EXHIBIT "A"

SCOPE OF SERVICES

FOR

CONTINUING SERVICES TRAFFIC STUDIES

FINANCIAL PROJECT ID: 420112 2 32 01

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1.0 GENERAL REQUIREMENTS

The purpose of this contract is to provide the District One Traffic Operations Office with professional services for conducting needed traffic operations studies. The analysis and recommendations produced by the CONSULTANT will provide valuable input into the development of traffic operations improvement projects to be included in the Department's work program.

A major objective of this contract is to obtain study results as expeditiously as possible while maintaining a high degree of thoroughness and professionalism. Independent study types have been identified and work tasks for each have been specified.

1.1 Acronyms

AADT	Annual Average Daily Traffic
DPM	Department's Project Manager
DTOE	District Traffic Operations Engineer
FDOT	Florida Department of Transportation
MUTCD	Manual on Uniform Traffic Control Devices
MICE	Manual on Intersection Control Evaluation
MUTS	The Manual on Uniform Traffic Studies published by the Traffic Engineering & Operations Office, Florida Department of Transportation.

1.2 Issuance of Task Work Order Authorizations

Authorization to perform one or more of the tasks described in this Scope of Services shall be conveyed to the CONSULTANT through a written Task Work Order issued by the DPM. The Task Work Order shall specify the type of study to be conducted, the tasks required, the locations to be included and the date on which the study is to be completed and submitted to the Department.

Each Task Work Order issued by the DPM shall serve as formal notice to precede, effective upon issuance of the Task Work Order.

1.3 Study Type Report

A final report for each study type shall be furnished to include the approved products of all tasks identified.

1.4 Executive Summary

The report for relevant studies shall contain an executive summary providing a general overview of the contents of the report and general comments about the location, purpose, findings, conclusions and recommendations.

1.5 Sealing of Reports

All study type documents and copies submitted to the Department shall be signed and sealed by a Florida Registered Professional Engineer.

1.6 Task Product

One (1) printable Portable Document Format (PDF) of the signed and sealed traffic data or report dated is required, along with any associated CADD files in DGN format. The PDF file shall be submitted by electronic mails (E-Mails), on an approved file transfer program, or on a CD or DVD with a label listing the task work order number and date on the CD/DVD. The file name should be the task work order number (i.e. TWO****.pdf).

2.0 TYPES OF STUDIES

This scope of work contains four (4) study types for which the CONSULTANT will be issued work orders. These study types and the work tasks associated with each study type are as follows:

2.1 Study Type I - Corridor Analysis - (Page A-4)
- Task 1 - Qualitative Assessment
- Task 2 - Field Inventory
- Task 3 - Crash Analysis
- Task 4 - Synchro/Sim Traffic Analysis
- Task 5 - Future Conditions Analysis
- Task 6 - Development of Alternatives and Recommendations
- Task 7 - Preparation and Submittal of Report
- Task 8 - Travel Time and Delay Study

2.2 Study Type II - Intersection Analysis - (Page A-7)
- Task 1 - Qualitative Assessment
- Task 2 - Field Inventory
- Task 3 - Crash Analysis
- Task 4a - Signal Synchro/Sim Traffic Analysis
- Task 4b - Future Conditions Analysis
- Task 4c - Roundabout
  - Subtask 4c1 - Inventory
  - Subtask 4c2 - Sidra Intersection Analysis
  - Subtask 4c3 - Benefit/Cost Analysis
  - Subtask 4c4 - Concept Development

Task 5 - Development of Alternatives and Recommendations
Task 6 - Preparation and Submittal of Report

2.3 Study Type IIIA & IIIB - Signal Warrant Analysis - (Page A-11)
Task 1 - Qualitative Assessment
Task 2 - 8-Hour Turning Movement Counts
Task 3 - 24-Hour Approach Traffic Counts
Task 4 - Field Inventory
Task 5a - Intersection Delay Analysis (4-Legged Intersection)
Task 5b - Intersection Delay Analysis (T-Intersection)
Task 6 - Crash Analysis
Task 7 - Warrant Analysis and Recommendations

2.4 Study Type IV - Composite Study - (Page A-14)
Task 1 - 8-Hour Turning Movement Count
Task 2 - 4-Hour Turning Movement Count
Task 3 - 12-Hour Turning Movement Count
Task 4 - 24-Hour Approach Traffic Count
Task 5 - 3-Day Continuous Traffic Count
Task 6 - 7-Day Continuous Traffic Study
Task 7 - Pedestrian Group Size Study
Task 8 - 8-Hour Pedestrian-Bicycle Count
Task 9 - Vehicle Gap Size Count
Task 10 - Left Turn Delay Study
Task 11 - Intersection Delay Study
Task 12 - Field Inventory
Task 13 - Crash Analysis
Task 14 - Qualitative Assessment
Task 15 - Development of Alternatives and Recommendations
Task 16 - Preparation and Submittal of Report
Task 17 - Signal Equipment Inventory (with travel time)
Task 18 - Signal Equipment Inventory (without travel time)
Task 19 - No-Passing Zone Study
Task 20 - Advisory Speed Study
Task 21 - Speed Zone Study Report
Task 22 - Vehicle Spot Speed Study (with travel time)
Task 23 - Vehicle Spot Speed Study (without travel time)
Task 24 - Vehicle Spot Speed Study (24 Hours, All Vehicles, With Travel Time)
Task 25 - Vehicle Spot Speed Study (24 Hours, All Vehicles, Without Travel Time)
Task 26 - Vehicle Classification Count (24 Hours, All Vehicles, With Travel Time)
Task 27 - Vehicle Classification Count (24 Hours, All Vehicles, Without Travel Time)
Task 28a - Roundabout Inventory
Task 28b - SIDRA Intersection Analysis
Task 28c - Benefit/Cost Analysis
Task 28d - Roundabout Concept Development
Task 29a - ICE Stage 1 Screening
Task 29b - ICE Stage 2 Preliminary Control Strategy Assessment
Task 29c - ICE Stage 3 Detailed Control Strategy Assessment
Task 30 - ICE Peer Review
Task 31 - Management of Sub Consultant

Task 32a - Meetings
Task 32b - Meeting Preparation
Task 33 - In-house Support
Task 34 - Miscellaneous Studies

3.0 DESCRIPTION OF STUDY TASKS

This section describes for each study type included in this scope the work required in each task and the task product(s). Also, the units of payment of each work task are defined for the purpose of payment.

