	279	280	320	379	420	593	680	711	445	312	213	203	145	135	6062R
18	A	68	54	49	29	27	33	64	105	172	185	238	280	324	355	366	440	360	359	312	259	177	126	151	116	4738R
19	S	83	37	36	33	21	24	39	84	105	161	189	211	242	265	276	324	327	327	246	213	162	113	94	70	4056R
20	M	32	16	18	23	1																				

Data Sources

Percent Heavy Vehicles (GSVTs)

Example for a core freeway in an urbanized area

TRAFFIC CHARACTERISTICS				
Planning analysis hour factor (K)	0.090	0.085	0.090	0.090
Directional distribution factor (D)	0.547	0.547	0.550	0.550
Peak hour factor (PHF)	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)			1,700	2,100
Heavy vehicle percent	4.0	4.0	2.0	2.0
Local adjustment factor	0.91	0.91	0.97	0.98
% left turns				
% right turns				

% Heavy Vehicles = 4.0

TABLE 1
Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

INPUT VALUE ASSUMPTIONS	Uninterrupted Flow Facilities				Interrupted Flow Facilities			
	Freeway	Con- tinuous	Rightway		Class I	Class II	Bicycle	Pedestrian
ROADWAY CHARACTERISTICS								
Area type (a,b)	u	u	u	u	u	u	u	u
Number of through lanes (b/c/d/e)	4,10	4,12	2	4,6	2	4,8	2	4,8
Peak speed (mph)	70	60	30	30	45	30	30	45
Flow (pcphpl)	15	20	25	20	50	35	35	50
Shoulder lanes (h,i,j)	n	n	n	f	n	f	n	f
Median (k,l)	1	1	1	1	1	1	1	1
% left turning cross		80						
Enclosure left turn lane support (m,n)		(6)	y	y	y	y	y	y
Enclosure right turn lane (o,p)			q	q	q	q	q	q
Facility length (r,s)	4	4	1	1	2	2	1.9	1.8
TRAFFIC CHARACTERISTICS								
Planning analysis hour factor (K)	0.090	0.085	0.090	0.090	0.090	0.090	0.090	0.090
Directional distribution factor (D)	0.547	0.547	0.550	0.550	0.547	0.547	0.547	0.547
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)	1,500	1,700	2,100	2,100	1,500	1,500	1,500	1,500
Heavy vehicle percent	4.0	4.0	2.0	2.0	1.0	1.0	1.0	2.0
Local adjustment factor	0.91	0.91	0.97	0.98				
% left turns					12	12	12	12
% right turns					12	12	12	12
CONTROL CHARACTERISTICS								
Number of signals			4	4	10	10	4	6
Signal type (t,u)					3	4	4	4
Signal type (v,w)					c	c	c	c
Cycle length (x)			130	130	130	130	130	130
Effective green time (y,z)			0.44	0.45	0.44	0.44	0.44	0.44
ADDITIONAL CHARACTERISTICS								
Final shoulder service area (aa)							n, 50%	y
Passover condition (ab, ac)								t
On-ramp condition (ad)								n, 50%
Side-ramp (ae)								t
Side-ramp protection (af)								n
LEVEL OF SERVICE THRESHOLDS								
Level of Service	Desired	Minimum	Maximum	Class I	Class II	Score	Score	Score
A	>= 81.3	>= 17	>= 31 mph	>= 20 mph	>= 20 mph	>= 3.75	>= 3.75	>= 6
B	>= 75.0	>= 24	>= 23 mph	>= 17 mph	>= 17 mph	>= 3.50	>= 3.50	>= 4
C	>= 69.7	>= 31	>= 18 mph	>= 13 mph	>= 13 mph	>= 4.25	>= 4.25	>= 3
D	>= 64.3	>= 35	>= 15 mph	>= 10 mph	>= 10 mph	>= 5.00	>= 5.00	>= 2



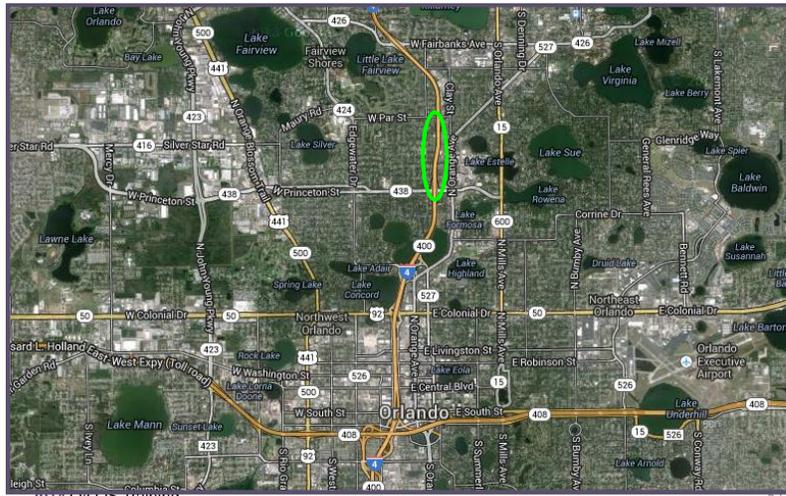
Data Sources Example Problem

Find the following parameters for Interstate I-4 in Orlando (D5) between Princeton St and Par St:

- Area Type
- Peak Direction
- AADT
- K-Factor
- D-Factor
- % Heavy Vehicles

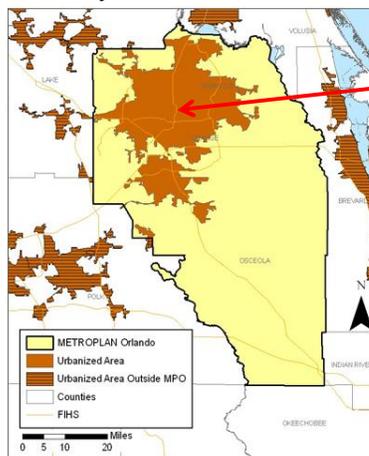


Data Sources Example Problem Area Type



Data Sources Example Problem Area Type

- The study roadway is in Orlando, FL:



Data Sources Example Problem

Area Type

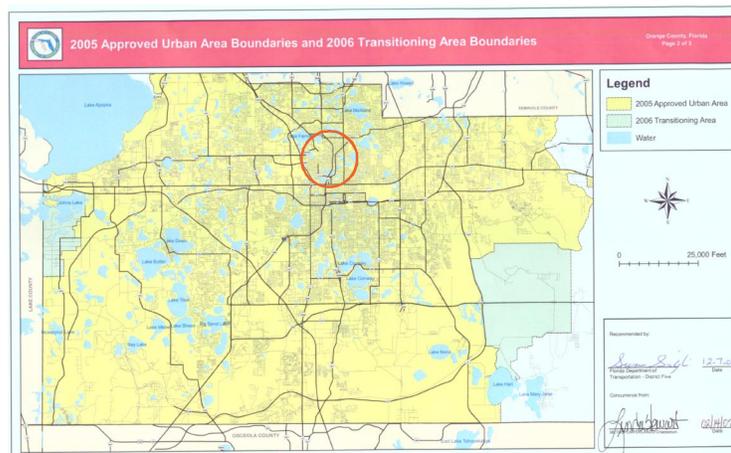
- The study roadway (I-4) is within the urbanized area of the map

→ Orlando is classified as an urbanized area

Side note: Orlando is one of the 7 urbanized areas the State of Florida considers a “Large Urbanized” area

Data Sources Example Problem

District 5 Urban/Transitioning Area Maps



Data Sources Example Problem

Determine:

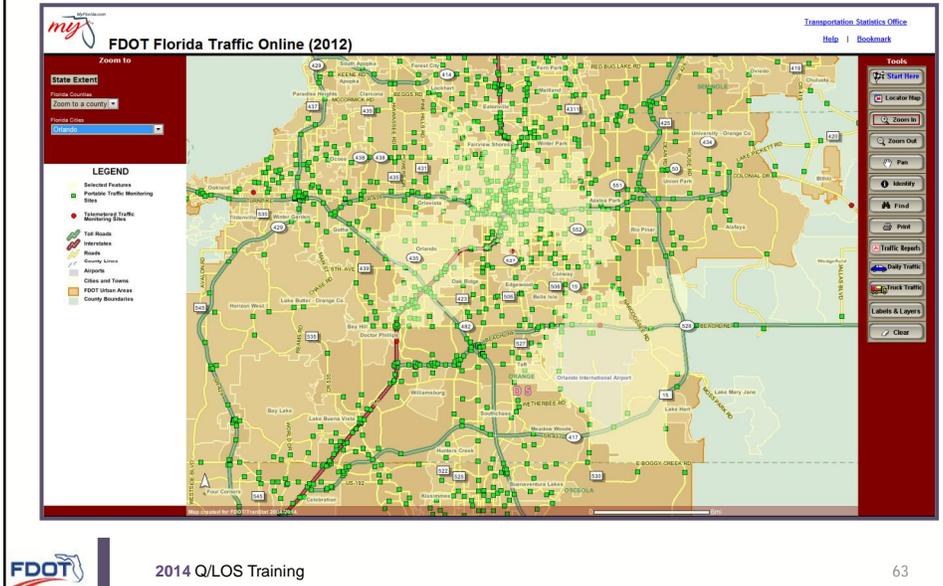
- Peak Direction
- AADT
- K-Factor
- D-Factor



Data Sources Example Problem



Data Sources Example Problem



Data Sources Example Problem



Data Sources Example Problem

The screenshot shows the FDOT Florida Traffic Online (2012) web application. The main map area displays a street network in Orlando, Florida, with various traffic data layers overlaid. The legend on the left side of the map includes the following categories:

- Select Features
- Florida Traffic Monitoring Sites
- Intersecting Traffic Monitoring Sites
- Toll Roads
- Interstates
- Roads
- Rivers
- Lakes
- County Lines
- Alleys
- Cities and Towns
- FDOT Urban Areas
- County Boundaries

The interface also includes a search bar at the top right, a navigation toolbar on the right side, and a state selection dropdown on the left. The map shows major roads like I-4, I-17, and SR 408, along with various local streets and landmarks.

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Data Sources Example Problem

This screenshot is identical to the one above, showing the FDOT Florida Traffic Online (2012) interface. In this version, two specific locations are highlighted with pink circles: 'PRINCE ST' and 'FAA ST'. These streets are located in the central part of the map, near the intersection of I-4 and SR 408.

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Data Sources Example Problem

FDOT Florida Traffic Online (2012)

Transportation Statistics Office

Zoom to: State Extent, Florida Counties, Orange

LEGEND

- Select Features
- Florida Traffic Monitoring Sites
- Intersecting Traffic Monitoring Sites
- Toll Roads
- Interstates
- Roads
- Rivers
- Lakes
- County Lines
- Alleys
- Cities and Towns
- FDOT Urban Areas
- County Boundaries

Tools

- Start Here
- Locator Map
- Zoom In
- Zoom Out
- Find
- Identity
- Print
- Traffic Reports
- Daily Traffic
- Track Traffic
- Labels & Layers
- Clear

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Data Sources Example Problem

FDOT Florida Traffic Online (2012)

Transportation Statistics Office

Zoom to: State Extent, Florida Counties, Orange

LEGEND

Site Information

Feature	1
Site	753061
Description	ON I-4, 0.121 MI. NE OF SR-438 (UCLP)
Section	75280000
Milepoint	20.06
AADT	183500
Site Type	Portable
Class Data	Yes
K Factor	8
D Factor	52.3
T Factor	5.5

TRAFFIC REPORTS (provided in format)

Orange County	Annual Average Daily Traffic
	Annual Vehicle Classification
	Historical AADT Data
	Synopsis 753061CL-20130326
	Vehicle Class History

Tools

- Start Here
- Locator Map
- Zoom In
- Zoom Out
- Find
- Identity
- Print
- Traffic Reports
- Daily Traffic
- Track Traffic
- Labels & Layers
- Clear

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COUNTY: 75
 STATION: 3061
 DESCRIPTION: ON I-4, 0.121 MI. NE OF SR-438 (UCLP)
 START DATE: 03/26/2013
 START TIME: 0000

TIME	DIRECTION: E				TOTAL	DIRECTION: W				COMBINED TOTAL	
	1ST	2ND	3RD	4TH		1ST	2ND	3RD	4TH		
0000	383	377	328	325	1413	219	258	199	145	821	2234
0100	258	215	206	184	863	131	141	120	102	494	1357
0200	176	168	166	147	657	100	113	118	89	420	1077
0300	148	139	131	139	557	91	139	138	156	524	1081
0400	115	148	169	175	607	195	241	317	349	1102	1709
0500	169	271	330	439	1209	339	548	766	900	2553	3762
0600	406	697	869	959	2931	1036	1375	1751	1748	5910	8841
0700	1065	1545	1489	1342	5441	1676	1888	1928	1855	7347	12788
0800	1139	1137	1199	1610	5085	1813	1842	1783	1633	7071	12156
0900	1437	1276	1275	1307	5295	1587	1650	1721	1724	6682	11977
1000	1041	1080	1142	1170	4433	1595	1587	1618	1598	6398	10831
1100	1089	1242	1157	1259	4747	1501	1511	1527	1570	6109	10856
1200	1200	1249	1354	1263	5066	1416	1529	1474	1567	5986	11052
1300	1189	1285	1328	1334	5136	1500	1543	1507	1470	6020	11156
1400	1306	1384	1289	1440	5419	1583	1464	1456	1353	5856	11275
1500	1422	1433	1473	1398	5726	1529	1590	1545	1599	6263	11989
1600	1301	1294	1332	1200	5127	1527	1584	1549	1564	6224	11351
1700	1366	1268	1155	1139	4928	1439	1570	1576	1777	6362	11290
1800	1293	1381	1433	1318	5425	1501	1610	1351	1221	5683	11108
1900	1341	1156	1094	1037	4628	1055	1079	975	846	3955	8583
2000	1045	1000	904	932	3881	833	873	854	805	3365	7246
2100	872	861	955	1006	3694	786	840	717	702	3045	6739
2200	815	674	709	617	2815	667	647	488	464	2266	5081
2300	571	586	483	447	2087	402	433	362	296	1493	3580
24-HOUR TOTALS:					87160	101949					189109

