2014

Quality/Level of Service Training

PROBLEM SET

FDOT

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

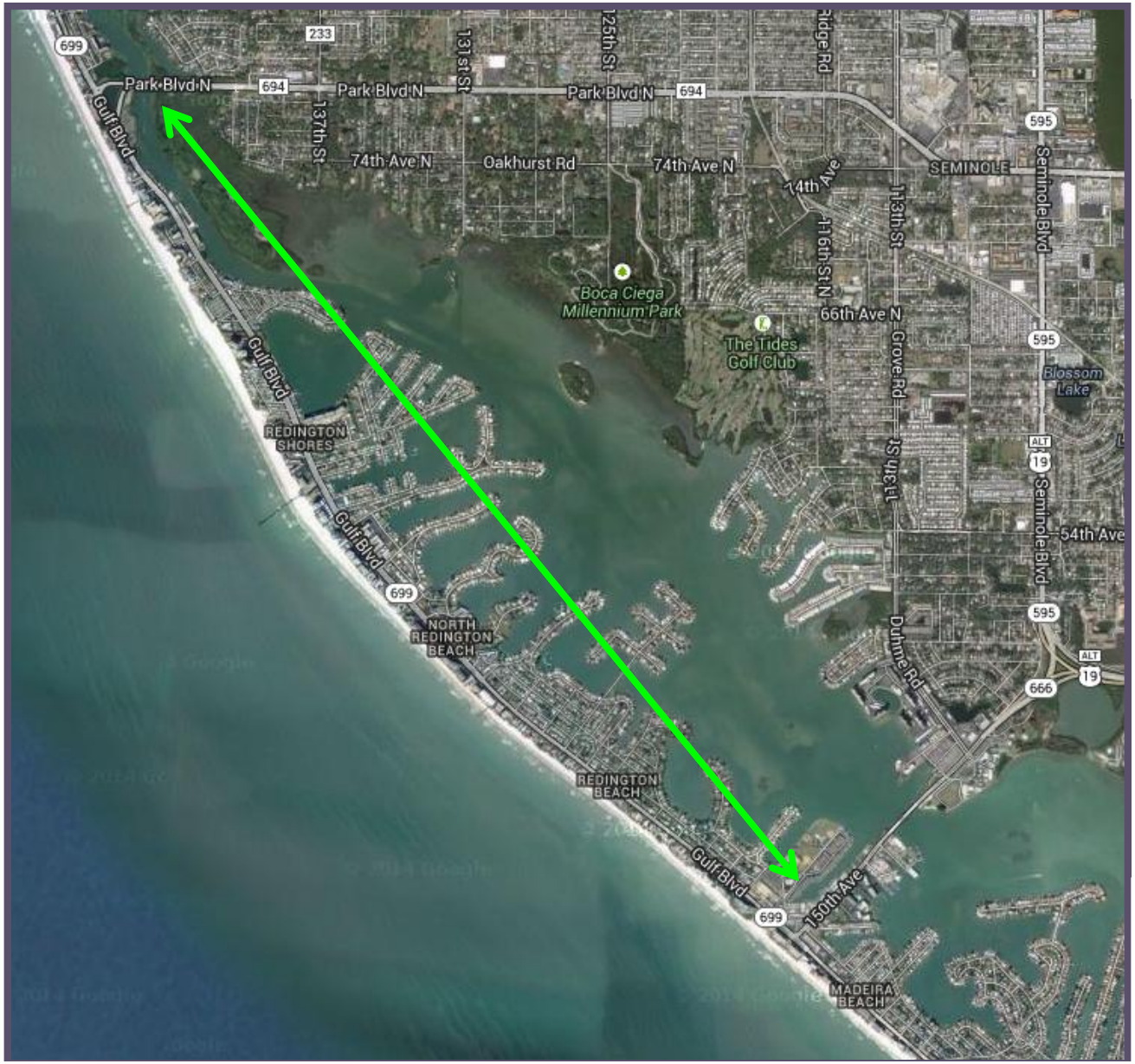
Data Sources Workshop Problem

SR 699

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

Identify:

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



Data Sources Workshop Problem

Answer Sheet

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

GSVT Example #1

Determine the max. service volume for LOS E:

- In terms of AADT
- In a core urbanized area
- For a 10-lane freeway

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
  - AADT=13,000
  - 3 buses/hour
  - 40% bike lane coverage
  - 90% sidewalk coverage

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

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

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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