3.1 STUDY TYPE I: CORRIDOR ANALYSIS

Purpose

The corridor analysis involves a comprehensive, systematic review of a particular arterial from an operational efficiency and safety perspective. The required product of this study is a report identifying deficiencies and recommended improvements (such as those to improve geometrics, delays and queues, travel time, safety, etc.) for consideration by the department as a basis for the development of an arterial improvement program. Elements of the study report are intended to provide input to the plans preparation process for the recommended improvement projects.

Basis of Payment

The basic unit of this study shall be per corridor miles comprising the section to be studied. For the purpose of this contract, it is assumed that an urban section be one mile in length with 4 signals or less, while a two (2) mile rural section be less than one signal per mile. Composite mileage should be rounded to the nearest tenth of a mile and shall be established by the DEPARTMENT prior to issuance of the work order. The established unit price per mile studied shall be considered full compensation for all work required to perform this study.

Period of Performance

The normal period of performance allowed for completion of a Corridor Study shall be contingent upon the individual corridor and shall be established by the Department based on discussions with the CONSULTANT prior to issuance of the work order. Signal operational studies and/or intersection studies included as part of the Corridor Study are to be conducted concurrently with the Corridor Study and no additional time shall be allotted for their completion.

Scope of Work

This section specifies the work tasks to be performed by the CONSULTANT, the responsibilities of the CONSULTANT and the Department, as well as the products and reports to be developed by the CONSULTANT and delivered to the Department at the completion of the Corridor Study.

Task 1: QUALITATIVE ASSESSMENT

A Professional Engineer shall investigate the corridor during peak periods to identify any geometric traffic operations and traffic control conditions that may provide input to the determination of operational improvements and/or optimal signal control.

Task 2: FIELD INVENTORY

The CONSULTANT shall conduct a field inventory of the arterial under study and shall prepare a condition diagram. At minimum, the CONSULTANT shall develop a drawing to include lane widths, turn lane lengths, taper lengths, and sign locations. Additional roadway features should be included as appropriate.

Task Product

Arterial Inventory
Condition Diagram

Task 3: CRASH ANALYSIS

The CONSULTANT, using his own computer equipment and instructions provided by the DPM, will obtain authorization to access the Department's Crash Analysis Reporting (CAR) Online System and University of Florida's Signal Four Analytics. The CONSULTANT will then obtain electronic copies of crash records from these systems. Crash report images can then be viewed, stored electronically, or printed. The CONSULTANT will also contact the local jurisdiction to request local crash information when available.

The CONSULTANT will then prepare collision diagrams in a DPM approved format. The diagrams shall depict the most recent full 5 years for which data is available.

A crash analysis shall be performed based on a review of the crash reports and the prepared diagrams. The crash analysis will identify the source of the crash information and include a summary table of the crashes.

Task Product

Crash Analysis
Collision Diagram

Task 4: SYNCHRO/SIM TRAFFIC ANALYSIS

The CONSULTANT shall model the roadway using Synchro and SimTraffic computer programs in order to evaluate the recommended corridor improvements versus the existing roadway operation and identify the alternative that results in the safest and most efficient corridor operation for motor vehicles, pedestrian, and bicycles.

The CONSULTANT shall be responsible for determining all input parameters and obtaining all field data for the Synchro analysis. The CONSULTANT should refer to FDOT's Traffic Analysis Handbook for guidance regarding accepted methodologies and input parameters. The CONSULTANT shall identify the existing operating mode of any traffic signals in the corridor (i.e. coordinated or non-coordinated) for each period analyzed. A minimum of three periods will be analyzed (normally the morning, midday and evening peak hours). If the said traffic signals are operating in coordinated mode, then the existing cycle length for each period shall be utilized for each alternative. If the

traffic signals are operating in non-coordinated mode, then the maximum green timings based on field observation of intersection operations during each period shall be used. Submit electronic files of all input/output for the corridor. SimTraffic simulations shall also be generated for the existing, as well as the proposed alternatives. The results of the Synchro and SimTraffic analyses for the existing and proposed alternatives shall be tabulated. The results shall include delay and Level of Service (LOS) for the corridor.

Task Product

Existing and Proposed Alternatives Synchro files
Summary of measures of effectiveness

Task 5: FUTURE CONDITIONS ANALYSIS

Cursory analysis of how the recommended improvements operate over a 5 to 10-year period may be performed to determine how long an acceptable level of service may be maintained. A future analysis year will be established based on the type of project or if and when other major improvements are scheduled. This information will be used to establish the benefit/cost of the recommended improvement for use in the prioritization process. Future projections will be based on trend analysis for the short time frames. The analysis may include the same type of tasks included under Task 4.

Task Product

Future and Proposed Alternatives Synchro files
Summary of measures of effectiveness

Task 6: DEVELOPMENT OF ALTERNATIVES AND RECOMMENDATIONS

Utilizing the products from the field inventory and crash analysis, the CONSULTANT will develop and analyze feasible and appropriate alternatives, which address solutions to the defined problem(s). The appropriate alternatives include, but are not limited to: capacity analysis improvements, turn lane extensions, access management improvements (median openings), signal modifications/phase changes and complete street improvements. Complete street improvements include, but are not limited to: new signalized and unsignalized pedestrian crossings; a road diet; hybrid or rapid flashing beacons at critical unsignalized pedestrian crossings; on-street parking; bicycle lanes; transit-systems; pedestrian fencing and streetscaping, among other treatments. Based on this analysis the CONSULTANT shall recommend one of the alternatives.

Task Product

Development of Alternatives
Analysis of Alternatives
Recommended Alternative

Task 7: PREPARATION AND SUBMISSION OF REPORT

The CONSULTANT shall document the results and recommendations from the Corridor Study in a report and submit the report for review and comment. The report shall include color photographs (and/or graphics), summary of field inventory, results of signal operation and/or roundabout studies, arterial coordination analysis, conceptual drawings of recommended improvements with supporting documentation, cost estimates and a proposed sequential improvement plan.