	DIRECTION: E				DIRECTION: W				COMBINED DIRECTIONS	
	1ST	2ND	3RD	4TH	1ST	2ND	3RD	4TH	1ST	2ND
A.M.	845	5598	715	7484	715	12999	1500	11989	715	12999
P.M.	1445	5768	715	6464	715	12999	1500	11989	715	12999
DAILY	1445	5768	715	7484	715	12999	1500	11989	715	12999

TRUCK PERCENTAGE: E 5.05, W 5.81, COMBINED 5.46

DIR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	TOTTRK	TOTVOL
E	417	70089	12209	412	1759	190	22	878	846	215	40	15	28	0	40	4405	87160
W	202	79299	16517	389	2253	216	37	724	2120	84	58	36	8	0	6	5925	101949

Data Sources Example Problem

Planning analysis hour factor (K)	0.090	0.085	0.090	0.090
Directional distribution factor (D)	0.547	0.547	0.550	0.550
Peak hour factor (PHF)	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)			1,700	2,100
Heavy vehicle percent	4.0	4.0	2.0	2.0
Local adjustment factor	0.91	0.91	0.97	0.98
% left turns				
% right turns				

% Heavy Vehicles = 4.0

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

TABLE 1 (continued)

RDFT VALUE ASSIGNMENTS	Uninterrupted Flow Facilities			Interrupted Flow Facilities				
	Freeway	Urban	Rural	Class I	Class II	Bicycle	Class I	
ROADWAY CHARACTERISTICS								
Area type (in. ft)	in	in	in	in	in	in	in	in
Number of through lanes (both dir.)	4-10	4-12	2	4-6	2	4-8	2	4-4
Percent paved (mph)	70	60	50	70	45	50	50	45
Free flow speed (mph)	75	70	55	55	50	55	35	50
Access lanes (ft)	n	n	n	n	n	n	n	n
Median (ft. or ft.)	1	1	1	1	1	1	1	1
Access (ft)	50	50	50	50	50	50	50	50
% left turning lanes								
Exclusive left turn lane support (ft.)								
Exclusive right turn lane (ft.)								
Facility length (mi)	4	4	3	3	2	2	1.9	1.8
Number of lanes	4	4	4	4	4	4	4	4
TRAFFIC CHARACTERISTICS								
Planning analysis hour factor (K)	0.090	0.085	0.090	0.090	0.090	0.090	0.090	0.090
Directional distribution factor (D)	0.547	0.547	0.550	0.550	0.547	0.547	0.550	0.550
Peak hour factor (PHF)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Base saturation flow rate (pcphpl)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Heavy vehicle percent	4.0	4.0	2.0	2.0	1.0	1.0	1.0	2.0
Local adjustment factor	0.91	0.91	0.97	0.98				
% left turns					12	12	12	12
% right turns					12	12	12	12
CONTROL CHARACTERISTICS								
Number of signals					4	4	10	4
Signal type (ft. or ft.)					1	1	4	4
Signal type (ft. or ft.)					6	6	6	6
Cycle length (s)					120	120	120	120
Effective green time (s)					0.44	0.45	0.44	0.44
LEVEL OF SERVICE THRESHOLDS								
Level of Service	Freeway	Urban	Two-Lane/Highway	Arterial	Class I	Class II	Bicycle	Class I
Score	≥ 17	≥ 13	≥ 17	≥ 31 mph	≥ 27 mph	≥ 27.5	≥ 6	≥ 6
C	≤ 24	≤ 17.5	≤ 24	≥ 27 mph	≥ 27 mph	≥ 27.5	≥ 4	≥ 4
D	≤ 31	≤ 21	≤ 31	≥ 18 mph	≥ 18 mph	≥ 21.5	≥ 3	≥ 3
E	≤ 39	≤ 28.5	≤ 39	≥ 15 mph	≥ 15 mph	≥ 24.0	≥ 2	≥ 2



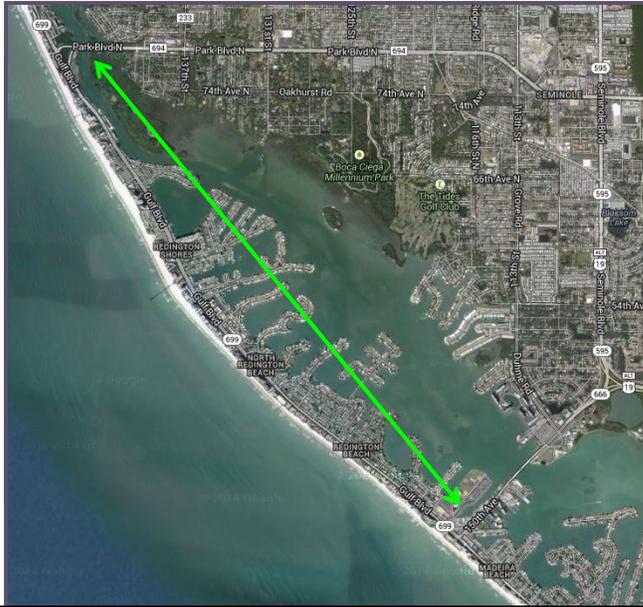
Data Sources Workshop Problem

SR 699

- Between Park Blvd and SR 666
- Redington Beach (D7)

Identify:

- Area Type
- AADT, K-Factor, D-Factor
- Peak Direction
- % Heavy Vehicles



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Data Sources Workshop Problem

Answer Sheet

- Area Type = _____
- AADT = _____
- K-Factor = _____
- D-Factor = _____
- Peak Direction = _____
- % Heavy Vehicles = _____



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Generalized Service Volume Tables

Types of Analyses

Planning

- Default values for nearly all of the model inputs
- Limited data requirements, high-level results

Operational

- All or nearly all of the required model inputs
- More data, more precise results

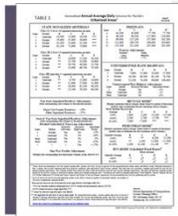
Design

- To establish the detailed physical features

This course will focus on planning-level analysis

Types of Analysis Tools

Planning



Operational



Generalized Service Volume Tables

- Highest-level planning tool
- Provide a rough estimate of capacity and LOS
- Use the same rules as LOSPLAN software and the Q/LOS Handbook
- FDOT supported and statewide acceptable for PLANNING only

Level of Service	Volume Range	Volume Range	Volume Range
STATE-SIGNALIZED ARTERIALS			
A	0 - 10,000	10,000 - 20,000	20,000 - 30,000
B	10,000 - 20,000	20,000 - 30,000	30,000 - 40,000
C	20,000 - 30,000	30,000 - 40,000	40,000 - 50,000
D	30,000 - 40,000	40,000 - 50,000	50,000 - 60,000
E	40,000 - 50,000	50,000 - 60,000	60,000 - 70,000
UNDERSATURATED FLOW HIGHWAYS			
A	0 - 10,000	10,000 - 20,000	20,000 - 30,000
B	10,000 - 20,000	20,000 - 30,000	30,000 - 40,000
C	20,000 - 30,000	30,000 - 40,000	40,000 - 50,000
D	30,000 - 40,000	40,000 - 50,000	50,000 - 60,000
E	40,000 - 50,000	50,000 - 60,000	60,000 - 70,000
BUYLE MODE*			
A	0 - 10,000	10,000 - 20,000	20,000 - 30,000
B	10,000 - 20,000	20,000 - 30,000	30,000 - 40,000
C	20,000 - 30,000	30,000 - 40,000	40,000 - 50,000
D	30,000 - 40,000	40,000 - 50,000	50,000 - 60,000
E	40,000 - 50,000	50,000 - 60,000	60,000 - 70,000
PEDESTAL MODE*			
A	0 - 10,000	10,000 - 20,000	20,000 - 30,000
B	10,000 - 20,000	20,000 - 30,000	30,000 - 40,000
C	20,000 - 30,000	30,000 - 40,000	40,000 - 50,000
D	30,000 - 40,000	40,000 - 50,000	50,000 - 60,000
E	40,000 - 50,000	50,000 - 60,000	60,000 - 70,000



Generalized Service Volume Tables

Roadway Type	Service Volume (ADT)	LOS
Interstate Freeway	100,000 - 1,000,000	A
State Freeway	10,000 - 100,000	B
Urban Freeway	10,000 - 100,000	B
Urban Arterial	10,000 - 100,000	C
Suburban Arterial	10,000 - 100,000	C
Rural Arterial	10,000 - 100,000	C
Rural Collector	10,000 - 100,000	D
Rural Local	10,000 - 100,000	D

Provide estimates of maximum service volumes for various Florida roadway types

Represent average roadway conditions for the state, not any single roadway

Allow analysts to quickly and easily estimate LOS from volumes and estimate capacity

Generalized Service Volume Tables

Limitations

- Results are rough estimates and may not be truly representative of the study area
- Simplified planning level assumptions are made, therefore the tables must not be used for actual design or operation of facilities where more appropriate tools are available

Generalized Service Volume Tables

LOS Thresholds

- Urbanized and Transitioning/Urban

Level of Service	LEVEL OF SERVICE THRESHOLDS							
	Freeways	Highways		Arterials		Bicycle	Ped	Bus
	Density	Two-Lane %ffs	Multilane Density	Class I ats	Class II ats	Score	Score	Buses/lr
B	≤ 17	> 83.3	≤ 17	> 31 mph	> 22 mph	≤ 2.75	≤ 2.75	≤ 6
C	≤ 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	≤ 39	> 58.3	≤ 35	> 15 mph	> 10 mph	≤ 5.00	≤ 5.00	< 2

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

- Rural

Level of Service	LEVEL OF SERVICE THRESHOLDS					
	Freeways	Highways				
	Density	Two-Lane %tsf	Two-Lane ats	Two-Lane %ffs	Multilane Density	Multilane Density
B	≤ 14	≤ 50	≤ 55	> 83.3	≤ 14	≤ 14
C	≤ 22	≤ 65	≤ 50	> 75.0	≤ 22	≤ 22
D	≤ 29	≤ 80	≤ 45	> 66.7	≤ 29	≤ 29
E	≤ 36	> 80	≤ 40	> 58.3	≤ 34	≤ 34

Level of Service	Arterials Major City/Co (ats)	Bicycle Score	Pedestrian Score
B	> 31 mph	≤ 2.75	≤ 2.75
C	> 23 mph	≤ 3.50	≤ 3.50
D	> 18 mph	≤ 4.25	≤ 4.25
E	> 15 mph	≤ 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 Service Volume Tables

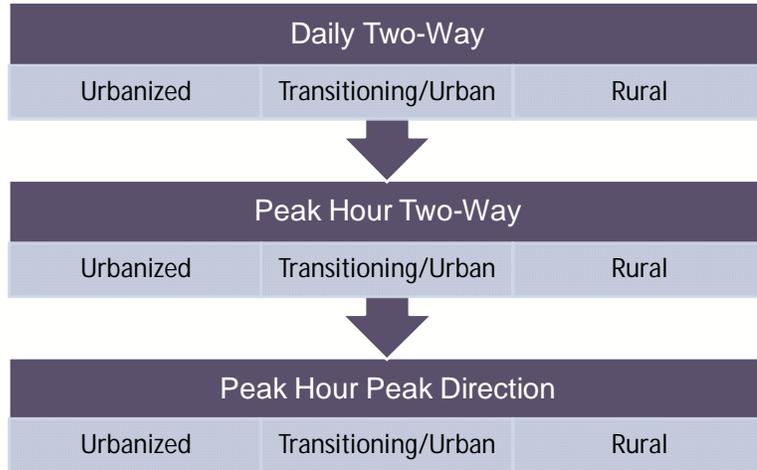
LOS Thresholds

The Generalized Service Volume Tables use LOS thresholds that differ from the HCM in some cases

- Arterial facility LOS criteria for automobiles uses an arterial two class system with average travel speed as the service measure to set LOS thresholds
- HCM does not use an arterial class system and uses percent base free flow speed as the service measure to set LOS thresholds
- Rural freeways use LOS thresholds developed through research at the University of Florida rather than the HCM freeway LOS thresholds, and differing thresholds by area type have been applied to other facility types as well

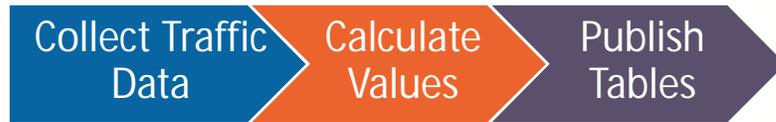


Generalized Service Volume Tables

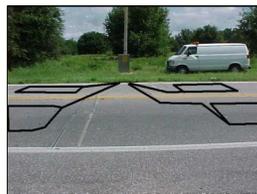


Generalized Service Volume Tables

How the Tables Were Developed



From roadways around the state



Using LOSPLAN and generalized assumed values for variables



TABLE 1
Generalized Service Volume Tables for Various Roadway Types

Roadway Type	Daily Two-Way			Peak Hour Two-Way			Peak Hour Peak Direction		
	Urbanized	Transitioning/Urban	Rural	Urbanized	Transitioning/Urban	Rural	Urbanized	Transitioning/Urban	Rural
Two-Lane Undivided	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Two-Lane Divided	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Four-Lane Undivided	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Four-Lane Divided	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000



Generalized Service Volume Tables

Assumptions

- Default values were assumed for each input parameter based on area type and roadway type to create the tables
- The assumed values were developed from traffic and signalization studies performed by FDOT, and reflect typical conditions on Florida roadways



