**EXHIBIT A**

**SCOPE OF SERVICES**

**FOR COUNTYWIDE INTERSECTION IMPROVEMENTS PRIORITIZATION STUDY**

**RFP Number PNC2121497P1**

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# Scope of Services

## 1. Background

CTS Engineering, Inc. ("Consultant") is tasked to develop a prioritized schedule of signalized intersections improvements projects ("Project").

There are approximately 1,461 signalized intersections within Broward County ("County"). Consultant will develop methodologies to:

1) longlist 250 intersections requiring improvements using readily available information.
2) shortlist 100 intersection improvements to be implemented in 5 groups ranging from short to long term, and 5 constructible intersection improvement projects for immediate work program implementation.

For the shortlisted 100 intersections, Consultant will develop preliminary improvement conceptual alternatives and preliminary cost estimates for comparison of each alternative.

## 2. Project Schedule and Submittals

Within ten (10) business days after the Notice-To-Proceed ("NTP"), and prior to Consultant beginning work, Consultant shall provide a detailed Project activity/event schedule for County and Consultant scheduled activities required to complete the Project Services. The schedule shall be based upon the duration specified below from the date specified in the NTP. The schedule shall be accompanied by an anticipated payout and fiscal progress curve, including all required phase submittals. For scheduling purposes, Consultant shall allow for one month review time for each phase submittal and any other submittals as appropriate.

Table 1 below identifies the key milestones and their time to complete from the date identified in County's NTP.

***Table 1- Project Milestones and Duration***

| Milestone | Duration (months) |
|---|---|
| Coordination meetings | 2 |
| **Task 1: Longlist to 250 Intersections** | |
| • Submittal and approval of Shortlisting (250 intersections) methodology | 1 |
| • Data gathering/analysis | 1 |
| • Submit Shortlisting to 250 intersections task report | 1 |

| Milestone | Duration (months) |
|---|---|
| **Task 2: Select 5 Constructible Intersection Improvements for Immediate Work Program Implementation** | |
| • Provide recommendations task report with recommendations for improvement alternatives, concepts, and cost estimates. | 1 |
| **Task 3: Shortlist 100 intersection improvements** | |
| • Submittal and approval of prioritization methodology | 1 |
| • Data collection/field visits | 2 |
| • Data analysis/modeling | 1 |
| • Submit Shortlist of 100 intersection improvements task report | 1 |
| **Task 4: Recommendation of short-, mid-, and long-term improvement alternatives, concepts, and long-range cost estimates** | |
| • Group 1: Recommend 10 intersection improvement projects to be included in County's Surtax Program short-term implementation plan. | 1 |
| • Group 2: Recommend 15 intersection improvement projects to be included in County's Surtax Program short- to mid-term implementation plan. | 2 |
| • Group 3: Recommend 25 intersection improvement projects to be included in County's Surtax Program mid-term implementation plan. | 3 |
| • Group 4: Recommend 25 intersection improvement projects to be included in County's Surtax Program mid- to long-term implementation plan. | 3 |
| • Group 5: Recommend 25 intersection improvement projects to be included in County's Surtax Program long-term implementation plan. | 2 |
| **Task 5: Study Report and Electronic Delivery of Project files** | |
| • Final Study Report and Electronic Delivery of Final Project Files and Presentations to County Administration, County Commission and Surtax Board | 2 |
| **Total** | **24** |

## 3. Project Requirements

### 3a. Liaison Office

County and Consultant will designate a Liaison Office and a Project Manager who shall be the representative of their respective organizations for the Project. While it is expected Consultant shall seek and receive advice from various state, regional, and local agencies, the final direction on all matters of this Project remain with the County Project Manager.

**3b. Key Personnel**

Consultant's work shall be performed and directed by the key personnel identified in the proposal presentations by Consultant. Any changes in the indicated personnel shall be subject to review and approval by County.