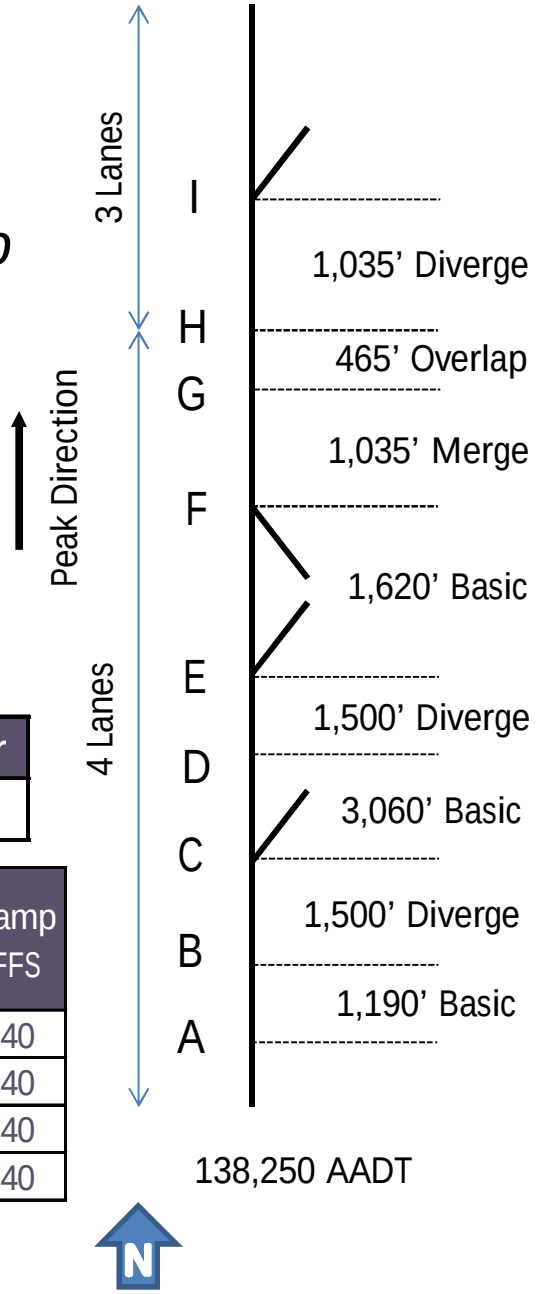
Example #1 *Basic/Ramps/Ramp Overlap*

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



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Workshop #1 *Basic/Ramps/Weave*

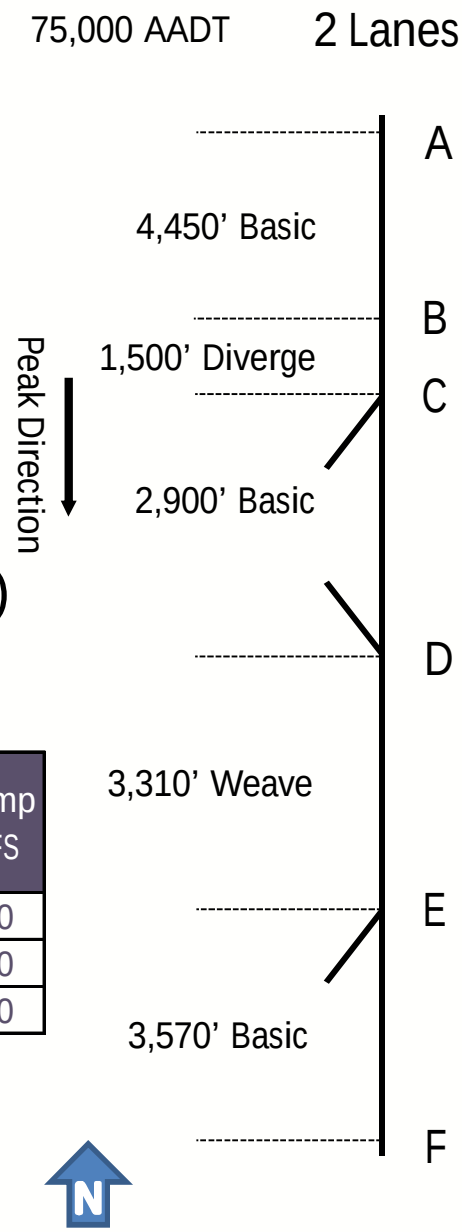
I-295 between St. Johns Bluff Rd & Town Center Pkwy, Jacksonville