Generalized Service Volume Tables

Most Important Generalized Assumptions

- Standard K
 - Urbanized and Transitioning Area Standard K = 0.09
except core freeways = 0.085
 - Rural Area Standard K = 0.095
except rural freeways = 0.105
- Peak Hour Factor (PHF) = 1.0
- Directional Distribution Factor (D)

	Freeways		Highways		Arterials			
	Regular	Core	Two-Lane	Multilane	Class 1		Class 2	
# Through Lanes	4-8	4-12	2	4-6	2	4-8	2	4-8
Urbanized								
D-Factor	0.547	0.547	0.55	0.55	0.55	0.56	0.565	0.56
Transitioning								
D-Factor	0.555	-	0.55	0.55	0.55	0.57	0.57	0.565
Rural								
D-Factor	0.555	-	0.55	0.55	0.55			



Generalized Service Volume Tables

Back of the Tables

- The back of that tables contain the input variables used in LOSPLAN to produce the generalized service volume tables

TABLE 3 (continued) Generalized Annual Average Daily Volumes for Florida's Rural Undeveloped Areas and Developed Areas Less Than 5,000 Population 12/16/12

INPUT VALUE ASSUMPTIONS	Uninterrupted Flow Facilities					Interrupted Flow Facilities				
	Freeways	Highways				Arterials	Bicycle	Pedestrian		
ROADWAY CHARACTERISTICS										
Area type (ru, rd)	rural	ru	ru	rd	rd	rd	rd	rd	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	65	45	55	45	45
Free flow speed (mph)	75	60	70	55	60	70	50	60	50	50
Auxiliary lanes (n,y)	n									
Median (n, nr, r)	n	n	r	n	r	n	r	r	r	n
Terrain (Lr)	1	1	1	1	1	1	1	1	1	1
% no passing zone		20								
Exclusive left turn lanes (n, y)		[n]	y	[n]	y	y	y	y	y	y
Exclusive right turn lanes (n, y)										
Facility length (mi)	14	10	10	5	5	10	2.5	4	2	2
Number of basic segments	4									
TRAFFIC CHARACTERISTICS										
Planning analysis level factor (K)	0.100	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
Development distribution factor (D)	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	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
Flow conversion factor (K ₂)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy vehicle percent	12.0	5.0	12.0	4.0	4.0	3.0	3.0	6.0	3.0	3.0
Local adjustment factor	0.84	0.88	0.73	0.97	0.82					
% left turn						12	12		12	12
% right turn						12	12		12	12
CONTROL CHARACTERISTICS										
Number of lanes						3	3	3	3	3
Access type (Lr)						2	2	2	2	2
Signal type (Lr)						2	2	2	2	2
Cycle length (s)						80	80	80	80	80
Effective green time (s)						0.44	0.44	0.37	0.44	0.44
MULTIMODAL CHARACTERISTICS										
Formal shoulder bicycle lanes (n, y)							0.50%	0.50%		
Outside lane width (n, y)										
Permanence condition (L, S)										
Median (n, y)										
Shoulder width or separation, LW										
Shoulder protective barrier (n, y)										
LEVEL OF SERVICE THRESHOLDS										
Level of Service	Freeways	Two Lane (n)		Two Lane (r)		Multiple (n)		Multiple (r)		Minimum (r)
		Density	%FS	Density	%FS	Density	Density			
A		14	50	15	45	15	45	15	45	15
B		22	45	20	40	20	40	20	40	20
C		30	35	25	30	25	30	25	30	25
D		39	25	30	20	30	20	30	20	30
E		49	20	40	15	40	15	40	15	40
Level of Service	Arterials	Major City (n)		Major City (r)		Minor City (n)		Minor City (r)		Prediction Score
		Score	Score	Score	Score	Score	Score			
A		21	15	21	15	21	15	21	15	21
B		23	15	23	15	23	15	23	15	23
C		25	15	25	15	25	15	25	15	25
D		28	15	28	15	28	15	28	15	28
E		30	15	30	15	30	15	30	15	30



Generalized Service Volume Tables

Roadway Variables

Num. of Lanes (both dir.) **2**

Terrain **Level**

Posted Speed **55**

Free-Flow Speed **60**

Segment Length **10.0**

Left Turn/Blockage Impact

Median

Passing Lanes

Passing Lane Length **0.0**

% No Passing Zones **20**

Traffic Variables

AADT **7000** Peak Dir. Hr. Vol. **36**

K factor (%) **9.5** Off-peak Dir. Hr. Vol. **29**

D factor (%) **55.0** % Heavy Vehicles **5**

PHF **1.000**

For the variables highlighted in blue, local value

TABLE 3 (continued) Generalized Annual Average Daily Volumes for Florida's Rural Undeveloped Areas and Developed Areas Less Than 5,000 Population 12/16/12

INPUT VALUE ASSUMPTIONS	Uninterrupted Flow Facilities					Interrupted Flow Facilities				
	Freeways	Highways				Arterials	Bicycle	Pedestrian		
ROADWAY CHARACTERISTICS										
Area type (ru, rd)	rural	ru	ru	rd	rd	rd	rd	rd	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	65	45	55	45	45
Free flow speed (mph)	75	60	70	55	60	70	50	60	50	50
Auxiliary lanes (n,y)	n									
Median (n, nr, r)	n	n	r	n	r	n	r	r	r	n
Terrain (Lr)	1	1	1	1	1	1	1	1	1	1
% no passing zone		20								
Exclusive left turn lanes (n, y)		[n]	y	[n]	y	y	y	y	y	y
Exclusive right turn lanes (n, y)										
Facility length (mi)	14	10	10	5	5	10	2.5	4	2	2
Number of basic segments	4									



Generalized Service Volume Tables

Service Volumes From HIGHPLAN

Lanes	Annual Average Daily Traffic				
	A	B	C	D	E
2	2600	4700	8400	14300	28600

TABLE 2 Generalized Annual Average Daily Volumes for Florida's Transitioning Areas and Areas Over 5,000 Not in Urbanized Areas¹ 12/16/12

UNINTERRUPTED FLOW FACILITIES					
STATE SIGNALIZED ARTERIALS					
Lanes	Median	B	C	D	E
2	Undivided	14,000	16,300	**	**
4	Divided	34,000	33,300	**	**
6	Divided	52,100	33,300	**	**
Class II (31 mph or slower posted speed limit)					
Lanes	Median	B	C	D	E
2	Undivided	6,500	13,300	14,300	
4	Divided	9,900	28,800	31,600	
6	Divided	16,000	34,900	47,600	
Non-State Signalized Roadways Adjustment (Also computing new volumes by the additional percent)					
Non-State Signalized Roadways - 10%					
Median & Turn Lane Adjustment					
Lanes	Median	Left Lane	Right Lane	Turn	Adjustment
2	Divided	Yes	No	Yes	+1%
2	Undivided	Yes	No	Yes	+2%
4	Divided	Yes	No	Yes	+1%
4	Undivided	Yes	No	Yes	+2%
6	Divided	Yes	No	Yes	+1%
6	Undivided	Yes	No	Yes	+2%
6	Divided	Yes	No	Yes	+1%
6	Undivided	Yes	No	Yes	+2%

UNINTERRUPTED FLOW HIGHWAYS

Rural Undeveloped

Lanes	Median	B	C	D	E
2	Undivided	4,700	8,400	14,300	28,600
4	Divided	25,700	40,300	51,000	57,900
6	Divided	38,800	60,400	76,700	86,800



Generalized Service Volume Tables

Asterisks on the Tables vs. LOSPLAN

- Note that the asterisks in the LOSPLAN software differ from the generalized service volume table
- The information is the same, the number of asterisks differs

LOSPLAN

Generalized Service Volume Tables

* Cannot be achieved using table input value defaults.

** Not applicable for that level of service letter grade. For the automobile mode, volumes greater than level of service D become F because intersection capacities have been reached. For the bicycle mode, the level of service letter grade (including F) is not achievable because there is no maximum vehicle volume threshold using table input value defaults.

* Service volumes for the specific facility being analyzed, based on the number of thru lanes appearing in the intersection and segment data screens.

** Cannot be achieved based on input data provided.

*** Not applicable for that level of service letter grade. See generalized tables notes for more details.



Generalized Service Volume Tables

Process for Using Tables

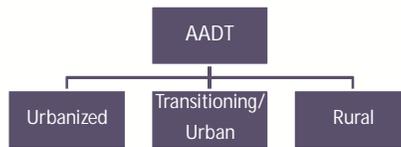
Automobile Mode	Bicycle Mode	Pedestrian Mode	Bus Mode
Facility Type	Key Variables	Key Variables	Key Variables
<ul style="list-style-type: none"> Freeways Uninterrupted Flow Highways State Two-Way Arterials Non-State Roadways 	<ul style="list-style-type: none"> Paved shoulder/ bicycle lane coverage Number of motorized vehicles 	<ul style="list-style-type: none"> Sidewalk coverage Number of motorized vehicles 	<ul style="list-style-type: none"> Bus frequency Sidewalk coverage



Generalized Service Volume Tables

Table Format

Tables 1-3



Tables 4-6



Tables 7-9



Generalized Service Volume Tables

Freeways

FREEWAYS				
Core Urbanized				
Lanes	B	C	D	E
4	47,400	64,000	77,900	84,600
6	69,900	95,200	116,600	130,600
8	92,500	126,400	154,300	176,600
10	115,100	159,700	194,500	222,700
12	162,400	216,700	256,600	268,900

Urbanized				
Lanes	B	C	D	E
4	45,800	61,500	74,400	79,900
6	68,100	93,000	111,800	123,300
8	91,500	123,500	148,700	166,800
10	114,800	156,000	187,100	210,300

Freeway Adjustments		
Auxiliary Lanes		Ramp
Present in Both Directions	+20,000	Metering
		+5%

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

TABLE 1

INTERRUPTED FLOW FACILITIES					UNINTERRUPTED FLOW FACILITIES						
STATE SIGNALIZED ARTERIALS											
Class I (40 mph or higher posted speed limit)											
Lanes	Median	B	C	D	E	Lanes	B	C	D	E	
2	Undivided	8,800	17,700	**	**	4	47,400	64,000	77,900	84,600	
4	Divided	37,800	39,800	**	**	6	69,900	95,200	116,600	130,600	
6	Divided	34,400	39,800	**	**	8	82,500	126,400	154,300	176,600	
8	Divided	78,800	80,100	**	**	10	115,100	159,700	194,500	222,700	
						12	162,400	216,700	256,600	268,900	
Class II (35 mph or slower posted speed limit)											
Lanes	Median	B	C	D	E	Lanes	B	C	D	E	
2	Undivided	7,500	14,800	15,600		4	45,800	61,500	74,400	79,900	
4	Divided	14,500	32,600	33,600		6	48,100	93,000	111,800	123,300	
6	Divided	23,200	30,000	30,600		8	91,500	123,500	148,700	166,800	
8	Divided	33,000	67,500	68,100		10	114,800	156,000	187,100	210,300	
Non-State Signalized Roadway Adjustments											
After converting one count to the adjacent count											
Non-State Signalized Roadways: -10%											
Median & Turn Lane Adjustments											
Lanes	Median	Left Lane	Right Lane	Adjustment		Lanes	B	C	D	E	
2	Divided	Yes	No	+5%		4	Undivided	8,800	17,700	24,200	33,300
4	Divided	Yes	No	+20%		6	Divided	36,700	51,800	65,600	72,600
6	Divided	Yes	No	+20%		8	Divided	55,000	77,700	98,500	108,800
8	Divided	Yes	No	+20%							
10	Divided	Yes	No	+20%							
12	Divided	Yes	No	+20%							
14	Divided	Yes	No	+20%							
16	Divided	Yes	No	+20%							
18	Divided	Yes	No	+20%							
20	Divided	Yes	No	+20%							
22	Divided	Yes	No	+20%							
24	Divided	Yes	No	+20%							
26	Divided	Yes	No	+20%							
28	Divided	Yes	No	+20%							
30	Divided	Yes	No	+20%							
32	Divided	Yes	No	+20%							
34	Divided	Yes	No	+20%							
36	Divided	Yes	No	+20%							
38	Divided	Yes	No	+20%							
40	Divided	Yes	No	+20%							
42	Divided	Yes	No	+20%							
44	Divided	Yes	No	+20%							
46	Divided	Yes	No	+20%							
48	Divided	Yes	No	+20%							
50	Divided	Yes	No	+20%							
52	Divided	Yes	No	+20%							
54	Divided	Yes	No	+20%							
56	Divided	Yes	No	+20%							
58	Divided	Yes	No	+20%							
60	Divided	Yes	No	+20%							
62	Divided	Yes	No	+20%							
64	Divided	Yes	No	+20%							
66	Divided	Yes	No	+20%							
68	Divided	Yes	No	+20%							
70	Divided	Yes	No	+20%							
72	Divided	Yes	No	+20%							
74	Divided	Yes	No	+20%							
76	Divided	Yes	No	+20%							
78	Divided	Yes	No	+20%							
80	Divided	Yes	No	+20%							
82	Divided	Yes	No	+20%							
84	Divided	Yes	No	+20%							
86	Divided	Yes	No	+20%							
88	Divided	Yes	No	+20%							
90	Divided	Yes	No	+20%							
92	Divided	Yes	No	+20%							
94	Divided	Yes	No	+20%							
96	Divided	Yes	No	+20%							
98	Divided	Yes	No	+20%							
100	Divided	Yes	No	+20%							
102	Divided	Yes	No	+20%							
104	Divided	Yes	No	+20%							
106	Divided	Yes	No	+20%							
108	Divided	Yes	No	+20%							
110	Divided	Yes	No	+20%							
112	Divided	Yes	No	+20%							
114	Divided	Yes	No	+20%							
116	Divided	Yes	No	+20%							
118	Divided	Yes	No	+20%							
120	Divided	Yes	No	+20%							
122	Divided	Yes	No	+20%							
124	Divided	Yes	No	+20%							
126	Divided	Yes	No	+20%							
128	Divided	Yes	No	+20%							
130	Divided	Yes	No	+20%							
132	Divided	Yes	No	+20%							
134	Divided	Yes	No	+20%							
136	Divided	Yes	No	+20%							
138	Divided	Yes	No	+20%							
140	Divided	Yes	No	+20%							
142	Divided	Yes	No	+20%							
144	Divided	Yes	No	+20%							
146	Divided	Yes	No	+20%							
148	Divided	Yes	No	+20%							
150	Divided	Yes	No	+20%							
152	Divided	Yes	No	+20%							
154	Divided	Yes	No	+20%							
156	Divided	Yes	No	+20%							
158	Divided	Yes	No	+20%							
160	Divided	Yes	No	+20%							
162	Divided	Yes	No	+20%							
164	Divided	Yes	No	+20%							
166	Divided	Yes	No	+20%							
168	Divided	Yes	No	+20%							
170	Divided	Yes	No	+20%							
172	Divided	Yes	No	+20%							
174	Divided	Yes	No	+20%							
176	Divided	Yes	No	+20%							
178	Divided	Yes	No	+20%							
180	Divided	Yes	No	+20%							
182	Divided	Yes	No	+20%							
184	Divided	Yes	No	+20%							
186	Divided	Yes	No	+20%							
188	Divided	Yes	No	+20%							
190	Divided	Yes	No	+20%							
192	Divided	Yes	No	+20%							
194	Divided	Yes	No	+20%							
196	Divided	Yes	No	+20%							
198	Divided	Yes	No	+20%							
200	Divided	Yes	No	+20%							
202	Divided	Yes	No	+20%							
204	Divided	Yes	No	+20%							
206	Divided	Yes	No	+20%							
208	Divided	Yes	No	+20%							
210	Divided	Yes	No	+20%							
212	Divided	Yes	No	+20%							
214	Divided	Yes	No	+20%							
216	Divided	Yes	No	+20%							
218	Divided	Yes	No	+20%							
220	Divided	Yes	No	+20%							
222	Divided	Yes	No	+20%							
224	Divided	Yes	No	+20%							
226	Divided	Yes	No	+20%							
228	Divided	Yes	No	+20%							
230	Divided	Yes	No	+20%							
232	Divided	Yes	No	+20%							
234	Divided	Yes	No	+20%							
236	Divided	Yes	No	+20%							
238	Divided	Yes	No	+20%							
240	Divided	Yes	No	+20%							
242	Divided	Yes	No	+20%							
244	Divided	Yes	No	+20%							
246	Divided	Yes	No	+20%							
248	Divided	Yes	No	+20%							
250	Divided	Yes	No	+20%							
252	Divided	Yes	No	+20%							
254	Divided	Yes	No	+20%							
256	Divided	Yes	No	+20%							
258	Divided	Yes	No	+20%							
260	Divided										

