



FDOT District One 2011 LOS Spreadsheet

User Guide

Prepared by:

GMB Engineers & Planners, Inc.

2602 E. Livingston Street

Orlando, FL - 32803



1.0 INTRODUCTION

1.1 OVERVIEW

Level of service (LOS) is a measure by which transportation engineers determine the quality of service on transportation infrastructure (automobile, transit and pedestrian facilities) with quantitative stratification into letters A through F, with A being the best and F being the worst. Two levels of LOS analysis were identified in the Florida Department of Transportation (FDOT) Quality/ Level of Service Handbook (Q/LOS Handbook); 1) Generalized Planning and 2) Conceptual Planning. Generalized planning makes extensive use of statewide default values and is intended for broad applications such as statewide analysis, initial problem identification, and future planning. As such, the LOS Spreadsheets included in this report makes use of the LOS determination techniques specified strictly for Generalized Planning purposes.

Every year District One updates a set of roadway parameters and the corresponding roadway LOS information for the 12 counties that form District One. As such, this report deals with the year 2011 LOS update using the generalized service volumes from the **2009 FDOT Quality/LOS Handbook (version date 10/04/2010)**. The roadway parameters included in the Year 2011 LOS update are current as of December 31, 2011.

The following 12 counties (designated County ID) in alphabetical order form District One:

- ▶ Charlotte (01)
- ▶ Collier (03)
- ▶ Desoto (04)
- ▶ Glades (05)
- ▶ Highlands (09)
- ▶ Hendry (07)
- ▶ Lee (12)
- ▶ Manatee (13)
- ▶ Hardee (06)
- ▶ Okeechobee (91)
- ▶ Polk (16)
- ▶ Sarasota (17)



This report has two components as described in the following paragraphs.

1) Year 2011 LOS Excel Spreadsheets which provide a summary of the existing and future roadway characteristics and the corresponding LOS information. The roadway characteristics and LOS information are provided for the roadway facilities that are active on the State Highway System (SHS) in District One, State of Florida, as of December 31, 2011. As part of this annual LOS update, the Daily LOS, Peak Hour Two-Way LOS and Peak Hour Directional LOS information are provided for each of the 12 counties. In addition, the spreadsheet for each county provides information for Year 2017 Existing plus Committed (E+C) and the Year 2035 planned number of lanes and LOS information.

2) The user guide provides a detailed explanation of the information provided in the LOS spreadsheets, including the sources for input information.

The user guide is provided in Section 2.0 of this report. The LOS spreadsheets are provided in Section 3.0 of this report.

1.2 BACKGROUND

The initial roadway segment information was obtained from the FDOT Central Office. The FDOT Central Office provides information for the roadway segments active on the SHS every year as part of the statewide update of the roadway LOS. The information includes the state roadway section number, current AADT, existing number of through lanes, posted speed, SIS facilities, and One-way facilities.

As such the initial segregation as performed by the Central Office made sure that each roadway segment consisted of only one count station to accurately reflect the traffic volumes. The roadway segments were further divided into sub-segments based on the difference in any of the other above mentioned roadway parameters. However, this report also includes “aggregated” segments that were formed by combining individual segments having similar roadway characteristics in an attempt to avoid under or over estimation of LOS in smaller segments.



2.0 LOS UPDATE USER GUIDE

This LOS update report, in addition to the user guide, contains a LOS spreadsheet for each of the 12 counties in District One identifying generalized LOS information for the roadway segments on the SHS, Generalized Service Volumes (GSV) Database (GSV_Database) sheet lists all the possible combinations of the service volumes, Historical and Current Counts (Hist_Cur_CNTS) sheet containing the historical, current AADT data, and the necessary regression analysis calculations used to project future traffic volumes for the individual count station, and Signals sheet containing the information of signals on all the SHS roadway segments in District One.