- 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	-



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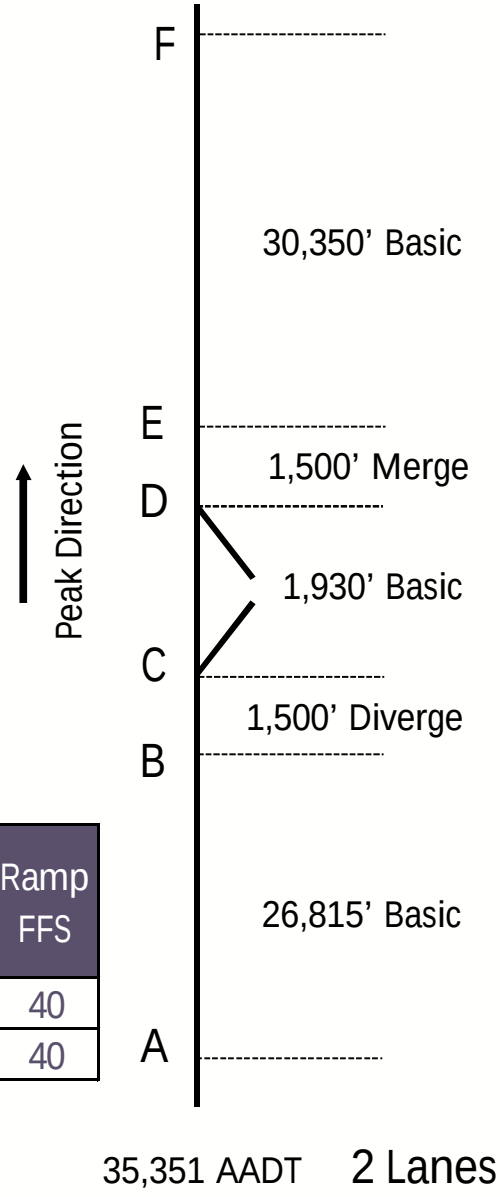
Workshop #2 *Basic/Ramps*

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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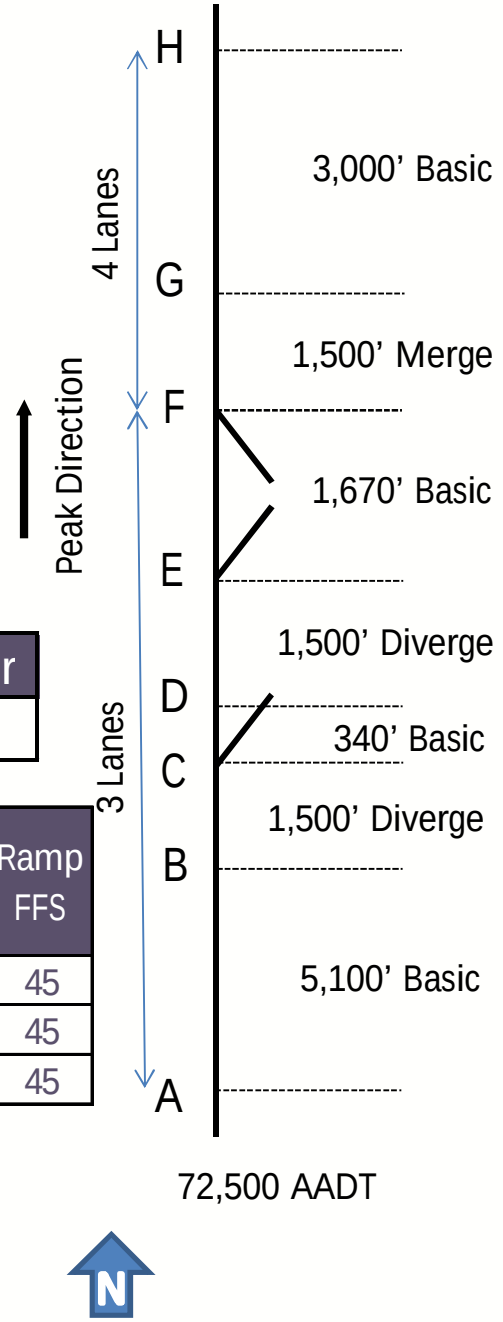
Workshop #3 *Basic/Ramps*