Generalized Service Volume Tables

State Signalized Arterials

Two classes based on arterial speed limit

STATE SIGNALIZED ARTERIALS				
Class I (40 mph or higher posted speed limit)				
Lanes	Median	B	C	D
2	Undivided	* 16,800	17,700	**
4	Divided	* 37,900	39,800	**
6	Divided	* 58,400	59,900	**
8	Divided	* 78,800	80,100	**
Class II (35 mph or slower posted speed limit)				
Lanes	Median	B	C	D
2	Undivided	* 7,300	14,800	15,600
4	Divided	* 14,500	32,400	33,900
6	Divided	* 23,300	50,000	50,900
8	Divided	* 32,000	67,300	68,100

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

TABLE 1

INTERRUPTED FLOW FACILITIES					UNINTERRUPTED FLOW FACILITIES				
STATE SIGNALIZED ARTERIALS					FREEWAYS				
Class I (40 mph or higher posted speed limit)					Class I (40 mph or higher posted speed limit)				
Lanes	Median	B	C	D	Lanes	B	C	D	E
2	Undivided	* 16,800	17,700	**	4	47,000	44,000	79,000	84,000
4	Divided	* 37,900	39,800	**	6	69,900	95,200	116,600	150,600
6	Divided	* 58,400	59,900	**	8	82,200	126,400	154,500	216,600
8	Divided	* 78,800	80,100	**	10	115,100	159,700	194,500	272,700
					12	162,400	216,700	256,600	358,900
Class II (35 mph or slower posted speed limit)					Urbanized				
Lanes	Median	B	C	D	Lanes	B	C	D	E
2	Undivided	* 7,300	14,800	15,600	4	45,800	65,500	74,400	79,900
4	Divided	* 14,500	32,400	33,900	6	48,100	93,000	111,800	121,200
6	Divided	* 23,300	50,000	50,900	8	91,500	132,500	148,700	166,800
8	Divided	* 32,000	67,300	68,100	10	114,800	156,000	187,100	210,900

Source: Florida Department of Transportation, 2012. For more information, visit www.floridadot.com.



Generalized Service Volume Tables

Non-State Signalized Roadways

Adjustments for State and Non-State Signalized Roadways

- Divided/Undivided
- Turn Lanes
- One-Way

Non-State Signalized Roadway Adjustments
(After corresponding state volumes by the indicated percent.)

Non-State Signalized Roadways - 10%

Median & Turn Lane Adjustments

Lanes	Median	Exclusive Left Lanes	Exclusive Right Lanes	Adjustment Factors
2	Divided	Yes	No	+5%
2	Undivided	No	No	-20%
Multi	Undivided	Yes	No	-5%
Multi	Undivided	No	No	+25%
-	-	-	Yes	+5%

One-Way Facility Adjustment

Multiply the corresponding two-directional volumes in this table by 0.6

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

TABLE 1

INTERRUPTED FLOW FACILITIES					UNINTERRUPTED FLOW FACILITIES				
STATE SIGNALIZED ARTERIALS					FREEWAYS				
Class I (40 mph or higher posted speed limit)					Class I (40 mph or higher posted speed limit)				
Lanes	Median	B	C	D	Lanes	B	C	D	E
2	Undivided	* 16,800	17,700	**	4	47,000	44,000	79,000	84,000
4	Divided	* 37,900	39,800	**	6	69,900	95,200	116,600	150,600
6	Divided	* 58,400	59,900	**	8	82,200	126,400	154,500	216,600
8	Divided	* 78,800	80,100	**	10	115,100	159,700	194,500	272,700
					12	162,400	216,700	256,600	358,900
Class II (35 mph or slower posted speed limit)					Urbanized				
Lanes	Median	B	C	D	Lanes	B	C	D	E
2	Undivided	* 7,300	14,800	15,600	4	45,800	65,500	74,400	79,900
4	Divided	* 14,500	32,400	33,900	6	48,100	93,000	111,800	121,200
6	Divided	* 23,300	50,000	50,900	8	91,500	132,500	148,700	166,800
8	Divided	* 32,000	67,300	68,100	10	114,800	156,000	187,100	210,900

Source: Florida Department of Transportation, 2012. For more information, visit www.floridadot.com.



Generalized Service Volume Tables

Multimodal LOS

BICYCLE MODE²
(Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/Bicycle Lane Coverage	B	C	D	E
0-49%	*	2,900	7,600	19,700
50-84%	2,100	6,700	19,700	>19,700
85-100%	9,300	19,700	>19,700	**

Bicycle Mode Based on:

- Paved shoulder/bicycle lane coverage
- Number of motorized vehicles

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

TABLE 1

INTERRUPTED FLOW FACILITIES					UNINTERRUPTED FLOW FACILITIES					
STATE SIGNALIZED ARTERIALS					FREEWAYS					
Class I (40 mph or higher posted speed limit)					Class I (Urbanized)					
Lanes	Median	B	C	D	Lanes	B	C	D	E	
2	Undivided	+	14,500	17,700	+	47,000	64,000	79,000	84,000	
4	Divided	+	37,900	39,800	**	6	69,900	95,200	116,600	150,600
6	Divided	+	54,400	59,900	**	8	82,500	126,400	154,500	216,600
8	Divided	+	78,800	80,100	**	10	115,100	159,700	194,500	221,700
12	Divided	+	162,400	174,700	**	12	162,400	216,700	256,000	298,900
Class II (35 mph or slower posted speed limit)					Class II (Urbanized)					
Lanes	Median	B	C	D	Lanes	B	C	D	E	
2	Undivided	+	7,500	14,800	15,600	4	45,800	65,500	74,400	79,900
4	Divided	+	14,500	16,600	31,600	6	48,100	93,000	113,800	121,200
6	Divided	+	21,500	30,600	50,600	8	91,500	123,500	148,700	166,800
8	Divided	+	33,000	47,500	68,100	10	114,800	156,000	187,100	210,900
Non-State Signalized Roadway Adjustments (After incorporating any volume or adjustment factors)					Freeway Adjustments (After incorporating any volume or adjustment factors)					
Non-State Signalized Roadways: -10%					Freeway Adjustments: +3%					
Median & Turn Lane Adjustments (After incorporating any volume or adjustment factors)					Uninterrupted Flow Highway Adjustments (After incorporating any volume or adjustment factors)					
Lanes	Median	Left Lane	Right Lane	Adjustment Factor	Lanes	Median	Left Lane	Right Lane	Adjustment Factor	
2	Undivided	Yes	No	+2%	2	Undivided	Yes	No	+2%	
4	Divided	Yes	No	+2%	4	Divided	Yes	No	+2%	
6	Divided	Yes	No	+2%	6	Divided	Yes	No	+2%	
8	Divided	Yes	No	+2%	8	Divided	Yes	No	+2%	
10	Divided	Yes	No	+2%	10	Divided	Yes	No	+2%	
12	Divided	Yes	No	+2%	12	Divided	Yes	No	+2%	
One-Way Facility Adjustment (Multiply the corresponding two-directional volume by the factor below)					Uninterrupted Flow Highway Adjustment (Multiply the corresponding two-directional volume by the factor below)					
One-Way Facility Adjustment: -5%					Uninterrupted Flow Highway Adjustment: -5%					
Bicycle Mode ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					Bicycle 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					Paved Shoulder/Bicycle Lane Coverage					
0-49% * 2,900 7,600 19,700					0-49% * 2,900 7,600 19,700					
50-84% 2,100 6,700 19,700 >19,700					50-84% 2,100 6,700 19,700 >19,700					
85-100% 9,300 19,700 >19,700 **					85-100% 9,300 19,700 >19,700 **					
PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					
Sidewalk Coverage					Sidewalk Coverage					
0-49% * 1,600 8,700 15,800					0-49% * 1,600 8,700 15,800					
50-84% 3,800 10,700 17,400 >19,700					50-84% 3,800 10,700 17,400 >19,700					
85-100% 8,300 19,700 >19,700 **					85-100% 8,300 19,700 >19,700 **					
BUS MODE (Scheduled Fixed Route) (Shown in peak hour in peak direction)					BUS MODE (Scheduled Fixed Route) (Shown in peak hour in peak direction)					
Sidewalk Coverage					Sidewalk Coverage					
0-49% -5 -2 -1 -2					0-49% -5 -2 -1 -2					
50-84% -4 -2 -1 -2					50-84% -4 -2 -1 -2					
85-100% -4 -2 -1 -2					85-100% -4 -2 -1 -2					



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Generalized Service Volume Tables

Multimodal LOS

Pedestrian Mode Based on:

- Sidewalk coverage
- Number of motorized vehicles

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%	*	2,800	9,500	
50-84%	1,600	8,700	15,800	
85-100%	3,800	10,700	17,400	>19,700

Generalized Annual Average Daily Volumes for Florida's Urbanized Areas

TABLE 1

INTERRUPTED FLOW FACILITIES					UNINTERRUPTED FLOW FACILITIES					
STATE SIGNALIZED ARTERIALS					FREEWAYS					
Class I (40 mph or higher posted speed limit)					Class I (Urbanized)					
Lanes	Median	B	C	D	Lanes	B	C	D	E	
2	Undivided	+	14,500	17,700	+	47,000	64,000	79,000	84,000	
4	Divided	+	37,900	39,800	**	6	69,900	95,200	116,600	150,600
6	Divided	+	54,400	59,900	**	8	82,500	126,400	154,500	216,600
8	Divided	+	78,800	80,100	**	10	115,100	159,700	194,500	221,700
12	Divided	+	162,400	174,700	**	12	162,400	216,700	256,000	298,900
Class II (35 mph or slower posted speed limit)					Class II (Urbanized)					
Lanes	Median	B	C	D	Lanes	B	C	D	E	
2	Undivided	+	7,500	14,800	15,600	4	45,800	65,500	74,400	79,900
4	Divided	+	14,500	16,600	31,600	6	48,100	93,000	113,800	121,200
6	Divided	+	21,500	30,600	50,600	8	91,500	123,500	148,700	166,800
8	Divided	+	33,000	47,500	68,100	10	114,800	156,000	187,100	210,900
Non-State Signalized Roadway Adjustments (After incorporating any volume or adjustment factors)					Freeway Adjustments (After incorporating any volume or adjustment factors)					
Non-State Signalized Roadways: -10%					Freeway Adjustments: +3%					
Median & Turn Lane Adjustments (After incorporating any volume or adjustment factors)					Uninterrupted Flow Highway Adjustments (After incorporating any volume or adjustment factors)					
Lanes	Median	Left Lane	Right Lane	Adjustment Factor	Lanes	Median	Left Lane	Right Lane	Adjustment Factor	
2	Undivided	Yes	No	+2%	2	Undivided	Yes	No	+2%	
4	Divided	Yes	No	+2%	4	Divided	Yes	No	+2%	
6	Divided	Yes	No	+2%	6	Divided	Yes	No	+2%	
8	Divided	Yes	No	+2%	8	Divided	Yes	No	+2%	
10	Divided	Yes	No	+2%	10	Divided	Yes	No	+2%	
12	Divided	Yes	No	+2%	12	Divided	Yes	No	+2%	
One-Way Facility Adjustment (Multiply the corresponding two-directional volume by the factor below)					Uninterrupted Flow Highway Adjustment (Multiply the corresponding two-directional volume by the factor below)					
One-Way Facility Adjustment: -5%					Uninterrupted Flow Highway Adjustment: -5%					
Bicycle Mode ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					Bicycle 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					Paved Shoulder/Bicycle Lane Coverage					
0-49% * 2,900 7,600 19,700					0-49% * 2,900 7,600 19,700					
50-84% 2,100 6,700 19,700 >19,700					50-84% 2,100 6,700 19,700 >19,700					
85-100% 9,300 19,700 >19,700 **					85-100% 9,300 19,700 >19,700 **					
PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					PEDESTRIAN MODE ² (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)					
Sidewalk Coverage					Sidewalk Coverage					
0-49% * 1,600 8,700 15,800					0-49% * 1,600 8,700 15,800					
50-84% 3,800 10,700 17,400 >19,700					50-84% 3,800 10,700 17,400 >19,700					
85-100% 8,300 19,700 >19,700 **					85-100% 8,300 19,700 >19,700 **					
BUS MODE (Scheduled Fixed Route) (Shown in peak hour in peak direction)					BUS MODE (Scheduled Fixed Route) (Shown in peak hour in peak direction)					
Sidewalk Coverage					Sidewalk Coverage					
0-49% -5 -2 -1 -2					0-49% -5 -2 -1 -2					
50-84% -4 -2 -1 -2					50-84% -4 -2 -1 -2					
85-100% -4 -2 -1 -2					85-100% -4 -2 -1 -2					



