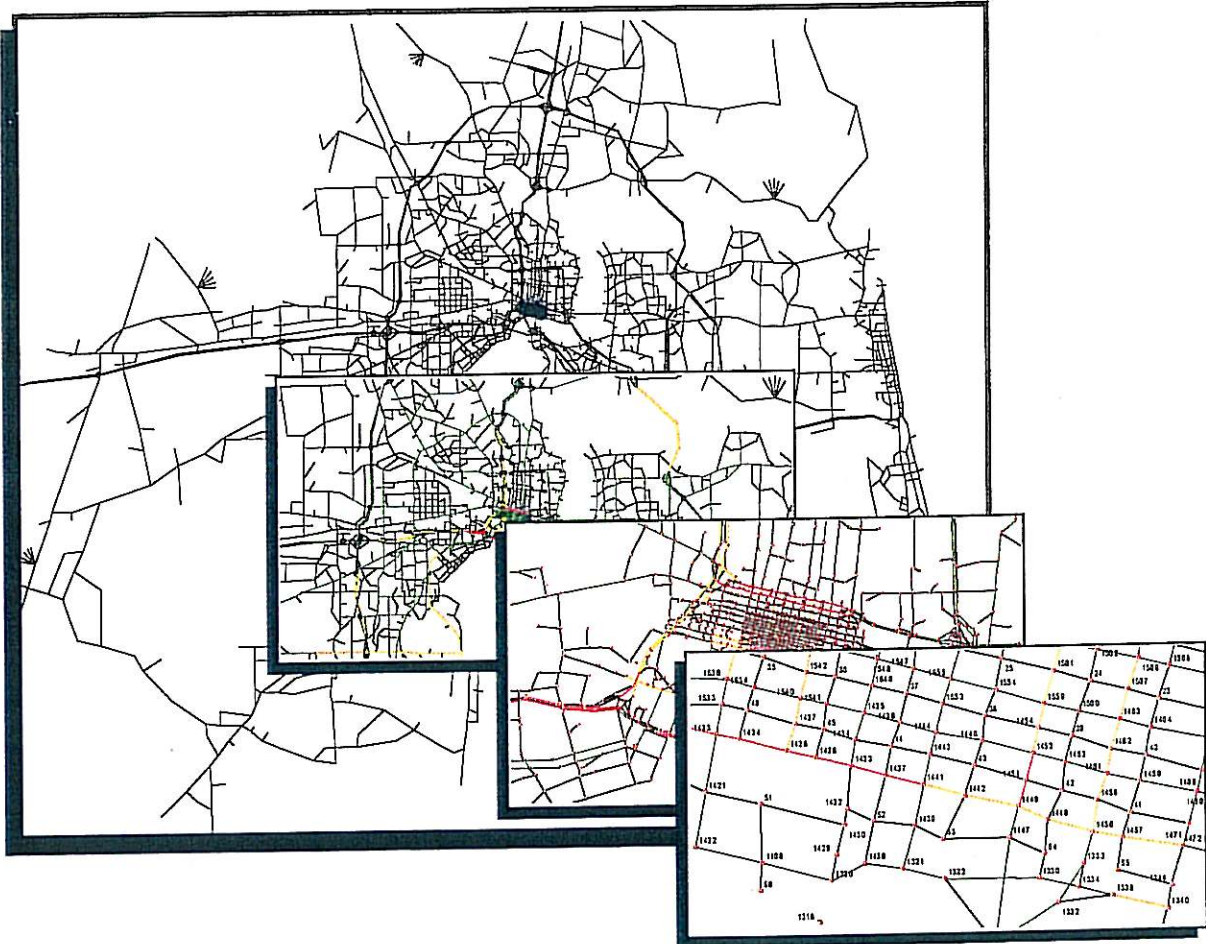


HIGHWAY NETWORK (HNET) PROCEDURAL ENHANCEMENTS STUDY EXECUTIVE SUMMARY



Prepared For



Florida Department of Transportation
Central Office, Systems Planning

Prepared By



March 1998

HIGHWAY NETWORK (HNET) PROCEDURAL ENHANCEMENTS STUDY

EXECUTIVE SUMMARY

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Prepared by
PBS&J, Inc.
1901 Commonwealth Lane
Tallahassee, Florida 32303

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The highway network building model of the Florida Standard Urban Transportation Model Structure (FSUTMS) is called "HNET." The HNET model is designed to build a computerized database of highway network information based on a series of user-supplied datasets. A highway network may be described as a system of links and nodes that describes an area's roadway system. Nodes are points in the network where features intersect, end, or curve sharply. A link represents the section of a transportation network that lies between two adjacent nodes.

PURPOSE OF STUDY

The HNET Procedural Enhancements Study was initiated by the Florida Model Task Force (MTF) in the spring of 1996. The purpose of the study was to develop a methodology for coding and validating highway networks using standardized two-digit area types and facility types. The enhancements recommended as part of this study provide a connection between the four-step models currently in use and the micro-simulation models being developed as part of the federal Travel Model Improvement Program (TMIP). This study is also consistent with methodologies used in the 1994 Highway Capacity Manual update.

Model validation testing was conducted with three urban area FSUTMS models in order to refine study recommendations and quantify the benefits of two-digit coding. Area Type and Facility Type definitions have been developed and recommended by the Model Task Force. In addition, updated default speeds and capacities were developed and approved based on the 1995 FDOT LOS Manual. Other capacity-related model parameters (e.g., UROAD, BPR Curves) were also recommended to enhance model validity.

HNET COORDINATION

The HNET Subcommittee of the Model Task Force was formally activated during the MTF meeting in March 1996. The subcommittee includes representatives from several FDOT districts, local agencies, and consulting firms. Through coordination with FDOT/Central Office, several informal meetings of the subcommittee were held via teleconference. During these meetings, goals and objectives for the study were identified, issues and concerns were discussed, and preliminary recommendations were developed.

In addition to working with members of the HNET Subcommittee, local representatives for the three study test areas (Pensacola, Jacksonville, Indian River County) were informed of study progress. Progress reports on the study were provided through articles published in *Florida Transportation Modeling* in July 1996, November 1996, and April 1997. The HNET study findings and recommendations were presented to the MTF Technical Team on April 9, 1997.

Approved area types, facility types, speeds, capacities, UROAD factors and BPR curves are described later in this report. Additional information on FSUTMS network requirements, validation testing, development of recommendations, and network coding procedures are provided in the following companion documents:

- HNET Procedural Enhancements Study: Final Technical Report
- HNET Procedural Enhancements Study: Final User's Manual

VALIDATION TESTING

In order to develop and test new procedures for highway network modeling using two-digit area types and facility types, Jacksonville, Pensacola, and Indian River County were approved by the Model Task Force as network coding and validation test sites for large, medium, and small urbanized areas, respectively. Initial two-digit networks for these areas were developed by using the "TWODIGIT" program, released with Version 5.0 of FSUTMS, to append zeros to existing one-digit area and facility type designations.

Further stratification of two-digit area and facility types was based largely on previous efforts conducted as part of the Tampa Bay Regional Transportation Analysis model (RTA). Additional refinements were made to the coding structure in order to develop a coding methodology that would be applicable throughout the state, and address the needs of modeling specialized facilities such as High Occupancy Vehicle (HOV) lanes and toll roads, identified in the Southeast Florida Regional Planning Model (SERPM IV). Iterative model validation runs were conducted to assess the validity of two-digit coding procedures and to develop recommendations for statewide application.