**3c. Progress Reporting**

Consultant shall meet with County as required and shall provide a written monthly progress report with approved schedule, schedule status, and payout curve or by using the earned value method that describes the work performed on each task. The report will include assessing Project risk through monthly documentation of identifying and updating the risk category and approach for monitoring those tasks. Invoices shall be submitted after County approves the monthly progress report and the payout curve or with earned value analysis. The Project Manager will make judgment on whether work of sufficient quality and quantity has been accomplished by comparing the reported percent complete against actual work accomplished.

**3d. Correspondence**

Copies of all written correspondence between Consultant and any party pertaining specifically to this Agreement shall be provided to County for their records within one (1) week of the receipt or mailing of said correspondence.

**3e. Professional Endorsement**

Consultant shall have a Licensed Professional Engineer in the State of Florida sign and seal all reports as required by Florida Statutes and applicable standards.

**3f. Coordination with Other Consultants**

Consultant is to coordinate their work with all adjacent and integral consultants to effect complete and homogenous plans and specifications for the Project(s) described herein.

**3g. Invoicing Limits**

Payment for the work accomplished shall be in accordance with the Method of Compensation of this Agreement. Invoices shall be submitted to County, in a format prescribed by County. At a minimum, Consultant is required to track staff hours by activity. The County Project Manager and Consultant shall monitor the cumulative invoiced billings to ensure the reasonableness of the billings compared to the Project schedule and the work accomplished and accepted by County.

Consultant shall provide a list of key events and the associated total percentage of work considered to be complete at each event. This list shall be used to control invoicing. Payments will not be made that exceed the percentage of work for any event until those events have occurred and the results are acceptable to County.

## 4. Project Common Tasks

Project Common Tasks, as listed below, are work efforts required to be performed by Consultant that are applicable to Project activities:

**4a. Cost Estimates**

Consultant is responsible for producing preliminary construction cost estimates as detailed in this Scope of Services.

**4b. Field Reviews**

Consultant shall make as many trips to the field as required to obtain necessary data as per this Scope of Services.

**4c. Technical Meetings**

Consultant shall attend all technical meetings necessary to execute the Scope of Services of this Agreement. This includes meetings with County and/or Agency staff, between disciplines and subconsultants, such as access management meetings, pavement design meetings, local governments, railroads, airports, and miscellaneous meetings. Consultant shall prepare and submit to the County Project Manager for review, the meeting minutes for all meetings attended by them. The meeting minutes are due within five (5) working days of attending the meeting.

**4d. Quality Assurance/Quality Control**

It is the intention of County that Consultants, including their subconsultant(s), are held responsible for their work, including review of the produced documents. The purpose of Consultant plan reviews is to ensure that the produced documents follow the procedures outlined in the applicable standards and manuals, that state and federal standards are followed with County's concept, and that submittals are complete. All subconsultant documents shall be submitted by the subconsultant directly to Consultant for their independent Quality Assurance/Quality Control review and subsequent submittal to County.

Consultant shall be responsible to independently and continually perform quality assurance/quality control ("QA/QC") their deliverables. Consultant should regularly communicate with County's Project Manager to discuss and resolve issues or solicit opinions from those within designated areas of expertise.

Consultant shall be responsible for the professional quality, technical accuracy and coordination of all surveys, designs, drawings, specifications, and other services furnished by Consultant and its subconsultant(s) under this Agreement.

Consultant shall provide a Quality Control Plan that describes the procedures to be utilized to verify, independently check, and review all maps, reports, and other documentation prepared as a part of the Agreement. Consultant shall describe how the checking and review processes are to be documented to verify that the required procedures were followed. The Quality Control Plan shall be one specifically designed for this Project. Consultant shall submit a Quality Control Plan for approval within twenty (20) business days of the written Notice to Proceed and it shall be signed by Consultant's Project Manager and Consultant ("QA/QC") Manager. The Quality Control Plan shall include the names of Consultant's staff that will perform the quality control reviews. The Quality Control reviewer shall be a Florida Licensed Professional Engineer fully prequalified under F.A.C. 14-75 in the work type being reviewed. Marked up documents and a written resolution of comments on a point-by-point basis will be required,

if requested by County, with each submittal. The responsible Professional Engineer that performed the QA/QC review will sign a statement certifying that the review was conducted and found to meet required specifications.