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GSVT Example #2

Determine the auto LOS:

- In terms of peak hour directional volumes
- In an undeveloped rural area
- For an uninterrupted flow highway with
 - 2 lanes (one in each direction)
 - No median/undivided
 - No passing lanes
 - Peak hour directional volume is 400

GSVT Example #3

Determine the auto LOS:

- In terms of AADT
- In a developed rural area (pop. 3,000)
- For an uninterrupted flow highway with
 - 4 lanes
 - 25,000 AADT
 - No median
 - Exclusive left turn lanes

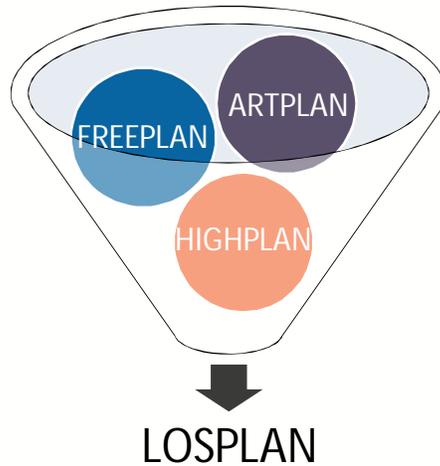
GSVT Example #4

Determine the bicycle, pedestrian, and bus LOS:

- In terms of AADT
- In an urbanized area
- For a state signalized arterial with
 - 2 lanes
 - 40% bike lane coverage
 - AADT=13,000
 - 90% sidewalk coverage
 - 3 buses/hour

LOSPLAN

LOSPLAN Software



LOSPLAN Software



- Conceptual planning tool
- More detail, greater flexibility compared to Generalized Service Volume Tables
- Uses the same rules as the Generalized Service Volume Tables and the Q/LOS Handbook
- FDOT supported and statewide acceptable for PLANNING only



Most Important Variables

Area Type



Auto

- AADT
- K-Factor
- D-Factor
- Number of Lanes
- Left Turn Lanes
- Signal Spacing
- g/C

Multimodal

- Paved Shoulder/
Bicycle Lane
- Sidewalk
- Bus Frequency

LOSPLAN Capabilities

- Allows for planning-level multimodal LOS and capacity analysis with minimal input requirements
- Provides facility specific service volume tables for auto, bike, pedestrian, and bus based on model inputs

LOSPLAN Limitations

- Results are rough estimates and may not be truly representative of the study area
- Simplifying planning level assumptions made, therefore it must not be used for actual design or operation of facilities where better tools exist

Key Differences Between Other Tools

ARTPLAN

- Requires significantly fewer inputs than other tools such as HCS, TRANSYT-7F, and CORSIM
- Uses average travel speed rather than percent base free flow speed as the primary service measure

Number of inputs comparison:

Input	HCS Streets 2010	ARTPLAN
Turning Movements/Volume	12	3
Signal Timing Parameters	75+	5

Key Differences Between Other Tools

HIGHPLAN

- Uses two classes of two-lane highways rather than three, as HCS uses
- Uses a modified version of the multilane speed-flow curves developed for the HCM, extending beyond the 60 mph maximum
- Approximately the same number of inputs as HCS, but simplified approximation of free flow speed



Key Differences Between Other Tools

FREEPLAN

- Includes extensions to the HCM methodology for planning purposes
- Relies on revised density thresholds differing from the HCM density thresholds
- Basic segments in FREEPLAN require 9 inputs as opposed to 11 in HCS facilities



Key Differences Between Other Tools



2013 Q/LOS Handbook - Pg. 4



HIGHPLAN 2012

HIGHPLAN 2012
Multilane and Two-Lane Highway
Level of Service Analysis
For Conceptual Planning and Preliminary Engineering
Version Date: 12/12/2012

Startup Options
Would you like to...

Start a new project or Open an existing project

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION





HIGHPLAN 2012

Uses

- Roadways with average signalized intersection spacing great than 2 miles
- Can perform three types of highway analysis:
 - Two-Lane Segment
 - Multilane Segment
 - Two-Lane Facility
 - At least 3 miles in length
 - Typically bounded by major roadways or area type boundaries



HIGHPLAN

Strengths

- Requires only basic geometry and volume information for LOS estimation
- Incorporates Florida specific adjustments

Limitations

- Only supports analysis of multilane segments, not multilane facilities
- Not capable of non-automotive LOS evaluation
- Limits free flow speed to 5 mph increments



HIGHPLAN

When to use other tools

- When conducting operational or design level analysis
- When the study is not on a Florida roadway



HIGHPLAN - Definitions

- **Type of Analysis:**
 - **Two-Lane Segment** – Used when study area is one segment of two-lane uninterrupted flow highway
 - **Multilane Segment** – Used for analysis of highway segments with greater than one lane in each direction
 - **Two-Lane Facility** – Used for analysis of interrupted flow two-lane highways made up of multiple segments and intersections



HIGHPLAN - Definitions

- **Class:**

- **Class I** – Primary connectors, long-distance trips, and high travel speeds; assumed for rural undeveloped area type
- **Class II** – Scenic routes, areas with rugged terrain and/or low expected speeds; **not used in HIGHPLAN**
- **Class III** – Moderately developed areas such as towns with more access points; assumed for urbanized, transitioning/urban, and rural developed area types



HIGHPLAN - Definitions

- **Number of Lanes** - Number of through lanes in both directions for the entire roadway cross-section; exclude left turn lanes and center two-way left turn lanes.



HIGHPLAN - Definitions

- **Left Turn/Blockage Impact** – Indication that the road lacks left turn storage bays and left turning vehicles often block through vehicles; disabled for "Rural Undeveloped" roadways



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HIGHPLAN - Definitions

- **Percent No Passing Zones** – Percent of a two-lane highway where passing is prohibited in the analysis direction

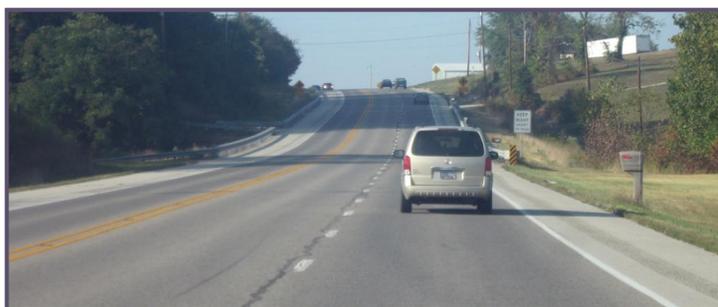


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HIGHPLAN - Definitions

- **Passing Lane** – short lane (approximately 1 mile) added to provide passing opportunities in one direction of travel on a two-lane highway
 - Only applicable to service volume tables



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HIGHPLAN

Example #1 *Two-Lane Segment*

SR 24 between US 19/US 98 & SR 500, near Gainesville

- Rural undeveloped area type
- EB peak direction
- 45 mph posted speed limit
- 11.3 mile segment
- 4% no passing zones
- No median

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
1,200	55.3	5.0	0.84



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HIGHPLAN

Workshop #1 *Two-Lane Segment*

SR 62 between Saffold Rd & SR 37, Parrish/Wauchula

- Rural undeveloped area type
- EB peak direction
- 60 mph posted speed limit
- 10.9 mile segment
- 11% no passing zones
- No median

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
3,500	55.8	5.0	0.84



HIGHPLAN

Workshop #2 *Two-Lane Segment*

SR 20 between Bloxham Cutoff & Geddie Rd, Tallahassee

- Transitioning/Urban area type
- WB peak direction
- 55 mph posted speed limit
- 14.5 mile segment
- 62% no passing zones
- No median

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
5,931	78.7	4.0	0.91



HIGHPLAN

Workshop #3 *Two-Lane Segment*

SR 490 between US 98 & SR 44, Homosassa Springs

- Transitioning/Urban area type
- SB peak direction
- 45 mph posted speed limit
- 6.2 mile segment
- No median
- 85% no passing zones

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
7,700	54.6	4.0	0.91



HIGHPLAN

Example #2 *Multilane Segment*

US 27 between Monarch Blvd & O'Brien Rd, Leesburg

- Transitioning/Urban area type
- NB peak direction
- 4-lane highway
- 55 mph posted speed limit
- 2.8 mile segment
- Median present

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
19,000	55.1	4.0	0.88



HIGHPLAN

Workshop #4 *Multilane Segment*

US 19/27 between Avalon Rd & CR 14, Lamont

- Rural undeveloped area type
- NB peak direction
- 4-lane highway
- 65 mph posted speed limit
- 12.6 mile segment
- Median present

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
5,056	55.8	12.0	0.76



HIGHPLAN

Workshop #5 *Multilane Segment*

SR 289 between Fairfield Dr & Bayou Blvd, Pensacola

- Large/Other urbanized area type
- NB peak direction
- 4-lane highway
- 40 mph posted speed limit
- 1.3 mile segment
- No median

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
26,500	56.1	2.0	0.88



HIGHPLAN

Workshop #6 Multilane Segment

US 29 between Barrineau Park Rd & Molino Rd, Molino

- Rural developed area type
- NB peak direction
- 4-lane highway
- 65 mph posted speed limit
- 2.5 mile segment
- Median present

AADT	D-Factor	% Heavy Vehicles	Local Adjustment Factor
14,100	55.2	4.0	0.88



FREEPLAN 2012

Freeway
Level of Service Analysis
For Conceptual Planning and Preliminary Engineering
Version Date: 12/12/2012

Startup Options
Would you like to...

Start a new project or Open an existing project





Uses

- Estimates automotive LOS and capacity for freeways and freeway facilities
- Capable of analyzing basic segments, on-ramps, off-ramps, ramp overlaps, weaving segments, and toll plazas



FREEPLAN

Strengths

- Requires only basic geometry and volume information for LOS estimation
- Includes extensions of HCM methodology for planning use
- Incorporates Florida specific adjustments

Limitations

- Calculations not fully documented



FREEPLAN

When to use other tools

- When conducting operational or design level analysis
- When the study is not on a Florida roadway



FREEPLAN - Definitions

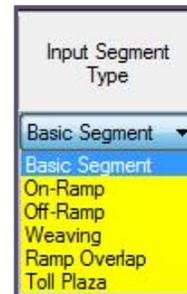
Segment Types:

1. Basic
2. On-Ramp
3. Off-Ramp
4. Ramp Overlap
5. Weaving
6. Toll Plaza

Segment Length:

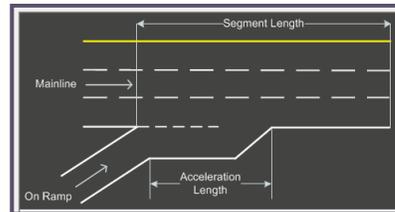
- Default Values:

Default Segments	Length (in feet)
Basic Segment	5280
On-Ramp Segment	1500
Off-Ramp Segment	1500
Ramp Overlap Segment	500
Weaving Segment	3000
Toll Plaza Segment	3000

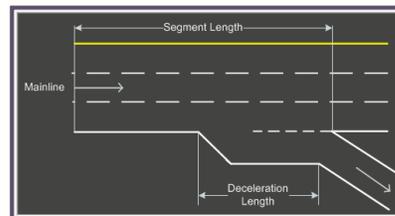


FREEPLAN - Definitions

- Acceleration Length** – Measured from on-ramp gore to the end of the taper; Typically 1,000'



- Deceleration Length** – Measured from beginning of taper to off-ramp gore; typically 450'

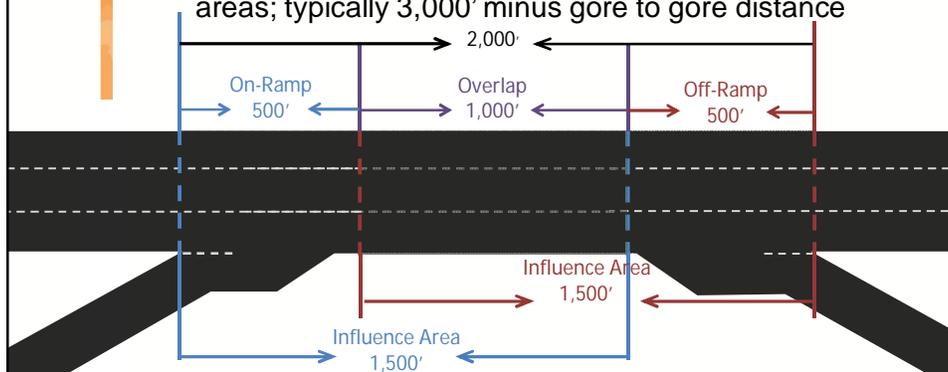


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FREEPLAN - Definitions

- Ramp Overlap** - occurs when the influence area of an on-ramp and the influence area of an off-ramp extend into one another, creating an overlap in the influence areas; typically 3,000' minus gore to gore distance



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FREEPLAN - Definitions

- **Ramp Metering** – used to control the flow of vehicles entering the freeway from on-ramps, in an effort to reduce the turbulence in the merge area and delay the onset of a potential breakdown.