Model validation efforts were begun once the three networks had been fully converted using the initial two-digit area types and facility types. The purposes of the validation testing effort, requested by the Model Task Force, were twofold. First, the MTF desired to quantify the benefits of two-digit coding (i.e., prove that two-digit coding would better represent highway networks and improve model accuracy). Second, the validation testing process would provide the basis for recommendations to the MTF on coding practices and default model parameter settings.

Following initial validation testing, refinements were made to the two-digit area types and facility types. In the end, 22 validation runs were conducted for Jacksonville and Pensacola and 16 for Indian River County. In many cases, the two-digit methodology displayed more accurate results than the original one-digit networks. As a result, recommendations were developed and approved by the Model Task Force.

RECOMMENDED NETWORK AREA TYPES AND FACILITY TYPES

Table 1 depicts the final approved two-digit area type codes. As described earlier, these categories were based largely on area types developed for the Tampa Bay RTA. The primary changes to the original RTA methodology included subdividing the Urbanized Area Primary CBD category into two categories based on population size and the addition of Beach Residential and Beach OBD categories as used in the SERPM IV model.

Table 2 depicts the final approved two-digit facility type codes, based largely on facility types developed in the Tampa Bay RTA. Nine categories of ramp facility types (FT 71-FT 79) were recommended to ensure consistency between ramps and mainline facility speeds for different types of facilities. The HOV categories (FT 81-89) were also divided into nine categories both to reflect consistency between HOV and general use lane speeds, and to accommodate time-of-day issues identified in the SERPM IV model. Toll facilities (FT 91-99) were divided into five categories of mainline facilities, two categories of ramps, and a separate category for all toll plazas. This last category, facility type 99, was recommended based on new toll plaza coding methodologies developed by FDOT's Turnpike District.

TABLE 1
APPROVED TWO-DIGIT AREA TYPES

Area Type Description	
1x	CBD Areas (AT 10 is default)
11	Urbanized Area (over 500,000) Primary City Central Business District
12	Urbanized Area (under 500,000) Primary City Central Business District
13	Other Urbanized Area Central Business District and Small City Downtown
14	Non-Urbanized Area Small City Downtown
2x	CBD Fringe Areas (AT 20 is default)
21	All Central Business District (CBD) Fringe Areas
3x	Residential Areas (AT 30 is default)
31	Residential Area of Urbanized Areas
32	Undeveloped Portions of Urbanized Areas
33	Transitioning Areas/Urban Areas over 5,000 Population
34	Beach Residential (per SERPM)
4x	OBD Areas (AT 40 is default)
41	High Density Outlying Business District
42	Other Outlying Business District
43	Beach OBD (per SERPM)
5x	Rural Areas (AT 50 is default)
51	Developed Rural Areas/Small Cities under 5,000 Population
52	Undeveloped Rural Areas

TABLE 2
APPROVED TWO-DIGIT FACILITY TYPES

Facility Type Description	
1x	Freeways and Expressways (FT 10 is default)
11	Urban Freeway Group 1 (cities of 500,000 or more)
12	Other Freeway (not in Group 1)
15	Collector/Distributor Lane
16	Controlled Access Expressway
17	Controlled Access Parkway
2x	Divided Arterials (FT 20 is default)
21	Divided Arterial Unsignalized (55 mph)
22	Divided Arterial Unsignalized (45 mph)
23	Divided Arterial Class Ia <i>I</i> 0-1.99 sig/mi.
24	Divided Arterial Class Ib <i>II</i> 2-4.50 " "
25	Divided Arterial Class II/III <i>III/IV</i> Gr. 4.50 " "
3x	Undivided Arterials (FT 30 is default)
31	Undivided Arterial Unsignalized with Turn Bays
32	Undivided Arterial Class Ia with Turn Bays <i>I</i>
33	Undivided Arterial Class Ib with Turn Bays <i>II</i>
34	Undivided Arterial Class II/III with Turn Bays <i>III</i>
35	Undivided Arterial Unsignalized without Turn Bays
36	Undivided Arterial Class Ia without Turn Bays <i>I</i>
37	Undivided Arterial Class Ib without Turn Bays <i>II</i>
38	Undivided Arterial Class II/III without Turn Bays <i>III</i>
4x	Collectors (FT 40 is default)
41	Major Local Divided Roadway
42	Major Local Undivided Roadway with Turn Bays
43	Major Local Undivided Roadway without Turn Bays
44	Other Local Divided Roadway
45	Other Local Undivided Roadway with Turn Bays
46	Other Local Undivided Roadway without Turn Bays
47	Low Speed Local Collector
48	Very Low Speed Local Collector
5x	Centroid Connectors (FT 50 is default)
51	Basic Centroid Connector
52	External Station Centroid Connector

TABLE 2 (cont'd)
APPROVED TWO-DIGIT FACILITY TYPES

Facility Type Description	
6x One-Way Facilities (FT 69 is default)	
61	One-Way Facility Unsignalized
62	One-Way Facility Class Ia
63	One-Way Facility Class Ib
64	One-Way Facility Class II/III
65	Frontage Road Unsignalized
66	Frontage Road Class Ia
67	Frontage Road Class Ib (default for all Frontage Roads)
68	Frontage Road Class II/III
7x Ramps	
71	Freeway On-Ramp
72	Freeway Loop On-Ramp
73	Other On-Ramp
74	Other Loop On-Ramp
75	Freeway Off-Ramp
76	Freeway Loop Off-Ramp
77	Other Off-Ramp
78	Other Loop Off-Ramp
79	Freeway-Freeway High-Speed Ramp
8x HOV Facilities (FT 80 is default)	
81	Freeway Group 1 HOV Lane (Barrier Separated)
82	Other Freeway HOV Lane (Barrier Separated)
83	Freeway Group 1 HOV Lane (Non-Separated)
84	Other Freeway HOV Lane (Non-Separated)
85	Non Freeway HOV Lane
86	AM&PM Peak HOV Ramp
87	AM Peak Only HOV Ramp
88	PM Peak Only HOV Ramp
89	All Day HOV Ramp
9x Toll Facilities	
91	Freeway Group 1 Toll Facility
92	Other Freeway Toll Facility
93	Expressway/Parkway Toll Facility
94	Divided Arterial Toll Facility
95	Undivided Arterial Toll Facility
97	Toll On-Ramp
98	Toll Off-Ramp
99	Toll Plaza

RECOMMENDED NETWORK SPEEDS AND CAPACITIES

Table 3 depicts the final input capacities approved by the Model Task Force. These capacities are based on the 1995 FDOT LOS Manual, Tables F-1 through F-3, Generalized Two-Way Peak Hour Volumes. Two-way peak hour volumes for LOS E were divided in half to obtain directional volumes. In addition to developing capacities for all two-digit area type/facility type combinations, capacities were also developed for default facility types (e.g. FT 10,20,30,etc.) for users who choose not to fully convert to the expanded two-digit categories.

Two different sets of speeds are approved for use with the new two-digit coding structure. The first set of input speeds, presented in Table 4, was developed through a process of iterative model validation testing in the three HNET test areas of Jacksonville, Pensacola, and Indian River County. In each of the urban areas, application of these speeds improved model validity over the previously developed Model Update Task C input speeds. The HNET speeds reflect typical travel conditions along a corridor including the deceleration, delay, and acceleration associated with signalization.

The second set of speeds, depicted in Table 5, are based on mid-block free-flow speeds presented in the FDOT LOS Manual and used in the SERPM IV model. Some modifications were made to the SERPM speeds to reflect additional area type and facility type categories not used in SERPM. Since the LOS Manual input speeds are generally higher than the HNET speeds, the Model Task Force recognized that their use may require adjustments to friction factors in the model and the use of congested skims as an input to trip distribution. Furthermore, validation testing revealed that the LOS Manual speeds may also work well in uncongested networks such as Indian River County.

