EXHIBIT A

SCOPE OF SERVICES

District-Wide Traffic Operations/Safety Studies

(Work Group 6.1)

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SCOPE OF SERVICES

District-Wide Safety/Traffic Operations Studies (Work Group 6.1)

OBJECTIVE

The general purpose of this consultant contract is to provide the Department with professional traffic engineering services through the development of various traffic operations and safety studies that will be identified for intersections, arterials, etc., and related improvement recommendations and evaluations.

All reports/studies are to be signed and sealed by a professional engineer registered in Florida whose area of specialty is traffic engineering. The Department must approve the studies to fulfill the requirements of the contract. As part of this approval process, a preliminary or draft report is to be submitted for Department review before submitting the final signed and sealed document. The Department's Project Manager will determine the submittal dates for the draft and final reports.

Authorization to perform the required services shall be conveyed to the Consultant through a Task Work Order for Professional Services (TWO) issued by the Department's Project Manager. The Task Work Orders specify the limits of the study area, the desired task activities to be performed, the estimated completion date, the products to be submitted to the Department, and the total price to be paid to the Consultant for services rendered and approved. Each Task Work Order issued by the Department's Project Manager shall serve as the formal authorization, effective the date of the Letter of Authorization or a subsequent date if so specified.

SERVICES

The Consultant shall provide engineering services to satisfy the Department's stated contract objectives as further described in the following overall service types and tasks.

PROJECT MANAGEMENT

This service type includes management activities conducted by the Consultant to ensure the satisfactory completion of the contract requirements. Project management is a continuous service rendered throughout the duration of the contract and includes scheduling, monitoring, documenting and reporting activities. These activities will be used to assist in the Department's review of the Consultant's conformance to the scope of services. For this contract, project management will be divided into three (3) areas; 1) schedule/status reports, 2) meetings and 3) project records/files. This service will be paid as part of the individual TWO.

SCHEDULE/STATUS REPORTS

The Consultant shall submit, when requested by the Department's project manager, a project schedule for each study location within one week after receiving the "Task Work Order". This project schedule will address the establishment of time frames for completing the applicable task activities outlined in the Task Work Order. The Consultant shall also meet with the project manager monthly or prepare monthly status reports of the Contract's progress as directed by the Department's project manager. This status report shall include, but not be limited to, a discussion of technical/contract administration problems encountered and resolved, updates to and variations from the project schedule(s), and a current comparison of contract expenditures by task activity to include anticipated and actual billing costs to the Department for work

satisfactorily completed. Two (2) copies of the monthly status report shall be delivered to the Department by the tenth day of the following month.

The Department shall provide prompt review and comments of the monthly status report as needed and provide guidance in the resolution of any problems or schedule variation.

Products

i) Project schedules with updates
ii) Monthly status reports

MEETINGS

Periodic meetings, no less than every other month, relating to the performance of contract services and tasks, will be necessary throughout the duration of the contract. The Consultant shall prepare minutes of each meeting to include "action" items developed and/or assigned. These minutes shall be distributed to all attendees within one week after the meeting.

Product

i) Meeting minutes

CONTRACT RECORDS AND FILES

The Consultant shall maintain the records and files for the work required in this contract. The records and files shall contain all correspondence to and from the Consultant related to the completion of work. This also includes any other materials, traffic data, or information that the Consultant has obtained or has been sent/given to the Consultant. The records and files shall include all TWOs completed to date and shall be delivered to the Department every four (4) months. This submittal shall include the deliverable for each TWO in an electronic format (PDF preferably for the reports), as needed by the Department Project Manager.

The Department shall forward to the Consultant copies of all correspondence, materials, traffic data and other information received/directed to others if related to the work in this contract and appropriate for the contract files.

Product

i) Contract records and files

SERVICE TYPE 1 - QUALITATIVE ASSESSMENT

Task 1A - Qualitative Assessment (Intersection)

A qualified traffic engineer of the firm, experienced in the traffic engineering discipline, and registered in the state of Florida (PTOE Certified Preferred) shall visit the location under study during the morning and evening peak traffic periods or other period (such as a crash peak or school dismissal) as specified by the Department’s project manager, to make qualitative assessments of the intersection operation. Such factors as queue lengths, delays, vehicular conflicts or any other operational characteristics critical to evaluate the need for intersection improvements, signal control, and left-turn phase, etc. shall be noted. During the field review safety conditions must also be observed and recorded.

The Consultant shall also examine the physical features to document evidence of high-crash conditions and observe traffic movements for high-risk maneuvers. In addition, the Consultant will review geometry and traffic control devices for deficiencies related to abnormal crash patterns and identify potential driver expectancy problems. The Consultant will complete a standard Field Observation Report form or equivalent form approved by the Project Manager.

Photographs shall be taken of all intersection approaches with emphasis on obtaining visual information that would be of value to the Department during any subsequent project plan preparation activities. For example, utility conflicts, right-of-way constraints, obstructions, unusual geometries, deficient pavement conditions or markings, etc. should be photographed and/or otherwise detailed as appropriate. Photos and other details, as appropriate will be included in the report.

The Consultant shall collect hourly traffic count data on each approach to the intersection for a minimum period of 72 hours during typical weekday traffic conditions or as otherwise specified. Traffic count data should be recorded by automatic traffic recorders (ATR) furnished by the Consultant. In addition, the Consultant shall collect fifteen-minute peak-hour turning movement counts (two hours in the morning and two hours in the afternoon or other peak periods during which warranting volumes might exist) and pedestrian volume shall be taken for a total of four (4) hours encompassing the morning and afternoon peak periods and representative off-peak periods as needed. The consultant shall review the traffic count data and the results of this qualitative assessment shall be incorporated in an official recording of field review observations.

The Consultant must also review five years of latest crash history available for the intersection following "FDOT Crash Data Guidance" located in the Safety Office website. This review includes the preparation of crash summary sheets. The crash summary shall at a minimum include the classification of crashes by type, time of day, day of the week, and month. Injury severity must also be documented in the summary as well as weather and lighting conditions under which the crash occurred. Consultant shall calculate the safety ratio and confidence level for the spot under study and thus determine if the location is a high crash location.

Finally, the consultant shall also recommend to the Department the need for any improvements and/or further study if necessary.

Task 1A Products

i) Assessment of intersection safety and operation in report form (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)
ii) 72-hour approach volume counts
iii) Four-hour turning movement counts/with pedestrian volume
iv) Recommendations for improvements and/or further study if necessary
v) Crash summary review (include crash summary sheets)

Task 1B - Qualitative Assessment (Arterial)

The Qualitative Assessment (Arterial) analysis will be conducted along a study section that for the purpose of this contract is assumed for an urban section to be one mile in length with 4 signals or less, or a two (2) mile rural section with not more than two signals. A qualified traffic engineer of the firm, experienced in the traffic engineering discipline, and registered in the state of Florida (PTOE Certified Preferred), shall visit the arterial under study during the morning and evening peak traffic period, or other period as specified by the Department's Project Manager, in order to make qualitative assessments of arterial operation, particularly in terms of queue lengths, delays, travel speeds, high crash segments, high crash spots, access, conflicts

or any other operational characteristics that should be considered in evaluating the need for safety or operational improvements.

The Consultant must also review five years of latest crash history available for the arterial following “FDOT Crash Data Guidance” located in the Safety Office website. This review includes the preparation of crash summary sheets. The crash summary shall at a minimum include the classification of crashes by type, time of day, day of the week, and month. Injury severity must also be documented in the summary as well as weather and lighting conditions under which the crash occurred. Consultant shall calculate the safety ratio and confidence level for the spots within the study area and for the segment and thus determine if spots/segment is high crash locations.

The Consultant shall also evaluate the arterial’s conformance to current access management criteria. The evaluation shall include an assessment of the nonconforming locations that may be affecting safety and/or level of service. It should also include any recommendations to rectify the nonconformance if warranted.

The Consultant shall perform standard travel time and delay studies along the subject arterial using the manual method or the computerized, both of which are demonstrated in the Manual on Uniform Traffic Studies (MUTS). The Department’s Project Manager must approve other state-of-the-art techniques.

Travel time and delay studies shall be conducted in each direction of travel during the morning and evening peak traffic periods and during a daytime off-peak period. A minimum of six (6) runs shall be made for each direction and time period. From the travel time and delay data, a speed profile shall be developed for each condition. The profiles shall be supplemented with a written analysis of the location and determination of possible causes of the measured delays and constrained running speeds.

Photographs shall be taken of any geometric, traffic or traffic control aspect about which the Department’s Project Manager should be aware. The Consultant shall recommend to the Department the need for any improvements and/or further study if necessary.

Task 1B Products

i) Assessment of the arterial safety and operation (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)
ii) Travel time and delay profiles
iii) Travel time and delay analysis
iv) Summarized data & most prominent delay location
v) Crash summary review (include crash summary sheets)
vi) Recommendation for improvements and/or further study if necessary

SERVICE TYPE 2 - SIGNAL WARRANT ANALYSIS

Task 2 - Signal Warrant Analysis

The Signal Warrant Analysis is the study used to evaluate a candidate location for possible signalization or signal removal. The Manual of Uniform Traffic Control Devices identifies the warrants that are to be evaluated as appropriate for the location. As an absolute minimum, the Signal Warrant Analysis will include the following activities.

Subtask 2(a) Intersection Inventory

The Consultant shall conduct a field inventory of each intersection under study and prepare a detailed condition diagram on standard Department form contained in the MUTS or in another format approved by the Department. Condition diagrams should be created using CADD (DGN format) and shall include intersection geometry, lane use/arrangements, and identification of all traffic control devices including pedestrian features, and other roadway or roadside elements that contribute to the quality of intersection operation or safety such as bus stops, school zones, sight distance obstructions, etc. within 300 feet. It shall also include any roadway features, which may be impacted by signal installation or proposed alternatives.