Consultant shall, without additional compensation, correct all errors or deficiencies in the designs, maps, drawings, specifications and/or other products and services.

**4e. Supervision**

Consultant shall supervise all technical activities.

**4f. Coordination**

Consultant shall coordinate with all disciplines of the Project to produce a final coherent report.

## 5. Stakeholders Coordination

Consultant will coordinate with all stakeholders including, but not limited to:

a. Florida Department of Transportation ("FDOT") Districts 4 and 6
b. County (multiple departments and divisions within):
    - Transportation Department
    - Public Works Department
    - Environmental Protection and Growth Management
    - Transportation Department
c. Water Management Districts
d. Florida's Turnpike Enterprise
e. Broward Metropolitan Planning Organization ("MPO")
f. Local agencies
g. Tri-Rail, Florida East Coast railroad agencies
h. All 31 County municipalities
i. Palm Beach County Engineering and Public Works
j. Miami Dade County Department of Transportation and Public Works
k. Neighboring Cities:
    - City of Aventura
    - Town of Golden Beach
    - City of Miami Gardens
    - City of Boca Raton

Consultant coordination shall identify relevant information, including, but not limited to:

a. Recently completed construction projects
b. Planned or programmed improvements
c. Planned developments
d. Any other available relevant data

The coordination with other agencies will be conducted primarily via email to gather data and relevant information. The coordination will take place at two stages, one during the initial stages of the study and during the shortlisting of the 100 intersections. Coordination via virtual or physical meetings must be warranted by the complexity of the coordination effort (this effort will be separately negotiated, as necessary). Consultant will prepare all required material (e.g. agenda, presentations, maps, minutes, etc.) for each virtual or physical meeting with coordinated agencies.

Task Products/Deliverables

- Compilation of coordination emails and data/information gathered during coordination

## 6. Longlist of 250 Intersections

### 6a. Methodology Development

Consultant will research and develop a methodology to evaluate all County intersections using data gathered in Subtask 1b below. Evaluation result must provide the top 250 intersections needing improvements. The methodology will include applying needs assessment based on criteria such as safety, mobility, socioeconomic attributes, and recent/ongoing studies information. Various indicators for safety and mobility must be assessed for each intersection. The methodology will also detail weighting factors that could be applied to each of these criteria.

The methodology for arriving at the longlist of 250 intersections will involve the following steps –

1. Excluding intersections that may not lend themselves to capacity and/or safety improvements (such as firehouse signal and U-turn signals).
2. Identify and eliminate those intersections that have funded capacity and safety improvement projects and those that have had recently implemented capacity and safety improvement projects using the work program, recently completed projects and programmed Project information obtained during stakeholder coordination.
3. Develop a methodology to rank the remaining candidate intersection using needs assessment based on criteria such as safety, mobility, socioeconomic attributes, and recent/ongoing studies information. The methodology will consider various measures (such as crash frequency and severity for safety; Level of Service ("LOS"), Volume-to-Capacity ("v/c"), truck percentage, etc. for mobility) under each criterion for ranking the top 250 intersections.
4. The methodology will also detail weighting factors that will be applied to each of these criteria.
5. A dashboard application to assess various criteria and weights will be developed as part of this task.
6. The methodology will be submitted to County for approval. The format of County's review may be a workshop-type presentation with County representatives. The setup of the review will be determined by County. The methodology will be updated with any input from County.