ADDITIONAL RECOMMENDATIONS

In addition to new area types, facility types, capacities, and speeds, enhancements to the TRANPLAN equilibrium highway load program were recommended by the Model Task Force to fully realize the benefits of the two-digit coding methodology. These enhancements were developed through the SERPM IV model validation and have been recommended for use in other areas of Florida by the Model Task Force.

TABLE 3: RECOMMENDED TWO-DIGIT LOS E CAPACITIES*

Facility Type	Area Type															
	AT 11 Main CBD 500,000+	AT 10,12 Main CBD <500,000	AT 13 Other Urban Area CBD	AT 14 Non-Urban Area CBD	AT 20,21 CBD Fringe Area	AT 30,31,34 Residential Area	AT 32 Undeveloped Area	AT 33 Transit/Shopping Area	AT 41,43 Major OBID	AT 40,41 Other OBID	AT 51 Developed Rural Areas	AT 50,53 Undeveloped Rural Areas				
(10) Freeway	4-9 1,775	1,713	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,675	1,675				
	3	1,783	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,667	1,667				
	1-2	1,775	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600				
(11) Urban Freeway Group I	4-9	N/A	N/A	N/A	1,775	1,775	1,775	N/A	1,775	1,775	N/A	N/A				
	3	1,783	N/A	N/A	N/A	1,783	1,783	N/A	1,783	1,783	N/A	N/A				
	1-2	1,775	N/A	N/A	1,775	1,775	1,775	N/A	1,775	1,775	N/A	N/A				
(12) Other Freeway	4-9	N/A	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,675	1,675				
	3	N/A	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,667	1,667				
	1-2	N/A	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600				
(13) Collector/Distributor Lane Facilities	4-9	1,775	1,713	1,738	1,713	1,713	N/A	1,738	1,713	1,713	N/A	N/A				
	3	1,783	1,717	1,733	1,717	1,717	N/A	1,733	1,717	1,717	N/A	N/A				
	1-2	1,775	1,725	1,725	1,650	1,725	N/A	1,650	1,725	1,725	N/A	N/A				
(16) Controlled Access Expressways	4-9	1,775	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,675	1,675				
	3	1,783	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,667	1,667				
	1-2	1,775	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600				
(17) Controlled Access Parkways	4-9	1,775	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,675	1,675				
	3	1,783	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,667	1,667				
	1-2	1,775	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600				
(20) Divided Arterial	4-9	691	711	731	N/A	765	765	N/A	731	731	N/A	N/A				
	3	755	775	797	740	833	833	788	797	797	1,458	1,433				
	2	750	768	790	735	833	833	788	790	790	1,458	1,433				
	1	719	735	777	719	830	830	788	777	777	1,240	1,060				
(21) Divided Arterial Urban LOS Unsignalized, 45 Mph or Rural 55 Mph	3-9	N/A	N/A	N/A	1,628	1,628	1,628	1,542	1,628	1,628	1,458	1,433				
	2	N/A	N/A	N/A	1,628	1,628	1,628	1,542	1,628	1,628	1,458	1,433				
	1	N/A	N/A	N/A	1,580	1,580	1,580	1,512	1,580	1,580	1,325	1,100				
(22) Divided Arterial Urban LOS Unsignalized, 45 Mph or Rural 45 Mph	3-9	1,628	1,628	1,628	1,542	1,628	1,628	1,542	1,628	1,628	1,458	1,433				
	2	1,628	1,628	1,628	1,542	1,628	1,628	1,542	1,628	1,628	1,458	1,433				
	1	1,580	1,580	1,580	1,512	1,580	1,580	1,512	1,580	1,580	1,240	1,060				
(23) Divided Arterial Urban LOS Class Ia or Rural Class Ia	4-9	765	765	765	N/A	765	765	N/A	765	765	N/A	N/A				
	3	833	833	833	788	833	833	788	833	833	765	N/A				
	2	833	833	833	788	833	833	788	833	833	765	N/A				
	1	830	830	830	788	830	830	788	830	830	765	N/A				
(24) Divided Arterial Urban LOS Class Ib or Rural Class Ib	4-9	731	731	731	N/A	731	731	N/A	731	731	N/A	N/A				
	3	797	797	797	740	797	797	740	797	797	740	N/A				
	2	790	790	790	735	790	790	735	790	790	735	N/A				
	1	777	777	777	719	777	777	719	777	777	720	N/A				
(25) Divided Arterial Urban LOS Class II or Urban LOS Class III	4-9	691	711	711	N/A	711	711	N/A	711	711	N/A	N/A				
	3	755	775	775	720	775	775	720	775	775	740	N/A				
	2	750	768	768	713	768	768	713	768	768	740	N/A				
	1	719	735	735	683	735	735	683	735	735	740	N/A				
(30) Undivided Arterial	3-9	566	581	598	555	598	625	591	598	598	N/A	N/A				
	2	563	576	593	551	593	624	591	593	593	1,075	1,075				
	1	548	560	592	548	592	632	600	592	592	1,010	1,045				
(31) Undivided Arterial Bay Urban LOS Unsignalized or Bay Rural Uninterrupted 55 mph	3-9	1,547	1,547	1,547	1,465	1,547	1,547	1,465	1,547	1,547	1,260	1,260				
	2	1,546	1,546	1,546	1,465	1,546	1,546	1,465	1,546	1,546	1,260	1,260				
	1	1,505	1,505	1,505	1,440	1,505	1,505	1,440	1,505	1,505	1,260	1,260				