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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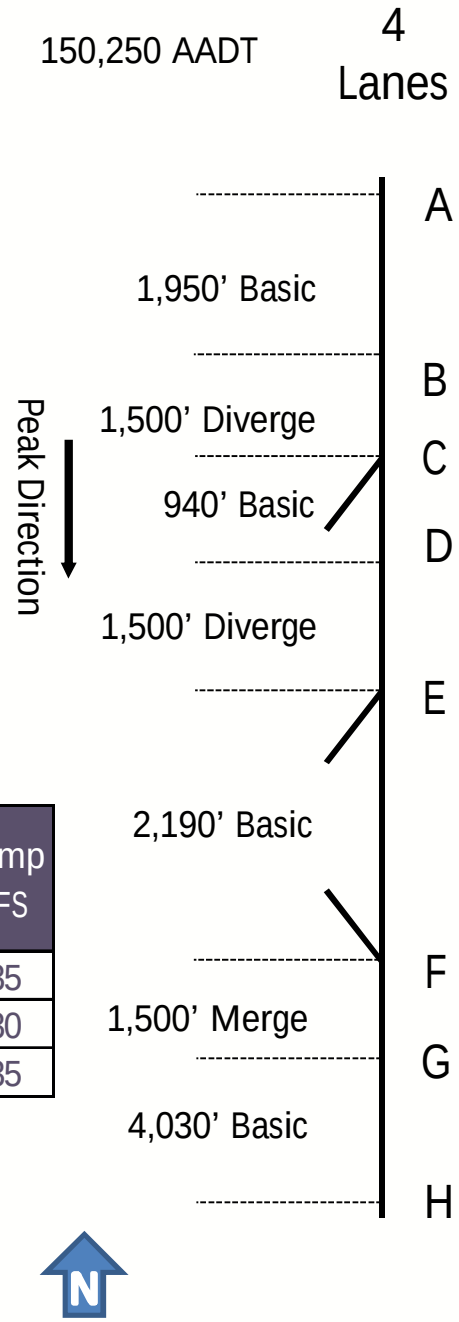
Workshop #4 *Basic/Ramps*

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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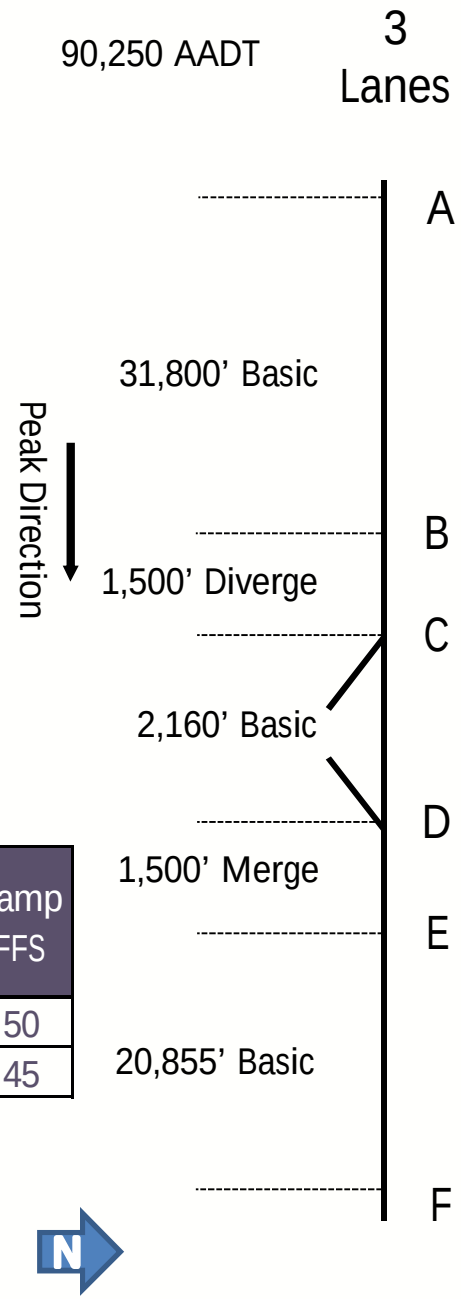
Workshop #5 *Basic/Ramps*