Subtask 2(a) Product

i) Condition diagram

Subtask 2(b) Crash Analysis

The consultant shall analyze the crash data, collision diagrams and identify abnormal crash characteristics or patterns. The Consultant will develop a list of possible causes and countermeasures for each abnormal crash pattern. These causes must be site specific, identified during field review of the location under study. The Consultant's engineer will quantify the abnormal crash history (using FDOT Crash Data Guidance located in the Safety office's website) whenever possible using scientifically based methods such as expected value analysis, safety ratio, confidence level, statewide/districtwide crash rates, Highway Safety Manual methods, or other statistical method.

Subtask 2(b) Products

i) Crash analysis (include crash summary sheets)
ii) Abnormal crash characteristics/patterns
iii) Possible crash causes and countermeasures for each abnormal pattern

Subtask 2(c) Warrant Analysis/Recommendations in Report Format

The analysis of the collected data and the evaluation of the applicable warrants described in the MUTCD, and the Department's Manual of Uniform Traffic Studies (MUTS) shall form the basis for the report. From the analysis and in consideration of accepted traffic engineering practice, the Consultant shall formulate a recommendation as to whether a signal is warranted and justified and should be considered for installation or removal.

(Special Note: It is expected that engineering judgment will be exercised in making final recommendations for installation of a traffic signal. Consideration should be given to such factors as spacing of adjacent signals, impact of the new signal on arterial operation, acceptable gaps in the mainline traffic, etc. If an intersection is determined to meet signal warrants, alternatives to signal installation described in the Department's Manual on Intersection Control Evaluation (Service Type 16) must be conducted to determine the appropriate intersection control strategy. Also, if applicable include other recommendations such as pavement markings, signage, channelization, etc. Attached to this report, in the form of appendices or figures (as appropriate), shall be the completed Departmental Warrant Analysis forms, Condition Diagrams, Collision Diagrams, and other products of Subtasks as described above.

Subtask 2(c) Products

i) Signal warrant analysis report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)
ii) Technician worksheets

SERVICE TYPE 3 - INTERSECTION ANALYSIS

Task 3 - Intersection Safety and Operational Analysis

The Intersection Analysis is the tool by which an intersection is evaluated, after observation and data analysis, to determine the need as well as opportunity for safety and operational improvements. For the purposes of contract negotiations, all intersection analyses shall be assumed to be performed at intersections under signal control. The Consultant is expected to consider intersection geometry, channelization, signal timing and phasing, display and operations, crash history (using FDOT Crash Data Guidance located in the FDOT Safety office's website), and delays as well as any other factors that impact the safety and operation of the intersection. Recommendations for improvement shall be evaluated for their effectiveness. A minimum of three (3) alternatives will be evaluated. The "Do Nothing" alternative may be included but not counted as one of the three alternatives. As a minimum, an Intersection Analysis will include the following activities.

Subtask 3(a) Intersection Inventory

The Consultant shall conduct a field inventory of each intersection under study and prepare a detailed condition diagram on standard Department form contained in the MUTS or in another format approved by the Department. Condition diagrams should be created using CADD (DGN format) and shall include intersection geometry, lane use/arrangements, and identification of all traffic control devices including pedestrian features, and other roadway or roadside elements that contribute to the quality of intersection operation or safety such as bus stops, school zones, sight distance obstructions, etc. within 300 feet. It shall also include any roadway features, which may be impacted by an alternative.

Subtask 3(a) Product

i) Condition diagram

Subtask 3(b) Crash Analysis

The consultant shall analyze the crash data, collision diagrams and identify abnormal crash characteristics or patterns. The Consultant will develop a list of possible causes and countermeasures for each abnormal crash pattern. These causes must be site specific, identified during field review of the location under study. The Consultant's engineer will quantify the abnormal crash history (following FDOT Crash Data Guidance) whenever possible using scientifically based methods such as expected value analysis, safety ratio, confidence level, statewide/districtwide crash rates, Predictive Method in the Highway Safety Manual, or other statistical method. Collision diagrams will be added as a separate task if not included on previous tasks.

Subtask 3(b) Products

i) Collision Diagrams
ii) Crash analysis (include crash summary sheets)
iii) Abnormal crash characteristics/patterns
iv) Possible crash causes and countermeasures for each abnormal pattern

Subtask 3(c) Intersection Delay Study

An Intersection Delay Study shall be made for a total of four (4) hours encompassing the morning and evening peak traffic periods or another period as specified by the Department's Project Manager. This is to be collected for two (2) approaches (one lane group/one movement per approach) and collected simultaneously with the turning movement counts. This study shall be performed in accordance with the MUTS or other method approved by the Department's Project Manager. The study will provide some basic measures of delays, such as the average vehicle delay, presently existing at the intersection. This will cover both signalized and un-signalized intersections.

Subtask 3(c) Products

i) Intersection delay study
ii) Technician's worksheets

Subtask 3(d) Level of Service Analysis

Using methodology based on the latest HIGHWAY CAPACITY MANUAL (HCM), the Consultant shall determine the existing and resulting level of service (LOS) for the existing and proposed alternatives or as directed by the Department. Level of service results obtained from running available software (such as HCS, Synchro, etc.) must be calibrated using field measured data such as delay or saturation flow rate. In some cases, as determined by Department's Project Manager, traffic simulation using CORSIM/VISSIM models may be required. This task will be negotiated separately.

An operational analysis will be used for critical intersection(s); the appropriate analysis as authorized by the Department's Project Manager will be utilized.

Subtask 3(d) Products

i) Level of service for existing condition
ii) Level of service for optimized existing conditions
iii) Level of service of proposed conditions
iv) Summary of proposed recommendations

Subtask 3(e) Recommendations for Improvements

From the results of the previous tasks, appropriate analysis, and any supplemental work tasks authorized by the Department's Project Manager, the Consultant shall make conceptual recommendations for optimizing the intersection operation - from both a safety and operational standpoint. The Consultant shall provide sketches, created in CADD (DGN format) with detailed measurements as appropriate, of existing conditions as well as proposed conditions for the improvement alternatives identified. All proposed intersection improvements should be evaluated for their overall and peak period effectiveness. The Consultant shall describe the expected number and type of crashes reduced by each improvement. As part of this effort the consultant shall evaluate the design criteria, design variances/exceptions, constructability and impacts (right of Way, drainage, permits, utilities, environmental, access management, American with Disabilities Act, etc.) of the alternatives.

Subtask 3(e) Products

i) Proposed improvement sketches
ii) Analysis of effectiveness for each Improvement

Subtask 3(f) Development of Preliminary Cost Estimates, Project Benefits

The Consultant shall determine a preliminary cost estimate (which will include PE, CEI and contingencies; also, R/W if available) of the improvement alternatives proposed using recent Department's historical cost data or other method as approved by the Department's Project Manager. The cost estimate shall make a distinction between the cost of the safety and operational improvements separately, so that safety and operational benefits can be clearly identified. Therefore, separate cost estimates for operational and safety improvements shall be submitted. The Consultant shall also determine the project/user safety and operational benefits resulting from implementation of the improvements identified. Project/user benefits will include such items as crash reduction, reduction in number of stops and delays and savings in fuel consumption. Nationally recognized references (such as those published by U.S.D.O.T.) shall be used to ascertain these benefits with the approval from the Department's Project Manager. The Consultant shall develop a safety benefit/cost ratio, an operational benefit/cost ratio and a total benefit/cost ratio for each of the proposed alternatives.

Subtask 3(f) Products

i) Cost estimates for proposed improvements (Safety/ Operational)
ii) Benefit/cost ratios (Safety/Operational/Total)

Subtask 3(g) Report

The products of previous subtasks within this study shall be analyzed collectively. The consultant shall then form an Intersection Analysis report. The report shall recommend, in consideration of accepted traffic engineering practice and optimal project/user benefits, intersection improvements to include but not be limited to geometry and/or capacity enhancements, improved channelization and positive guidance, improved signal operations, which may include display adjustments or phasing and timing adjustments, and reduced fixed object and sight distance hazards. Attached to this report, in the form of appendices or figures (as appropriate), shall be the products of subtasks described above.

Subtask 3(g) Products

i) Intersection analysis report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)

SERVICE TYPE 4 - ARTERIAL ANALYSIS

Task 4 - Arterial Safety and Operational Analysis

The Arterial Analysis will be conducted along a study section that for the purpose of this contract is assumed for an urban section to be one mile in length with 4 signals or less, or a two (2) mile rural section with not more than two signals. The analysis will form the basis for recommended improvements intended to control access, reduce travel time, delays and queues, enhance safety, manage and/or reduce conflicts, enhance positive guidance, and improve overall operational and traffic flow characteristics. A minimum of three (3) alternatives will be evaluated. The "do nothing alternative" may be included but not counted as one of the three alternatives. As a minimum, an Arterial Analysis will include these subtask activities:

Subtask 4(a) Traffic Counts

The Consultant shall collect hourly 72 hours approach counts on all approaches at one intersection within the study limits during typical weekday traffic conditions or as otherwise specified. In addition, the Consultant shall collect four (4) hours of fifteen-minute peak-hour turning movement counts (two hours in

the morning and two hours in the afternoon or other peak periods during which such volumes might exist) and pedestrian volume shall be taken for a total of four (4) hours encompassing the morning and afternoon peak periods and representative off-peak periods as needed. The Department's Project Manager may supplement the traffic data collection at additional intersections within the study limits

Subtask 4(a) Products

i) 72-hour approach volume counts at one intersection
ii) Four-hour turning movement counts/with pedestrian counts at one intersection

Subtask 4(b) Arterial Inventory

The Consultant shall conduct a field inventory of the arterial portion under study and prepare a detailed condition diagram on standard Department form contained in the MUTS or in another format approved by the Department. Condition diagrams should be created using CADD (DGN format) and shall include intersection geometry, lane use/arrangement, and identification of all traffic control devices including pedestrian features, and other roadway or roadside elements that contribute to the quality of intersection operation or safety such as bus stops, school zones within 300 feet, sight distance obstructions, etc. The inventory will also include a summary of phasing, splits, offsets, etc. for each signal. Intersections not in conformance with MUTCD or Departmental standards shall be identified detailing the nonconforming condition. For each signalized intersection within the study area, the distance in all directions to the next signalized intersection shall be measured and recorded to the nearest hundredth of a mile.