TABLE 3 (cont'd): RECOMMENDED TWO-DIGIT LOS E CAPACITIES*

Facility Type	Area Type														AT 50,52 Undeveloped Rural Areas	
	AT 11 Main CBD 500,000+	AT 10,12 Main CBD <500,000	AT 13 Other Urban Area CBD	AT 14 Non-Urban Area CBD	AT 20,21 CBD Fringe Areas	AT 30,31,34 Residential Areas	AT 32 Undeveloped Areas	AT 33 Transferring Areas	AT 41,43 Major OBD	AT 40,42 Other OBD	AT 51 Developed Rural Areas					
(32) Undivided Arterial Bays Urban LOS Class Ia or Bays Rural Undersaturated 45 mph	3-9 791	791	791	749	791	791	791	749	791	791	791	791	791	791	N/A	N/A
(33) Undivided Arterial Bays Urban LOS Class Ib or Bays Rural LOS Class Ia	2 791	791	791	748	791	791	791	748	791	791	791	791	791	791	1,363	N/A
(34) Undivided Arterial Bays Urban LOS Class II or Bays Urban LOS Class III or Bays Rural LOS Class Ia2	1 790	790	790	750	790	790	790	750	790	790	790	790	790	790	1,180	1,060
(35) Undivided Arterial No Bays Urban LOS Unsignalized or No Bays Rural LOS 55 Mph	3-9 757	757	757	703	757	757	757	703	757	757	757	757	757	757	N/A	N/A
(36) Undivided Arterial No Bays Urban LOS Class Ia or No Bays Rural LOS 45 Mph	2 751	751	751	698	751	751	751	698	751	751	751	751	751	751	N/A	N/A
(37) Undivided Arterial No Bays Urban LOS Class Ib or No Bays Rural LOS Class Ia1	1 740	740	740	685	740	740	740	685	740	740	740	740	740	740	715	N/A
(38) Undivided Arterial No Bays Urban LOS Class III or No Bays Urban LOS Class II or No Bays Rural LOS Class Ia2	3-9 717	736	736	684	736	736	736	684	736	736	736	736	736	736	N/A	N/A
(39) Undivided Arterial Major Local Divided	2 713	729	729	677	729	729	729	677	729	729	729	729	729	729	698	N/A
(40) Collector Major Local Undivided, Bays	1 685	700	700	650	700	700	700	650	700	700	700	700	700	700	685	N/A
(41) Collector Major Local Undivided, No Bays	1,221	1,221	1,221	1,156	1,221	1,221	1,221	1,156	1,221	1,221	1,221	1,221	1,221	1,221	N/A	N/A
(42) Collector Major Local Undivided, Bays	2 1,221	1,221	1,221	1,156	1,221	1,221	1,221	1,156	1,221	1,221	1,221	1,221	1,221	1,221	1,093	1,075
(43) Collector Other Local Divided	1 1,204	1,204	1,204	1,152	1,204	1,204	1,204	1,152	1,204	1,204	1,204	1,204	1,204	1,204	1,010	1,045
(44) Collector Other Local Divided	3-9 625	625	625	591	625	625	625	591	625	625	625	625	625	625	N/A	N/A
(45) Collector Other Local Divided	2 624	624	624	591	624	624	624	591	624	624	624	624	624	624	1,093	1,075
(46) Collector Other Local Undivided, Bays	1 632	632	632	600	632	632	632	600	632	632	632	632	632	632	945	1,005
(47) Collector Low Speed Local/Rural	3-9 598	598	598	555	598	598	598	555	598	598	598	598	598	598	N/A	N/A
(48) Collector Very Low Speed Local/Rural	2 593	593	593	551	593	593	593	551	593	593	593	593	593	593	575	N/A
(49) Collector Very Low Speed Local/Rural	1 592	592	592	548	592	592	592	548	592	592	592	592	592	592	575	N/A
(50) Crossover Connector	3-9 566	581	581	540	581	581	581	540	581	581	581	581	581	581	N/A	N/A
	2 563	576	576	534	576	576	576	534	576	576	576	576	576	576	550	N/A
	1 518	560	560	520	560	560	560	520	560	560	560	560	560	560	540	N/A
	3-9 429	429	429	504	429	429	429	504	429	429	429	429	429	429	N/A	N/A
	2 429	429	429	504	429	429	429	504	429	429	429	429	429	429	550	1,075
	1 424	424	424	480	424	424	424	480	424	424	424	424	424	424	540	1,005
	3-9 755	775	775	720	755	755	755	720	755	755	755	755	755	755	N/A	N/A
	2 750	768	768	713	758	758	758	713	758	758	758	758	758	758	N/A	N/A
	1 719	735	735	719	740	740	740	719	740	740	740	740	740	740	N/A	N/A
	3-9 717	736	736	684	736	736	736	684	736	736	736	736	736	736	N/A	N/A
	2 713	729	729	677	729	729	729	677	729	729	729	729	729	729	N/A	N/A
	1 685	700	700	650	700	700	700	650	700	700	700	700	700	700	N/A	N/A
	3-9 566	581	581	540	581	581	581	540	581	581	581	581	581	581	N/A	N/A
	2 563	576	576	534	576	576	576	534	576	576	576	576	576	576	575	N/A
	1 530	530	530	490	530	530	530	490	530	530	530	530	530	530	575	1,045
	2-9 573	573	573	530	573	573	573	530	573	573	573	573	573	573	N/A	N/A
	1 557	557	557	515	557	557	557	515	557	557	557	557	557	557	N/A	N/A
	2-9 543	543	543	504	543	543	543	504	543	543	543	543	543	543	698	N/A
	1 530	530	530	490	530	530	530	490	530	530	530	530	530	530	685	1,060
	2-9 429	429	429	398	429	429	429	398	429	429	429	429	429	429	550	N/A
	1 424	424	424	392	424	424	424	392	424	424	424	424	424	424	540	1,005
	2-9 429	429	429	398	429	429	429	398	429	429	429	429	429	429	550	N/A
	1 424	424	424	392	424	424	424	392	424	424	424	424	424	424	540	1,005
ALL	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

TABLE 3 (cont'd): RECOMMENDED TWO-DIGIT LOS E CAPACITIES*

Facility Type	Area Type													
	AT 11 Main CBD 500,000+	AT 10,12 Main CBD <500,000	AT 13 Other Urban Area CBD	AT 14 Non-Urban Area CBD	AT 20,21 CBD Fringe Areas	AT 30,31,34 Residential Areas	AT 33 Undeveloped Areas	AT 33 Transitional Areas	AT 41,43 Major OBD	AT 40,42 Other OBD	AT 51 Developed Rural Areas	AT 50,53 Undeveloped Rural Areas		
(51) Basic Centroid Connector	ALL	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000		
(52) External Centroid Connector	ALL	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000		
(60) One Way Facilities	4-9	622	640	638	666	689	689	N/A	638	638	1,311	N/A		
	3	680	698	717	666	750	750	710	717	717	1,311	N/A		
	2	675	691	711	662	749	749	709	711	711	1,311	N/A		
	1	658	672	710	658	758	758	720	710	710	690	N/A		
(61) One Way Facilities Urban Unsignalized	3-9	1,466	1,466	1,466	1,388	1,466	1,466	1,388	1,466	1,466	N/A	N/A		
	2	1,465	1,465	1,465	1,388	1,465	1,465	1,388	1,465	1,465	1,311	N/A		
	1	1,445	1,445	1,445	1,382	1,445	1,445	1,382	1,445	1,445	1,134	N/A		
(62) One Way Facilities Urban LOS Class Ia	4-9	689	689	689	N/A	689	689	N/A	689	689	N/A	N/A		
	3	750	750	750	710	750	750	710	750	750	N/A	N/A		
	2	749	749	749	709	749	749	709	749	749	690	N/A		
	1	758	758	758	720	758	758	720	758	758	690	N/A		
(63) One Way Facilities Urban LOS Class Ib	4-9	658	658	N/A	N/A	658	658	N/A	658	658	N/A	N/A		
	3	717	717	717	666	717	717	666	717	717	N/A	N/A		
	2	711	711	711	662	711	711	662	711	711	660	N/A		
	1	710	710	710	658	710	710	658	710	710	648	N/A		
(64) One Way Facilities Urban LOS Class II or III	4-9	622	640	640	N/A	640	640	N/A	640	640	N/A	N/A		
	3	680	698	698	648	698	698	648	698	698	N/A	N/A		
	2	675	691	691	641	691	691	641	691	691	N/A	N/A		
	1	658	672	672	624	672	672	624	672	672	N/A	N/A		
(65) Frontage Roads Urban Unsignalized	2-9	1,465	1,465	1,465	1,388	1,465	1,465	1,388	1,465	1,465	1,311	N/A		
	1	1,445	1,445	1,445	1,382	1,445	1,445	1,382	1,445	1,445	1,134	N/A		
(66) Frontage Roads Urban LOS Class Ia	2-9	749	749	749	709	749	749	709	749	749	690	N/A		
	1	758	758	758	720	758	758	720	758	758	690	N/A		
(67) Frontage Roads Urban LOS Class Ib	2-9	711	711	711	662	711	711	662	711	711	660	N/A		
	1	710	710	710	658	710	710	658	710	710	648	N/A		
(68) Frontage Roads Urban LOS Class II or III	2-9	675	691	691	641	691	691	641	691	691	N/A	N/A		
	1	638	672	672	624	672	672	624	672	672	N/A	N/A		
(70) Ramps	ALL	1,775	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600		
(71) Freeway On-Ramp	ALL	1,445	1,445	1,445	1,382	1,445	1,445	1,382	1,445	1,445	1,134	1,206		
(72) Freeway Loop On-Ramp	ALL	638	672	672	624	672	672	624	672	672	690	1,206		
(73) Other On-Ramp	ALL	1,445	1,445	1,445	1,382	1,445	1,445	1,382	1,445	1,445	1,134	1,206		
(74) Other Loop On-Ramp	ALL	638	672	672	624	672	672	624	672	672	690	645		
(75) Freeway Off-Ramp	ALL	1,445	1,445	1,445	1,382	1,445	1,445	1,382	1,445	1,445	1,134	1,206		
(76) Freeway Loop Off-Ramp	ALL	638	672	672	624	672	672	624	672	672	690	645		
(77) Other Off-Ramp	ALL	1,445	1,445	1,445	1,382	1,445	1,445	1,382	1,445	1,445	1,134	1,206		
(78) Other Loop Off-Ramp	ALL	638	672	672	624	672	672	624	672	672	690	645		
(79) Freeway - Freeway Ramp	ALL	1,775	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600		
(80) Exclusive HOV Lanes	ALL	1,775	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600		
(81) Freeway Group 1 HOV Lanes Barrier Separated	ALL	1,775	N/A	N/A	N/A	1,775	1,775	N/A	1,775	1,775	N/A	N/A		
(82) Other Freeway HOV Lanes Barrier Separated	ALL	N/A	1,725	1,725	1,650	1,725	1,725	1,650	1,725	1,725	1,600	1,600		
(83) Freeway Group 1 HOV Lanes Non-Separated	ALL	1,775	N/A	N/A	N/A	1,775	1,775	N/A	1,775	1,775	N/A	N/A		