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

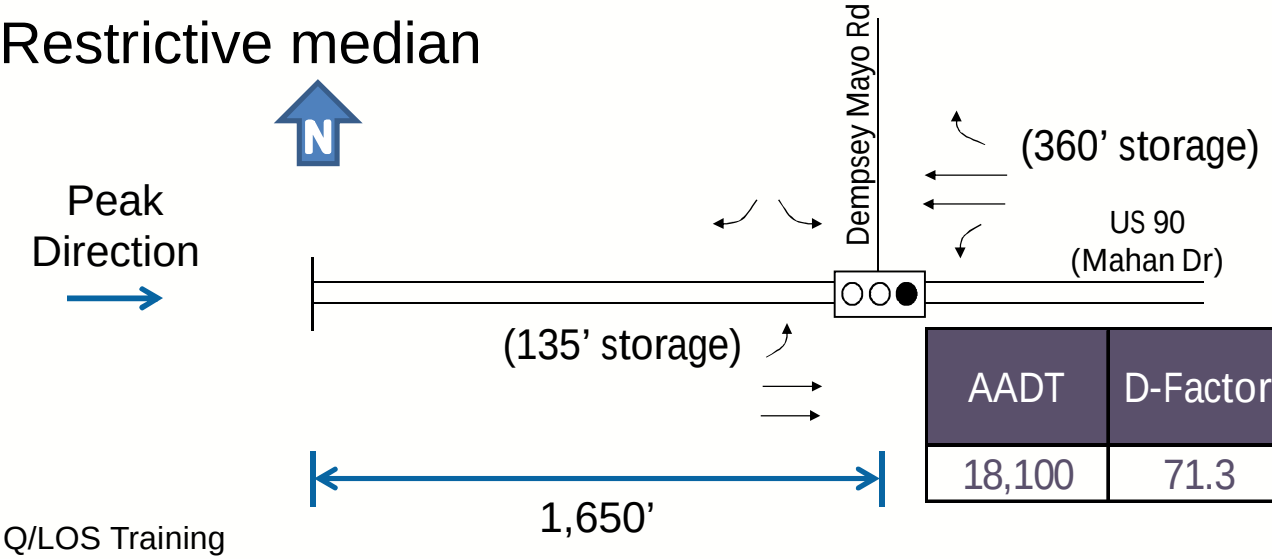


ARTPLAN

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



AADT	D-Factor	% Heavy Vehicles
18,100	71.3	1.0

ARTPLAN

Example #2 *Known Inputs & Multimodal Analysis*

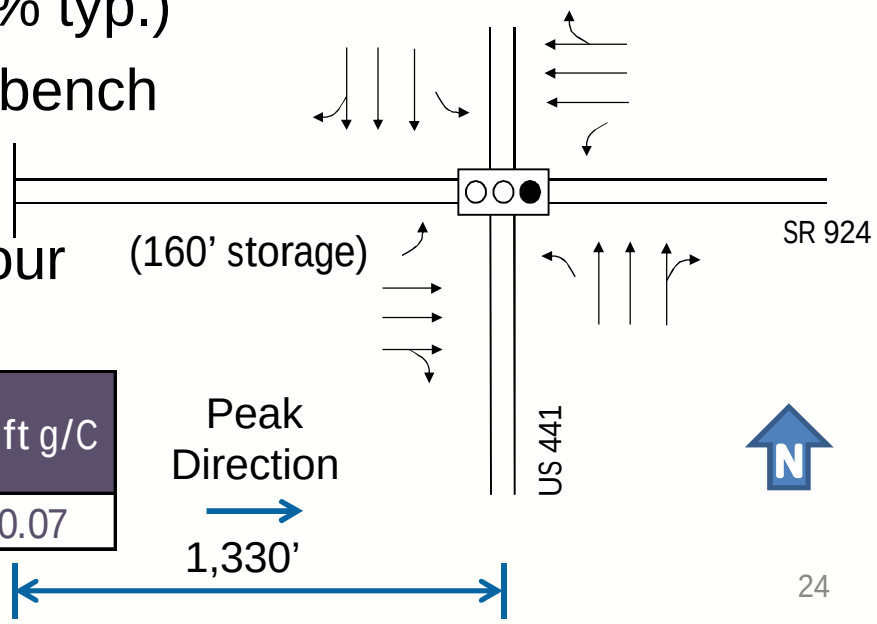
State Route 924 & US 441, Miami

- 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

Signal Timing