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FREEPLAN - Definitions

- **Weave Configuration**

Weave Configuration

One-Sided Two-Sided

Short Length (ft)

of Weaving Lanes

Min. Lane Changes Freeway-Ramp

Min. Lane Changes Ramp-Freeway

Min. Lane Changes Ramp-Ramp

On-Ramp Roadway				Off-Ramp Roadway				
Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Ramp To Ramp Proportion	Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Off-Ramp Analysis	
40	2.00	443	0.05	40	2.00	443	<input type="checkbox"/> Edit	

OK Cancel

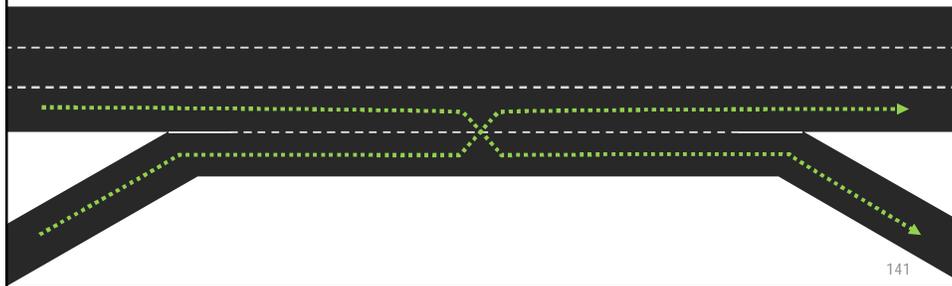


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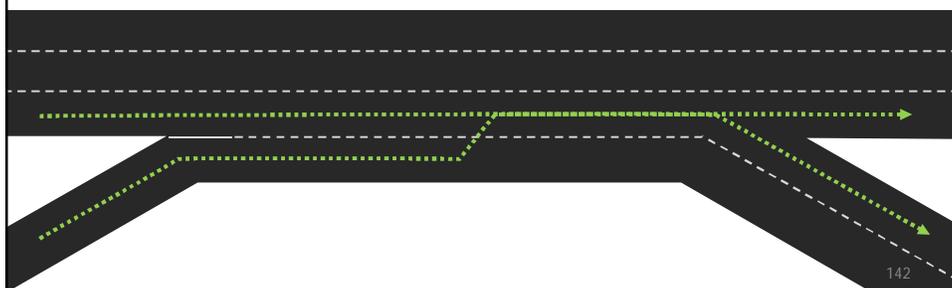
FREEPLAN - Definitions

- **One-Sided Weaving Segment** - Weaving maneuvers require no more than two lane changes



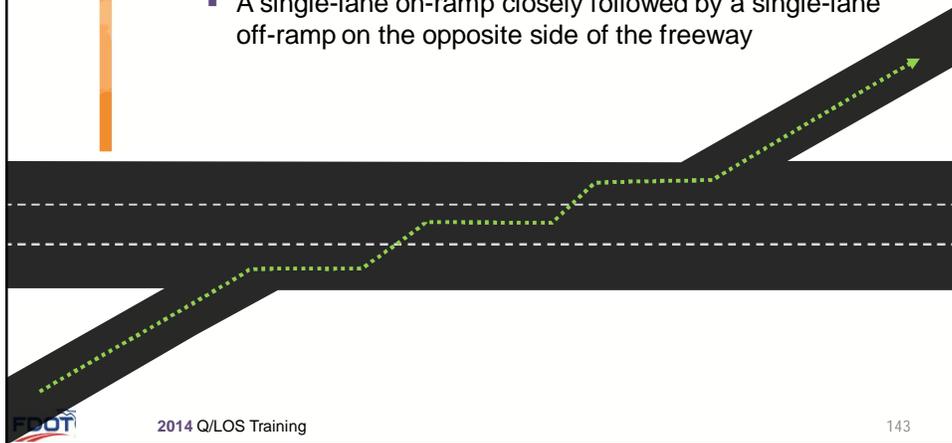
FREEPLAN - Definitions

- **One-Sided Weaving Segment** - Weaving maneuvers require no more than two lane changes



FREEPLAN - Definitions

- **Two-Sided Weaving Segment**
 - At least one weaving maneuver requires 3+ lane changes
 - OR:
 - A single-lane on-ramp closely followed by a single-lane off-ramp on the opposite side of the freeway



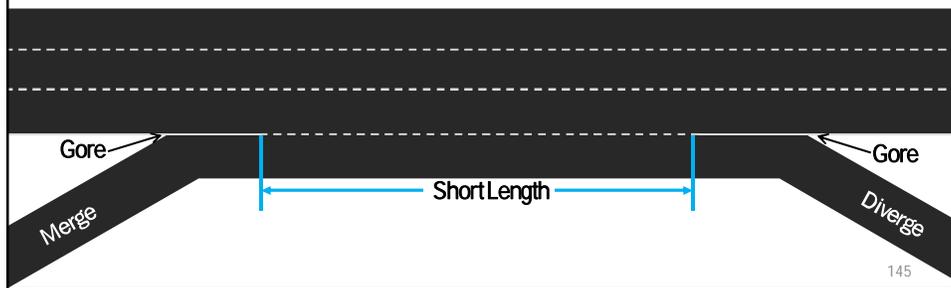
FREEPLAN - Definitions

- **Short Length**

On-Ramp Roadway				Off-Ramp Roadway			
Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Ramp To Ramp Proportion	Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Off-Ramp Analysis
40	2.00	443	0.05	40	2.00	443	<input type="checkbox"/>

FREEPLAN - Definitions

- **Short Length** - The distance in a weaving segment over which lane changes are not prohibited or dissuaded by markings



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FREEPLAN - Definitions

- **Number of Weaving Lanes**

The screenshot shows the 'Weave Configuration' dialog box in the FREEPLAN software. The dialog includes a diagram of a weaving segment and a table for roadway data.

Weave Configuration

One-Sided Two-Sided

Short Length (ft) 3000

of Weaving Lanes 2

Min. Lane Changes Freeway-Ramp 1

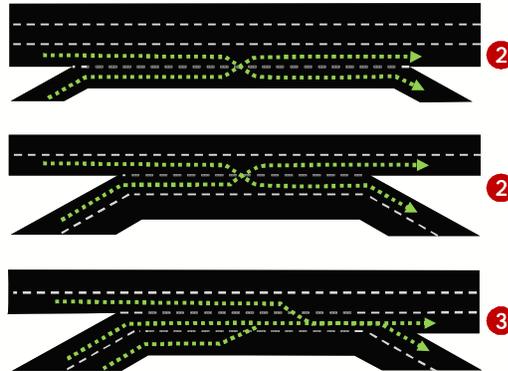
Min. Lane Changes Ramp-Freeway 1

Min. Lane Changes Ramp-Ramp 0

On-Ramp Roadway				Off-Ramp Roadway				
Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Ramp To Ramp Proportion	Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Off-Ramp Analysis	
40	2.00	443	0.05	40	2.00	443	<input type="checkbox"/> Edit	

FREEPLAN - Definitions

- Number of Weaving Lanes** - Number of lanes from which a weaving maneuver may be completed with one lane change or no lane changes; Either 2 or 3.



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FREEPLAN - Definitions

- Minimum Lane Changes**

Segment Length
Short Length

Mainline

On Ramp

Auxiliary Lane

Off Ramp

Weave Configuration

One-Sided Two-Sided

Short Length (ft) 3000

of Weaving Lanes 2

Min. Lane Changes Freeway-Ramp 1

Min. Lane Changes Ramp-Freeway 1

Min. Lane Changes Ramp-Ramp 0

On-Ramp Roadway				Off-Ramp Roadway				
Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Ramp To Ramp Proportion	Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Off-Ramp Analysis	Edit
40	2.00	443	0.05	40	2.00	443	<input type="checkbox"/>	Edit

OK

Cancel



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FREEPLAN - Definitions

- **Minimum Lane Changes** - Minimum number of lane changes that must be made by a single weaving vehicle to successfully execute a:
 - Ramp to Freeway maneuver (1-sided only)
 - Freeway to Ramp maneuver (1-sided only)
 - Ramp to Ramp maneuver (2-sided only)
- Assume that every weaving vehicle enters in the lane closest to their desired exit leg and leaves the segment in the lane closest to their entry leg.

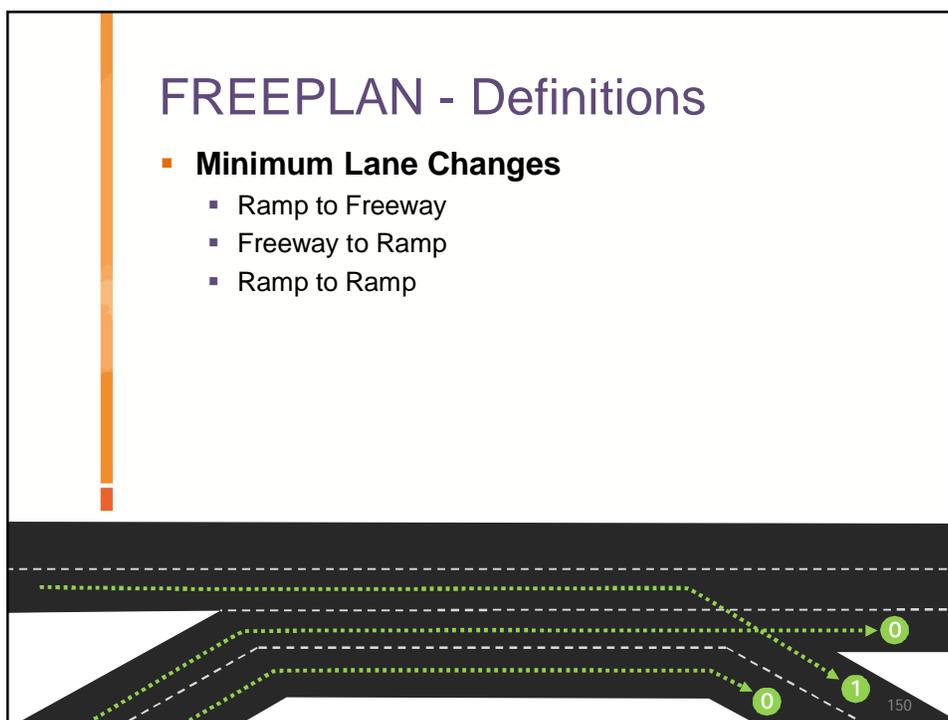


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FREEPLAN - Definitions

- **Minimum Lane Changes**
 - Ramp to Freeway
 - Freeway to Ramp
 - Ramp to Ramp



FREEPLAN - Definitions

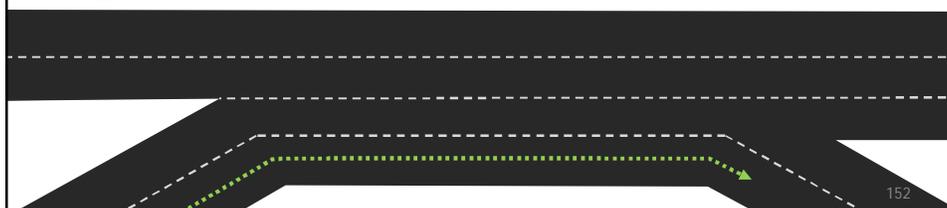
- **Ramp To Ramp Proportion**

On-Ramp Roadway				Off-Ramp Roadway			
Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Ramp To Ramp Proportion	Free Flow Speed (mi/h)	% Trucks	Demand (veh/h)	Off-Ramp Analysis
40	2.00	443	0.05	40	2.00	443	Edit



FREEPLAN - Definitions

- **Ramp to Ramp Proportion** - The ratio of vehicles that enter a weave's on-ramp and then exit the weave's off-ramp to the total vehicles entering the on-ramp; Default 5%



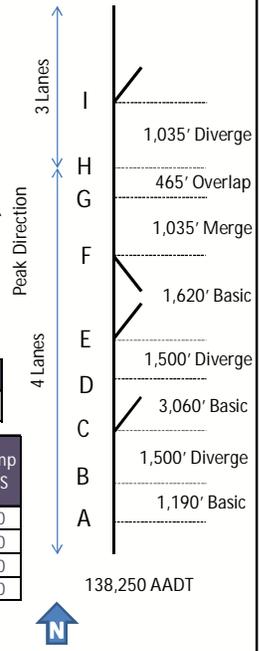
FREEPLAN

Example #1 Basic/Ramps/Ramp Overlap
I-4 between Princeton St & Lee Rd, Orlando

- Large urbanized area type
- Core freeway – K-factor of 8.0 (K_{other})
- 50 mph posted speed limit

D-Factor	% Heavy Vehicles	Local Adjustment Factor
51.8	4.0	0.98

Segment	Segment Name	Type	Ramp Demand	# of Ramp Lanes	Ramp % Heavy Vehicles	Acc/Dec Length [ft]	Ramp FFS
2	B-C	Off-Ramp	486	1	4.0	740	40
4	D-E	Off-Ramp	720	1	4.0	600	40
6	F-G	On-Ramp	486	1	4.0	600	40
8	H-I	Off-Ramp	945	1	4.0	1,500	40