The LOS worksheet provides various roadway characteristics and LOS information for SHS roadway segments obtained from various sources like FDOT Roadway Characteristic Inventory (RCI) Database, Florida Traffic Online (FTO) (2011), the 2009 Q/LOS Handbook (**version date 10/04/2010**). In addition to the current (2011) LOS information, Year 2017 E+C and Year 2035 LOS information are also provided in the LOS Spreadsheets. The GSV from 2009 Q/LOS Handbook are provided in **Appendix A** of this report.

Service volumes for LOS B for multilane state signalized arterials in rural developed areas were derived in proportion to multilane uninterrupted flow highway service volumes.

For example, the LOS B service volume for four (4) lanes Divided State Signalized Arterial is calculated as mentioned below.

Service Volume for 4 Lanes Divided State Signalized Arterial - SV4LD_SSA

Service Volume for 4 Lanes Divided Uninterrupted Flow Highway - SV4LD_UFH

$$LOS\ B\ for\ SV\ 4LD\ _\ SSA = \frac{((LOS\ C\ for\ SV\ 4LD\ _\ SSA) * (LOS\ B\ for\ SV\ 4LD\ _\ UFH))}{LOS\ C\ for\ SV\ 4LD\ _\ UFH}$$

$$= \frac{23,300 * 23800}{37200} \cong 14,900$$



The LOS worksheets are divided into three sections. Section 1: *column B* through *column AF* is the existing information section for each roadway segment. Section 2: *column AG* through *column BC* is the information section on the future (Year 2017 and Year 2035) traffic projections and LOS calculations for each roadway segment. Section 3: *Columns BD* through *BF* provide the information on the Standard K factor, and, existing D and T₂₄ factors.

2.1 RESOURCES

The roadway information incorporated into the LOS update spreadsheets for each county are obtained from the following resources.

2.1.1 Central Office LOS Update preliminary sheet: This sheet is provided every year to the respective districts across the State of Florida for updating the roadway LOS. The basic roadway segmentation is provided in this sheet and later refined in the LOS report.

2.1.2 Roadway Characteristics Inventory (RCI): RCI maintained by FDOT is accessed by roadway section number and feature number. Example: through lanes (feature number 212).

2.1.2.1 Straight Line Diagrams (SLD's): The straight line diagrams are available by county through the external links provided in the RCI Menu. The SLD's are specifically helpful in verifying the through number of lanes, median types and side streets.

2.1.3 District One Access Management Update Sheet: The 2008 Access Management Update study completed by GMB Engineers and Planners, Inc. was also used in verifying various roadway characteristics.

2.1.5 Florida Traffic Online (FTO) Tool: The FTO contains the count station information, its location, volume, and map of the count stations. The FTO was used to obtain the existing and historical traffic information for the count stations. The standard K and D factors for the roadway segments were obtained from the FTO tool.

2.1.6 Quality/ LOS (Q/LOS) Handbook: The LOS calculations included as part of this study are based on the 2009 Quality/Level of Service Handbook (version date 10/4/2010).

2.1.7 Highway Capacity Manual (HCM): The Highway Capacity Manual (HCM 2000) is a source for terms and definitions.



2.1.8 FDOT Work Program Administration: The FDOT Work Program Administration is accessed by Item/Segment number (8-digit number) to obtain the information on capacity improvement projects that have construction funding within the next three fiscal years for Non SIS facilities, and within the next five fiscal years for SIS facilities. This information was used to determine the 2017 E+C number of lanes.

2.1.9 FDOT Tentative Work Program Report: The Draft FDOT Tentative Work Program Report (FY 2012/13 – FY 2016/17) is also used to determine the 2017 E+C number of lanes.

2.2 COLUMN DESCRIPTIONS

The following is a detailed description of each column and whether the column information is an input or output in the LOS spreadsheet. The analysis condition drop down is located in the title of each of 12 counties spreadsheet in the Cell “AG4”. By changing the value of this cell “AG4” in the title, the analysis is updated for all the three analysis years (Existing -2011, E+C-2017 and Long term – 2035).