TABLE 3 (cont'd): RECOMMENDED TWO-DIGIT LOS E CAPACITIES*

Facility Type	Area Type													
	AT 11	AT 10,12	AT 13	AT 14	AT 20,21	AT 30,31,34	AT 32	AT 33	AT 40,42	AT 41,43	AT 40,42	AT 51	AT 50,52	
Loops Per Direction	Main CBD 500,000+	Main CBD <500,000	Other Urban Area CBD	Non-Urban Area CBD	CBD Fringe Area	Residential Area	Undeveloped Area	Transit/Highway Area	Other OBD	Major OBD	Other OBD	Developed Rural Areas	Undeveloped Rural Areas	
(84) Other Freeway HOV Lanes Non-Separated	N/A	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(85) Non-Freeway HOV Lanes	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(86) AM&PM Peak Only HOV Ramp	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(87) AM Peak Only HOV Ramp	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(88) PM Peak Only HOV Ramp	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(89) All Day HOV Ramp	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(90) Toll Facilities														
4-9	1,775	1,713	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,713	1,675	1,675	
3	1,783	1,717	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,717	1,667	1,667	
1-2	1,775	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(91) Urban Freeway Group 1 Toll Facility														
4-9	1,775	N/A	N/A	N/A	1,775	1,775	1,775	N/A	1,775	1,775	1,775	N/A	N/A	
3	1,783	N/A	N/A	N/A	1,783	1,783	1,783	N/A	1,783	1,783	1,783	N/A	N/A	
1-2	1,775	N/A	N/A	N/A	1,775	1,775	1,775	N/A	1,775	1,775	1,775	N/A	N/A	
(92) Other Freeway Toll Facility														
4-9	N/A	1,713	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,713	1,675	1,675	
3	N/A	1,717	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,717	1,667	1,667	
1-2	N/A	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(93) Expressway/Parkway Toll Facility														
4-9	1,775	1,713	1,713	1,738	1,713	1,713	1,713	1,738	1,713	1,713	1,713	1,675	1,675	
3	1,783	1,717	1,717	1,733	1,717	1,717	1,717	1,733	1,717	1,717	1,717	1,667	1,667	
1-2	1,775	1,725	1,725	1,650	1,725	1,725	1,725	1,650	1,725	1,725	1,725	1,600	1,600	
(94) Divided Arterial Toll Facility														
3-9	1,628	1,628	1,628	1,542	1,628	1,628	1,628	1,542	1,628	1,628	1,628	1,433	1,433	
2	1,628	1,628	1,628	1,542	1,628	1,628	1,628	1,542	1,628	1,628	1,628	1,433	1,433	
1	1,580	1,580	1,580	1,512	1,580	1,580	1,580	1,512	1,580	1,580	1,580	1,240	1,240	
(95) Undivided Arterial Toll Facility														
3-9	1,547	1,547	1,547	1,465	1,547	1,547	1,547	1,465	1,547	1,547	1,547	N/A	N/A	
2	1,546	1,546	1,546	1,465	1,546	1,546	1,546	1,465	1,546	1,546	1,546	1,385	1,385	
1	1,505	1,505	1,505	1,440	1,505	1,505	1,505	1,440	1,505	1,505	1,505	1,260	1,260	
(97) Toll Facility On-Ramp														
ALL	1,445	1,445	1,445	1,382	1,445	1,445	1,445	1,382	1,445	1,445	1,445	1,134	1,134	
(98) Toll Facility Off-Ramp														
ALL	1,445	1,445	1,445	1,382	1,445	1,445	1,445	1,382	1,445	1,445	1,445	1,134	1,134	
(99) Toll Plaza														
ALL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Sources: *FDOT 1995 Level-of-Service Manual, with default recommendations used in Tallehassee-Leon County 2020 Transportation Study, Pensacola 2020 Update and 2015 Tampa Bay RTA.
 See LOS ASSUMPTIONS FOR RECOMMENDED TWO-DIGIT CAPACITIES* Table for specific Level-of-Service assumptions.
 Note:
 • Capacities listed in vehicle per hour per lane.
 Post, Buckley, Schuh & Jernigan, Inc.