Task Products/Deliverables

- Methodology for Longlisting

**6b. Data Gathering**

Based upon the methodology approved in Subtask 3a, Consultant may obtain the following data:

a. Traffic and Multimodal Activity Data

- Historical traffic counts
- Historical pedestrian and bicycle data
- Historical truck traffic data
- Historical transit stops boarding/alighting data at stops near intersections
- Systemwide travel time and speed
- Systemwide travel delay
- Historical traffic safety data
- Sources:
  - Data obtained from agencies
  - Big Data (i.e.: Streetlight, HERE, INRIX, etc.)
  - Intelligent Transportation Systems ("ITS") / Transportation Systems Management and Operations ("TSM&O") data

b. Multimodal Transportation System Data

- Geometric configurations such as travel lanes, turn lane storage, and channelization
- Lane width, median, and on-street marking
- Sidewalk, bike lane, and other complete-street facilities
- Bus stops (near side/far side)
- Right-of-way ("ROW")
- As-built Plans
- Lighting conditions
- Structures
- Drainage and utilities
- Pavement Condition
- Access Management
- Adjacent Railway Crossings
- Signing and pavement markings
- Signal Timing Information
- Traffic monitoring devices (sensors, cameras, and other new technologies)

c. Land Use, Growth Management, and Environmental Data:

- Existing and approved future land use plans
- Upcoming major developments around the intersections
- Permits
- Environmental features: Natural, Physical, and Social

- Historic, Archeological, and Cultural Resources (Section 106)
- Visual quality
- Socio-economic and environmental justice studies
- Noise and air quality
- Section 4(f) historic sites, publicly owned parks, recreation areas, and wildlife and waterfowl refuges
- Contamination (hazardous materials)
- Sea-level rise and resilience
- Projected growth in population, employment, and traffic volumes

d. Past Studies, Plans, and Projects:

- County Surtax Program 5-Year Plan
- Long Range Transportation Plan (County Commitment 2045 Metropolitan Transportation Plan)
- County Public Works Capital Plan
- City Capital Improvement Plans ("CIP")
- FDOT Work Program and Strategic Intermodal System 2045 Cost Feasible Plan
- Corridor Studies or Master Plans (on-going and recently finished) from any of the agencies listed in the coordination section
- Recently completed intersection improvement projects

e. Other Project-Related Data:

- Imagery databases
- Citizen Requests and Complaints (311, log documents from Public Works records)

**6c. Data Analysis**

After the initial filtering of locations based on recently completed/ongoing/planned Project information, needs assessment criteria will be applied based on approved methodology. The following criteria which will be further vetted through coordination with County during the methodology development process, are proposed for this needs-based assessment:

1. Safety – crash data readily available from the University of Florida's Signal Four Analytics database for the most recent five years will be utilized for this evaluation. This crash data could be further supplemented with FDOT crash analysis reporting system ("CARS") data, if needed. The following safety measures will be utilized in ranking the intersections:
2. Crash frequency
3. Crash severity
4. Mobility – traffic-related measures such as delays, speeds, volume, and volume/capacity ratio from readily available Data sources such as HERE, RITIS, and INRIX will be utilized for the ranking the intersections. This could be supplemented with Streetlight data, if needed (additional fee will apply given that this data is not free). At this stage, field data collection is not anticipated. Another source

of data for evaluation of mobility related metrics is the intersection performance metrics from the County Traffic Engineering Division. Also, FDOT's annual LOS maps (existing and future), County MPO LOS spreadsheets, and Southeast Florida Regional Planning Model ("SERPM") model metrics will also be reviewed. The following mobility measures will be utilized in ranking the intersections:

5. Congestion index (speed, v/c ratio, and los)
6. Future v/c ratio
7. Truck percentage
8. Transit ridership
9. Pedestrian/bicycle activity
10. Socioeconomic Data – land use trends, citizen complaints/requests and agency input will be utilized as another evaluation criteria. The following socioeconomic data measures will be utilized in ranking the intersections:
11. Population and employment growth rate from the County MPO Long-Range Transportation Plan Traffic Analysis Zones ("TAZ")
12. Historical 311 reports from the public, local police districts, and school districts,
13. Agency input.
14. Recent/Ongoing Studies – recent and ongoing studies by various agencies (e.g., FDOT, County and municipalities) will be obtained through stakeholder coordination. These could be utilized in expediting intersection improvements for implementation, especially for the five intersection improvements for immediate implementation. These study documents will be thoroughly reviewed to ensure that the recommendations from the studies –
15. have not been programmed for implementation after study completion
16. are still valid based on existing conditions
17. are included in the upcoming tasks for shortlisting and scoping

The weighting for these individual criteria will be determined during the methodology development and approval process in coordination with County under Task 3a. Using these criteria and their assigned weights, the list of intersections will be ranked. Consultant will coordinate with all the cities and other potential parties, such as FDOT and MPO, to gather their input on the methodology and longlisting criteria.

