



PALM BEACH COUNTY TRAFFIC DIVISION

DEFAULT INPUT VALUES FOR:

- **HCM INTERSECTION ANALYSIS**
- **HCM ARTERIAL ANALYSIS**
- **SIGNAL TIMING OPTIMIZATION**

Authority: Article 12 of the Palm Beach County ULDC (the Traffic Performance Standards) requires that, “The HCM Operational Analysis shall comply with the default input values published by the County Engineer no more frequently than twice per year. Revisions to the input values may be made to reflect actual or projected field conditions where substantial differences from the default values can be demonstrated.” (ULDC Article 12.B.2.A.1.c)

Any traffic study submitted in Palm Beach County which uses either HCM operational analysis for an intersection or HCM arterial analysis for a link must use the default values published in this document or demonstrate why deviation from these values is appropriate, to the satisfaction of the County Engineer.

This document was last updated February 1, 2008

**PALM BEACH COUNTY
ENGINEERING AND PUBLIC WORKS DEPARTMENT
TRAFFIC DIVISION**



DEFAULT INPUT VALUES FOR HCM INTERSECTION ANALYSIS

Area, Geometry and Volume Data	
Area Type	CBD or Other
Analysis Type (HCS+ only)	Single Period unless Multiple is requested by Traffic Division
Turn Lanes	Existing plus Assured Construction (provide phasing analysis and documentation)
Intersection Turning Movements	Projected total volumes at build out year from traffic study
Peak Hour Factor (PHF)	0.95
Length of Analysis Period (Duration)	0.25 hr
Right Turn on Red	Use 60 vph for exclusive right turn lane Use 10 vph for shared right/through lane
Percent Turns Using Shared Lane	Max. 10% unless actual counts justify higher value
Average Queue Spacing	25 ft
Available Queue Storage Length	Use actual values (can be estimated from aerial photos)
Operating Parameters	
Initial Unmet Demand (veh)	0
Arrival Type	3 – uncoordinated 4 – coordinated (peak <u>and</u> off-peak direction) To be applied to coordinated movements only
Unit Extension Time (UE)	3.0 seconds
Upstream Filtering/Metering Adj. Factor (I)	1.0
Startup Lost Time	2.0 seconds per applicable phase
Extension of Effective Green Time	2.0 seconds
Pedestrian Speed (ft/s), Travel Distance (ft), Cross Walk Width (ft)	4.0 ft/s, Actual, Actual
Actuation Type	Actual or per signal timing optimization defaults
Cycle Length, Phasing and Green Times	Actual unless conditions warrant change by County Engineer, then according to signal timing optimization defaults
Saturation Flow Data	
Base Saturation Flow Rate	1,900 pc/h/ln
Lane Widths	Actual
Heavy Vehicles	2%
Grades	0%
Parking Maneuvers per hour	None
Bus Stops per hour	Actual if known, otherwise zero
Lane Utilization	Where CMA is greater than 1400 manually set $F_{LU} = 1.0$, otherwise leave as default (table 10-23 in HCM)
Conflicting Bikes and Peds per hour	Actual if known, otherwise zero
Percent Turns using protected phase	Estimate using ratio of protected to total green time

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DEFAULT INPUT VALUES FOR HCM ARTERIAL ANALYSIS

HCM arterial analysis requires only three inputs beyond those required for intersection analysis: segment length, free flow speed, and urban street class. The purpose of this document is to present Palm Beach County guidelines in determining each of these inputs for a given analysis segment.

1. Segment Length

- A. The length of an individual analysis segment is given as the center-to-center distance between two signalized intersections and can be measured using the Palm Beach County GIS coverages. For the first segment in the arterial, the lesser of the distance to the upstream signal or 0.25 miles shall be used. This requirement applies to each direction of analysis.
- B. The overall length of the corridor being analyzed involves the determination of which intersections and segments must be included in determining an analysis corridor. To determine the analysis corridor, the following guidelines should be considered:
 1. Traffic signal spacing should be 2 miles or less (HCM Page 15-1).
 2. The total length of the analysis corridor should be at least 2 miles. (HCM Page 15-1).
 3. If the analysis corridor includes a coordinated traffic signal system, the entire signal system should be included in the analysis corridor where possible.
 4. Where possible, the analysis corridor should be uniform in cross section (e.g. the analysis corridor should not include both 4-lane and 6-lane sections of a roadway).
 5. Special conditions such as T-intersections and intersections where the turning volumes represent a high percentage of the approach traffic should be evaluated through consultation with the Traffic Division.

2. Free Flow Speed

It would be difficult to predict what an appropriate free flow speed would be for a road segment in the future given likely changes in the "street environment" variables that influence free flow speed such as adjacent land uses, the number of access points, clear zone distance, etc. In some cases the road segment being analyzed may not even exist at the present time, so it would be difficult to predict what influence the road geometry and street environment will have on the driver's speed choice.

For the purposes of arterial analysis, use the posted speed limit as the free flow speed of a given street segment.

3. Urban Street Class

Page 15-3 of Chapter 15 of the Year 2000 Highway Capacity Manual (HCM) states that the **Urban Street Class** can be determined by either direct field measurement of the free flow speed (as outlined in Appendix B of Chapter 15) or by an assessment of the subject street's functional and design categories.