FREEPLAN

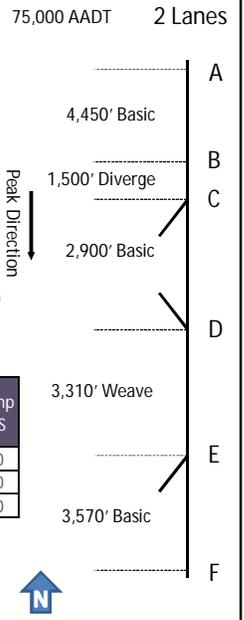
Workshop #1 Basic/Ramps/Weave
I-295 between St. Johns Bluff Rd & Town Center Pkwy, Jacksonville

- Large urbanized area type
- 65 mph posted speed limit
- One sided weave (Ramp to Ramp = 5%)

D-Factor	% Heavy Vehicles	Local Adjustment Factor
57.9	4.0	0.98

Segment	Segment Name	Type	Ramp Demand	# of Ramp Lanes	Ramp % Heavy Vehicles	Acc/Dec Length [ft]	Ramp FFS
2	B-C	Off-Ramp	621	1	4.0	220	40
4	D-E	Weave On	801	1	4.0	-	40
4	D-E	Weave Off	567	1	4.0	-	40

Min. Lane Changes				
Short Length	# Weaving Lanes	Freeway-Ramp	Ramp-Freeway	Ramp-Ramp
2,800	2	1	1	-



FREEPLAN

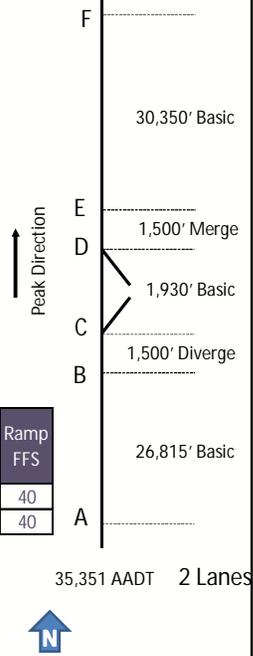
Workshop #2 Basic/Ramps

I-75 between CR 673 & CR 470, Bushnell

- Rural area type
- 70 mph posted speed limit

D-Factor	% Heavy Vehicles	Local Adjustment Factor
56.1	12.0	0.90

Segment	Segment Name	Type	Ramp Demand	# of Ramp Lanes	Ramp % Heavy Vehicles	Acc/Dec Length [ft]	Ramp FFS
2	B-C	Off-Ramp	144	1	12.0	610	40
4	D-E	On-Ramp	162	1	12.0	630	40



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FREEPLAN

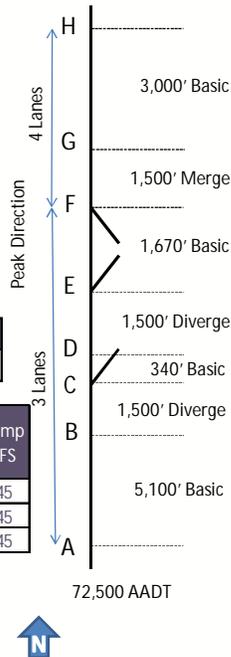
Workshop #3 Basic/Ramps

I-95 between FL 104 & FL 102, Jacksonville

- Large urbanized area type
- 70 mph posted speed limit

D-Factor	% Heavy Vehicles	Local Adjustment Factor
54.5	4.0	0.98

Segment	Segment Name	Type	Ramp Demand	# of Ramp Lanes	Ramp % Heavy Vehicles	Acc/Dec Length [ft]	Ramp FFS
2	B-C	Off-Ramp	387	1	4.0	260	45
4	D-E	Off-Ramp	234	1	4.0	830	45
6	F-G	On-Ramp	828	2	4.0	975	45



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FREEPLAN

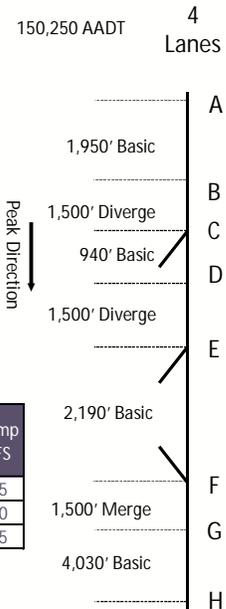
Workshop #4 Basic/Ramps

I-75 between Royal Palm Blvd & Sheridan St, Weston

- Large urbanized area type
- 70 mph posted speed limit

D-Factor	% Heavy Vehicles	Local Adjustment Factor
54.4	4.0	0.98

Segment	Segment Name	Type	Ramp Demand	# of Ramp Lanes	Ramp % Heavy Vehicles	Acc/Dec Length [ft]	Ramp FFS
2	B-C	Off-Ramp	504	1	4.0	460	35
4	D-E	Off-Ramp	288	1	4.0	1,500	30
6	F-G	On-Ramp	1,125	1	4.0	1,500	35



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FREEPLAN

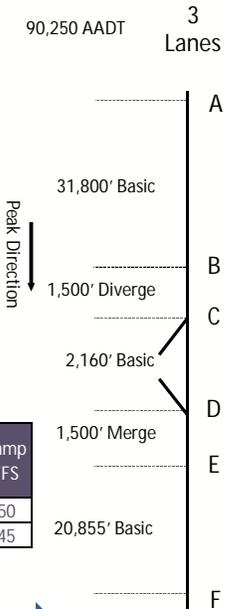
Workshop #5 Basic/Ramps

I-4 between CR 557 & CR 532, near Haines City

- Transitioning area type
- 70 mph posted speed limit

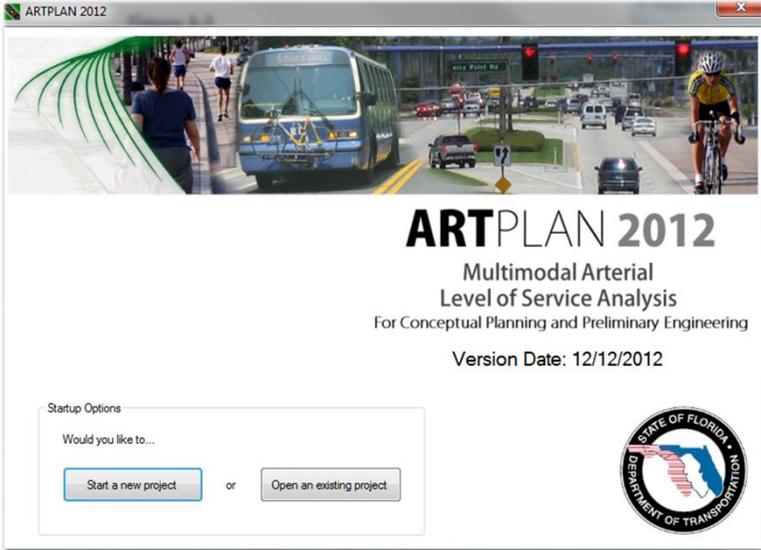
D-Factor	% Heavy Vehicles	Local Adjustment Factor
51.9	9.0	0.95

Segment	Segment Name	Type	Ramp Demand	# of Ramp Lanes	Ramp % Heavy Vehicles	Acc/Dec Length [ft]	Ramp FFS
2	B-C	Off-Ramp	495	1	9.0	900	50
4	D-E	On-Ramp	279	1	9.0	1,500	45



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ARTPLAN 2012

Multimodal Arterial
Level of Service Analysis
For Conceptual Planning and Preliminary Engineering

Version Date: 12/12/2012

Startup Options
Would you like to...

Start a new project or Open an existing project

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

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ARTPLAN 2012

Uses

- Can perform three types of arterial analysis:
 - Single Intersection
 - Segments
 - Facilities
- Provides LOS for four modes:
 - Auto
 - Bicycle
 - Pedestrian
 - Bus

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ARTPLAN

Strengths

- Much fewer inputs than HCS Streets
- Inputs are easily attainable
- Provides multimodal analysis with limited required information

ARTPLAN

Limitations

- Only allows protected or protected + permitted left turn phasing, not permissive only
- Only allows pretimed, actuated coordinated, or fully actuated signal controls – does not allow semi-actuated, semi-actuated uncoordinated
- Does not allow off peak direction analysis
- Limits free flow speed to 5 mph increments
- Limited user guide

When to use other tools

- When analysis is operational or design level

ARTPLAN – Multimodal Analysis

Pedestrian/Bicycle/Transit Inputs

Input	HCS Streets 2010	ARTPLAN
Pedestrian Parameters	76	16
Bicycle Parameters	42	6
Transit Parameters	24	4

ARTPLAN - Definitions

- **Roadway Class**

- **Class 1** – Arterials with a posted speed of 40 mph or greater

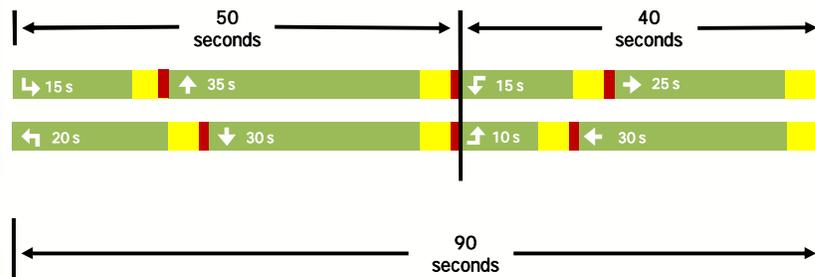


- **Class 2** – Arterials with a posted speed of 35 mph or less



ARTPLAN - Definitions

- **Cycle Length** – The amount of time (in seconds) that is provided to service all movements at a signalized intersection; a cycle length should provide sufficient capacity at the critical intersection(s) and provide progression through the system

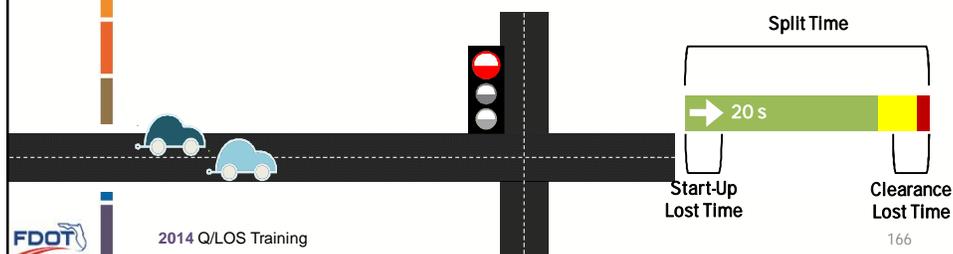


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ARTPLAN - Definitions

- **Green time (G)** – The amount of time within a given phase during which the green indication is present
- **Effective green time (g)** – The time during which a movement or set of movements may proceed through a signal; the effective green time is equal to the split time minus the lost time



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ARTPLAN - Definitions

- **Green Time Ratio (g/C)** – The ratio of the effective green time of a phase to the cycle length
- Indicates the proportion of the cycle length that traffic may move through the intersection for a particular movement
- ARTPLAN requires two inputs for g/C:
 - Through g/C
 - Left g/C

Pretimed Signals
 $g/C \approx G/C$

Actuated Signals
 $g/C \approx (G+4)/C$

2013 Q/LOS Handbook - Pg. 99

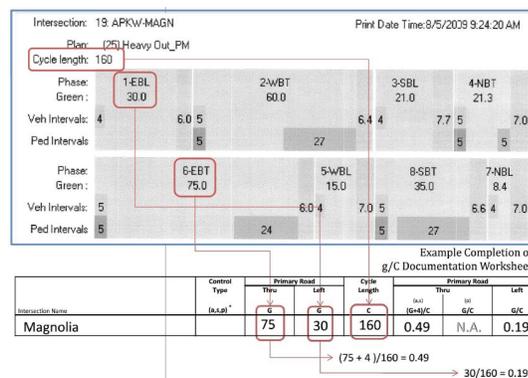


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ARTPLAN - Definitions

- **Signal Timing**
 - Through g/C
 - Left g/C



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ARTPLAN - Definitions

Control Type

- **Pretimed** – Use of a preset sequence of phase times with no use of vehicle detection
- **Coordinated Actuated** – Use of a fixed cycle length while the amount of green time for the main street through phase varies, utilizing unused time from the minor phases.
- **Fully Actuated** – Use of vehicle detection for all signal phases on both the main and side street approaches



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ARTPLAN - Definitions

Left-Turn Phasing

- **Protected turn** – Green arrow
- **Permissive turn** – Green ball (or flashing yellow arrow) where left turns have to yield to oncoming traffic
- **Protected + Permissive turn** – Starts as green arrow, changes to green ball (or vice versa)

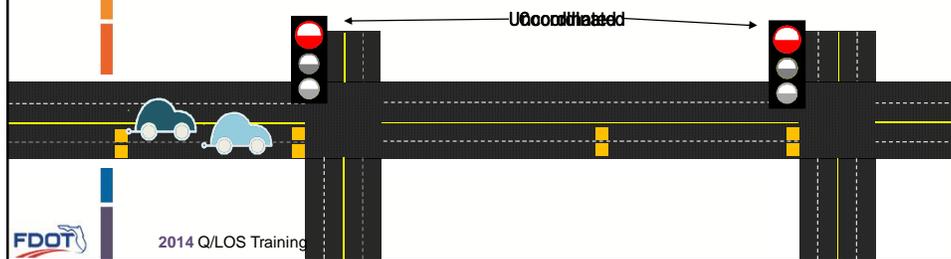


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ARTPLAN - Definitions

- **Arrival Type** – A generalized categorization of the quality of progression between signalized intersections, ranging from 1 to 6
- Uncoordinated signals are represented by arrival type 3, and coordinated signals are represented by arrival type 4 or higher



ARTPLAN - Definitions

- **Number of Left/Right Turn Lanes**
- **Percent Left/Right Turns** – percentage of vehicles performing a left or right-turning movement on the approach to a signalized intersection
- **Total Left Turn Storage** – The total amount of storage length in feet for exclusive left turn lanes



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ARTPLAN - Definitions

- **On-Street Parking**
 - Impacts both link running time as well as bicycle and pedestrian LOS
- **Parking Activity**
 - Low
 - Medium
 - High



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ARTPLAN - Definitions

Pedestrian Mode Variables

- **Sidewalk** - paved walkway at the side of a roadway, typically 5 feet in width (on the directional side of the arterial being analyzed)
- **Sidewalk Protective Barrier** - Physical barriers of at least 3' high and spacing of 20' or less that separate pedestrians from vehicles, such as planted trees and on-street parking.