Subtask 4(b) Products

i) Condition diagram
ii) Supplemental inventory information

Subtask 4(c) Crash Analysis

The consultant shall analyze the crash data, collision diagrams and identify abnormal crash characteristics or patterns. The Consultant will develop a list of possible causes and countermeasures for each abnormal crash pattern. These causes must be site specific, identified during field review of the location under study. The Consultant's engineer will quantify the abnormal crash history (following FDOT Crash Data Guidance located in the Safety office's website) whenever possible using scientifically based methods such as expected value analysis, safety ratio, confidence level, statewide/districtwide crash rates, Predicted method in the Highway Safety Manual, or other statistical method.

Subtask 4(c) Products

i) Crash analysis (include crash summary sheets)
ii) Abnormal crash characteristics/patterns
iii) Possible crash causes and countermeasures for each abnormal pattern

Subtask 4(d) Arterial Analysis/Signal Optimization

Using methodology based on the HIGHWAY CAPACITY MANUAL (HCM), the Consultant shall determine the roadway's existing and proposed level of service (LOS) for the existing conditions and for each of the proposed alternatives. This analysis shall also include LOS analysis for the individual intersections within the arterial under study.

The consultant may also be required, when requested by the Department's project manager, to use the CORSIM/VISSIM model to evaluate the existing and proposed alternatives, (this task will be negotiated separately). The Consultant may also be required to use Synchro for signal system optimization. The consultant shall analyze various traffic signal control alternatives and determine the optimal strategy using the measure of effectiveness produced by the program as a guide. Controller type, phasing, cycle length, and splits shall be determined for two periods of the day. In developing the optimum control parameters, the Consultant shall take into consideration the Miami-Dade or Monroe County system requirements (i.e. cycle length, minimum greens, etc.). Optimization of the signal operation shall be evaluated for each candidate geometric modification and each potential combination of modifications.

Subtask 4(d) Products

i) Level of service for existing condition, optimized existing conditions, and proposed alternatives (Arterial and individual intersections)
ii) Summary of proposed recommendations
iii) Optimal signal control parameters
iv) Revised controller timing sheets
v) CORSIM input and output files (if requested by the Department's project manager)

Subtask 4(e) Recommendations for Improvements

From the results of the previous tasks, appropriate analysis, and any supplemental work tasks authorized by the Department's Project Manager, the Consultant shall make conceptual recommendations for optimizing the operation of the arterial, from both a safety and operational standpoint. The Consultant shall provide sketches, created in CADD (DGN format) with detailed measurements as appropriate, of existing conditions as well as proposed conditions for the improvement alternatives identified. The Consultant shall describe the expected number and type of crashes reduced by each improvement type. As part of this effort the consultant shall evaluate the design criteria, design variances/ exceptions, constructability and impacts (right-of-way, drainage, permits, utilities, environmental, access management, American with Disabilities Act, etc.) of the alternatives.

Subtask 4(e) Products

i) Proposed improvement sketches
ii) Analysis of effectiveness for each improvement

Subtask 4(f) Development of Preliminary Cost Estimates, Project Benefits

The Consultant shall determine a preliminary cost estimate (which will include PE, CEI and contingencies; also, R/W if available), of the proposed improvement using recent Department's historical cost data or other method as approved by the Department's Project Manager. The cost estimate shall make a distinction between the cost of the safety and operational improvements separately, so that safety and operational benefits can be clearly identified. Therefore, separate cost estimates for operational and safety improvements shall be submitted. The Consultant shall also determine the project/user safety and operational benefits resulting from implementation of the improvements identified. Project/user benefits will include such items as crash reduction, reduction in number of stops and delays and savings in fuel consumption. Nationally recognized references (such as those published by U.S.D.O.T.) shall be used to ascertain these benefits with the approval from the Department's Project Manager. The Consultant shall develop a safety benefit/cost ratio, an operational benefit/cost ratio and a total benefit/cost ratio for each of the proposed alternatives.

Subtask 4(f) Products

i) Cost Estimates for Proposed Improvements (Safety/ Operational)
ii) Benefit/Cost Ratios (Safety/Operational/Total)

Subtask 4(g) Report

The products of previous subtasks within this study shall be analyzed collectively. The consultant shall then form an Arterial Analysis report. The report shall recommend, in consideration of accepted traffic engineering practice and optimal project/user benefits, a coordinated sequence of improvements to enhance motorist safety (by reduction in crashes and their severity) and/or increase the efficiency of traffic flow along the arterial corridor. The sketches for the existing conditions as well as proposed improvements shall be included in the report. Recommended improvements shall be based upon consideration of all relevant corridor elements (including the crash history (CAR on-line Data)) and shall be directed at improving access, circulation, travel time, delays, stops, motorist safety, and fuel consumption. Emphasis should be given to those projects having low cost and high impact.

Subtask 4(g) Products

i) Arterial analysis report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)

SERVICE TYPE 5- LEFT TURN PHASE WARRANT ANALYSIS

Task 5 - Left Turn Phase Warrant Analysis

The Left Turn Phase Warrant Analysis is the study used to evaluate a location for a possible protected left turn signal phase at an existing signalized intersection. Although the Manual on Uniform Traffic Control Devices provides no left turn phasing warrants, publications such as the ITE Traffic Control Devices Handbook and NCHRP 812, Signal Timing Manual, 2nd Edition offer suggested guidelines for separate left turn phasing. As an absolute minimum, the Left Turn Phase Warrant Analysis will include the following activities.

Subtask 5(a) Delay Study

An Intersection Delay Study shall be conducted to include two (2) approaches (one lane group/one movement per approach). The study will include a total of four (4) hours, two (2) hours each for the morning and afternoon peak periods, unless otherwise specified by the Department's Project Manager. This study shall be performed in accordance with the MUTS or other method approved by the Department's Project Manager. The study will provide measures of delays for the left turn vehicle movements only. If the vehicle delay cannot be measured for the left turn movements (i.e. when no exclusive left turn lane provided) then delay for the whole approach shall be collected.

Subtask 5(a) Products

i) Delay Study
ii) Technician's worksheets

Subtask 5(b) Intersection Inventory

The Consultant shall conduct a field inventory of the intersection under study and prepare a detailed condition diagram on standard Department form contained in the MUTS or in another format approved by

the Department. Condition diagrams should be created using CADD (DGN format) and shall include intersection geometry, lane use/arrangements, and identification of all traffic control devices including pedestrian features, and other roadway or roadside elements that contribute to the quality of intersection operation or safety such as bus stops, school zones, sight distance obstructions, etc. within 300 feet.

Subtask 5(b) Product

i) Condition Diagram

Subtask 5(c) Crash Analysis

The consultant shall analyze the crash data, collision diagrams and identify abnormal crash characteristics or patterns. The Consultant will develop a list of possible causes and countermeasures for each abnormal crash pattern. These causes must be site specific, identified during field review of the location under study. The Consultant's engineer will quantify the abnormal crash history (CAR on-line Data) whenever possible using scientifically based methods such as expected value analysis, safety ratio, confidence level, statewide crash rates, or other statistical method.

Subtask 5(c) Products

i) Crash analysis (include crash summary sheets)
ii) Abnormal crash characteristics/patterns
iii) Possible crash causes and countermeasures for each abnormal pattern

Subtask 5(d) Level of Service Analysis

Using methodology based on the HIGHWAY CAPACITY MANUAL, the Consultant shall determine the existing level of service for the morning and afternoon peak periods. If a left turn phase is warranted or recommended, then the Consultant shall determine the level of service with the proposed phasing and timing. If a left turn phase is not warranted nor recommended, then the Consultant shall optimize the existing phasing and timing in order to improve the operation of the intersection.

Subtask 5(d) Products

i) Level of Service for existing conditions
ii) Level of Service for optimized existing conditions
iii) Level of Service of proposed conditions
iv) Summary of proposed recommendations

Subtask 5(e) Report

The products of previous subtasks within this study shall be analyzed collectively. The consultant shall then perform a left turn phase warrant analysis. All appropriate recommendations shall be included in the report.

Subtask 5(e) Products

i) Left turn phase warrant analysis report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)

SERVICE TYPE 6 - SUPPLEMENTAL TASKS/COMPOSITE STUDY

Task 6 - Supplemental Tasks/Composite Study

The activities outlined below as subtasks can be performed as supplements to and in support of the Qualitative Assessment, Signal Warrant Analysis, Intersection Analysis, Arterial Analysis, and/or Left Turn Phase Warrant Analysis. These supplemental tasks may alternatively be required to be performed separately or together to form a specialized or composite study, thus enabling the Department to utilize the services of the Consultant in solving a variety of traffic safety and operational problems.

Subtask 6(a) 72-Hour Traffic Counts

The Consultant shall collect hourly traffic count data broken down into 15-minute increments on each approach to the intersection of a minimum period of 72 hours during typical weekday traffic conditions. Automatic devices furnished by the Consultant shall record count data.

Subtask 6(a) Product

i) 72-hour Volumes (per intersection)

Subtask 6(b) 7 Day Traffic Counts

The Consultant shall collect hourly traffic count data broken down into 15-minute increments on each approach to the intersection for a period of seven (7) days. Automatic devices furnished by the Consultant shall record count data.

Subtask 6(b) Product

i) 7 Day Volumes (per intersection)

Subtask 6(c1) Turning Movement Counts

The Consultant shall perform four (4) hour turning movement counts for all approaches as directed by the Department's Project Manager. Fifteen-minute turning movement volumes (to include trucks but tabulated separately) and pedestrian volume shall be taken during the same four (4) hours, two (2) hours each for the morning and afternoon peak periods or as specified by the Department's Project Manager.