Task Product

Corridor Analysis Report (1 PDF)

Task 8: TRAVEL TIME AND DELAY STUDY

The CONSULTANT shall perform a Travel Time and Delay Study in accordance with the procedures outlined in Chapter 13 of the MUTS.

Task Product

Travel Time and Delay Study

3.2 STUDY TYPE II: INTERSECTION ANALYSIS

Purpose

This study involves the analysis of an existing or proposed intersection in order to develop a specific conceptual design recommendation that can be utilized in preparing plans for the construction of a new or modified intersection. This analysis may include geometric improvements to increase capacity and operational efficiency.

Basis of Payment

An intersection analysis will be authorized on an intersection-by-intersection basis. The intersection may be presently signalized or unsignalized. The established unit price per intersection shall be considered full compensation for all work required to perform this study.

Period of Performance

The normal period of performance allowed for completion of an intersection analysis shall be 1 month for each location.

Scope of Work

This section specifies the work tasks to be performed by the CONSULTANT, the responsibilities of the CONSULTANT and the Department, as well as the products and reports to be developed by the CONSULTANT and delivered to the Department at the completion of the intersection analysis.

Task 1: QUALITATIVE ASSESSMENT

A Professional Engineer shall investigate the intersection during peak periods to identify any geometric traffic operations and traffic control conditions that may provide input to the determination of operational improvements and/or optimal signal control.

Task 2: FIELD INVENTORY

The CONSULTANT shall conduct a field inventory of the intersection under study and shall prepare a condition diagram. At minimum the CONSULTANT shall develop a drawing to include lane widths, turn lane lengths, taper lengths, and sign locations. Additional roadway features should be included as appropriate.

Task Product

Intersection Inventory
Condition Diagram

Task 3: CRASH ANALYSIS

The CONSULTANT, using his own computer equipment and instructions provided by the DPM, will obtain authorization to access the Department's Crash Analysis Reporting (CAR) Online System and University of Florida's Signal Four Analytics. The CONSULTANT will then obtain electronic copies of crash records from these systems. Crash report images can then be viewed, stored electronically, or printed. The CONSULTANT will also contact the local jurisdiction to request local crash information when available.

The CONSULTANT will then prepare collision diagrams in a DPM approved format. The diagrams shall depict the most recent full 5 years for which data is available.

A crash analysis shall be performed based on a review of the crash reports and the prepared diagrams. The crash analysis will identify the source of the crash information and include a summary table of the crashes.

Task Product

Crash Analysis
Collision Diagram

Task 4a: SYNCHRO/SIM TRAFFIC ANALYSIS

The CONSULTANT shall use Synchro and SimTraffic computer programs to compare the existing conditions of an intersection to the proposed alternatives in order to identify the alternative that results in the safest and most efficient intersection operation for motor vehicles, pedestrian, and bicycles.

The CONSULTANT shall be responsible for determining all input parameters and obtaining all field data for the Synchro analysis. The CONSULTANT should refer to FDOT's Traffic Analysis Handbook for guidance regarding accepted methodologies and input parameters. The CONSULTANT shall identify the existing operating mode of the traffic signal (i.e. coordinated or non-coordinated) for each period analyzed. A minimum

of three periods will be analyzed (normally the morning, midday and evening peak hours). If the signal is operating in coordinated mode, then the existing cycle length for each period shall be utilized for each alternative. If the intersection is operating in non-coordinated mode, then the maximum green timings based on field observation of intersection operations during each period shall be used.

SimTraffic simulations shall also be generated for the existing, as well as the proposed alternatives. The results of the Synchro and SimTraffic analyses for the existing and proposed alternatives shall be tabulated. The results shall include the following:

1. Delay and Level of Service (LOS)
   a. By intersection
   b. By approach
   c. By movement
2. Queue lengths by movement

Task Product

Existing and Proposed Alternatives Synchro files
Summary of measures of effectiveness

Task 4b: FUTURE CONDITIONS ANALYSIS

Cursory analysis of how the recommended improvements operate over a 5 to 10-year period may be performed to determine how long an acceptable level of service may be maintained. A future analysis year will be established based on the type of project or if and when other major improvements are scheduled. This information will be used to establish the benefit/cost of the recommended improvement for use in the prioritization process. Future projections will be based on trend analysis for the short time frames. The analysis may include the same type of tasks included under Task 4a.

Task Product

Future and Proposed Alternatives Synchro files
Summary of measures of effectiveness

Task 4c: ROUNDABOUT

Subtask 4c1: INVENTORY

The CONSULTANT shall be responsible for determining all input parameters and obtaining all field data for the roundabout analysis. The field review will include identifying any utilities discernible from a ground level view. This may include electrical transmission lines, natural gas pipelines, other utilities (water, wastewater, etc.) correspondent easements, railroads, etc. The review will also document any potential site characteristics that may influence the roundabout feasibility such as adjacent wetlands or other drainage features, parks or historic properties, structures, property access, or other environmental concerns.

The CONSULTANT shall perform a cursory geometric screening to review potential impacts based upon the estimated roundabout size. The review will be conducted over scaled aerial photography (rectified) with the intent to highlight any potential issues identifiable in this cursory screening. This could include expected needs for additional Right-of-Way (ROW), possible environmental or utility impacts, expected needs for approach realignments that could impact adjacent properties, etc. These items will be coordinated with appropriate FDOT staff to determine possible options to be explored as part of the concept development.

Subtask 4c2: SIDRA INTERSECTION ANALYSIS

The CONSULTANT shall use the SIDRA computer program to compare the existing conditions of an intersection to the proposed roundabout alternative. The CONSULTANT should refer to FDOT's Intersection Design Guide for guidance regarding accepted methodologies and input parameters. The CONSULTANT shall identify the existing operating mode of the intersection and a minimum of three periods will be analyzed (normally the morning, midday and evening peak hours). For existing signalized intersections, the CONSULTANT will obtain existing signal timings from the maintaining agency for use in the analysis. The analysis should include a sensitivity analysis to determine the longevity of the roundabout and its capacity to accommodate future growth. The results of the SIDRA analyses for the existing and proposed roundabout shall be tabulated. The results shall include the volume-to-capacity ratio, average control delay, level of service and 95th percentile queue lengths by approach.

Task Product

Summary of measures of effectiveness

Subtask 4c3 – BENEFIT/COST ANALYSIS

The CONSULTANT will develop a benefit/cost analysis based on the alternatives proposed. Based on this analysis, the consultant shall recommend one of the alternatives.