- 1. Section No. (Column B):** This is an eight-digit number representing a State road. The first two digits represent county number, the next three digits represent section number, and the last three digits represent sub-section number. The source for this number is the SLD’s and the RCI database.
- 2. State Road No. (Column E):** This is the state road name for the previously mentioned section number.
- 3. Local Road Name (Column F):** This is the Local road name for the Section No. mentioned in Column B. The source for this name is feature 114 from the RCI database.
- 4. From (Column G):** This indicates the start of a roadway segment generally in text format. It can be a street name, city, county boundary, major landmark, or combination of text and milepost.
- 5. From M.P. (Column H):** This is the beginning milepost of the section number in number format with three decimals. This number does not always start from zero. Sometimes it starts with a number greater than zero depending on the status of a particular roadway segment.



6. **To (Column I):** This indicates the end of the section number generally in text format. It can be a street name, city, county boundary, major landmark, or combination of text and milepost.
7. **To M.P. (Column J):** This is the ending milepost of the section number in number format with three decimals.
8. **Section Length (Column K):** This determines the difference between the two mileposts (From M.P and To M.P) for each roadway segment.
9. **SIS (Column M):** SIS is an acronym for Strategic Intermodal System. It is also determined from RCI database, feature 147. The following abbreviations are used in this column.

“ES”: Emerging SIS

“ESC”: Emerging SIS Connector

“SIS”: SIS Facility

“SC”: SIS Connector

“NHS” : National Highway System Connector

10. **Functional Classification (Column N):** This indicates the Functional Classification of the roadway and is determined from the RCI database, feature 121. The different types of functional classification as specified in the RCI database are:

- Principal Arterial – Interstate
- Principal Arterial – Other
- Minor Arterial
- Major Collector
- Collector

11. **Posted Speed (Column O):** This indicates the posted speed limit of a predominant portion of the roadway segment. The posted speed limit is determined from RCI database, feature 311 and validated with the Access Management Study Reports.



12. Area Type (Column P): Area Type is determined from the latest Federal Highway Administration (FHWA) approved urban boundaries. The following abbreviations are used in this column.

“UA”: Urbanized Areas

“TA”: Transitioning/Urban Areas

“RDA”: Rural Developed Areas

“RUA”: Rural Undeveloped Areas.

13. Existing Facility Type (Column Q): Facility type is determined using guidelines specified in the Q/LOS Handbook. It is mainly dependent on the presence of signals on a roadway segment. The combination of this column with Arterial/ Freeway Class will be more logical. The following abbreviations are used in this column. If a roadway segment of length greater than 3.0 miles had one signal, then we considered that segment as Highway facility.

“A” is for Arterial, when signals are present on a roadway segment.

“H” is for Highway, when there are no signals on a roadway segment.

“F” is for Freeway.

14. FDOT LOS Std. (Column R, AJ & AR): This is the FDOT LOS standard for the section based on SIS, Area Type or Facility Type. This is determined from Florida Administrative Code (FAC) 14-94 provided in Table 8-1 of 2009 FDOT Quality /LOS Handbook. This information is provided in the **Appendix B** of this report.

15. County LOS Std. (Column S): This is the County adopted LOS standard for the state roadway segments. This information is obtained from the various sources mentioned in Table 1.

16. City LOS Std. (Column T): This is the City adopted LOS standard for the roadway segments within the city jurisdiction. This information is obtained from the respective City Comprehensive Plans.

**Table 1: List of Sources for County LOS Standard**

County	Source for County LOS Std.
Charlotte	Charlotte County Transportation Element September 2009
Collier	2011 Collier County Annual Update & Inventory Report (AUIR)
DeSoto	DeSoto County Traffic Circulation Element May 2012
Glades	Glades County 2020 Comprehensive Plan
Hardee	Hardee County Comp Plan 2010
Hendry	Hendry County Comprehensive Plan
Highlands	Highlands County Comprehensive Plan (Adopted 1-91 Revised 12-07)
Lee	Lee County Traffic Circulation
Manatee	Manatee County Traffic Element - Table 5.1 October 2010
Okeechobee	Okeechobee County Comprehensive Plan May 2009
Polk	Polk County Roadway Network Database July 2012
Sarasota	2012 Sarasota County Traffic Counts