Subtask 6(c1) Products

i) Four (4) hours turning movement volumes (per intersection)
ii) Four (4) hours pedestrian volumes (per intersection)

Subtask 6(c2) 6-Hour Turning Movement Counts

The Consultant shall perform six hour turning movement counts for all approaches as directed by the Department's Project Manager. Fifteen-minute turning movement counts (to include trucks but tabulated separately) and pedestrian counts shall be taken during the same six hours, for each peak period or as specified by the Department's Project Manager.

Subtask 6(c2) Products

i) Six-hour turning movement counts (per intersection)
ii) Six-hour pedestrian counts (per intersection)

Subtask 6(c3) 8-Hour Turning Movement Counts

The Consultant shall perform eight hour turning movement counts for all approaches as directed by the Department's Project Manager. Fifteen-minute turning movement counts (to include trucks but tabulated separately) and pedestrian volume shall be taken during the same eight hours as specified by the Department's Project Manager.

Subtask 6(c3) Products

i) Eight-hour turning movement counts (per intersection)
ii) Eight-hour pedestrian counts (per intersection)

Subtask 6(d) Intersection Inventory

The Consultant shall conduct a field inventory of each intersection under study and prepare a detailed condition diagram on standard Department form contained in the MUTS or in another format approved by the Department. Condition diagrams should be created using CADD (DGN format) and shall include intersection geometry, lane use/arrangements, and identification of all traffic control devices including pedestrian features, and other roadway or roadside elements that contribute to the quality of intersection operation or safety such as bus stops, school zones, sight distance obstructions, etc. within 300 feet. It shall also include any roadway features that may be impacted by any proposed alternatives.

Subtask 6(d) Product

i) Condition Diagram

Subtask 6(e) Crash Analysis

The consultant shall analyze the crash data, collision diagrams and identify abnormal crash characteristics or patterns. The Consultant will develop a list of possible causes and countermeasures for each abnormal crash pattern. These causes must be site specific, identified during field review of the location under study. The Consultant's engineer will quantify the abnormal crash history (following FDOT Crash Data Guidance located in FDOT Safety office's website) whenever possible using scientifically based methods such as expected value analysis, safety ratio, confidence level, statewide crash rates, predictive method in the Highway Safety Manual, or other statistical method.

Subtask 6(e) Products

i) Crash analysis
ii) Abnormal crash characteristics/patterns
iii) Possible crash causes and countermeasures for each abnormal pattern

Subtask 6(f) Travel Time and Delay Study

The Consultant shall perform standard travel time and delay studies along the subject arterial using the manual method or the computerized, both of which are demonstrated in the Manual on Uniform Traffic Studies (MUTS). The Department's Project Manager must approve other state-of-the-art techniques.

Travel time and delay studies shall be conducted in each direction of travel during the morning and evening peak traffic periods and during a daytime off-peak period. A minimum of six (6) runs shall be made for each direction and time period. Travel time and delay studies will be conducted along a study section which for the purpose of this contract is assumed to be an urban section that is one mile in length with four (4) signals or less, or a two (2) mile rural section with not more than two (2) signals. From the travel time and delay

data, a speed profile shall be developed for each condition. The profiles shall be supplemented with a written analysis of the location and determination of possible causes of the measured delays and constrained running speeds.

Subtask 6(f) Products

i) Travel time and delay profiles
ii) Travel time and delay analysis
iii) Summarized data & most prominent delay location

Subtask 6(g) Intersection Delay Study

An Intersection Delay Study shall be conducted to include two (2) approaches (one lane group/one movement per approach). The study will include a total of four (4) hours, two (2) hours each for the morning and afternoon peak periods, unless otherwise specified by the Department's Project Manager. This study shall be performed in accordance with the MUTS or other method approved by the Department's Project Manager. The study will provide some basic measures of delays, such as the average vehicle delay, presently existing at the intersection. This will cover both signalized and un-signalized intersections.

Subtask 6(g) Products

i) Intersection delay study
ii) Technician's worksheets

Subtask 6(h) Queue Analysis

The Consultant shall collect data/measure existing queue lengths during typical weekday AM and PM peak periods at all intersection approaches. Field observations are to be compared with calculated queue using the methods outlined in Institute of Transportations Engineers (ITE) Traffic Engineering Handbook, or other method to be approved by the Department's Project Manager.

Subtask 6(h) Products

i) Existing queue length data
ii) Queue length predictions for improvement alternatives
iii) Potential improvements
iv) Technician worksheets

Subtask 6(i) Vehicle Gap Measurements

The Consultant shall measure the gaps between vehicles at specified locations in accordance with the MUTS and shall record and summarize the data on standard Department forms contained in MUTS.

Subtask 6(i) Products

i) Vehicle gap measurements
ii) Technician's worksheets

Subtask 6(j) Conflict Analysis

The Conflict Analysis shall be consistent with methodology as presented in the ITE Manual of Transportation Engineering Studies. The Consultant shall field observe and record all conflicts and their frequencies. Conflict types are to include but not limited to: slow vehicle, lane change, and left-turn all

directions, angle, U-turn, right-turn all direction, etc. The analysis shall be both quantitative and qualitative. Due to the subjective nature of this type of analysis, the Consultant shall make efforts to ensure the use of one highly qualified traffic engineer, registered in the state of Florida (PTOE Certified Preferred) with practical/operational experience for all conflict observations. There are to be four thirty-minute periods for observation and collection of data; AM period, mid-day period, PM period, and one off-peak period.

Subtask 6(j) Products

i) Conflict summaries
ii) Conflict diagram
iii) Summary of significant conflicts

Subtask 6(k) Level of Service Analysis/Optimization (Intersections)

Using a methodology based on the HIGHWAY CAPACITY MANUAL, the Consultant shall determine the existing and proposed level of service for the existing conditions and the proposed improvement projects as directed by the Department. An operational analysis will be used for critical intersection(s). The results of this subtask may be included as an Appendix to the Conceptual Study Report. Additionally, the Consultant shall optimize the signal timing for existing and proposed conditions.

Subtask 6(k) Products

i) Level of Service for existing conditions
ii) Level of Service for optimized existing conditions
iii) Level of Service of proposed alternatives
iv) Summary of proposed recommendations

Subtask 6(l) Arterial Analysis/Traffic Signal Optimization

Using methodology based on the HIGHWAY CAPACITY MANUAL, the Consultant shall determine the roadway's existing and proposed level of service (LOS) for the existing conditions and for each of the three proposed alternatives. This analysis shall also include LOS analysis for the individual intersections within the arterial under study.

The Consultant may use Synchro for signal system optimization. The consultant may also be required, when requested by the Department’s project manager, to use the CORSIM/VISSIM model to evaluate the existing and the three proposed alternatives, (this task will be negotiated separately). The consultant shall analyze various traffic signal control alternatives and determine the optimal strategy using the measure of effectiveness produced by the program as a guide. Controller type, phasing, cycle length, and splits shall be determined for two periods of the day. In developing the optimum control parameters, the Consultant shall take into consideration the Miami-Dade or Monroe County system requirements (i.e. cycle length, minimum greens, etc.). Optimization of the signal operation shall be evaluated for each candidate geometric modification and each potential combination of modifications.

Subtask 6(l) Products

i) Analysis of effectiveness for existing and the alternatives
ii) Optimal signal control parameters
iii) Summary of proposed recommendations
iv) Revised controller timing sheets
v) CORSIM/VISSIM input and output file (if requested by the project manager as part of the analysis)

Subtask 6(m) Pedestrian Group Size and Counts

The consultant shall collect pedestrian counts and group size data in accordance with the Departments Manual on Uniform Traffic Studies (MUTS) during the morning (2 hours) and evening (2 hours) peak traffic periods or other period as specified by the Department's project manager (crash peak).

Subtask 6(m) Product

i) Pedestrian group size and counts

Subtask 6(n) Spot Speed Study

The Consultant will obtain speed data by means of detection and relay devices or radar or other method with approval of Departments Project Manager. The speed parameters to be determined are: 85th percentile speed, average speed, speed variance, and pace.

Subtask 6(n) Products

i) 85th percentile speed
ii) Average speed
iii) Speed variance
iv) Pace

Subtask 6(o) Sight Distance Study

The Consultant will measure available sight distance for one approach (stopping, passing, or intersection) and compare it with appropriate criteria (AASHTO, MUTCD, FDOT, etc.). Sight distances must be depicted graphically.

Subtask 6(o) Products

i) Measured sight distance

Subtask 6(p) Highway Lighting Study

The Consultant will determine the adequacy of existing lighting systems and the need for new, additional or improved lighting systems. The Consultant will choose a lighting study technique (AASHTO Criteria, NCHRP Report No. 152 Method, Light Meter, etc.) and get the Department's Project Manager's approval before usage. Maintenance related outages of luminaires should be verified (field verified) prior to the study.

Subtask 6(p) Product

i) Lighting evaluation, adequacy, and recommendation

Subtask 6(q) Safe Curve Speed Study

The Consultant shall determine the need for maximum safe advisory speed signs and the maximum safe speed for a given curve, according to the Department's Manual of Uniform Traffic Studies (MUTS). The Consultant will record and summarize the data on standard Department forms contained in the MUTS or other equivalent forms approved by Project Manager.

Subtask 6(q) Products

i) Recommended advisory speed for curve

ii) Technician worksheets

Subtask 6(r) Collision Diagrams

The Consultant shall prepare collision diagrams for the study intersection for the last three (3) years. Collision diagrams shall be drawn using CADD (DGN format) on standard Department forms contained in the MUTS or another Department approved form. Collision diagrams for arterials will be negotiated separately.

Subtask 6(r) Product

i) Collision diagram

Subtask 6(s) Crash Review

The Consultant shall review a minimum of three years of crash history (CAR on-line Data) of the intersection. This review includes the preparation of crash summary sheets. The crash summary shall at a minimum include the classification of crashes by type, time of day, day of the week, direction of travel, and month. Injury severity must also be documented in the summary as well as weather and lighting condition under which the crash occurred. Consultant shall calculate the safety ratio and confidence level for the spot under study and thus determine if the location is a high crash location.