Task Product

Benefit/Cost Analysis

Subtask 4c4 – CONCEPT DEVELOPMENT

The CONSULTANT will develop a conceptual plan-view roundabout layout to a level sufficient to verify that the concept will meet the objectives outlined in NCHRP Report 672, including fastest path speeds, heavy vehicle accommodation, natural vehicle paths, and multimodal accommodation. The development of the roundabout concept will take into consideration the appropriate size and placement of the inscribed circle, and the alignment and arrangement of approaches to meet the geometric objectives outlined in NCHRP Report 672.

Task Product

Roundabout concept drawing

Task 5: DEVELOPMENT OF ALTERNATIVES AND RECOMMENDATIONS

Utilizing the products from the field inventory and crash analysis, the Consultant will develop and analyze feasible and appropriate alternatives, which address solutions to the defined problem(s). Based on this analysis, the CONSULTANT shall recommend one of the alternatives.

Task Product

Development of Alternatives
Analysis of Alternatives
Recommended Alternative

Task 6: PREPARATION AND SUBMISSION OF REPORT

The CONSULTANT shall document the results and recommendations from the Intersection Study in a report and submit the report for review and comment. The report shall include color photographs (and/or graphics), summary of field inventory, results of signal operation and/or roundabout studies, arterial coordination analysis, conceptual drawings of recommended improvements with supporting documentation, cost estimates and a proposed sequential improvement plan.

Task Product

Intersection Analysis Report (1 PDF)

3.3 STUDY TYPE IIIA: SIGNAL WARRANT ANALYSIS (4-Legged Intersection)
STUDY TYPE IIIB: SIGNAL WARRANT ANALYSIS (T-Intersection)

Purpose
This study is intended to provide a specific determination as to whether or not a particular intersection meets warrants for signalization and, if so, whether or not a signal should be installed. The engineer should also identify any improvements (such as geometrics, signing, marking, lighting, etc.) for consideration by the department, if he/she feels it appropriate.

Basis of Payment
A signal warrant analysis will be authorized on an intersection-by-intersection basis. The established unit price per intersection shall be considered full compensation for all work required to perform this study.

Period of Performance
The normal period of performance allowed for completion of a signal warrant analysis shall be 1 month for each location.

Scope of Work

This section specifies the work tasks to be performed by the CONSULTANT, the responsibilities of the CONSULTANT and the Department, as well as the products and reports to be developed by the CONSULTANT and delivered to the Department at the completion of the signal warrant analysis. It is intended that work tasks 1, 2, 3, 4, 5a, 6 & 7 be completed as a part of this Study Type for a 4-legged intersection. It is intended that work tasks 1, 2, 3, 4, 5b, 6 & 7 be completed as a part of this Study Type for a T-intersection.

Task 1: QUALITATIVE ASSESSMENT

A qualified engineer of the firm shall visit the intersection under study during the morning and evening peak traffic periods in the same time period of the data collection in order to make qualitative assessments of intersection operation, particularly in terms of queue lengths, delays, conflicts or any other operational characteristics which should be considered in evaluating the need for a traffic signal.

Photographs shall be taken to document any geometric, traffic, or traffic control aspects which the DPM needs to be made aware of.

The CONSULTANT shall recommend to the DPM the need for supplemental work tasks.

Task Product

Assessment of Intersection Operation
Recommendation for Supplemental Work Tasks

Task 2: 8-HOUR TURNING MOVEMENT COUNTS

Hourly turning movement counts and pedestrian/bicycle counts shall be taken for a total of eight hours encompassing the morning, midday, and evening peak traffic periods and/or other peak periods during which warranting volumes might exist. The count shall be collected on a typical weekday (Tuesday, Wednesday or Thursday) unless otherwise directed by the DPM. Counts should not be taken during adverse weather conditions or when the intersection is within a construction zone. Turning movement counts shall be provided in 15-minute intervals for all vehicles (automobiles, trucks and buses) and for trucks and buses only. U-turn and right turn on red turning movement counts will also be shown.

Task Product

8-hour turning movement volumes
8-hour pedestrian and bicycle volumes

Task 3: 24-HOUR TRAFFIC COUNTS

The CONSULTANT shall collect traffic count data for a minimum period of 24 hours during typical weekday (Tuesday, Wednesday or Thursday) traffic conditions. In conducting the counts, the CONSULTANT shall utilize an automatic traffic counter that

produces a written record of the traffic volumes and the time of day, either directly or through subsequent interconnection and processing with external electronic hardware. The count data shall be presented in tabular form showing 15-minute interval volumes and hourly summaries.

Task Product

24-Hour Approach Volume Counts

Task 4: FIELD INVENTORY

The CONSULTANT shall conduct a field inventory of each intersection under study and prepare a condition diagram on standard Department forms contained in the Manual on Uniform Traffic Studies or in another format approved by the Department. Condition diagrams shall include intersection geometry, all traffic control devices, and other roadway or roadside elements that contribute to the quality of intersection operation. The condition diagram shall show lane assignments and lengths of turn lanes. The posted speed on both intersecting roadways shall also be shown.

Task Product

Condition Diagram

Task 5a: INTERSECTION DELAY ANALYSIS (4-Legged Intersection)

An intersection delay analysis shall be made for four consecutive 15-minute periods during morning and afternoon peak hours for both side street approaches. Delay analysis should be done on a typical weekday (Tuesday, Wednesday or Thursday). This study shall be performed in accordance with the Manual on Uniform Traffic Studies (MUTS). The study will provide some basic measures of delays, such as the average vehicle delay, presently existing at an intersection.

Task Product

Intersection Delay Analysis

Task 5b: INTERSECTION DELAY ANALYSIS (T-Intersection)

An intersection delay analysis shall be made for four consecutive 15-minute periods during morning and afternoon peak hours for one side street approach. Delay analysis should be done on a typical weekday (Tuesday, Wednesday or Thursday). This study shall be performed in accordance with the MUTS. The study will provide some basic measures of delays, such as the average vehicle delay, presently existing at an intersection.