Since free flow speed measurements are not currently available for arterial road segments in Palm Beach County and since the arterial analysis procedure under the County's Traffic Performance Standards is being applied to future year conditions that will exist at the time a land development is built out, it is recommended that Urban Street Class be determined solely on the basis of street segment's functional and design categories, including the **posted** speed limit.

To determine what functional and design categories a particular road segment would fall into, Exhibits 3 and 4 on page 10-6 of the HCM should be consulted. Since some of the categories in these exhibits are not quantified, the following guidelines with respect to Palm Beach County are provided to assist in interpretation of the categories. These should not necessarily be used as precise standards but applied with engineering judgment on a case-by-case basis and in consideration of results from other categories.

Exhibit 10-3 of HCM with PBC Additional Restrictions

URBAN STREET CLASS	
Class I	High-speed Principal Arterial
Class II	Suburban Principal Arterial Suburban Minor Arterial Intermediate Principal Arterial
Class III	Intermediate Minor Arterial Urban Principal Arterial
Class IV	This designation is not used in Palm Beach County

Exhibit 10-4 of HCM with PBC Quantitative Values

Criterion	FUNCTIONAL CATEGORY	
	Principal Arterial	Minor Arterial
Mobility Function	Very important	Important
Access Function	Very minor	Substantial
Points Connected	Freeways, activity centers, major traffic generators	Principal arterials
Predominant Trips Served	≥ 5 miles	< 5 miles

Exhibit 10-4 of HCM with PBC Quantitative Values (Continued)

Criterion	DESIGN CATEGORY			
	High-Speed	Suburban	Intermediate	Urban
Driveway/access density ¹	> 660 feet	440-660 feet	245-440 feet	< 245 feet
Arterial Type	Multilane divided; undivided or two-lane with shoulders	Multilane divided; undivided or two-lane with shoulders	Multilane divided or undivided; one-way, two-lane	Undivided one-way, two-way, two or more lanes
Parking	No	No	Some	Significant
Separate left-turn lanes	Yes	Yes	Usually	Some
Signals/mile	0.5 – 2	1 – 5	4 – 10	6 – 12
Speed limit	45 – 55 mph	40 – 45 mph	30 – 40 mph	25 – 35 mph
Pedestrian activity ²	≤ 5 / hr	≤ 10 / hr	≤ 20 / hr	> 20 / hr
Roadside development ³	FAR ≤ 0.2 ≤ 1.0 DU/AC	FAR ≤ 0.3 ≤ 3.0 DU/AC	FAR ≤ 0.35 ≤ 5.0 DU/AC	FAR > 0.35 > 5.0 DU/AC

¹ Derived from FDOT access management roadway classification criteria

² Derived from a review of pedestrian counts for various intersections in Palm Beach County

³ Derived from a review of Land Use Element and Map of Palm Beach County Comprehensive Plan

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DEFAULT INPUT VALUES FOR SIGNAL TIMING OPTIMIZATION

An existing case analysis shall be conducted using the existing signal timing information obtained from the Traffic Division of Palm Beach County. Optimization of the signal timing is permitted only after establishing the need based on the results from the existing case. Signal timing optimization must use the default values noted below or demonstrate why deviation from these values is appropriate to the satisfaction of the County Engineer.

1. Non Coordinated Signal Operation

- a) Use the following minimum green times:

Thru Phases:

Main Street: 30.0 seconds

Side Street: 10.0 seconds

All Left Turn Phases: 8.0 seconds

- b) Cycle Length Range: 80 to 160 seconds
c) Yellow and All Red Intervals: Use existing unless geometric changes warrant an increase
d) Round all timing values to the nearest whole second
e) Consider a fully actuated mode analysis unless otherwise specified in the signal timing plan.
f) Optimize only Signal Timing, not Phasing, unless otherwise approved by the Traffic Division.
g) For Test 1, the v/c ratios shall not exceed 1.0 and the delay shall not exceed 80 seconds for any of the critical movements.
h) For Test 2, the v/c ratios shall not exceed 1.0 and the delay shall not exceed 110 seconds for any of the critical movements.

2. Coordinated Signal Operation

- a) Use the following minimum green times:

Thru Phases:

Main Street green: Use higher of ped requirement (walk + ped clearance) or 30.0 seconds

Side Street: Use higher of ped requirement (walk + ped clearance) or 10.0 seconds

Left Turn Phases:

Use 10.0 seconds for protected/permissive phasing

Use 12.0 seconds for protected only phasing.

- b) Cycle Length: Use existing cycle length for the system, unless otherwise approved by the Traffic Division.
c) Yellow and All Red Intervals: Use existing unless geometric changes warrant an increase
d) Round all timing values to the nearest whole second
e) Conduct a semi-actuated mode analysis unless otherwise specified in the existing system timing plan.
f) Optimize only Signal Timing, not Phasing, unless otherwise approved by the Traffic Division.
g) For Test 1, the v/c ratios shall not exceed 1.0 and the delay shall not exceed 80 seconds for any of the critical movements.
h) For Test 2, the v/c ratios shall not exceed 1.0 and the delay shall not exceed 110 seconds for any of the critical movements.