- 17. No. of Signals (Column U):** The number of signals, determined from the RCI database, feature 322 and is verified with the Access Management Report and video logs. According to Q/LOS Handbook (Page 74), *“when determining the number of signalized intersections per mile, to avoid double counting, the signalized intersections at the ends of the facility should not be counted. In general, FDOT recommends not counting the roadway’s first signalized intersection and counting the last one”*. The same guidelines were followed when entering the number of signals. This column does not include the flashing signals or emergency signals. If the segment has no signals, the cell is left blank.
- 18. Signal Density (Column V) (Hidden):** Signal Density is defined as number of signalized intersections per mile. This is calculated by dividing the number of signals (Column U) on a roadway segment with the section length (Column K).
- 19. Arterial Class (Column W):** This column represents the arterial class based on the signal density for arterials in Urbanized Areas and Transitioning Areas per the guidelines specified in the Q/LOS Handbook. This should be referred to in combination with the



area type and facility type. This will display 1, 2, or 3 for arterial roadway segments in Urbanized Areas and Transitioning Areas. The Arterial Class definitions are as follows:

- **Arterial Class "1"**: Arterials with signal density of less than 2 signals per mile.
- **Arterial Class "2"**: Arterials with signal density from 2 to 4.5 signals per mile.
- **Arterial Class "3"**: Arterials with signal density greater than 4.5 signals per mile.

20. Divided/ Undivided (Column X): This indicates the median type and is determined from the RCI database feature 120 and is verified with SLD's. The following abbreviations are used in this column.

"D": Divided Roadway indicating presence of a restrictive or a non-restrictive median.

"U": Undivided Roadway indicating the non presence of a median.

21. 2W/ 1W (Column Y): This indicates whether the roadway is two-way (2W) or one-way (1W) roadway facility.

22. Left Turn Bays (Column Z): This indicates the presence or absence of left turn lanes and is determined from the RCI database, feature 213. The presence of left turn lanes, although for a small portion of the segment is considered as having left turn bays. The following abbreviations are used in this column.

"WL": With left turn bays.

"0L": zero left turn bays.

23. Right Turn Bays (Column AA): This indicates the presence or non presence of right turn lanes and is determined from the RCI database, feature 213. The presence of right turn lanes, although for a small portion of the segment is considered as having right turn bays. The following abbreviations are used in this column.

"WR": With right turn bays.

"0R": No right turn bays.

For Freeways, the presence of auxiliary lanes is shown in this column. The following observations are used in this column.

"WA": With Auxiliary Lane on both sides of the freeway.



“W1A”: With Auxiliary Lane on one side of the freeway.

“0A”: No Auxiliary Lane.

- 24. Thru Lanes (Column AB):** This indicates the number of through lanes in 2011 for a particular roadway segment. It is determined from RCI database, feature 212 and validated with SLD’s and sometimes with aerial imagery.
- 25. Capacity (Column AC):** This column represents the adjusted capacity of roadway for the corresponding FDOT LOS standard in *Column R* and the various input conditions like Area Type (*Column P*), Facility Type (*Column Q*), presence of median (*Column X*), left turn bays (*Column Z*), right turn bays (*Column AA*), and existing lanes (*Column AB*) etc.
- 26. Volume (Column AD):** This is the Year 2011 volume column displaying the existing volumes based on the selected analysis period from the drop down menu in the cell “AG4”. The drop down menu provides the Daily, Peak Hour Two Way, and Peak Hour Directional conditions. The Peak Hour Two Way and Peak Hour Directional volumes are calculated using the standard K and D₃₀ factors. It should be noted that the value in this column becomes the output for the “aggregated” segments.
- 27. LOS (Column AE):** This is a calculated column displaying the existing LOS for the roadway segment based on the existing volume (*Column AD*). The LOS is determined with all the adjustments and characteristic combinations as shown in the GSV_Database sheet of the LOS Workbook.
- 28. Deficiency Determination (Column AF):** This compares the existing 2011 AADT volumes with the Daily Service Volume and indicates if the roadway is “Over Capacity” or “Near Capacity”. If the existing AADT volume exceeds the Daily Service Volume then the segment is identified as “Over Capacity” and if the AADT volume is equal to or greater than 90 percent of the Daily service Volume than the segment is identified as “Near Capacity”.
- 29. TRIP Improvement (Column AG):** TRIP is an acronym for Transportation Regional Incentive Program. In this column, “Yes” represents that there are TRIP improvements for that particular roadway segment. (This information is provided by FDOT Staff)