Task Product

Intersection Delay Analysis

Task 6: CRASH ANALYSIS

The CONSULTANT, using his own computer equipment and instructions provided by the DPM, will obtain authorization to access the Department's Crash Analysis Reporting (CAR) Online System and University of Florida's Signal Four Analytics. The CONSULTANT will then obtain electronic copies of crash records from these systems. Crash report images can then be viewed, stored electronically, or printed. The CONSULTANT will also contact the local jurisdiction to request local crash information when available.

The CONSULTANT will then prepare collision diagrams in a DPM approved format. The diagrams shall depict the most recent full 5 years for which data is available.

A crash analysis shall be performed based on a review of the crash reports and the prepared diagrams. The crash analysis will identify the source of the crash information and include a summary table of the crashes.

Task Product

Crash Analysis
Collision Diagram

Task 7: WARRANT ANALYSIS AND RECOMMENDATION

The CONSULTANT shall analyze the collected data in light of the warranting conditions for the warrants described in the MUTCD, the Department's MUTS, and accepted traffic engineering practice. From this analysis, a recommendation shall be formulated as to whether or not a traffic signal should be installed. The recommendation and the basis for it shall be documented in a summary report. Attached to this report shall be a completed Departmental Traffic Signal Warrant Form, the condition diagram, the collision diagram, and the products of any authorized supplemental work tasks. Each intersection studied shall be documented in such a package.

Task Product

Warrant Analysis Report (1 PDF)
Warrant Analysis Summary Table (1 PDF)

3.4 STUDY TYPE IV: COMPOSITE STUDY

Purpose

The composite study is designed to enable the District Traffic Operations Office to utilize the services of the CONSULTANT in solving a variety of traffic problems. This study requires the DPM and CONSULTANT to develop the study design for a particular traffic problem by selecting appropriate

tasks defined herein.

Basis of Payment

This study is designed to be flexible. Therefore, each task shall be priced individually. Any combination of tasks may be selected for a particular composite study. Payment for each composite study will be the summation of the prices for selected tasks. The price for each task is based on its individual unit price, if multiple units are required, the task cost will be the number of units times the individual unit price.

Scope of Work

This section specifies the work tasks that may be performed by the Consultant for a particular composite study; the responsibilities of the CONSULTANT and the Department, and the work task products to be developed by the CONSULTANT and delivered to the Department. A composite study may be made up of only one work task or a combination of the work tasks.

Task 1: 8-HOUR TURNING MOVEMENT COUNTS

Hourly turning movement counts and pedestrian/bicycle counts shall be taken for a total of eight hours encompassing the morning, midday and evening peak traffic periods and/or other peak periods during which warranting volumes might exist. The count shall be collected on a typical weekday (Tuesday, Wednesday or Thursday) unless otherwise directed by the DPM. Counts should not be taken during adverse weather conditions or when the intersection is within a construction zone. Turning movement counts shall be provided in 15-minute intervals for all vehicles (automobiles, trucks and buses) and for trucks and buses only. U-turn and right turn on red turning movement counts will also be shown.

Task Product

8-hour turning movement volumes
8-hour pedestrian and bicycle volumes

Task 2: 4-HOUR TURNING MOVEMENT COUNTS

Hourly turning movement counts and pedestrian/bicycle counts shall be taken for a total of four hours encompassing the morning and afternoon peak hours, and/or other peak periods as directed by the DPM. The count is intended for use at minor intersections and low volume driveways. The count shall be collected on a typical weekday (Tuesday, Wednesday or Thursday) unless otherwise directed by the DPM. Counts should not be taken during adverse weather conditions or when the intersection is within a construction zone. Turning movement counts shall be provided in 15-minute intervals for all vehicles (automobiles, trucks and buses) and for trucks and buses only. U-turn and right turn on red turning movement counts should also be shown.

Task Product

4-hour turning movement volumes
4-hour pedestrian and bicycle volumes

Task 3: 12-HOUR TURNING MOVEMENT COUNTS

Hourly turning movement counts and pedestrian/bicycle counts shall be taken for a total of twelve hours encompassing either the 6:00 a.m. to 6:00 p.m., 7:00 a.m. to 7:00 p.m. or other twelve-hour period during which turning volume counts are needed. The count shall be collected on a typical weekday (Tuesday, Wednesday or Thursday) unless otherwise directed by the DPM. Counts should not be taken during adverse weather conditions or when the intersection is within a construction zone. Turning movement counts shall be provided in 15-minute intervals for all vehicles (automobiles, trucks and buses) and for trucks and buses only. U-turn and right turn on red turning movement counts will also be shown.

Task Product

12-hour turning movement volumes
12-hour pedestrian and bicycle volumes

Task 4: 24-HOUR APPROACH TRAFFIC COUNT

The CONSULTANT shall collect and summarize hourly traffic count data for a minimum period of 24 hours during typical weekday (Tuesday, Wednesday or Thursday) traffic conditions on all approaches. Count data shall be recorded by automatic devices furnished by the CONSULTANT. The count data shall be presented in tabular form broken down into direction of travel showing 15-minute interval volumes and hourly summaries.

Task Product

24-Hour Approach Volume Counts

Task 5: 3-DAY CONTINUOUS TRAFFIC COUNT

The CONSULTANT shall collect counts for a period of at least three (3) consecutive days for each direction of travel on the main artery. Count data shall be recorded by automatic devices furnished by the CONSULTANT. From the count data, a tabular presentation of directional traffic volumes shall be developed showing 15-minute interval volumes and hourly summaries over the three consecutive day period. A graphical presentation shall be developed showing hourly interval volumes over the three consecutive day period. The 3-day period shall not include a holiday unless otherwise directed by the DPM.

Task Product

3-Day Graph and Table

Task 6: 7-DAY CONTINUOUS TRAFFIC COUNT

The CONSULTANT shall collect counts for a period of at least seven (7) consecutive days for each direction of travel on the main artery. Count data shall be recorded by automatic devices furnished by the CONSULTANT. From the count data, a tabular presentation of directional traffic volumes shall be developed showing 15-minute interval volumes and hourly summaries over the seven consecutive day period. A graphical presentation shall be developed showing hourly interval volumes over the seven consecutive day period. The 7-day period shall not include a holiday unless otherwise directed by the DPM.