In addition to the traffic and safety needs, further considerations (that are integral to the socioeconomic needs and recent/ongoing study factors) such as the following will be considered for ranking and refining the longlisted intersections:

1. Verifying and prioritizing locations where County or local agencies have received complaints or citizen requests.

2. Verifying and prioritizing locations that have outdated design or infrastructure (based on review of as-builts and other available information). These intersections will be considered for ranking higher on the lists, as they have not been a recipient of improvements in a long time.
3. Verifying and prioritizing intersections identified on the approved County Surtax Program project list as needing intersection improvements.
4. Verifying and prioritizing recent studies that have developed potential capacity and safety improvements but were not programmed for implementation.

As per the goal of the County Surtax Program, refinements to the intersection list to ensure an equitable spread of sites throughout the County (i.e., avoiding lumping all screened locations in one part of the County) to distribute surtax money evenly across the entire county could be considered in coordination with County. Consultant will actively coordinate with County PM and staff to ensure proper distribution is considered for the final recommended 250 Intersections List.

Task Products/Deliverables

- Longlist of 250 Intersections documentation report

## 7. 5 Constructible Intersection Improvements

Following the longlisting of the 250 intersections, improvements at five (5) intersections will be identified for immediate implementation. The five (5) intersections for improvements will be identified based on a combination of:

- High/severe crashes
- High traffic volumes
- No right-of-way needs
- No environmental impacts

Consultant will utilize a top-down and iterative method starting with the top five (5) intersections from the Task 1 longlisting.

### 7a. Data Collection

In addition to the data gathered through coordination with stakeholders, additional data for the top 5 locations from the ranked list of 250 intersections will be collected. The data to be collected is:

5. 72-hour machine counts
6. 4-hour turning movement counts
7. County Traffic Engineering Division Traffic Management Center data
8. Signal Timing Information
9. As-built plans

10. Queue/Delay/Speed data (field collected, as needed)

The intent of this task is to identify improvements for immediate implementation at 5 locations, it is possible that improvements for immediate implementation may not be feasible at the top 5 locations. As such, data collection at more than 5 locations may be needed. It is assumed that about 10 locations will need to be evaluated.

**7b. Field Reviews**

Field visits for the top 5 intersections will be conducted to observe the physical, operational, & safety conditions. The field reviews will assess the following:

1. Geometric and Physical Conditions
    a. Pavement condition
    b. Alignment
    c. Cross slope and superelevation
    d. Lane width
    e. Signing and pavement markings
    f. Side slopes and clear zones (qualitative)
    g. Shoulder type and width
    h. Intersection elements
    i. Sight distances (qualitative)
    j. Drainage (qualitative)
    k. ADA features
    l. Transit stops
    m. Pedestrian and bicycle facilities
    n. Speed limits
    o. Lighting conditions (no field measurements)

2. Operational Conditions
    p. Queues
    q. Delay (qualitatively)
    r. Signal cycle failures
    s. Traffic conflicts

Professional engineers from Consultant team, qualified in the evaluated field (traffic operations, roadway geometry, safety, etc.) shall visit the locations under study during the peak traffic periods or other periods (such as a crash peak or school dismissal), to make qualitative assessments of the intersection operation. During the field review, other related conditions will also be observed and recorded. Consultant will review geometry and traffic control devices for deficiencies related to operational issues or crash issues and identify potential driver expectancy problems. Consultant will employ field observation checklists to ensure a thorough evaluation of the location. Photographs will be taken at the intersection to document all relevant information at the intersection such as vehicular

conflicts, queues/spills, utility conflicts, right-of-way constraints, obstructions, unusual geometries, deficient pavement conditions or markings, etc.