Cycle Length	g/C	% Left Turns	% Right Turns	Left g/C
100	0.38	15	10	0.07



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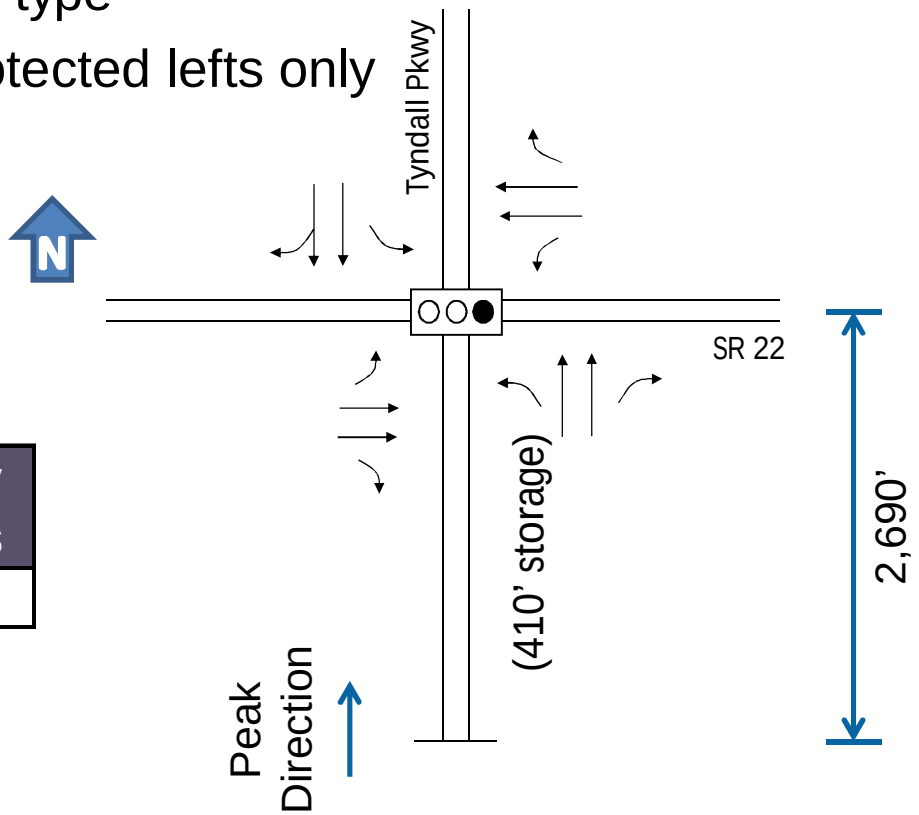
Workshop #1 *Planning-Level Inputs, Auto Only*

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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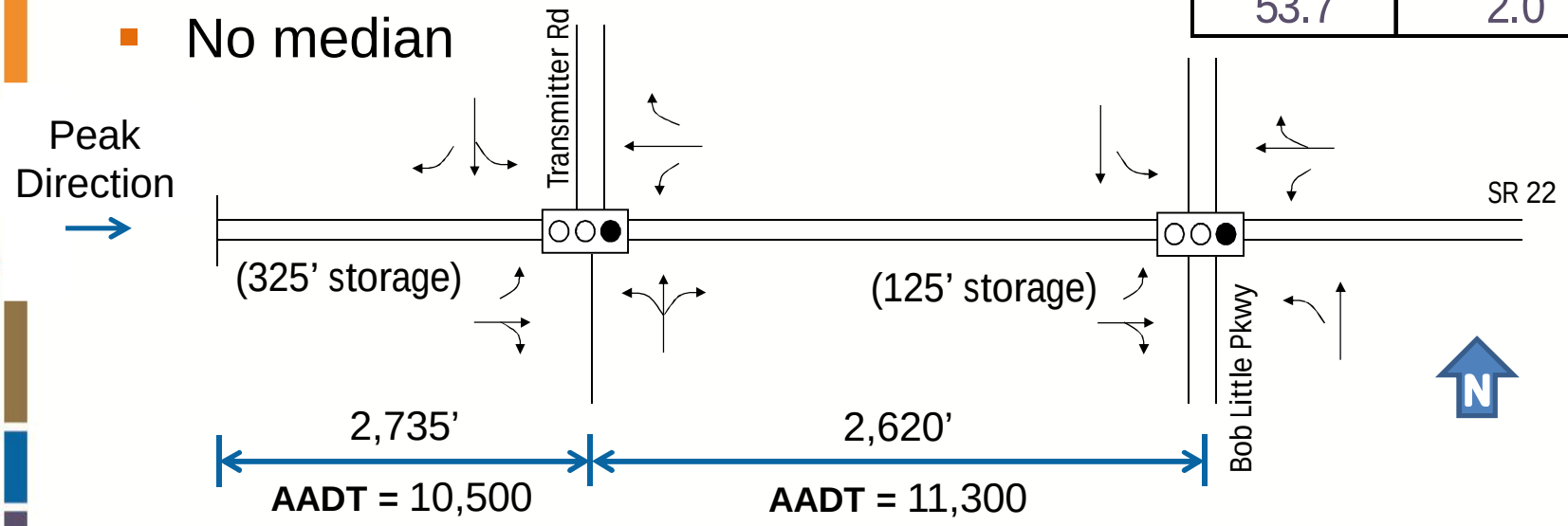
Workshop #2 *Planning-Level Inputs, Auto Only*