**TABLE 4
RECOMMENDED HNET INPUT
FREE-FLOW SPEEDS**

Facility Type	Recommended Default Speeds by Area Type											
	Main CBD 500,000+ AT 11	Main CBD 500,000- AT 10,12	Other Urban CBD AT 13	Non-Urban CBD AT 14	CBD Fringe AT 20,21	Residential AT 30,31,34	Undeveloped AT 32	Transition AT 33	High Den. OBD AT 41,43	Other OBD AT 40,42	Rural Developed AT 51	Rural Undeveloped AT 50,52
FT 10	40	40	40	50	45	50	50	45	45	45	54	55
FT 11	40	N/A	N/A	N/A	45	50	50	45	45	N/A	N/A	N/A
FT 12	N/A	40	40	50	45	50	50	45	45	45	54	55
FT 15	35	35	36	45	40	45	45	40	40	40	49	50
FT 16	35	35	36	45	40	45	45	40	40	40	49	50
FT 17	35	35	36	45	40	45	45	40	40	40	49	50
FT 20	28	28	30	35	32	37	37	33	34	43	43	44
FT 21	N/A	N/A	N/A	N/A	40	42	42	41	42	46	46	47
FT 22	34	34	35	44	37	39	39	38	39	43	43	44
FT 23	32	32	33	40	35	37	37	36	37	41	41	N/A
FT 24	29	29	30	35	32	34	34	33	34	38	38	N/A
FT 25	28	28	29	32	31	33	33	32	33	N/A	N/A	N/A
FT 30	22	22	26	33	28	33	33	29	30	40	40	41
FT 31	32	32	33	40	35	37	37	36	37	41	41	42
FT 32	29	29	30	37	32	34	34	33	34	38	38	39
FT 33	26	26	27	34	29	31	31	30	31	35	35	N/A
FT 34	23	23	24	31	26	28	28	27	28	32	32	N/A
FT 35	31	31	32	39	34	36	36	35	36	40	40	41
FT 36	28	28	29	36	31	33	33	32	33	37	37	38
FT 37	25	25	26	33	28	30	30	29	30	34	34	N/A
FT 38	22	22	23	30	25	27	27	26	27	31	31	N/A
FT 40	24	24	25	29	25	30	30	25	26	34	34	35
FT 41	27	27	28	35	28	32	32	30	32	N/A	N/A	N/A
FT 42	26	26	27	34	27	31	31	29	31	N/A	N/A	N/A
FT 43	25	25	26	33	26	30	30	28	30	34	34	35
FT 44	26	26	27	30	26	28	28	27	28	N/A	N/A	N/A
FT 45	25	25	26	29	25	26	26	26	26	29	29	30
FT 46	24	24	25	28	24	25	25	25	25	28	28	29
FT 47	23	23	24	27	21	24	24	23	24	24	24	25
FT 48	23	23	24	27	21	24	24	23	24	24	24	25
FT 50	10	10	12.5	15	12.5	15	15	14	15	19	19	20
FT 51	10	10	12.5	15	12.5	15	15	14	15	19	19	20
FT 52	15	15	17.5	20	17.5	20	20	19	20	24	24	25

**TABLE 4 (cont'd)
RECOMMENDED HNET INPUT
FREE-FLOW SPEEDS**

Facility Type	Recommended Default Speeds by Area Type												
	Main CBD 500,000+ AT 11	Main CBD 500,000- AT 10,12	Other Urban CBD AT 13	Non-Urban CBD AT 14	CBD Fringe AT 20,21	Residential AT 30,31,34	Undevel. AT 32	Transition AT 33	High Den. OBD AT 41,43	Other OBD AT 40,42	Rural Developed AT 51	Rural Undevel. AT 50,52	
	AT 11	AT 10,12	AT 13	AT 14	AT 20,21	AT 30,31,34	AT 32	AT 33	AT 41,43	AT 40,42	AT 51	AT 50,52	
FT 60	22	22	26	33	28	33	33	33	29	30	40	N/A	
FT 61	31	31	32	39	34	36	36	36	35	40	40	N/A	
FT 62	28	28	29	36	31	33	33	33	32	37	37	N/A	
FT 63	25	25	26	33	28	30	30	30	29	34	34	N/A	
FT 64	22	22	23	30	25	27	27	27	26	N/A	N/A	N/A	
FT 65	31	31	32	39	34	36	36	36	35	40	40	N/A	
FT 66	28	28	29	36	31	33	33	33	32	37	37	N/A	
FT 67	25	25	26	33	28	30	30	30	29	34	34	N/A	
FT 68	22	22	23	30	25	27	27	27	26	N/A	N/A	N/A	
FT 70	40	40	40	50	45	50	50	50	45	54	54	55	
FT 71	30	30	32	37	35	37	37	37	35	44	44	45	
FT 72	23	23	25	30	28	30	30	30	28	29	29	30	
FT 73	27	27	30	32	32	32	32	32	32	36	36	37	
FT 74	20	20	23	25	25	25	25	25	25	29	29	30	
FT 75	30	30	32	37	35	37	37	37	35	44	44	45	
FT 76	23	23	25	30	28	30	30	30	28	29	29	30	
FT 77	27	27	30	32	32	32	32	32	32	36	36	37	
FT 78	20	20	23	25	25	25	25	25	25	29	29	30	
FT 79	40	40	40	50	45	50	50	50	45	54	54	55	
FT 80	40.5	40.5	40.5	50.5	45.5	50.5	50.5	50.5	45.5	54.5	54.5	55.5	
FT 81	41.0	N/A	N/A	N/A	46.0	51.0	51.0	N/A	46.0	N/A	N/A	N/A	
FT 82	N/A	41.0	41.0	51.0	46.0	51.0	51.0	51.0	46.0	55.0	55.0	56.0	
FT 83	40.5	N/A	N/A	N/A	45.5	50.5	50.5	N/A	45.5	N/A	N/A	N/A	
FT 84	N/A	40.5	40.5	50.5	45.5	50.5	50.5	50.5	45.5	54.5	54.5	55.5	
FT 85	35.5	35.5	36.5	45.5	40.5	45.5	45.5	45.5	40.5	49.5	49.5	50.5	
FT 86	35.5	35.5	36.5	45.5	40.5	45.5	45.5	45.5	40.5	49.5	49.5	50.5	
FT 87	35.5	35.5	36.5	45.5	40.5	45.5	45.5	45.5	40.5	49.5	49.5	50.5	
FT 88	35.5	35.5	36.5	45.5	40.5	45.5	45.5	45.5	40.5	49.5	49.5	50.5	
FT 89	35.5	35.5	36.5	45.5	40.5	45.5	45.5	45.5	40.5	49.5	49.5	50.5	
FT 90	40	40	40	50	45	50	50	50	45	54	54	55	
FT 91	40	N/A	N/A	N/A	45	50	50	N/A	45	N/A	N/A	N/A	
FT 92	N/A	40	40	50	45	50	50	50	45	54	54	55	
FT 93	35	35	36	45	40	45	45	45	40	49	49	50	
FT 94	34	34	35	44	37	39	39	39	38	43	43	44	
FT 95	32	32	33	40	35	37	37	37	36	41	41	42	
FT 97	30	30	32	37	35	37	37	37	35	44	44	45	
FT 98	30	30	32	37	35	37	37	37	35	44	44	45	
FT 99	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