- 30. 2017 E+C Thru Lanes (Column AI):** This column shows the existing plus committed number of through lanes by the Year 2017. The roadway widening projects that had construction funding within the next three fiscal years (ending FY 2015) for Non SIS facilities and within the next five fiscal years (ending FY 2017) for SIS facilities was considered in determining the number of lanes in this column.
- 31. Capacity (Column AK):** This is the calculated column with service volume value for the corresponding FDOT LOS standard in *Column AJ* and the various input conditions like Area Type (*Column P*), Facility Type (*Column Q*), presence of median (*Column AL*), left turn bays (*Column AM*), right turn bays (*Column AN*), and 2017 E+C lanes (*Column AI*) etc.
- 32. 2017 Volume (Column AO):** This is a calculated column displaying the roadway volume for a roadway segment based on the analysis period selected from the dropdown menu. The drop down menu provides the Daily, Peak Hour Two Way, and Peak Hour Directional conditions. For the daily condition, the 2017 forecasted AADT volume will be displayed based on the regression analysis of historic counts. The Peak Hour Two-Way and Peak Hour Directional volumes are calculated using the Standard K factor and future D factors (D factor of 0.55 for two-way facility and 1.00 for one-way facility is used) and become the output in this column. It should be noted that a minimum annual growth rate of 2% was assumed in case of the regression analysis projecting a negative or less than 2% growth rate.
- 33. 2017 LOS (Column AP):** This is a calculated column displaying the LOS for a roadway segment and is determined based on the through lanes in 2017 E+C thru lanes (*Column AI*) and selected analysis period from the dropdown menu.
- 34. 2035 Thru Lanes (Column AQ):** This column shows the number of through lanes by the Year 2035 based on the 2035 Florida State Urban Transportation Model System (FSUTMS) Cost Feasible Model for Charlotte, Collier, Lee, Manatee, Polk, and Sarasota Counties and was provided by Traf-O-Data Inc. The Year 2035 through lanes was based on FSUTMS Needs Plan Model for DeSoto, Glades, Hardee, Hendry, Highlands, and Okeechobee counties and was provided by GMB Engineers and Planners, Inc except



Highlands County. The information for Highlands County was provided by Traf-O-Data Inc.

35. **Capacity (Column AS):** This is a calculated column with service volume value for the corresponding FDOT LOS standard in *Column AR* and the various input conditions like Area Type (*Column P*), Facility Type (*Column Q*), presence of median (*Column AT*), left turn bays (*Column AU*), right turn bays (*Column AV*), and 2035 thru lanes (*Column AQ*) etc.
36. **2035 Trends Volume (Column AW):** This is a calculated column displaying the AADT volume for a roadway segment based on the analysis period selected from the dropdown menu. The drop down menu provides the Daily, Peak Hour Two-Way, and Peak Hour Directional conditions. For the daily condition, the 2035 forecasted AADT volume will be displayed based on the regression analysis of historic counts. The Peak Hour Two-Way and Peak Hour Directional volumes are calculated using the Standard K factor and future D factor (D factor of 0.55 for two-way facility and 1.00 for one-way facility is used) and becomes the output in this column. It should be noted that a minimum annual growth rate of 2% was assumed in case of the regression analysis projecting a negative or less than 2% growth rate.
37. **2035 Trends LOS (Column AX):** This is a calculated column displaying the LOS for a roadway segment and is determined based on the selected year through lanes in 2035 Thru Lanes (*Column AQ*) and selected analysis period from the dropdown menu, with all the adjustments and characteristic combinations as shown in the GSV_Database of the LOS Workbook.
38. **2035 Model Volume (Column BB):** This is the year 2035 volume column displaying the future volumes based on the selection from the drop down menu. The drop down menu provides the Daily, Peak Hour Two-Way, and Peak Hour Directional conditions. The daily condition volumes are based on the 2035 FSUTMS Cost Feasible Plan Models and were provided by Traf-O-Data Inc and GMB Engineers and Planners, Inc as mentioned in above in the *Column AQ*. The Peak Hour Two Way and Peak Hour Directional volumes are calculated using the Standard K and future D factors (D factor of 0.55 for