Subtask 6(s) Product

i) Crash summary review (include crash summary sheets)

Subtask 6(t) Railroad Crossing Preemption Study

The purpose of this study is to investigate the need, and make recommendation, for signal preemption features for intersections located within 500 feet of railroad/highway crossings. To determine if vehicle queues extend to the tracks, use queue length simulation program and verify the results by making observations in the field. The study should be conducted in accordance with the MUTCD and the Department's guidelines.

Subtask 6(t) Product

i) Railroad/highway Crossing Preemption Study.

Subtask 6(u) Parking Study

The purpose of this study is to investigate the safety impact of on-street parking and make recommendations for altering/removing parking on a given segment of roadway. As part of this study, the Consultant will examine parking-related crashes; investigate the sight-restriction, if any, resulting from parking and parking occupancy rates and available alternative parking in the area.

Subtask 6(u) Products

i) Parking Study with Recommendations for Modification of parking, if any.

Subtask 6(v) ITS Studies for Safety Projects

The Consultant shall investigate the feasibility of implementing Intelligent Transportation Systems (ITS) applications to address operational and safety issues at intersections or corridors. This study may include benefit cost analyses, feasibility studies of equipment installation, perceptions-reaction time evaluation, evaluation of equipment specifications.

SERVICE TYPE 7 - OTHER TRAFFIC ENGINEERING RELATED STUDIES

Task 7 - Other Traffic Engineering Studies

The consultant will be required to perform other traffic engineering related studies. When the need arises a scope of services will be developed, and man-hours/fees will be negotiated separately. When requested by the Department's project manager the consultant shall submit a schedule of the tasks to be completed.

SERVICE TYPE 8 – PUBLIC INVOLVEMENT

Task 8 - Public Involvement

As part of any of the above studies, the consultant may be needed for public involvement activities. When the need arises a scope of services will be developed, and man-hours/fees will be negotiated separately.

SERVICE TYPE 9 – FATAL CRASH REVIEW

Task 9A - Fatal Crash Review (Office Review)

The purpose of this study is to investigate and analyze the fatal crash (for the purpose of this contract 10 fatal crashes are assumed) and make recommendations to improve the safety and operation of the locations. As part of this study, a qualified Traffic Engineer of the firm shall study the fatal crash report and review the web-based aerials/photo logs and photo logs provided by the Department.

The Consultant must also review a minimum of five years of crash history of the intersection (following FDOT Crash Data Guidance located in FDOT Safety office's website.This review includes the preparation of crash summary sheets and collision diagrams. The crash summary shall at a minimum include the classification of crashes by type, time of day, and day of the week, and month. Injury severity must also be documented in the summary as well as lighting and weather conditions under which the crash occurred. In addition, the consultant also shall verify the FDOT work program to identify recent projects (historical/ upcoming). Based on the crash review, the Consultant shall make recommendations to improve the safety and operation of the location.

Task 9A Products

i) Fatal crash report with recommendations
ii) Crash summary sheets
iii) Collision diagrams

Task 9B - Fatal Crash Review (Field Reviews)

The purpose of this study is to investigate and analyze the fatal crashes (for the purpose of this contract 5 fatal crashes are assumed) and their locations and make recommendations to improve the safety and operation of the locations. As part of this study, a qualified traffic engineer of the firm, experienced in the traffic engineering discipline, and registered in the state of Florida (PTOE Certified Preferred) shall study and investigate the fatal crash and its location and identify any geometric, roadside elements, fixed objects,

or traffic control conditions, deficient pavement markings, necessary signage, etc. Photographs shall be taken to identify the various geometric and roadway conditions described earlier.

The Consultant must also review a minimum of five years of crash history of the intersection (following FDOT Crash Data Guidance). This review includes the preparation of crash summary sheets. The crash summary shall at a minimum include the classification of crashes by type, time of day, and day of the week, and month. Injury severity must also be documented in the summary as well as lighting and weather conditions under which the crash occurred. Based on the investigation of the fatal crash location and the crash review, the Consultant shall make recommendations to improve the safety and operation of the location.

Task 9B Products

i) Fatal crash investigation report with recommendations
ii) Crash summary sheets

SERVICE TYPE 10 – SPEED ZONE STUDY

Task 10 - Speed Zone Study

The purpose of the speed zone study is to establish speed limits along roadway corridors. The study will be conducted along a section that for the purpose of this contract is assumed for an urban section to be one mile in length, or a two (2) mile rural section. The analysis will form the basis for recommended speed limits that provide safe travel for conditions found to exist along the roadway corridor.

Subtask 10(a) Spot Speed Study

The Consultant will obtain speed data by means of detection and relay devices or radar or other method with approval of Departments Project Manager. The spot speed study shall be conducted for a total of 3 locations. The study shall be conducted for both directions of travel. The speed parameters to be determined are: 85th percentile speed, average speed, speed variance, and pace.

Subtask 10(a) Products

i) 85th percentile speed; Average speed; Speed variance; Pace

Subtask 10(b) Crash Review

The Consultant shall review a minimum of five years of crash history (following FDOT Crash Data Guidance located at FDOT Safety office's website) for the segment. This review includes the preparation of crash summary sheets and collision diagrams. The crash summary shall at a minimum include the classification of crashes by type, time of day, day of the week, direction of travel, and month. Injury severity must also be documented in the summary as well as weather and lighting condition under which the crash occurred. Consultant shall calculate the safety ratio and confidence level for the spots within the study area and for the segment and thus determine if spots/segment is high crash location.

Subtask 10(b) Product

i) Crash summary review (include crash summary sheets)

Subtask 10(c) Assessment of Geometric Conditions

The Consultant will obtain existing plans and/or proposed improvement plans from the Department. The consultant shall review the plans provided and assess the existing and/or proposed conditions and their impact on the speed limits.

Furthermore, a qualified traffic engineer of the firm, experienced in the traffic engineering discipline, and registered in the state of Florida (PTOE Certified Preferred) shall visit the location under study and observe conditions that would have an effect on the speed limits posed along the corridor. These observations should include at minimum, number of signalized intersections, number of connecting roadways and driveways, lateral clearance, pavement condition, presence of pedestrians and parking, visibility, land use, level of roadside development, and posted speed limits.

Subtask 10(c) Product

i) Assessment of factors affecting speed limits
ii) Recommendation for speed limits

SERVICE TYPE 11 – TECHNICAL MEMO

Task 11 – Technical Memo

Subtask 11(a) Field Review

A qualified traffic engineer of the firm, experienced in the traffic engineering discipline, and registered in the state of Florida (PTOE Certified Preferred) shall visit the location under study during a period specified by the Department's Project Manager to make a judgment on the current level of traffic operations and safety.

The Consultant shall also examine the physical features to document evidence of high-crash conditions and observe traffic movements for high-risk maneuvers. In addition, the Consultant will review geometry and traffic control devices for deficiencies related to abnormal crash patterns and identify potential driver expectancy problems.

Photographs shall be taken to clarify any unusual findings during the field review. For example, utility conflicts, right of way constraints, obstructions, unusual geometries, deficient pavement conditions or markings, etc. should be photographed and/or otherwise detailed as appropriate. Photos and/or detailed graphics shall be included in the memo.

Subtask 11(b) Crash Review

The Consultant shall also review a minimum of five years of crash history (following FDOT Crash Data Guidance located in the Safety office's website) for the location and note any patterns which would indicate any facility safety deficiencies. Consultant shall also calculate the confidence level for the location under study and thus determine if it is a high crash location.

Subtask 11(c) Technical Memo

The products of previous subtasks within this study shall be analyzed collectively. The consultant shall then form a technical memo, not to exceed five (5) pages. The maximum turn-around time for a draft technical memo will be two (2) weeks. The memo shall recommend, in consideration of accepted traffic engineering practice and optimal project/user benefits, a recommendation for any supplemental work tasks. The memo shall contain the following:

Task 11 Products

i) Location map/aerial photographs
ii) Summary of field review
iii) Photographs taken in the field (if required)
iv) Review of crash data with confidence level analysis
v) Analysis
vi) Conclusion/recommendations

SERVICE TYPE 12 – HIGH CRASH LOCATION STUDIES

This service type supports implementation of the Florida Strategic Highway Safety Plan (SHSP) and follows guidelines in the Highway Safety Improvement Program (HSIP) Guidelines. Typically, locations for study are identified and prioritized by utilizing the high crash location lists from the Department CARS or by developing high crash listing based on various emphasis areas identified within the Florida SHSP. This methodology incorporates various stages of analysis. A description of each stage is as follows: The following are various tasks that could be used to help the Department with identifying/prioritizing high crash location lists; performing preliminary safety reviews; and conducting comprehensive safety studies for implementation of recommended improvements.

Task 12A – High Crash List Development

The Consultant shall develop a prioritized district-wide High Crash List based on the high crash location lists available from the Department's CARS or develop high crash listings using network screening methods (included in the Highway Safety Manual) for various emphasis areas of the SHSP.

Subtask 12(a) Product

i) High Crash Location List(s)

Task 12B – Preliminary Safety Review

The primary purpose of this preliminary safety review is to examine each study location from a historical crash data standpoint for identification of relevant crash patterns as well as probable causes and general countermeasures, and recommend if these locations should be reviewed further (a separate study to be conducted) to develop cost feasible constructible alternatives to address traffic safety concerns. During this process, locations that have been previously studied by the Department (safety studies from previous years, other studies conducted to address citizen requests, etc.) shall also be identified in order to minimize duplication of effort.

Subtask 12B(a) Define study location limits

The consultant shall review and adjust as appropriate, the limits for each location to define a logical segment or an intersection location based on a review of available web-based aerials and straight-line diagrams (SLD). This is an important step since the beginning and ending mileposts (MP) of each of the locations may have been derived based on mathematical and statistical computations while developing the high crash location lists.