Task Products/Deliverables

- Field Observations Notes

**7c. Traffic Operational/Safety Analysis**

Improvements under this task will involve intersections where improvements could be immediately implemented without the need for additional right-of-way or environmental impacts. Using the data collected and field review information, Consultant will utilize Synchro (for traffic operational analysis) to evaluate existing operating conditions (LOS, Delay, v/c, queues). Based on the results from previous tasks and appropriate analysis, Consultant will make conceptual recommendations for improving the identified intersections from both safety and operational standpoint. Consultant will also perform operational analysis for proposed conditions to document the benefits from the recommended improvements. Consultant will also review five years of crash history for these five intersections. This review will include the preparation of crash summary that includes the classification of crashes by type, time of day, day of the week, month, injury severity, lighting, and road surface conditions.

Task Products/Deliverables

- Level of service for existing conditions (AM/PM)
- Level of service of proposed conditions (AM/PM)
- Crash Summary

**7d. Engineering Evaluation and Alternatives Development**

Consultant will perform engineering evaluation for the concepts developed based on the traffic operational/safety analysis to verify preliminary feasibility of the identified improvements. Consultant will also prepare existing conditions and conceptual sketches of proposed conditions on aerial background in CADD (DGN format) with appropriate measurements.

Task Products/Deliverables

- Summary of proposed recommendations
- Existing and Proposed Conceptual Sketches

**7e. Cost Estimates and Financial Feasibility**

Consultant will evaluate the benefit in terms of delay reduction for operations improvements and crash reduction for safety related improvements. As part of this effort Consultant will verify feasibility of proposed improvements based on a review of available as-built plans and field observations. Consultant will also prepare preliminary cost estimates for the proposed improvements using programs such as FDOT's Long Range Estimating ("LRE") program and Historical Market Area Average Unit Cost Databases.

Task Products/Deliverables

- Cost Estimates
- Benefit-Cost and Net present value analysis

**7f. Scoping Reports for 5 Intersections**

The products of previous subtasks within this task will be analyzed collectively. Consultant will then prepare a scoping report for each intersection. The report will include sketches for the existing conditions as well as proposed improvements.

Task Products/Deliverables

- Scoping Reports for 5 intersections

## 8. Shortlist of 100 Intersections

As part of this task, Consultant will shortlist the 100 intersections. To expedite the process, we will utilize multiple teams to work simultaneously on this task. Following is a list of potential improvements that will be considered:

- Signal improvements (Signal Modification, Signal Control Improvements, and ITS Improvements) – Typically No Right of Way ("ROW") Needs
- Maintenance/Lighting/ADA Improvements – Typically Minor or No ROW Needs
- Geometric improvements
- Minor improvements (Minor or No ROW Needs)
    - Additional turn lane(s)
    - Extending turn storage length
    - Restriping, Signing, pavement markings,
- Major improvements (Major ROW Needs)
    - FDOT ICE Alternative Intersection Control Options
    - FHWA Innovative Intersections
    - Roundabouts
    - Grade Separation
    - Flyovers/Tunnels
- Pedestrian and Bicycle Facility Improvements (sidewalk, crosswalk, bike lane, multiuse path, etc.) – Typically, Minor or No ROW Needs
- Transit/Freight (near side/far side bus stop location, bus shelters, new bus stop, queue jump, Transit Signal Prioritizations, etc.) – Typically, Minor or No ROW Needs

The improvements identified are anticipated to be within a five-year programming cycle and grouping of projects based on difficulty of implementation (for e.g., ROW needs, etc.) will be considered during potential improvements development.