Task Product

7-Day Graph and Table

Task 7: PEDESTRIAN GROUP SIZE STUDY

The CONSULTANT shall perform a Pedestrian Group Size Study in accordance with the procedures outlined in Chapter 9 of the MUTS.

Task Product

Pedestrian Group Size Study

Task 8: 8-HOUR PEDESTRIAN-BICYCLE COUNT

The CONSULTANT shall perform an hourly manual pedestrian-bicycle count for a total of eight hours encompassing the morning, midday, and evening peak traffic periods and/or other peak periods during which warranting pedestrian-bicycle volumes might exist.

Task Product

8-hour pedestrian-bicycle volumes

Task 9: VEHICLE GAP SIZE STUDY

The CONSULTANT shall conduct a Vehicle Gap Size Study in accordance with the procedures outlined in Chapter 8 of the MUTS.

Task Product

Vehicle Gap Size Study

Task 10: LEFT TURN DELAY STUDY

A left turn delay study consists of reviewing the left turning vehicles at a signalized intersection where this movement is permissive or protected/permissive (5 section signal head) to determine if there are sufficient gaps in the opposing traffic stream to make this turn. This study consists of documenting how many left turning vehicles per cycle are waiting at the beginning of the green, how many move on the green arrow and/or green ball, how many make their movement on the yellow and red arrow or ball and how many are waiting at the end of the yellow arrow or ball. It also requires counting, per cycle, the opposing right turn, through, and left turn traffic volumes. It is intended for a study to be performed for each separate movement specified and shall be performed in both the morning and afternoon peak hours. This data shall be presented in tabular form showing each cycle counted/observed. Data shall be collected on a typical weekday (Tuesday, Wednesday or Thursday).

Task Product

Left Turn Delay Table (one approach)

Task 11: INTERSECTION DELAY ANALYSIS

An intersection delay analysis shall be made for four consecutive 15-minute periods during morning and afternoon peak hours for one side street approach. The counts shall be collected on a typical weekday (Tuesday, Wednesday or Thursday). This study shall be performed in accordance with the procedures outlined in Chapter 7 of the MUTS. The study will provide some basic measures of delays, such as the average vehicle delay, presently existing at an intersection.

Task Product

Intersection Delay Analysis (one approach)

Task 12: FIELD INVENTORY

The CONSULTANT shall conduct a field inventory of each intersection under study and prepare a condition diagram on standard Department forms contained in the Manual on Uniform Traffic Studies or in another format approved by the Department. Condition diagrams shall include intersection geometry, all traffic control devices, and other roadway or roadside elements which contribute to the quality of intersection operation. The condition diagram shall show lane assignments and lengths of turn lanes. The posted speed on both intersecting roadways shall also be shown.

Task Product

Condition Diagram

Task 13: CRASH ANALYSIS

The CONSULTANT, using his own computer equipment and instructions provided by

the DPM, will obtain authorization to access the Department's Crash Analysis Reporting (CAR) Online System and University of Florida's Signal Four Analytics. The CONSULTANT will then obtain electronic copies of crash records from these systems. Crash report images can then be viewed, stored electronically, or printed. The CONSULTANT will also contact the local jurisdiction to request local crash information when available.

The CONSULTANT will then prepare collision diagrams in a DPM approved format. The diagrams shall depict the most recent full 5 years for which data is available.

When complete crash data is not available from the Department's database, the CONSULTANT will contact local jurisdictions to obtain.

A crash analysis shall be performed based on a review of the crash reports and the prepared diagrams. The crash analysis will identify the source of the crash information and include a summary table of the crashes.

Task Product

Crash Analysis
Collision Diagram

Task 14: QUALITATIVE ASSESSMENT

A qualified Engineer of the firm shall visit the intersection under study during the morning and evening peak traffic periods in the same time period of the data collection in order to make qualitative assessments of intersection operation, particularly in terms of queue lengths, delays, conflicts or any other operational characteristics which should be considered in evaluating the need for a traffic signal.

Photographs shall be taken of any geometric, traffic, or traffic control aspects about which the DPM should be aware.

The CONSULTANT shall recommend to the DPM the need for supplemental work tasks.

Task Product

Assessment of Intersection Operation
Recommendation for Supplemental Work Tasks

Task 15: DEVELOPMENT OF ALTERNATIVES AND RECOMMENDATIONS

Utilizing the products from other tasks in a composite study, the CONSULTANT will develop and analyze feasible and appropriate alternatives, which address solutions to the defined problem(s). Based on this analysis, the CONSULTANT shall recommend one of the alternatives.

Task Product

Development of Alternatives
Analysis of Alternatives
Recommended Alternative

Task 16: PREPARATION AND SUBMITTAL OF REPORT

The CONSULTANT shall document the results and recommendations from all tasks in a composite study in a bound, written report.

Task Product

Study Report (1 pdf)

Task 17: TRAFFIC SIGNAL EQUIPMENT INVENTORY (with travel time)

The CONSULTANT shall conduct a field inventory of the signal equipment at a specified intersection documenting the number of poles and mast arms, pole type and length, span configuration, cabinet and controller type, pedestrian features, detection type, signal heads, street name signs and pre-emption. The inventory shall be submitted in a format (Access database or Excel spreadsheet) approved by the DPM.

Photographs shall be taken as directed by DPM.

Task Product

Signal Equipment Inventory

Task 18: TRAFFIC SIGNAL EQUIPMENT INVENTORY (without travel time)

This task will be used in conjunction with Task 19 when multiple signalized intersections on a highway are to be inventoried. The CONSULTANT shall conduct a field inventory of the signal equipment at a specified intersection documenting the number of poles and mast arms, pole type and length, span configuration, cabinet and controller type, pedestrian features, detection type, signal heads, street name signs and pre-emption. The inventory shall be submitted in a format (Access database or Excel spreadsheet) approved by the DPM.

Photographs shall be taken as directed by DPM.

Task Product

Signal Equipment Inventory

Task 19: NO-PASSING ZONE STUDY

The CONSULTANT shall conduct a No-Passing Zone Study for a specified section of State Highway. This type of study will be performed to determine what type of pavement markings should be used in the center line of a roadway, i.e., broken yellow line or solid yellow line, so that motorists have an indication of where it is safe to pass another vehicle. The no-passing areas include vertical and horizontal curves, railroad grade crossings, narrow bridges, intersections, transitions to and from multi-lane sections of roadway, and other locations where passing must be prohibited because of inadequate sight distance or other special conditions. All no-passing zones shall be established in accordance with the guidelines provided in Chapter 11 of the MUTS.