RECOMMENDED LOS INPUT FREE-FLOW SPEEDS		Recommended Default Speeds by Area Type												
		Main CBD 500,000+ AT 11	Main CBD 500,000- AT 10,12	Other Urban CBD AT 13	Non-Urban CBD AT 14	CBD Fringe AT 20,21	Residential AT 30,31,34	Undevel. AT 32	Transition AT 33	High Den. OBD AT 41,43	Other OBD AT 40,42	Rural Developed AT 51	Rural Undevel. AT 50,52	
Facility Type														
FT 10	DEFAULT	55	55	55	65	55	60	65	65	55	60	60	60	
FT 11	Freeway Group 1 (City of 500,000+)	55	N/A	N/A	N/A	55	60	65	65	55	60	60	60	
FT 12	Other Freeway (Group 2)	N/A	55	55	65	55	60	65	65	55	60	60	60	
FT 15	Collector/Distributor Lanes	50	50	50	60	50	55	60	60	50	55	55	55	
FT 16	Controlled-Access Expressway	50	50	50	60	50	55	60	60	50	55	55	55	
FT 17	Controlled-Access Parkway	50	50	50	60	50	55	60	60	50	55	55	55	
FT 20	DEFAULT	20	23	28	35	30	40	40	40	30	35	35	35	
FT 21	Divided Arterial 55 mph (RM)	N/A	N/A	N/A	N/A	45	50	50	55	45	50	55	50	
FT 22	Divided Arterial 45 mph (RM)	35	38	38	45	40	45	45	45	40	45	45	45	
FT 23	Divided Arterial Class Ia (RM)	30	33	33	40	35	40	40	40	35	40	45	45	
FT 24	Divided Arterial Class Ib (RM)	25	28	28	35	30	35	35	35	30	35	40	40	
FT 25	Divided Arterial Class II/III (RM)	20	23	23	30	25	30	30	30	25	30	30	30	
FT 30	DEFAULT	18	20	25	30	25	33	35	35	25	28	28	28	
FT 31	Undivided Arterial 45 mph (TB)	38	40	40	45	40	43	45	45	40	43	43	43	
FT 32	Undivided Arterial Class Ia (TB)	33	35	35	40	35	38	40	40	35	38	38	38	
FT 33	Undivided Arterial Class Ib (TB)	28	30	30	35	30	33	35	35	30	33	33	33	
FT 34	Undivided Arterial Class II/III (TB)	23	25	25	30	25	28	30	30	25	28	28	28	
FT 35	Undivided Arterial 45 mph (NTB)	33	35	35	40	35	38	40	40	35	38	38	38	
FT 36	Undivided Arterial Class Ia (NTB)	28	30	30	35	30	33	35	35	30	33	33	33	
FT 37	Undivided Arterial Class Ib (NTB)	23	25	25	30	25	28	30	30	25	28	28	28	
FT 38	Undivided Arterial Class II/III (NTB)	18	20	20	25	20	23	25	25	20	23	23	23	
FT 40	DEFAULT	25	27	27	32	27	33	35	35	27	30	30	30	
FT 41	Major Divided Collector	28	30	30	35	30	33	35	35	30	33	33	33	
FT 42	Major Undivided Collector (TB)	28	30	30	35	30	33	35	35	30	33	33	33	
FT 43	Major Undivided Collector (NTB)	28	30	30	35	30	33	35	35	30	33	33	33	
FT 44	Other Divided Collector	25	27	27	32	27	30	32	32	27	30	30	30	
FT 45	Other Undivided Collector (TB)	25	27	27	32	27	30	32	32	27	30	30	30	
FT 46	Other Undivided Collector (NTB)	25	27	27	32	27	30	32	32	27	30	30	30	
FT 47	Low Speed Collector	25	27	27	32	27	30	32	32	27	30	30	30	
FT 48	Very Low Speed Collector	25	27	27	32	27	30	32	32	27	30	30	30	
FT 50	DEFAULT	10.0	10.0	10.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	
FT 51	Centroid Connector	10.0	10.0	10.0	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	
FT 52	External Centroid Connector	15.0	15.0	15.0	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	

RECOMMENDED LOS INPUT FREE-FLOW SPEEDS		Recommended Default Speeds by Area Type														
		Facility Type														
		Main CBD 500,000+ AT 11	Main CBD 500,000- AT 10,12	Other Urban CBD AT 13	Non-Urban CBD AT 14	CBD Fringe AT 20,21	Residential AT 30,31,34	Undevel. AT 32	Transition AT 33	High Den. OBD AT 41,43	Other OBD AT 40,42	Rural Developed AT 51	Rural Undevel. AT 50,52			
FT 60	DEFAULT	25	27	32	37	32	40	42	42	32	45	35	32	42	45	N/A
FT 61	One-Way Street 45 mph	40	42	42	47	42	45	47	47	42	50	45	42	47	50	N/A
FT 62	One-Way Street Class Ia	35	37	37	42	37	40	42	42	37	40	40	42	45	45	N/A
FT 63	One-Way Street Class Ib	30	32	32	37	32	35	37	37	32	35	35	37	40	40	N/A
FT 64	One-Way Street Class II/III	25	27	27	32	27	30	32	32	27	30	30	32	32	30	N/A
FT 65	Frontage Roads 45 mph	40	42	42	47	42	45	47	47	42	50	45	42	45	50	N/A
FT 66	Frontage Roads Class Ia	35	37	37	42	37	40	42	42	37	40	40	42	45	45	N/A
FT 67	Frontage Roads Class Ib	30	32	32	37	32	35	37	37	32	35	35	37	40	40	N/A
FT 68	Frontage Roads Class II/III	25	27	27	32	27	30	32	32	27	30	30	32	32	30	N/A
FT 70	DEFAULT	55	55	55	65	55	60	65	65	55	70	60	65	70	70	70
FT 71	Freeway On-Ramp	40	40	40	50	40	45	47	47	40	50	45	47	50	50	50
FT 72	Freeway Loop On-Ramp	30	30	30	35	30	32	33	33	30	35	32	33	35	35	35
FT 73	Other On-Ramp	35	35	35	45	35	40	42	42	35	45	40	42	45	45	45
FT 74	Other Loop On-Ramp	25	25	25	30	25	27	28	28	25	30	27	27	30	30	30
FT 75	Freeway Off-Ramp	40	40	40	50	40	45	47	47	40	50	45	47	50	50	50
FT 76	Freeway Loop Off-Ramp	30	30	30	35	30	32	33	33	30	35	32	33	35	35	35
FT 77	Other Off-Ramp	35	35	35	45	35	40	42	42	35	45	40	42	45	45	45
FT 78	Other Loop Off-Ramp	25	25	25	30	25	27	28	28	25	30	27	27	30	30	30
FT 79	Freeway - Freeway Ramp	55	55	55	65	55	60	65	65	55	70	60	65	70	70	70
FT 80	DEFAULT	55.0	55.0	55.0	65.0	55.0	60.0	65.0	65.0	55.0	70.0	60.0	65.0	70.0	70.0	70.0
FT 81	HOV Lane Grp. 1 (Separated)	55.0	N/A	N/A	N/A	55.0	60.0	65.0	N/A	55.0	N/A	60.0	60.0	N/A	N/A	N/A
FT 82	HOV Lane Grp. 2 (Separated)	N/A	55.0	55.0	65.0	55.0	60.0	65.0	65.0	55.0	70.0	60.0	65.0	70.0	70.0	70.0
FT 83	HOV Lane Grp. 1 (Non-Separated)	55.0	N/A	N/A	N/A	55.0	60.0	65.0	N/A	55.0	N/A	60.0	60.0	N/A	N/A	N/A
FT 84	HOV Lane Grp. 2 (Non-Separated)	N/A	55.0	55.0	65.0	55.0	60.0	65.0	65.0	55.0	70.0	60.0	65.0	70.0	70.0	70.0
FT 85	Non-Freeway HOV Lane	50.0	50.0	50.0	60.0	50.0	55.0	60.0	60.0	50.0	65.0	55.0	55.0	65.0	65.0	65.0
FT 86	AM&PM Peak HOV Ramp	50.0	50.0	50.0	60.0	50.0	55.0	60.0	60.0	50.0	65.0	55.0	55.0	65.0	65.0	65.0
FT 87	AM Peak Only HOV Ramp	50.0	50.0	50.0	60.0	50.0	55.0	60.0	60.0	50.0	65.0	55.0	55.0	65.0	65.0	65.0
FT 88	PM Peak Only HOV Ramp	50.0	50.0	50.0	60.0	50.0	55.0	60.0	60.0	50.0	65.0	55.0	55.0	65.0	65.0	65.0
FT 89	All Day HOV Ramp	50.0	50.0	50.0	60.0	50.0	55.0	60.0	60.0	50.0	65.0	55.0	55.0	65.0	65.0	65.0
FT 90	DEFAULT	55	55	55	65	55	60	65	65	55	70	60	65	70	70	70
FT 91	Toll Freeway Group 1	55	N/A	N/A	N/A	55	60	65	N/A	55	N/A	60	60	N/A	N/A	N/A
FT 92	Other Toll Freeway	N/A	55	55	65	55	60	65	65	55	70	60	65	70	70	70
FT 93	Toll Expressway/Parkway	50	50	50	60	50	55	60	60	50	65	55	55	65	65	65
FT 94	Toll Divided Arterial	40	43	43	45	40	45	45	45	40	45	45	45	45	50	50
FT 95	Toll Undivided Arterial	38	40	40	45	40	43	43	45	40	45	45	45	45	50	50
FT 97	Toll On-Ramp	40	40	40	50	40	45	47	47	40	50	45	45	45	50	50
FT 98	Toll Off-Ramp	40	40	40	50	40	45	47	47	40	50	45	45	45	50	50
FT 99	Toll Plaza	N/A	N/A	N/A	N/A	40	45	47	47	40	50	45	45	45	50	50