Subtask 12B(b) Summarize Existing Conditions

The consultant shall summarize existing conditions for each location based on available office-based resources such as the Department's SLDs, web-based aerial maps and video logs, FDOT Geographic Information System (GIS) data, Florida Traffic Information, and FDOT Work Program information. The existing conditions review will summarize various pertinent elements including the functional classification, access management classification, speed limits, traffic volumes (Annual Average Daily Traffic [AADT]), lane configurations, and traffic control. In addition, the Department's five-year tentative work program, six-year work program history, and the Miami-Dade County Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) shall be reviewed to identify locations that may be currently under construction or were under construction during the referenced three years for which crash data were collected. Also, review of the Department's studies database shall be conducted to identify locations that have been previously studied to minimize any duplication of efforts.

Subtask 12B (c) Crash Analysis

The consultant shall perform preliminary crash analysis based on the latest available five years historical crash data following FDOT Crash Data Guidance. Crash reports for the crashes shall be reviewed to identify the appropriate crash type for a more robust analysis. The crash analysis shall include the following:

1) Crash summary tables and relevant crash statistics for each location.
2) Plot of crash data for segment locations along the length of the corridor in order to identify concentration of crashes (crash clusters) at a location/intersection.
3) Expected values analysis, when expected values are available, to identify the abnormal crash patterns by crash type for intersections. If expected values are not available, the analysis will be based on leading crash types. HSM based analysis could also be used.
4) Development of a list of probable causes and next steps unique to each location based on the preliminary safety review. These next steps may include field reviews, traffic data collection (automatic traffic recorder [ATR] counts, turning movement counts [TMC], spot-speed study, etc.), or a safety study.

The available publications such as FDOT's Traffic Engineering Manual (TEM), FDOT's Manual on Uniform Traffic Studies (MUTS), FDOT's Highway Safety Improvement Program (HSIP) Guidelines, the FHWA's Manual on Uniform Traffic Control Devices (MUTCD) shall be used for guidance in determining the recommendations. The overall analysis shall be summarized and presented in the form of a report for the Department's consideration.

Subtask 12B Products

i) Summary of Existing Conditions
ii) Crash Analysis
iii) Expected Value Analysis (or analysis by leading crash types)
iv) List of probable causes attributed to crashes
v) Work Program Review

Task 12C- Safety Study

Based upon the Department's approval of recommendations from the preliminary analyses, additional studies may be performed at specific high crash locations. A traditional crash analysis or HSM-based crash analysis could also be considered for these studies. These studies would be conducted in accordance with

the Intersection Analysis or Arterial Analysis Service Type as described in the sections within the subject Scope of Services.

Subtask 12 C Product

i) Intersection Analysis (Service Type 3) or Arterial Analysis (Service Type 4)

SERVICE TYPE 13 - TRAFFIC OPERATIONS SAFETY REVIEWS

Task 13 - 3R Safety Review

The purpose of this study is to identify traffic safety concerns and recommend countermeasures for locations that will be subject to a 3R (rehabilitation, resurfacing, and reconstruction) project. These recommendations will be used in the preparation of the plans packages documents. Established unit price per 3R safety review shall be considered full compensation for all tasks required to perform it. The Department's Project Manager shall have the final say on the expected content of the completed 3R safety review. All recommendations must meet current FDOT Standards and Specifications and the guidelines contained in the FDOT Design Manual (FDM, latest edition).

For the Purpose of this contract, a location shall be considered any length over which a design project will take place. Fees shall be broken down according to the following: length (1.5 miles or less, greater than 1.5 miles), number of signalized intersections (5 intersections or fewer on urban settings, and 6 or more in urban settings; 2 or less in rural settings, and more 3 or more in rural settings), and the distance of the subject location with respect to the Department's Headquarters. The normal period of performance allowed for completion of a safety review shall be three (3) weeks. The following subtasks shall be completed by the Consultant as part of this task.

Subtask 13(a) Department's Design Project Manager Coordination

The Consultant shall be responsible for coordinating all aspects of the safety review with the concerning Department's Design Project Manager. The Consultant responsibilities include obtaining detailed information regarding the scope of the project, its limits, and providing additional safety information to the Design Project Manager when requested. The Consultant shall also coordinate with the Design Project Manager to attend meetings regarding the project where safety issues are expected to be discussed; the consultant shall take notes and address any concerns presented during the meetings. The consultant shall be responsible for producing a brief "meeting notes" report and submit it to the Department's Project Manager.

Subtask 13(a) Product

i) Meeting Minutes.

Subtask 13(b) Data analysis

The Consultant shall be responsible for gathering and analyzing all data deemed necessary for the performance of the Safety Review. The data to be reviewed shall include, but is not limited to, the Department's Segment and Spot High Crash Lists, the summary of the latest 5 years of available crash data (following FDOT Crash Data Guidance, individual crash report for fatal crashes occurring during the same 5 year review period, and the scope of work for the project. Additional items, that may be required as part of the data analysis, might include the preparation of collision diagrams, and the review of individual crash reports, etc.

Subtask 13(b) Product

i) Tables/Figures summarizing the analysis

Subtask 13(c) Field Reviews

The Consultant shall be responsible for field reviewing the project location and identifying safety concerns associated with geometric alignment, roadway condition, sight distance, peak hour driver behavior, traffic signals, signing and marking, other traffic control devices and pedestrian, bicycle safety concerns. The consultant shall also report any fixed objects located within clear zones.

Subtask 13(c) Product

i) Field Notes

Subtask 13(d) Potential Improvements

The Consultant shall be responsible for producing recommendations that will address each one of the identified safety concerns. All recommendations must meet current FDOT Standards and specifications with the guidelines contained in the FDOT Plans Preparation Manual (latest edition) and the Florida's Design Standards for Resurfacing Restoration and Rehabilitation. The Consultant shall be responsible for discussing all recommendations with the Design Project Manager before submission of the Final Memorandum to the Department's Project Manager.

Subtask 13(a) Product

i) Potential Improvements

Subtask 13(e) Preparation and Submission of Memo First Draft Report:

After completion of the above listed subtasks, the Consultant shall prepare a draft memo. The memo shall include, as a minimum, the following information:

a) The section number, state road number, its beginning and ending mile post, the project's financial ID, and the Design Project Manager's name.
b) Crash data in table format approved by the Department Project Manager of the latest three (3) years available. The table shall include, among other information, crashes by type of weather and lighting condition, average daily traffic, and total number of fatal crashes. The consultant shall review, in detail, each fatal crash, and provide recommendations to potentially avoid/prevent similar events. A sample table will be provided by the Department.
c) Identification of safety concerns associated with geometric alignment, roadway condition, sight distance, traffic signals, signing and marking, and other traffic control devices.
d) A set of recommendations targeting each one of the identified safety concerns. These recommendations are anticipated to be implemented through the scope of the 3R project and must meet current FDOT standards and specifications. They must also be in agreement with the guidelines contained in the FDOT Design Manual (FDM, latest edition) and the FDOT Design Standards.
e) Final Memo: Following the draft report, and only after having addressed any comments that might have emerged from any of the interested parties, the consultant shall prepare a Final Memorandum. A PDF electronic file shall be submitted to the Department's Project Manager.

Subtask 13(a) Products

ii) 3R Safety Review Study Report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)

Subtask 13(f) Scope Meeting

The Consultant shall be responsible for attending scope meetings concerning the 3R project in representation of the Department's Safety Program Manager. The consultant shall provide input regarding safety concerns and improvements and take notes regarding safety related issues discussed at the meeting. The notes taken by the Consultant shall be submitted to the Department Project Manager within five (5) business days.

Subtask 13(a) Product

i) Meeting Minutes.

Subtask 13(g) Maintenance of the Department's Safety Review Tracking Database

The Consultant shall be responsible for updating and maintaining the Department's schedule (currently kept in Primavera software) used for tracking the design projects for which a safety review will be needed. The Consultant shall be responsible for prioritizing the safety review per the Primavera scheduling system. This list shall be submitted to the Department's Project Manager, who will issue a work order(s) to perform the necessary work. The Primavera schedule includes, among other things, information regarding the percentage completion of the safety review, forecasted start, actual start, forecasted finish, and actual finish date for the safety review. The consultant will be responsible for updating and maintaining the safety review activities within the database. As a minimum the following fields must be included and maintained in the database regarding each Safety Review: FM number, Date Requested to Consultant, State Road, State Section, Status, Beginning Mile Post (BMP), Ending Mile Post (EMP) Description, FDOT Project Manager, Year Completed, Consultant, Comments, Draft / Final. Any additional fields the consultant believes will assist in tracking the work performed, consultant's performance, and ongoing safety reviews might be added upon approval by the Department Project Manager. For the purposes of this database the consultant is required to use software under license agreement with the Department, this will allow the Department use of the Database even after the services provided by the consultant have ended.

Subtask 13(a) Product

i) Updated Database

SERVICE TYPE 14 - BEFORE & AFTER STUDIES

Task 14 Before and After Safety Studies

The objective of these studies is to evaluate the effectiveness of implemented safety improvements at specific locations. The findings from these studies will allow the Department Project Manager to track the performance of previously implemented safety improvements; it will also provide guidance in the selection of safety improvements for future safety projects. The Department will furnish a copy of the before study. For the purpose of this contract, a location shall be considered any length over which the implementation of the safety improvement(s) under study took place. Fees shall be broken down according to the following factors: number of signalized intersections, median openings, and distance from headquarters. The normal period of performance allowed for completion of a Before & After Safety Study shall be three (3) weeks. The following subtasks will be completed by the Consultant as part of this task.

Subtask 14(a) Geometric Analysis

The Consultant shall verify and analyze geometric conditions before and after the improvements from a safety/traffic operations study are implemented.

Subtask 14(b) Crash Analysis

The Consultant shall prepare collision diagrams for the after conditions and analyzing crash data of the before and after improvements. Three (3) years of crash data before and three (3) years after the improvements took place shall constitute the minimum period of analysis to be used in Before & After studies following FDOT Crash Data Guidance located in the Safety office's website. The Department Project Manager may allow for Before & After studies covering shorter crash data periods. Crashes during the period when improvements were being implemented shall not be included in the crash data analysis. The Consultant shall identify and analyze crash patterns, if any. Crash pattern recognition shall not be limited to those likely caused by geometric conditions; it shall also include those occurring periodically over time i.e. seasonal, nighttime, weekend crashes, etc.