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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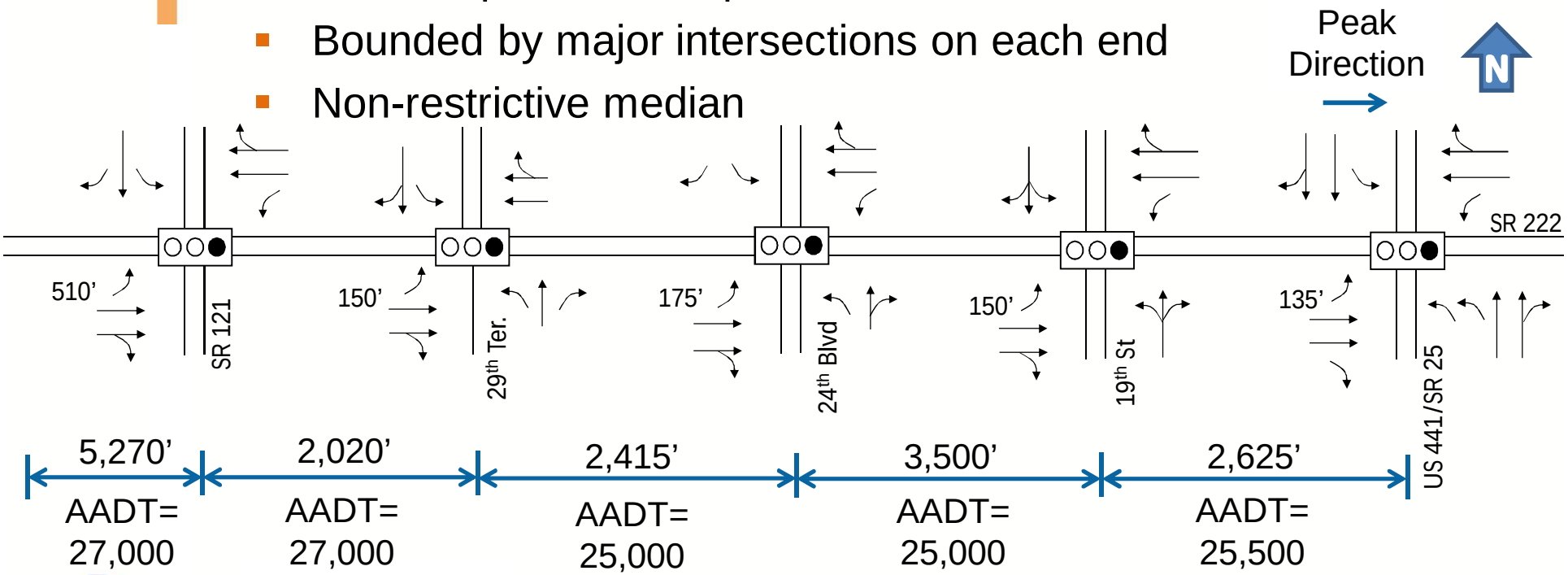
Workshop #3 *Planning-Level Inputs, Auto Only*