two-way facility and 1.00 for one-way facility is used) and become the output in this column.

39. **2035 Model LOS (Column BC):** This is a calculated column displaying the LOS for the roadway segment based on the volume condition displayed in *Column BB* and the number of through lanes as shown in *Column AQ*. The LOS is determined with all the adjustments and characteristic combinations as shown in the GSV_Database sheet of the LOS Workbook.
40. **Standard K Factor (Column BD):** This column displays the Standard K factor adopted by the FDOT, to be used in planning level analysis for a given roadway segment.
41. **Existing D₃₀ Factor (Column BE):** This column displays the existing D factor for a given roadway segment. The values are in number format with two decimals.
42. **Existing T₂₄ Factor (Column BF):** This column displays the existing planning level T₂₄ factor for a given roadway segment. The values are in number format with two decimals.



2.3 PROCEDURE FOR AGGREGATING SEGMENTS

The aggregated segments are shown in **Yellow** color in the county LOS spreadsheets. The sub-segments from which the aggregated segments are obtained are shown in **Tan** color (hidden). The other segments, which maintain the basic segregation as performed by the Central Office, are shown in **White** Color. The following is a list of the assumptions considered while aggregating individual sub-segments.

- ✦ Aggregation was performed for smaller sub-segments that have similar characteristics with more importance to the area type, existing AADT volumes, and number of lanes. However, engineering judgment was used in case of ambiguous combinations.
- ✦ For Existing Facility Type, the aggregated segment follows the same guidelines as used in the sub-segments.
- ✦ For the through number of lanes, the predominant sub-segment (in section length) number of lanes is shown in the aggregated segment.
- ✦ For “Posted Speed”, the predominant sub-segment (in section length) posted speed is shown in the aggregated segment.
- ✦ All the AADT calculations for the aggregated segment were the weighted average AADTs based on section lengths.
- ✦ “No. of Signals” for the aggregated segment is the sum of the sub-segment number of signals.
- ✦ For “Divided”, the predominant sub-segment (in section length) median type is shown in the aggregated segment.
- ✦ For “Left Turn Bays”, the aggregated segment is shown as having left turn bays if any of the sub-segments have left turn bays.
- ✦ For “Right Turn Bays”, the aggregated segment is shown as having right turn bays if any of the sub-segments have right turn bays.



2.4 MODIFICATIONS MADE TO THE 2011 LOS WORKBOOK

The following are the list of changes made to the 2011 LOS Workbook.

1. Existing and future K_{100} factors are replaced with Standard K factor and future D factor column is deleted and the same information is now mentioned in the footer of each individual spreadsheet.
2. The Model Output Correction Factor (MOCF) has been updated based on the information available from FDOT's 2011 Florida Traffic Online (FTO) tool.

3.0 LOS SPREADSHEETS

This section contains the LOS spreadsheets (Daily, Peak hour two-way, and Peak hour directional) for each of the 12 counties. In addition, keysheet maps illustrating the roadway network and section numbers for each of the 12 counties are also provided.