Subtask 14(b) Products

i) Collision Diagrams
ii) Crash Analysis
iii) Abnormal Crash Patterns

Subtask 14(c) Before & After Safety Analysis

The consultant shall be responsible for analyzing the effectiveness of the implemented safety improvements in reducing the targeted crash pattern, as well as, the impact those improvements had in other type of crashes. The consultant shall prepare a Benefit Cost analysis for the After conditions and compare it with the project which recommended the implemented improvements.

Subtask 14(c) Product

i) Prepare a B/C Analysis Comparison Report.

Subtask 14(d) Before & After Operational Analysis

The consultant shall analyze the impact the implemented improvements had in the operation of the transportation facility. The consultant may choose an appropriate traffic analysis/simulation software that might provide a sound analysis of the facility under study.

Subtask 14(d) Product

i) Prepare an Operational Analysis Report.

Subtask 14(e) Preparation and Submission of Report

After completion of subtasks 14(a), 14(b), 14(c), 14(d), the consultant shall prepare a draft report. Two hard copies of the draft report along with its respective PDF electronic file shall be submitted to the Department's Project Manager for review. The report shall as a minimum include the following information:

a) State Section number, State Road number, beginning and ending mile post.
b) Geometric analysis for the before and after conditions. Schematic diagrams of the before and after conditions shall be included as part of this section. Should pictures for the Before conditions exist, they shall be included and compared with similar pictures for the After conditions.

c) Crash data analysis for the specified period. Collision diagrams, one per year, or as otherwise requested by the Department's Project Manager shall be included as part of this section.
d) Before & After Safety Analysis.
e) Before and After Operational Analysis. The software output shall be included as part of this section.
f) Conclusions.

Final Report: only after having successfully addressed any comments that might have emerged from the first draft to the satisfaction of the Department's project Manager, the Consultant shall submit two signed and sealed copies of the Final report, along with its respective PDF electronic file.

Subtask 14(e) Products

i) Before-After Study Report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)

SERVICE TYPE 15 – ROAD SAFETY AUDITS (RSA)

The goal of an RSA is to develop recommendations that enhance safety, while minimizing impact, if any, on traffic flow. As part of this assignment, the Consultant shall complete the following steps consistent with the procedures and guidelines outlined in the FDOT MUTS Manual, MUTCD, HSIP, AASHTO, and FHWA RSA guidelines:

1) Identify project or existing road to be audited.
2) Select RSA team. The consultant team must provide a qualified and multidisciplinary team of experts suitable for the specific RSA to be conducted – each RSA will likely require the participation of different areas of expertise. While in the ideal RSA some of the expertise is provided by the local agency and/or the Department, there may be occasions in which these agencies are unable to provide the necessary expertise. For these cases, the consultant team shall have access to experts within the necessary fields of expertise. Typical fields of expertise necessary to conduct an RSA are:
    a. Road safety specialist. The road safe specialist shall act as the leader of all RSAs. As the RSA team leader, the road safety specialist shall sign and seal the final RSA document – the road safety specialist shall be a licensed engineer in the State of Florida
    b. Traffic operations engineer
    c. Road design engineer
    d. Local contact person
    e. Other areas of expertise. Some of the areas of expertise that may be required in some RSAs may include (this is not intended to be a comprehensive list):
        i. Human factors
        ii. Maintenance
        iii. Enforcement
        iv. First response
        v. Pedestrian & bicycle treatment
        vi. Transit operations
        vii. ITS
3) Conduct a pre-audit meeting to review project information. This meeting shall bring together the project owner, the design team (if any) and the audit team to discuss the context and scope of the RSA and to review all project information available.
4) Office review of crash data and other available information. This step aims to help identify areas of safety concerns. The RSA team should restrict its comments to those issues having a bearing on the safety of road users. Comments may be either specific to a location or broad-based. Issues

related to aesthetics, amenities, or congestion should also be commented upon if they lead to less-safe conditions

5) Perform field reviews under various conditions. For typical RSAs, at least 3 field reviews ought to be performed: one during nighttime, one during the daytime peak period, and one during daytime off-peak period. The number/time of field reviews may be modified if the RSA study location justifies it. The objectives of the field reviews are:
    a. Gain insight into the project or existing road
    b. Verify/identify areas of safety concerns
6) Conduct audit analysis and prepare report findings. As a result, the safety issues are identified and prioritized, and suggestions are made for reducing the degree of safety risk. Suggestions to enhance safety are to be prioritized using a Cartesian plane where the X axis represents "feasibility", and the Y axis represents "value". RSA suggestions should be appropriate to the state in the RSA and the elements being examined (ex., the suggestions of a construction phase RSA would be different than those made in a preliminary design RSA). The RSA results are then succinctly summarized in the formal RSA report.
7) Present audit findings to project owner, design team, RSA steering committee, or Safety Review Committee. The audit team will orally report the key RSA findings to the project owner, design team, RSA steering committee, or Safety Review Committee in order to facilitate the understanding of the RSA.
8) Record/Prepare Formal Response. The consultant team will summarize the feedback provided by the project owner, design team, RSA steering committee, or the Safety Review Committee to each safety issue/recommendation listed in the RSA report.

The Consultant team shall also be prepared to conduct RSAs of any of the following types:

1. Pre-construction road safety audits
    a. Preliminary design road safety audits
    b. Detailed design road safety audits
2. Construction Road Safety Audits
    a. Pre-opening road safety audits
3. Post-Construction Road Safety audits
    a. RSAs of existing roads

The members of the RSA team shall have demonstrated excellent command of the MUTCD and familiarity with the Department's Local Agency Participation (LAP) program. It is expected that many of the recommendations made on post-construction RSAs would involve pavement marking & signing enhancements. The consultant team shall have a demonstrated ability and experience interpreting the MUTCD and creating pavement marking & signing plans.

It is also expected that, occasionally, RSAs may recommend relatively high-cost safety enhancements (ex., installing a new signal, installing/upgrading lighting, etc.). Should an RSA take place on a non-State Road, it is also possible that the local agency having jurisdiction over the road may not have available the funds necessary to implement the recommendation. In these cases, the consultant will be required to explain to the local agency the Department's LAP program.

Task 15 Products

A RSA will be deemed completed after the following submittals are received and approved by the Department:

1. In general, the RSA report shall follow the following sample outline:
    a. Introduction

i. Scope and purpose of the RSA
ii. Identification of project stage or existing road and items reviewed and not reviewed
iii. Project limits

b. Background
i. Audit team, affiliation and qualifications of team members
ii. Commentary on data received from project owner and design team
iii. General observations regarding site visit
iv. Crash summary tables

c. Findings and suggestions
i. List of safety issues
1. Safety issue 1 – description of issue, evaluation of safety risk, suggestions
2. Safety issue 2 – etc.
ii. Prioritization of safety issues based on value and feasibility using Cartesian plane

d. Formal statement. This is a concluding statement signed by the RSA team members indicating that they have participated in the RSA and agreed or reached consensus on its findings. The RSA team leader – the Road Safety Specialist – who is required to be a licensed engineer in the State of Florida, shall sign and seal the final report.

Task 15 Products

i) RSA Report (one draft; one final signed/sealed with an electronic copy [PDF format], additional hard copies upon request)

SERVICE TYPE 16 – INTERSECTION CONTROL EVALUATION (ICE)

Task 16 Intersection Control Evaluation (ICE)

For an identified intersection, the goal for this study is to conduct the ICE analysis and determine a context-sensitive intersection control strategy that meets the project's purpose and need, fits the intersection location's context classification, provides safe travel facilities for all road users, and reflects the overall best value. The Consultant shall perform all work required for an ICE in accordance with all applicable manuals, guidelines, standards, handbooks, procedures, and current design memorandums. A three-stage evaluation process has been established to consider multiple context-sensitive control strategies when planning a new or modified intersection improvement. The following subtasks shall be completed by the Consultant for this task.

Subtask 16(a) Data Collection

The Consultant shall coordinate and carry out all efforts required to document the project location, basic roadway characteristics, control and design vehicles, design and target speeds, crash data collection, environmental data, multimodal use(s), and roadway context classifications of each intersection. This effort is comprised of desktop analysis as well as turning movement counts of the selected intersection.

Subtask 16(b) Data Analysis

The Consultant shall analyze each intersection using the Three Stage ICE procedure outlined below:

Stage 1 ICE Evaluation considers many potential intersection control strategies and evaluates them using the CAP-X and SPICE tools. The Cap-X tool is an operational analysis tool to evaluate selected types of innovative intersection designs, and the SPICE tool evaluates the safety performance of the intersections. Stage 1 is completed as part of the project's initial study process. Upon completion and approval of the Stage 1 ICE form, the proposed control strategies are prepared for Stage 2: Preliminary Control Strategy Assessment. If the Stage 1 ICE form is not approved, the DTOE or DDE may request additional data collection to help identify viable control strategies and Stage 1 is repeated.

Stage 2 ICE Evaluation is a preliminary control strategy assessment. It helps differentiate any remaining control strategies from Stage 1, by requiring an in-depth analysis of the proposed control strategies. Prior to conducting additional analyses, a conceptual design must be developed for each viable control strategy. These conceptual designs are essential for communicating control strategy concepts and evaluating factors (such as cost, right-of-way impacts, and environmental impact on a site-specific basis). The analysis should incorporate Traffic Operations, Safety Performance, Costs, Benefit-Cost Analysis, Environmental Impacts, Utility Impacts, Right-of-Way impacts, Multimodal Accommodations, as well as Agency Coordination and public input (if applicable). Upon completion of the Stage 2 ICE form, results of the analysis are shared with the DTOE, DDE, and applicable staff. If the Stage 2 ICE form is approved, prepare the proposed control strategies for Stage 3: Detailed Control Strategy Assessment. If the Stage 2 ICE form is not approved, the DTOE or DDE may require additional analysis and evaluation to help identify viable control strategies and Stage 2 Is repeated.