Task Product

No-Passing Zone Study

Task 20: ADVISORY SPEED STUDY

The CONSULTANT shall conduct an Advisory Speed Study for a specified section of State Highway. This type of study will be performed to determine the safe speed a vehicle can negotiate a given horizontal curve under ideal conditions. The study is also used to determine where turn and curve signs with advisory speed plaques are required for horizontal curves. All advisory speeds on horizontal curves shall be established in accordance with the guidelines provided in Chapter 10 of the MUTS.

Task Product

Advisory Speed Study

Task 21: SPEED ZONE STUDY REPORT

The CONSULTANT shall prepare a Speed Zone Study report based on the spot speed study and FDOT manual, SPEED ZONING FOR HIGHWAYS, ROADS AND STREETS IN FLORIDA, current version, and in accordance with the MUTS. Using these guidelines, the CONSULTANT shall prepare a report with recommendations on changes to existing speed zones. Three years of safety history and design elements shall be discussed as pertinent to any speed limit changes recommended. Existing speed zone data will be provided by the DEPARTMENT. The inventory of existing speed limit signs will be the responsibility of the CONSULTANT.

Task Product

Speed zone study report

Task 22: VEHICLE SPOT SPEED STUDY (with travel time)

A vehicle spot speed study is designed to measure the speed characteristics of vehicles in both directions at a specified location under free flow conditions (off peak periods) at the time the study was taken. Studies should be taken on a typical weekday (Tuesday,

Wednesday or Thursday) unless otherwise directed by the DPM. Studies should not be conducted during adverse weather conditions, during peak hours, or within a construction project. This study shall be made as directed by the MUTS and should utilize the standard forms contained in this manual, unless the use of other forms are approved by the DPM. The studies will be taken with either a radar or laser speed detection device and the results presented shall document the 85th percentile speed in both directions of the roadway studied. It shall also contain the posted speed, the average speed, the 50th percentile speed, the 10 mile per hour pace with the number of vehicles contained in the pace and the percent of vehicles contained in the pace, for both directions of travel with a minimum of 100 samples for each direction. In addition, the study shall include GPS coordinates for each individual speed study location.

Task Product

Vehicular Spot Speed Study
Summary Table

Task 23: VEHICLE SPOT SPEED STUDY (without travel time)

This task will be used in conjunction with Task 22 when more than one spot speed study is required for a roadway segment.

Task Product

Vehicular Spot Speed Study
Summary Table

Task 24: VEHICLE SPOT SPEED STUDY (24 Hours, All Vehicles, With Travel Time)

This task is similar to Task 22 except it is for a 24-hour period using automated in-road (such as pneumatic tubes) or roadside measurement equipment. The study shall be for vehicles in both directions within a segment of roadway. Studies should be taken on a typical weekday (Tuesday, Wednesday or Thursday) unless otherwise directed by the DPM. This study shall be made as directed by the MUTS and should utilize the standard forms contained in this manual, unless the use of other forms is approved by the DPM. The studies shall document the 85th percentile speed in both directions of the roadway studied. It shall also contain the posted speed, the average speed, the 50th percentile speed, the 10 mile per hour pace with the number of vehicles contained in the pace and the percent of vehicles contained in the pace, for both directions of travel. If a composite study consists of two or more spot speed studies, a summary table shall be provided. In addition, the study shall include GPS coordinates for each individual speed study location. The summary table should include the date, time and speed of every vehicle.

Task Product

Vehicular Spot Speed Study
Summary Table

Task 25: VEHICLE SPOT SPEED STUDY (24 Hours, All Vehicles, Without Travel Time)

This task will be used in conjunction with Task 24 when more than one spot speed study is required for a roadway segment.

Task Product

Vehicular Spot Speed Study
Summary Table

Task 26: VEHICLE CLASSIFICATION COUNT (24 Hours, All Vehicles, With Travel Time)

This task is similar to Task 24 except information regarding vehicle types which pass a particular point on the roadway for a 24-hour period using automated in-road (such as pneumatic tubes) or roadside measurement equipment will also be collected. The purpose of classification counting is to determine the vehicle mix of the traffic stream for axle conversion factors, pavement design and planning purposes. Counters should segregate traffic into the 13 categories used by the Federal Highway Administration (FHWA). The study shall be for vehicles in both directions. Studies should be taken on a typical weekday (Tuesday, Wednesday or Thursday) unless otherwise directed by the DPM. This study shall be made as directed by the MUTS and should utilize the standard forms contained in this manual, unless the use of other forms are approved by the DPM. The studies shall document the 85th percentile speed in both directions of the roadway studied. It shall also contain the posted speed, the average speed, the 50th percentile speed, the 10 mile per hour pace with the number of vehicles contained in the pace and the percent of vehicles contained in the pace, for both directions of travel. If a composite study consists of two or more spot speed studies, a summary table shall be provided. In addition, the study shall include GPS coordinates for each individual vehicle classification count/speed study location. The summary table should include the date, time, speed and classification of every vehicle.

Task Product

Vehicle Classification Count
Vehicular Spot Speed Study
Summary Table

Task 27: VEHICLE CLASSIFICATION COUNT (24 Hours, All Vehicles, Without Travel Time)

This task will be used in conjunction with Task 26 when more than one vehicle classification count is required for a roadway segment.

Task Product

Vehicle Classification Count
Vehicular Spot Speed Study
Summary Table

Task 28a: ROUNDABOUT INVENTORY

The CONSULTANT shall be responsible for determining all input parameters and obtaining all field data for the roundabout analysis. The field review will include identifying any utilities discernible from a ground level view. This may include electrical transmission lines, natural gas pipelines, other utilities (water, wastewater, etc.) correspondent easements, railroads, etc. The review will also document any potential site characteristics that may influence the roundabout feasibility such as adjacent wetlands or other drainage features, parks or historic properties, structures, property access, or other environmental concerns.