**8a. Methodology Development**

Consultant will review various available project ranking systems and develop a methodology for prioritizing intersection improvement projects in County. Several tried-and-tested proven ranking and project prioritization methods, such as FDOT's Strategic Investment Tool ("SIT") and the County Metropolitan Transportation Plan Prioritization Process will be utilized. The following criteria which will be further vetted through coordination with County are proposed for this prioritization –

1. Safety – crash data readily available from sources such as FDOT crash analysis reporting system ("CARS") and University of Florida's Signal Four Analytics database will be utilized for evaluation. Safety associated measures such as crash rate, severe crash frequency and crash reduction will be utilized in prioritizing the intersections.
2. Mobility – traffic-related measures such as existing LOS, future conditions LOS, truck percentage and multi-modal accommodations will be utilized for the prioritizing the intersections.
3. System Preservation – measures associated with system preservation such as pavement condition surveys and resiliency index will be utilized in prioritizing the intersections.
4. Feasibility – feasibility in terms of right-of-way availability, environmental impacts, benefit-cost and net present value analysis for economic feasibility will be utilized.
5. Community Impacts –land use changes (population and employment growth) may also be utilized in prioritizing the intersections.

Similar to the longlisting methodology, this will also detail weighting factors that could be applied to each of these criteria. The methodology will be submitted to County for approval. The methodology will be updated with any input from County.

Task Products/Deliverables

- Methodology for Shortlisting 100 intersections

**8b. Data Gathering**

In addition to the data gathered through coordination with stakeholders, the following additional data, as needed, for the top 100 locations from the list of 250 intersections will be collected –

1. Signal Four and CARS crash data for screening and analysis
2. Available 24-hour link counts and Turning Movement Counts for the 100 intersections
3. Signal timing plans
4. As-built plans
5. ROW and survey data
6. FDOT Efficient Transportation Decision Making ("ETDM") data for environmental screening
7. Plans, studies, lists of funded projects, construction information
8. Public complaints (311), log report from various offices in County, and inputs from cities or other sources

Data available from studies within three years will be utilized. At locations where data is not available, some data collection may be necessary.

Task Products/Deliverables

- Data (as noted)
- Preliminary recommendations for intersection improvements

**8c. Data Analysis/modeling**

As part of this task, Consultant will analyze and recommend capacity/safety improvements for the 100 intersections based on the data collected. Synchro and/or FDOT ICE (Stage 1) analysis may be conducted to identify the potential capacity improvements. The safety associated recommendations will be made based on 5-year crash history, targeting reduction of fatalities and severe injury crashes. In this task, both preliminary improvements implementable within a five-year period will be reviewed and recommended for each intersection. The traffic for the end of the 5-year may be estimated using the historical traffic volume, if needed (no SERPM demand modeling effort is anticipated and will be considered a supplemental task, if needed, by County later).

**8d. Preliminary Engineering/Design Feasibility Reviews**

Consultant will verify feasibility of proposed improvements based on a review of as-built plans and field observations. Sensitive locations (e.g., cemetery, school, park, etc.) will be documented as well to avoid any potential Section 4(f) property impacts. Consultant will perform Desktop Review of Environmental Features and preliminary Project research to assure environmental impacts are properly identified and documented for the alternatives.

If a location has no feasible improvements (e.g., intersections with options such as grade-separation only) or constrained by environmental impacts (e.g., church adjacent to the intersection), the next intersection from the ranked list from Task 1 will be analyzed. The process will be repeated until 100 intersections have been identified. The preliminary results will then be presented to County for comments.

Task Deliverable

- 100 Intersections improvements report

## 9. Recommendations for Short-, Mid-, and Long-Term Improvements

Improvement alternatives will be developed and prioritized with conceptual drawings and preliminary cost estimates.