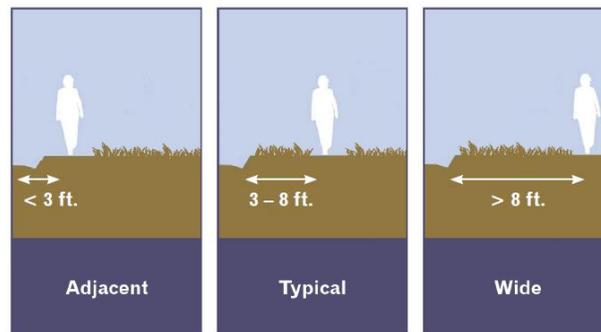
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ARTPLAN - Definitions

Pedestrian Mode Variables

- **Sidewalk/Roadway Separation** - lateral distance in feet from the outside edge of pavement to the inside edge of the sidewalk



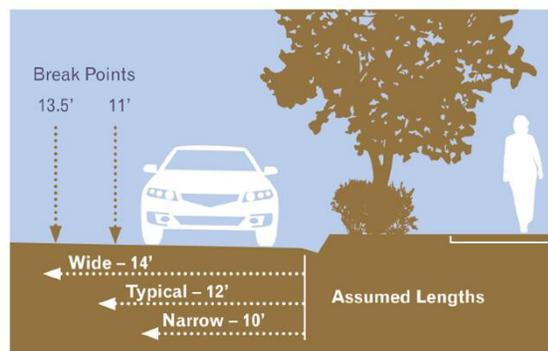
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ARTPLAN - Definitions

Bicycle Mode Variables

- **Outside Lane Width** - Width, in feet, of a roadway's outside motorized vehicle through lane, not including the gutter



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ARTPLAN - Definitions

Bicycle Mode Variables

- **Pavement Condition** - classification of the roadway surface where bicycling usually occurs
 - **Desirable** - new or recently resurfaced
 - **Typical** - light gray color, the surface appears worn, and may have some cracks; however, the ride for the bicyclist is fairly smooth
 - **Undesirable** - noticeable cracks, broken pavement, or ruts



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ARTPLAN - Definitions

Bicycle Mode Variables

- **Side Path** - Off-street dedicated bicycle and pedestrian path (ARTPLAN analyzes bicycles only)
- **Side Path Separation** - distance between the side path and the outside edge of the roadway



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ARTPLAN - Definitions

Bus Mode Variables

- Bus Stop Amenities
 - **Excellent** – Shelter and bench
 - **Good** – Shelter, no bench
 - **Fair** – Bench, no shelter
 - **Poor** – No bench or shelter

- Bus Stop Type
 - **Typical** – Dwell time approximately 15 s
 - **Major** – Dwell time approximately 35 s

- Passenger Load Factor
 - Passengers divided by seats (0 - 300%)



ARTPLAN – Future Year Analysis

ARTPLAN – LOSPLAN Training Inputs

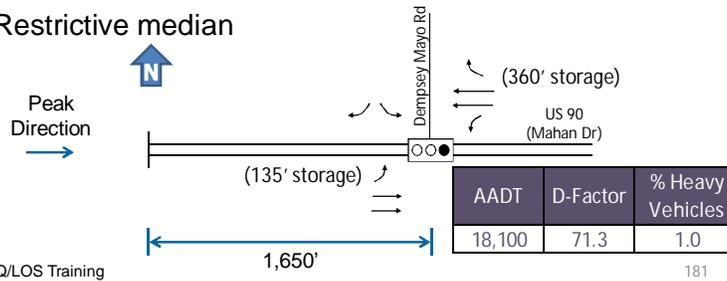
	Class	≥ 40 mph: Class I ≤ 35 mph: Class II
VOLUME	K Factor	Large Other Urbanized: 9.0 Transitioning Urban: 9.0 Rural Developed: 9.0 Rural Undeveloped: 9.5
	% Heavy Vehicles	Large Other Urbanized: 1.0 Transitioning Urban (2 lane): 2.0 Transitioning Urban (4-6 lane): 3.0 Rural Developed: 3.0
	Cycle Length	Large Urbanized: 150s Other Urbanized: 150s Transitioning Urban: 120s Rural: 90s
INTERSECTION	g/C	Major Intersections (State Arterials): 0.40 All Other Intersections: 0.55
	Arrival Type	Uncoordinated: 3 Coordinated: 4
	% Left Turns	Major Intersections (State Arterials): 15% All Other Intersections: 5%
MULTIMODAL	% Right Turns	Major Intersections (State Arterials): 15% All Other Intersections: 5%
	Left g/C	Major Intersections (State Arterials): 0.15 All Other Intersections: 0.10
	Auto Outside Lane Width	≥ 11 feet and < 13.5 feet (12 feet): Typical ≥ 13.5 feet (14 feet): Wide
MULTIMODAL	Bike Pavement Condition	New or recently resurfaced: Desirable Worn, some cracks: Typical Noticeable cracks/ruts and/or gravel/debris: Undesirable
	Sidewalk Roadway Separation	≤ 3 feet (2 feet): Adjacent > 3 feet and ≤ 8 feet (6 feet): Typical > 8 feet (11 feet): Wide
	Amenities	Shelter and seating: Excellent Shelter only: Good Seating only: Fair No shelter or seating: Poor
	Bus Stop	Bus stop with typical dwell time of 15 seconds: Typical Bus stop with typical dwell time of 35 seconds: Major



ARTPLAN

Example #1 Planning-Level Inputs, Auto Only Mahan Drive and Dempsey Mayo Road, Tallahassee

- Other urbanized area type ($K = 9.0$)
- Posted speed = 45 mph (Class I)
- $C = 150s$; $T g/C = 0.55$; $L g/C = 0.10$
- Percent turns ($L = 5\%$)
- Fully actuated signal, protected only phasing
- Restrictive median



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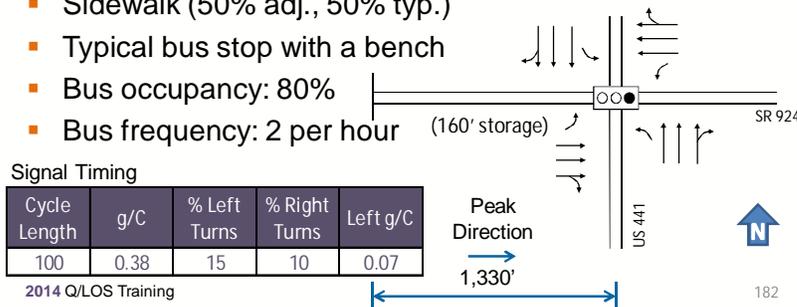
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ARTPLAN

Example #2 Known Inputs & Multimodal Analysis State Route 924 & US 441, Miami

- Large urbanized area type ($K = 9.0$)
- Pretimed with permitted lefts
- Restrictive median
- 40 mph posted speed limit (Class I)
- Sidewalk (50% adj., 50% typ.)
- Typical bus stop with a bench
- Bus occupancy: 80%
- Bus frequency: 2 per hour

AADT	D-Factor	% Heavy Vehicles	Peak Hour Factor
37,500	55.7	1.0	0.96



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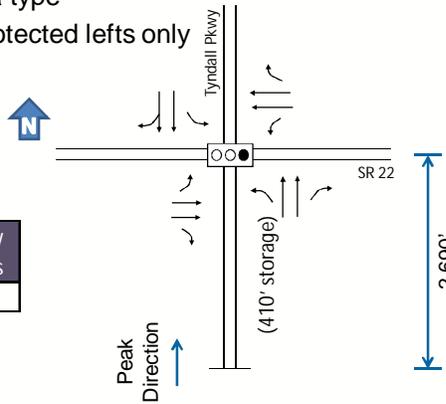
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Workshop #1 Planning-Level Inputs, Auto Only

Tyndall Pkwy & SR 22, Panama City

- Transitioning/Urban area type
- Fully actuated signal, protected lefts only
- Posted speed = 45 mph
- Major cross-street
- Restrictive median

AADT	D-Factor	% Heavy Vehicles
30,500	53.7	3.0



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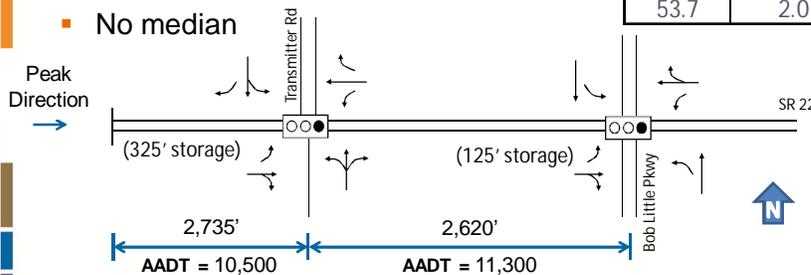
ARTPLAN

Workshop #2 Planning-Level Inputs, Auto Only

SR 22 between Transmitter Rd & Bob Little Rd

- Transitioning/Urban area type
- Fully actuated signal, protected lefts only
- Posted speed = 45 mph
- Non-major intersections
- No median

D-Factor	% Heavy Vehicles
53.7	2.0



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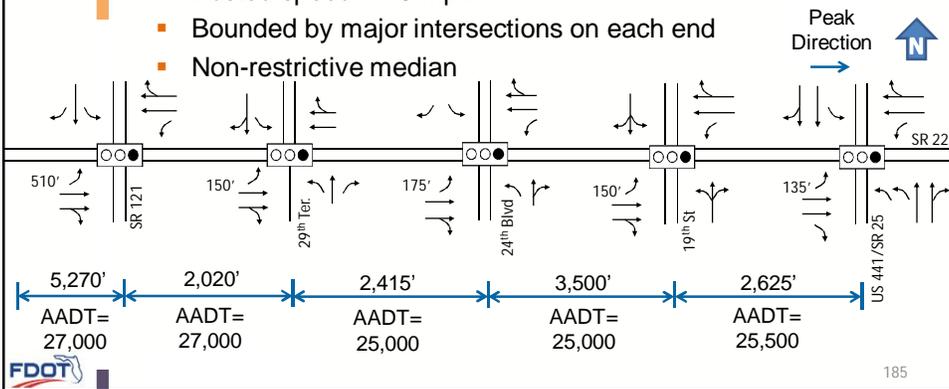
ARTPLAN

Workshop #3 Planning-Level Inputs, Auto Only

SR 222 between SR 121 & US 441/SR 441

- Other urbanized area type
- Coordinated/actuated, protected only lefts
- Posted speed = 45 mph
- Bounded by major intersections on each end
- Non-restrictive median

D-Factor	% Heavy Vehicles
52.5	1.0



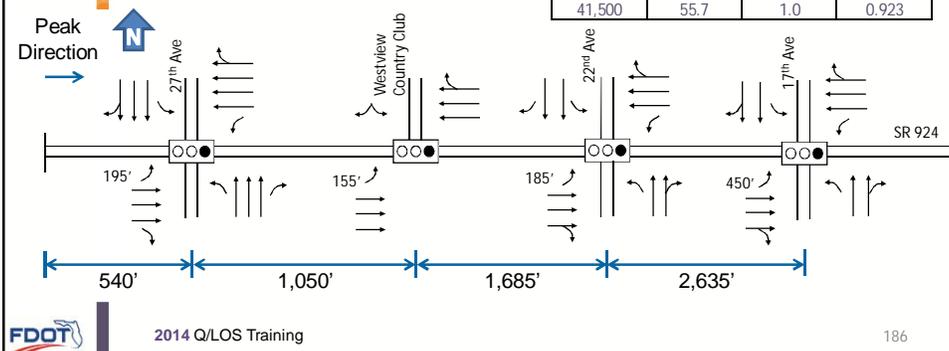
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Workshop #4 Known Inputs & Multimodal Analysis

State Route 924 between 27th Ave & 17th Ave, Miami

- Large urbanized area type
- Non-restrictive median west of 27th Ave, restrictive at others
- 40 mph posted speed limit

AAADT	D-Factor	% Heavy Vehicles	Peak Hour Factor
41,500	55.7	1.0	0.923



ARTPLAN

Workshop #4 *Known Inputs & Multimodal Analysis*

State Route 924 between 27th Ave & 17th Ave, Miami

- Fully actuated signal
- Adjacent sidewalks
- Bus frequency = 3 per hour
- Bus occupancy: 80%
- Typical bus stops
- Poor amenities at 17th, fair everywhere else

Segment	Cycle Length	g/C	% Left Turns	% Right Turns	Left Turn Phasing	Left g/C
NW 27th Ave	100	0.35	12	12	Prot	0.11
NW 27th Ave - Westview CC	100	0.96	1	0	Prot+Perm	0.10
Westview CC - NW 22nd Ave	100	0.40	11	13	Prot	0.10
NW 22nd Ave - NW 17th Ave	100	0.48	9	10	Prot	0.10



Wrap-Up



Course Objectives

- Move from understanding basic traffic concepts to hands-on capacity analysis
- Gain proficiency in planning analysis
- Understand the factors that have the greatest impact on the results
- Identify key differences between LOSPLAN and other tools

Wrap-Up

- What did you learn that was particularly useful?
- Do you have any suggestions for improving the training course?

Wrap-Up

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