The CONSULTANT shall perform a cursory geometric screening to review potential impacts based upon the estimated roundabout size. The review will be conducted over scaled aerial photography (rectified) with the intent to highlight any potential issues identifiable in this cursory screening. This could include expected needs for additional Right-of-Way (ROW), possible environmental or utility impacts, expected needs for approach realignments that could impact adjacent properties, etc. These items will be coordinated with appropriate FDOT staff to determine possible options to be explored as part of the concept development.

Task Product

Summary of existing field conditions

Task 28b: SIDRA INTERSECTION ANALYSIS

The CONSULTANT shall use SIDRA computer program to compare the existing conditions of an intersection to the proposed roundabout alternative. The CONSULTANT should refer to FDOT's Intersection Design Guide for guidance regarding accepted methodologies and input parameters. The CONSULTANT shall identify the existing operating mode of the intersection and a minimum of three periods will be analyzed (normally the morning, midday and evening peak hours). For existing signalized intersections, the CONSULTANT will obtain existing signal timings from the maintaining agency for use in the analysis. The analysis should include a sensitivity analysis to determine the longevity of the roundabout and its capacity to accommodate future growth. The results of the SIDRA analyses for the existing and proposed roundabout shall be tabulated. The results shall include the volume-to-capacity ratio, average control delay, level of service and 95th percentile queue lengths by approach.

Task Product

Summary of measures of effectiveness

Task 28c: BENEFIT/COST ANALYSIS

The CONSULTANT will develop a benefit cost analysis based on the alternatives proposed. Based on this analysis, the consultant shall recommend one of the alternatives.

Task Product

Benefit/Cost Analysis

Task 28d: ROUNDABOUT CONCEPT DEVELOPMENT

The CONSULTANT will develop a conceptual plan-view roundabout layout to a level sufficient to verify that the concept will meet the objectives outlined in NCHRP Report 672, including fastest path speeds, heavy vehicle accommodation, natural vehicle paths, and multimodal accommodation. The development of the roundabout concept will take into consideration the appropriate size and placement of the inscribed circle, and the alignment and arrangement of approaches to meet the geometric objectives outlined in NCHRP Report 672.

Task Product

Roundabout concept drawing

Task 29a: ICE STAGE 1 - SCREENING

The CAP-X and SPICE tools provided by the Department will be used by the CONSULTANT in this evaluation. The CONSULTANT will select up to four (4) alternatives to be evaluated with the Stage 2 analysis and approved by the Department prior to beginning the Stage 2 analysis.

Task Product

Technical Memorandum
CAP-X Analysis summary
SPICE Summary
Stage 1 ICE Form

Task 29b: ICE STAGE 2 - PRELIMINARY CONTROL STRATEGY ASSESSMENT

The Stage 2 analysis will include the development of concept plans and a cost estimate for up to 3 alternatives. The CONSULTANT will select the preferred alternative based on the ICE analysis. A meeting will be held with the Department to discuss the recommendations and determine the Department's recommendation prior to finalizing the study. Since the ICE spreadsheets and Synchro templates are constantly being refined by the Department as they receive feedback and debug the materials, there may be newer versions of tools that become available during the timeline of this evaluation. The CONSULTANT will utilize the version that is current at the start of the evaluation and

will continue to utilize the same spreadsheet for the duration of the evaluation. This task will be negotiated based on a scope of work developed jointly by the Consultant and the Department.

Task Product

Technical Memorandum
SPICE Summary
FDOT ICE Tool summary
Stage 2 ICE form
Intersection concept plans
Construction cost estimates
Stage 2 meeting

Task 29c: ICE STAGE 3- DETAILED CONTROL STRATEGY ASSESSMENT

The Stage 3 requires a more detailed assessment of remaining viable control strategies, collection of additional data as needed to support analysis and/or public vetting of control strategy options. When Stage 1 or Stage 2 does not identify a selected control strategy, Stage 3 activities may be customized to address the outstanding issues. This task will be negotiated based on a scope of work developed jointly by the Consultant and the Department.

Task Product

Technical Memorandum
Stage 3 ICE Form
Intersection Concept Plan
Cost estimate
Detailed Capacity Analysis

Task 30: ICE Peer Review

The CONSULTANT will conduct a peer review of all ICE analyses. Review comments will be documented and submitted to the department in a memorandum.

Task Product

Memorandum documenting the ICE peer review comments.

Department Responsibility

The Department will provide the consultant the following files to conduct a complete and thorough review:

- The Stage 1 CAP-X and SPICE analysis spreadsheets
- The Stage 2 Operations Analysis in Synchro, SIDRA, or HCS
- The Stage 2 SPICE and FDOT ICE Tool in spreadsheet format

- The Stage 2 Concept Plan and Cost Estimate
- The Stage 3 Detailed Analysis, Intersection Concept Plan, and Cost Estimate

Task 31: MANAGEMENT OF SUB CONSULTANT

The CONSULTANT may assign one or multiple tasks for a composite study to a sub consultant. This task will be used for oversight of the sub consultant's work and may include activities such as management and QA/QC.

Task Product

Submittal of Sub Consultant's tasks

Task 32a: MEETINGS

The CONSULTANT shall attend meetings to assist the Department in developing and responding to traffic study issues. Meetings shall be held with, but are not limited to: Committees for County MPOs, all District MPOs, all District City Councils, all District Board of County Commissioners, all types of District meetings and the public. The meeting shall be attended by one senior level traffic engineer. The duration of the meetings will be up to 6 hours each (including travel time).

Task Product

Attendance at Meetings

Task 32b. MEETING PREPARATION

The CONSULTANT shall research and prepare for meetings to assist the Department in developing and responding to traffic study issues.

Task Product

Presentation Material/Meeting Notes

Task 33: IN-HOUSE SUPPORT

The CONSULTANT shall assign one (1) staff person to work under the direct management and supervision of the Department Project Manager. This staff person shall be a Professional Engineer licensed in the state of Florida or Engineering Intern (EI) experienced with traffic engineering analysis and the preparation of traffic engineering reports. The work assignments for this staff person can be any tasks related to a traffic operations.

Task Product

Miscellaneous in-house staffing assignments.

Department Responsibility

The DEPARTMENT shall specify the duration of in-house staff support needed, in the task work order.

Task 34: MISCELLANEOUS STUDIES

The CONSULTANT shall conduct miscellaneous studies based on a scope of work developed jointly by the Consultant and the Department.

Task Product

Miscellaneous assignments.