**9a. Data Collection**

Consultant will utilize data collected as part of previous tasks to the extent possible. Additional data needed for additional analysis in developing various improvement alternatives will be collected as part of this task. Additional data includes:

1. 24-hour machine counts
2. 6 - hour turning movement counts
3. Signal timing plans
4. Aerial images/video logs
5. Queue/Delay/Speed/Gap data, if needed.
6. Pedestrian/Bicycle data, if needed
7. StreetLight data, if needed (Reimbursables included in the fee estimate)

Task Products/Deliverables

- Data (as noted)

**9b. Field Reviews**

Field visits for the top 100 intersections will be conducted to observe the physical, operational, & safety conditions. The field reviews will assess the following:

1. Geometric and Physical Conditions:
    a. Pavement condition
    b. Alignment
    c. Lane width
    d. Pavement markings and signs
    e. Shoulder type and width
    f. Intersection elements
    g. Sight distances (qualitative)
    h. ADA features
    i. Transit stops
    j. Pedestrian and bicycle facilities
    k. Speed limits
2. Operational Conditions:
    a. Queues
    b. Delay (qualitatively)
    c. Signal cycle failures
    d. Traffic conflicts

A qualified traffic engineer and design engineer from Consultant team shall visit the location under study during the morning and afternoon peak traffic periods or other periods (such as a crash peak or school dismissal), to make qualitative assessments of the intersection operation. During the field review traffic safety related conditions will also be observed and recorded. Consultant will review geometry and traffic control devices for deficiencies related to operational issues or crash issues and identify potential driver expectancy problems. Consultant will employ field observation checklists to ensure a thorough evaluation of the location. Photographs will be taken at the intersection to document all relevant information at the intersection such as vehicular conflicts, queues/spills, utility conflicts, right-of-way constraints, obstructions, unusual geometries, deficient pavement conditions or markings, etc.

**9c. Engineering Evaluation and Alternatives Development**

Consultant will perform engineering evaluation for the preliminary concepts developed under the previous task to verify preliminary feasibility of the identified improvements. The conceptual sketches will be developed utilizing aerial photography and as-built plans. The purpose of the development of the design concepts is to determine the general feasibility of the concept; identify potential right-of-way impacts; and determine critical design issues. The feasibility of such concepts will be reviewed consistent with the latest editions of the applicable standards, such as Florida Greenbook, FDOT Design Standards, FDOT Design Manual ("FDM"), Manual on Uniform Traffic Control Devices ("MUTCD") and A Policy on Geometric Design of Highways and Streets ("AASHTO"). The maintenance of access for pedestrians and bicyclists is a design element that will be considered.

**9d. Cost Estimates and Financial Feasibility**

Consultant shall determine a preliminary cost estimate of the improvement alternatives proposed using recent historical cost data or other method as approved by County. The cost estimate will make a distinction between the cost of the safety and operational improvements separately, so that safety and operational benefits can be clearly identified. Consultant will 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 County. Consultant will develop a benefit/cost ratio and net present value analysis for each of the proposed alternatives.

**9e. Scoping Reports for Top 100 Intersections**

The products of previous subtasks within this task will be analyzed collectively. Consultant will then prepare a scoping report for each intersection. The report will include sketches for the existing conditions as well as proposed improvements.

Task Products/Deliverables

- Cost Estimates
- Benefit-Cost and Net present value analysis
- Scoping Reports

## 10. Task 5 – Final Study Report and Electronic Delivery of Project Files

Consultant will maintain records of files, traffic count data, crash data, traffic engineering analysis software input and output files, documents, field photos, CADD files, presentations, videos, correspondence, and any other supporting documentation for this Project. A signed and sealed final report will be submitted. The final study report will include an Executive Summary to provide a summarization of the tasks, approved methodologies, recommendations including concepts and LREs, lessons learned, and conclusions. The report will also document recommendations and alternatives including concept plans, layouts, and cost estimates for all of the proposed improvements. In addition to the study reports, all supporting Project files will be made available to the County Highway Construction and Engineering Division through electronic delivery.

Consultant shall prepare presentation materials to be utilized at presentations to County Administration, County Surtax Board, and County Board of County Commissioners. Consultant shall coordinate with County the presentation material and final presentation shall be reviewed and approved by County prior to Consultant carrying out the presentations. The duration of each presentation is expected to be 1 to 2 hours, plus additional time for questions and inquiries from the audience.

Task Products/Deliverables

- Final Study Report with supporting documents in an electronic format.
- Presentation of Study Process and Results