The first recommendation was the application of variable UROAD factors. Validation testing conducted as part of the HNET study indicated that model performance was generally best when using a hybrid of LOS C and LOS D volumes to represent practical capacities. As a result, a default file of variable UROAD factors was developed based on the ratio between LOS C/D and LOS E capacities for different facility types. The Model Task Force endorsed using LOS E capacities with default variable UROAD factors rather than using input capacities based on LOS C/D (with a UROAD factor of 1.00). The use of variable UROAD factors provides additional flexibility for future model validation efforts, as congestion levels vary from one urban area to another.

The second recommended enhancement developed through SERPM was the inclusion of multiple BPR curves. The reason for applying multiple BPR curves is that speed/delay relationships (and levels of trip diversion) differ by facility type. Modifications to the BPR curves, validated in the SERPM IV model, have been made to reflect additional facility types. Default BPR curves, based on the SERPM IV validation, are recommended as a starting point for validation efforts where testing of variable curves is desired.

The final model parameter endorsed by the Model Task Force is the Variable CONFAC option. Implementation of variable CONFAC values is recognition that peak-to-daily volume relationships vary among different types of facilities. Application of variable CONFAC values should be based on local data on peaking characteristics for a variety of facilities.

Efforts are currently underway to incorporate multiple CONFAC, BPR, and UROAD values, by facility type, into a single file tentatively named VFACTORS.yya. This file will be a required input to the EQUILIBRIUM HIGHWAY LOAD program. Table 6 shows default values for these three parameters, which are recommended to be used in place of those generated in the automated VFACTORS.yya file.

RELATED ENHANCEMENTS AND FUTURE RESEARCH

It is recommended that additional data be collected on observed travel speeds for a variety of area types and facility types in several different urban areas. Data on typical travel speeds will allow true validation of link speeds to be achieved and could be used to update recommended default speeds

**TABLE 6
DEFAULT VARIABLE FACTORS**

Facility Type	Variable UROAD	Variable CONFAC*	Variable BPR**	
			LOS	Exponent
FT 10	0.660	0.100	0.150	6.500
FT 11	0.660	0.100	0.150	6.500
FT 12	0.660	0.100	0.150	6.500
FT 15	0.660	0.100	0.150	6.500
FT 16	0.660	0.100	0.150	6.500
FT 17	0.660	0.100	0.150	6.500
FT 20	0.900	0.100	0.150	5.500
FT 21	0.700	0.100	0.150	5.500
FT 22	0.700	0.100	0.150	5.500
FT 23	0.930	0.100	0.150	5.500
FT 24	0.910	0.100	0.150	5.500
FT 25	0.800	0.100	0.150	5.500
FT 30	0.900	0.100	0.150	4.500
FT 31	0.700	0.100	0.150	4.500
FT 32	0.930	0.100	0.150	4.500
FT 33	0.910	0.100	0.150	4.500
FT 34	0.800	0.100	0.150	4.500
FT 35	0.700	0.100	0.150	4.500
FT 36	0.930	0.100	0.150	4.500
FT 37	0.910	0.100	0.150	4.500
FT 38	0.800	0.100	0.150	4.500
FT 40	0.850	0.100	0.150	4.500
FT 41	0.760	0.100	0.150	4.500
FT 42	0.760	0.100	0.150	4.500
FT 43	0.760	0.100	0.150	4.500
FT 44	0.890	0.100	0.150	4.500
FT 45	0.890	0.100	0.150	4.500
FT 46	0.890	0.100	0.150	4.500
FT 47	0.890	0.100	0.150	4.500
FT 48	0.890	0.100	0.150	4.500
FT 50	1.000	0.100	0.150	4.500
FT 51	1.000	0.100	0.150	4.500
FT 52	1.000	0.100	0.150	4.500

Facility Type	Variable UROAD	Variable CONFAC*	Variable BPR**	
			LOS	Exponent
FT 60	0.900	0.100	0.150	4.500
FT 61	0.700	0.100	0.150	4.500
FT 62	0.930	0.100	0.150	4.500
FT 63	0.910	0.100	0.150	4.500
FT 64	0.800	0.100	0.150	4.500
FT 65	0.700	0.100	0.150	4.500
FT 66	0.930	0.100	0.150	4.500
FT 67	0.910	0.100	0.150	4.500
FT 68	0.800	0.100	0.150	4.500
FT 70	0.660	0.100	0.150	6.500
FT 71	0.570	0.100	0.150	6.500
FT 72	0.850	0.100	0.150	6.500
FT 73	0.570	0.100	0.150	6.500
FT 74	0.850	0.100	0.150	6.500
FT 75	0.570	0.100	0.150	6.500
FT 76	0.850	0.100	0.150	6.500
FT 77	0.570	0.100	0.150	6.500
FT 78	0.850	0.100	0.150	6.500
FT 79	0.660	0.100	0.150	6.500
FT 80	0.660	0.100	0.300	8.500
FT 81	0.660	0.100	0.300	8.500
FT 82	0.660	0.100	0.300	8.500
FT 83	0.660	0.100	0.300	8.500
FT 84	0.660	0.100	0.300	8.500
FT 85	0.660	0.100	0.300	8.500
FT 86	0.660	0.100	0.300	8.500
FT 87	0.660	0.100	0.300	8.500
FT 88	0.660	0.100	0.300	8.500
FT 89	0.660	0.100	0.300	8.500
FT 90	0.660	0.100	0.150	6.500
FT 91	0.660	0.100	0.150	6.500
FT 92	0.660	0.100	0.150	6.500
FT 93	0.660	0.100	0.150	6.500
FT 94	0.930	0.100	0.150	5.500
FT 95	0.930	0.100	0.150	4.500
FT 97	0.570	0.100	0.150	6.500
FT 98	0.570	0.100	0.150	6.500
FT 99	1.000	0.100	0.150	6.500

* The Variable CONFAC option needs further testing and review of available data to determine default values for each facility type.
 ** BPR LOS is the alpha coefficient for the curve, BPR Exponent is the beta.

in the future. Additionally, it is recommended that further research be conducted to analyze the potential opportunities that two-digit coding could provide in relation to transit modeling.

Finally, with the emergence of Geographic Information Systems (GIS) and GIS-visualization tools for transportation modeling, it is now possible to develop and display more accurate and detailed FSUTMS highway networks. Work is currently underway to also enhance the coding and displaying of transit networks through the use of GIS. It is recommended that modelers maximize the use of GIS technology and minimize the use of manual methodologies in the development of FSUTMS highway and transit networks.

Comments regarding experience in implementing these new HNET procedures should be forwarded to the FDOT/Systems Planning Office for addressing at future meetings of the Model Task Force. Recommended default speeds and capacities (and area types and facility types) will be reevaluated in the future as new data and model validation experience is obtained.