SR 222 between SR 121& US 441/SR 441

D-Factor	% Heavy Vehicles
52.5	1.0

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



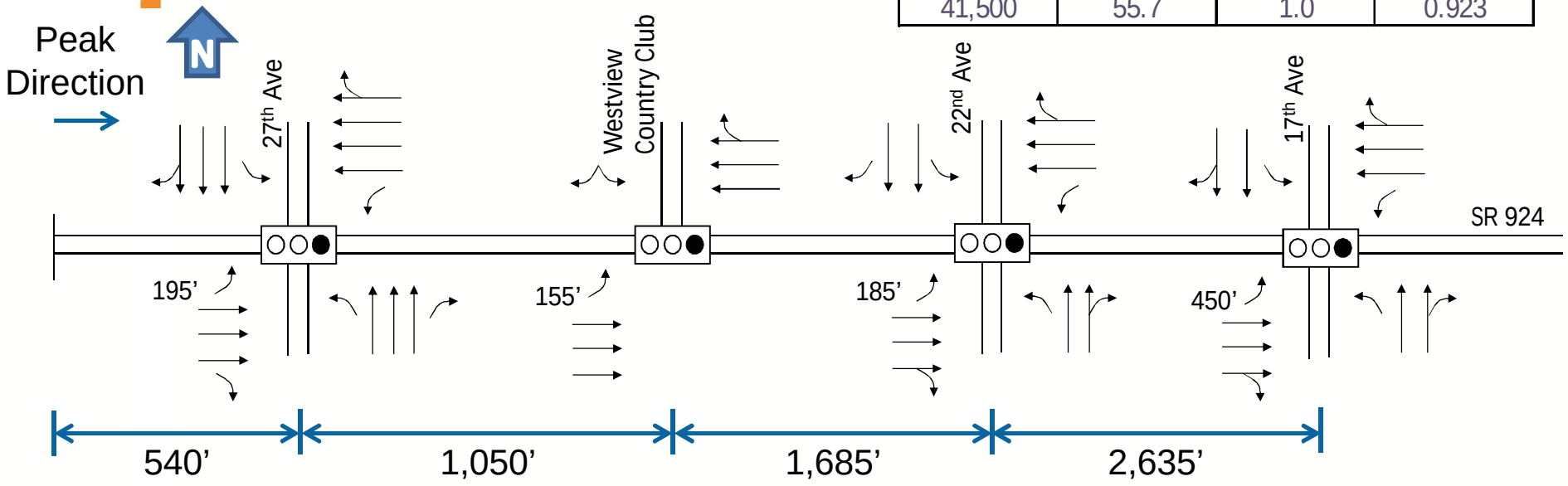
ARTPLAN

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

AADT	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

Additional GSVT Problems

Workshop A-1

Determine the auto LOS:

- In terms of AADT
- In an urban area (pop. 12,000)
- For an undivided state arterial with
  - 30 mph speed limit
  - 2 lanes
  - 10,000 AADT

Additional GSVT Problems

Workshop A-2

Determine the auto LOS:

- In terms of AADT
- In a developed rural area (pop. 4,500)
- For an uninterrupted flow highway with
  - 2 lanes
  - No median
  - Annual average daily volume of 32,000

Additional GSVT Problems

Workshop A-3

Determine the auto LOS:

- In terms of peak hour two-way volumes
- In a transitioning area
- For an 8-lane freeway with
  - Peak hour two-way volume is 12,400
  - Ramp metering

Additional GSVT Problems

Workshop A-4

Determine the auto LOS:

- In terms of peak hour directional volumes
- In an urban area
- For a non-state signalized roadway with
  - 45 mph speed limit
  - 6 lanes (3 in each direction)
  - Peak hour directional volume of 2,000

Additional GSVT Problems

Workshop A-5

Determine the max. service volume for LOS E:

- In terms of AADT
- In an urbanized area
- For a state signalized arterial with
  - One-way
  - 30 mph speed limit
  - 2 lanes in travel direction

Additional GSVT Problems

Workshop A-6

Determine the max. service volume for LOS E:

- In terms of peak hour two-way volumes
- In an undeveloped rural area
- For an uninterrupted flow highway with
  - 6 lanes
  - No median
  - No exclusive lefts

Additional GSVT Problems

Workshop A-7

Determine the auto LOS:

- In terms of peak hour directional volumes
- In an urbanized area
- For a freeway with
  - 6 lanes (3 in each direction)
  - Auxiliary lane
  - Peak hour directional volume of 4,000

Additional GSVT Problems

Workshop A-8

Determine the auto LOS:

- In terms of peak hour two-way volumes
- In an urban area
- For a non-state signalized roadway with
  - 30 mph speed limit
  - Exclusive left turn lanes
  - Peak hour two-way volume of 1,240
  - 2 lanes
  - Median

Additional GSVT Problems

Workshop A-9

Determine the auto LOS:

- In terms of peak hour directional volumes
- In an urbanized area
- For a divided state signalized arterial with
  - 4 lanes (2 in each direction)
  - 45 mph speed limit
  - Peak hour directional volume of
    1. 1,000
    2. 3,000