Stage 3 ICE Evaluation is a detailed assessment of the remaining control strategies from Stage 2. This may involve the collection of additional data, further public outreach, developing more detailed designs, conducting more detailed operational analysis, more detailed cost estimates, further environmental analysis, and any other activities necessary to identify the preferred control strategy. (Based on the level of outstanding issues from proposed strategies). Upon completion and approval of the Stage 3 ICE form, proceed to preliminary design for the recommended control strategy. If the submission of the Stage 3 ICE form is not approved, the party responsible for submitting the ICE form must revise their analysis or modify their evaluation based on the comments received from the DTOE and/or DDE.

Subtask 16(c) Strategy Recommendations

Based on the results of the Three-Stage ICE process, the effort shall move into preliminary design. The Consultant conducting the ICE analysis should provide all supporting documentation along with all DTOE and/or DDE signed ICE forms.

Task 16 Products

i) Stage 1 Deliverables
   a. CAP-X AM & PM Forms
   b. SPICE Form
   c. Signed Stage 1 ICE Form

ii) Stage 2 Deliverables (if applicable)
   a. Preliminary Concept Drawings of Control Strategies
   b. SPICE Form
   c. Signed Stage 2 ICE Form

iii) Stage 3 Deliverables (if applicable)
   a. Concept Drawing of Proposed Control Strategy
   b. Signed Stage 3 ICE Form

iv) PDF format report

SERVICE TYPE 17 – BOTTLENECK MITIGATION STUDIES

Task 17 Bottleneck Mitigation Study

The purpose of this study task is to conduct a Bottleneck Analysis for an identified intersection (the identified intersections typically exhibit severe congestion). The intent of the study is to analyze existing conditions of the intersection; assess the secondary congestion caused by the bottleneck intersection; and evaluate potential short-term, low cost treatments that reduce the duration and intensity of the congestion while improving mobility through the bottleneck intersection. The following subtasks will be completed by the Consultant for this study task.

Subtask 17(a) Data Collection

The Consultant shall collect all data required for the study which could include travel time runs, spot speed data, and intersection turning movement counts. The Consultant shall also obtain the current signal timing plan sheets from Miami-Dade County for the study intersection. In addition, transit service data including routes, stops, headways, and travel times and speeds will be gathered within the study area.

Subtask 17(b) Field Review

The Consultant shall conduct field reviews of the study area and intersections to verify physical and operational characteristics. These include lane geometry, signal timings, speed limits, operational restrictions, and field operations at the study intersection and vicinity. The field review will also verify maximum queue lengths for each approach and movement of the study intersections for four-hour AM and PM peak periods.

Subtask 17(c) Synchro Analysis

The Consultant shall develop an existing conditions Synchro network of the study area. This existing conditions analysis will be prepared for the four 60-minute periods between 6:00 am and 10:00 am within the 4-hour AM peak and 4-hour PM peak. The analysis will incorporate the signal timing plans that exist within the entire 4-hour AM peak period and 4-hour PM peak period, per the Miami-Dade County ATMS Timing Reports. Synchro models will also be developed, as needed, to provide preliminary screening of potential improvements.

The analysis will be prepared based on the latest Synchro software version, and measures of effectiveness will include Level of Service, queue lengths, and vehicular delay. These measures will be reported for each approach of each intersection, as well as for the overall intersection. The signal timings from the Synchro network will be utilized in subsequent VISSIM model analysis.

Subtask 17(d) VISSIM Analysis

Intersection and corridor analyses will be performed using VISSIM software. The analyses will be consistent with the guidelines outlined in FHWA's Traffic Analysis Toolbox technical documents and will evaluate the study area's operations based upon the appropriate measures of effectiveness (MOEs) including, but not limited to level of service, delay, volume-to-capacity ratio, queue length, travel time, throughput, and speed. Queue spillbacks shall be documented, and the conceptual design alternatives aimed at addressing existing and future spillback throughout the study area. The VISSIM microsimulation analyses will include existing conditions and one build alternative with recommended improvements (short-term only).

The operational analysis will be the basis for the development of short-term conceptual improvements. VISSIM microsimulation model will be developed for the AM/PM peak periods, and the model will be calibrated to existing conditions based on FDOT/FHWA guidelines and criteria. Simulation analyses will be performed to assess operating conditions for the network within the area of influence. VISSIM traffic simulation models will be used for evaluating traffic operations for existing conditions (model calibration) and build alternative with recommended short-term improvements

The following subtasks describe in detail the VISSIM Simulation work to be performed:

1) Prepare Existing Conditions Model
   An existing conditions model will be prepared for AM and PM peak periods. This model will be constructed based on the following items, which will confirm that the calibration process is performed properly.
   - Finalize model limits
   - Code geometry
   - Code signals/traffic control
   - Code traffics volumes/routing
   - Enter AM traffic data
   - Error checking
   - Prepare output processing

   The overall deliverable for this subtask is the AM/PM peak period VISSIM, un-calibrated existing conditions models.

2) Existing Model Calibration
   Once the existing conditions VISSIM model is constructed and error-checked, the simulation model will be calibrated to replicate the traffic performance of the existing conditions. The calibration of the existing AM/PM peak period models will adhere to the criteria and measures specified in the FHWA Traffic Analysis Toolbox technical documents. The VISSIM simulation development and calibration procedures/parameters will be documented as part of the Existing Conditions efforts including the following:
   - Establish Statistics and Criteria
   - Calibrate AM/PM peak model
   - Prepare calibration summary tables and figures

   The overall deliverable for this subtask is the calibrated peak period models.

3) Short-Term Build Model/Analysis
   The short-term improvement model will be prepared based on the concept design work prepared in other tasks. It is assumed that short-term improvements generally consist of improvements that do not add additional through lanes and extensive roadway widening is not considered feasible in the short-term horizon. Improvements to consider include transportation systems management and operations (TSM&O) concepts, signal timing adjustments, turn bay storage extensions, bus bays, and alternative at-grade intersection configurations. The deliverables for this subtask will be the AM peak period short-term model and summary tables of MOEs.

4) Model Documentation
   A summary report of the modeling work will be prepared, and will include output used for the assessment of various MOEs consisting of the following:

- Corridors/Routes - vehicle trips, travel time, and speed
- Intersections - turning movement volumes, delay times, and queue lengths
- Overall Network - vehicle trips, travel time, and delay time

The simulation outputs will be used for comparing the Existing with and Recommended Build Alternative.

5) Independent QA/QC
Formal QA/QC for the CORSIM modeling effort will be performed by members of the team not directly involved with the preparation of the modeling work.

Subtask 17(e) Conceptual Improvement Development

A conceptual plan depicting the recommended improvements will be developed for the study intersection to address bottleneck deficiencies. The outcome of this task will include a conceptual design sketch.

Subtask 17(f) Documentation

The findings from the previous subtasks shall be documented in a technical memorandum. Findings from the analysis will be summarized, as appropriate, in tables and graphics.

SERVICE TYPE 18 – MID-BLOCK PEDESTRIAN CROSSING EVALUATION

Task 18 Mid-block Pedestrian Crossing Evaluation

The purpose of this study task will be to assess the need for mid-block pedestrian crossings or other pedestrian and bicycle safety and mobility improvements at an identified study location. The following subtasks will be completed by the Consultant for this study task.

Subtask 18 (a) Data Gathering

As part of this task, the Consultant shall retrieve the latest five-year crash data from FDOT's Crash Analysis Reporting System, crash reports and review the High Crash List. This data could be potentially supplemented with Signal Four Analytics data for more recent years based on discussion with the Department Project Manager. The Consultant shall also verify FDOT work program and local agency planned projects in the vicinity of the study location to use it in the evaluation of the mid-block crosswalk.

Subtask 18 (b) Field Reviews

The consultant shall conduct field reviews during the periods of two highest pedestrian demand periods during a weekday. The field reviews will be conducted for a total of four hours and will focus on pedestrian activity in the study area, pedestrian characteristics, pedestrian generators, travel patterns, and pedestrian-vehicle interactions and qualitative assessment of available gaps for pedestrian to safely cross the roadway.

Subtask 18 (c) Crash Data Analysis:

The Consultant shall review the crash data (for the latest 5-year period) obtained through Subtask 18(a) to identify any pedestrian/bicycle crash patterns and contributing causes. Also, prepare cash summary tables by crash type, contributing cause, time of day etc. The consultant shall also prepare collision diagrams for pedestrian/bicycle crashes from the crash data.

Subtask 18 (d) Traffic Data Collection:

The Consultant will perform the following traffic data collection consistent with the data recommended for review as part of mid-block crossing evaluation in the FDOT TEM.

1) 12-Hour Pedestrian Counts for three days (data collection zones will be established based on the study location)
2) Spot Speed Study (both directions of traffic)
3) 12-hour bi-directional traffic volumes and gaps during the same days as the pedestrian counts are collected.

Subtask 18 (e) Midblock Crossing Evaluation

As part of this task, the Consultant shall evaluate the field reviews observations and pedestrian counts to assess current pedestrian demand at the study location to evaluate the need for a mid-block pedestrian crossing. This evaluation shall be based on the Department's Traffic Engineering Manual (TEM). This task shall also include a preliminary evaluation of the existing site conditions such as typical section, driveway locations, adjacent signalized intersections, etc. to assess the feasibility of providing a mid-block crosswalk at the study location.

Subtask 18 (f) Technical Memorandum

The consultant shall prepare a technical memorandum documenting all the above listed study tasks

SERVICE TYPE 19 – ENGINEERING SUPPORT STAFF

The Consultant should provide technical/engineering staff to the Department capable of assisting in the performance of a diverse range of Traffic Safety/Operations Studies and other important work assignments as may be determined by the Department Project Manager (DPM) during the period of the Letter of Authorization (LOA). The Consultant might be required to assign a full-time staff person(s) to work under the direct management and supervision of the DPM (or designee), which shall be based in the District Six Traffic Operations Office. Working hours for the assigned staff person(s) shall be under the Department’s normal working hours unless modified by the DPM and approved by the Consultant’s Project Manager.