TREBILCOCK
CONSULTING SOLUTIONS

PROFESSIONAL SERVICES PROPOSAL
CITY OF MARCO ISLAND TRAFFIC OPERATIONS STUDY FOR ITS
Contract 19-012 Professional Services Library – Engineering & Architecture

September 21, 2022

City of Marco Island

Justin Martin, PE
Interim Public Works Director
City of Marco Island
50 Bald Eagle Drive
Marco Island, FL 34145
E jmartin@cityofmarcoisland.com
P 239.389.3992

Consultant

Norman J. Trebilcock, AICP, PTOE, PE
President
Trebilcock Consulting Solutions, PA
2800 Davis Boulevard, Suite 200
Naples, FL 34104
ntrebilcock@trebilcock.biz
P 239.566.9551

PROJECT DESCRIPTION / SCOPE:

A comprehensive traffic signal retiming project will be performed for the City of Marco Island (CITY) by CONSULTANT (with sub consultant FTE—Florida Transportation Engineering, Inc.) in accordance with this Scope Work. Based on the experience of local traffic patterns, it is anticipated that the Peak Season 2023 will be from January 2, 2023 to April 7, 2023. In addition, the CONSULTANT will provide Performance Monitoring and Active Arterial Management of the subject arterial for a 60-day period after acceptance by the CITY. Based on a preliminary review of the CITY's traffic signal network, the Study Area / Retiming Project will include the following ten (10) intersections:

1. N. Collier Boulevard at N. Barfield Drive.
2. N. Collier Boulevard at E. Elkcam Circle.
3. N. Collier Boulevard at Bald Eagle Drive.
4. N. Collier Boulevard at W. Elkcam Circle.
5. N. Collier Boulevard at Kendall Drive.
6. N. Collier Boulevard at San Marco Road.
7. S. Collier Boulevard at Winterberry Drive.
8. San Marco Road at Heathwood Drive.
9. San Marco Road at Barfield Drive.
10. Bald Eagle Drive at Elkcam Circle.

It is anticipated that the above-named intersections will operate as a single coordinated signal system. However, the subject signal network may be divided into separate coordinated roadway segments based on collected traffic data and overall system performance. The CONSULTANT will ensure that any distinct coordinated roadway segments will operate on compatible cycle lengths to optimize the operational efficiency of the entire network. Intelligent Traffic System alternative considerations will be evaluated as well as geometry improvements to optimize the City's traffic operations. The individual tasks to be performed by the CONSULTANT follow.

A. DATA COLLECTION AND SOFTWARE MODEL DEVELOPMENT

Task 1: Seven (7) Day Bi-Directional Volume Counts

The CONSULTANT will collect traffic volume counts in the CITY for a period of at least seven (7) consecutive days for each direction of travel at the following locations:

1. N. Collier Boulevard between N. Barfield Drive and E. Elkcam Circle.
2. N. Collier Boulevard between Kendall Drive and San Marco Road.
3. S. Collier Boulevard between San Marco Road and Winterberry Drive.
4. San Marco Road between Heathwood Drive and Barfield Drive.

The CONSULTANT will supply electronic copies of all 7-day volume count data, including the raw data directly to the CITY in PDF format. The bi-directional counts will be used to identify peak period anomalies and to determine the operating time periods for each timing pattern developed for the subject arterial.

Task Product: The 7-day volume count data will be submitted in tabular form broken down into direction of travel, days, and hours with 15-minute increments and hourly totals. EXCEL will be used to submit the counts graphically showing the timing pattern intervals. The count information and graphs will be submitted electronically.

Task 2: Turning Movement Counts

The CONSULTANT will collect and summarize ten (10) hours of fifteen (15) minute turning movement counts (TMCs) at the ten (10) identified intersections using the procedures contained in the FDOT Manual on Uniform Traffic Studies (MUTS), Chapter IV, "Summary of Vehicle Movements". The counts will be conducted during the highest 10 hours of the day and include the AM peak, PM peak, and Off-peak periods. The counts will include heavy vehicles and pedestrian counts. Counts will not be conducted on holidays or during special events. TMCs will be collected for two (2) consecutive weekdays and the results will be averaged for input into the traffic model. Weekend TMCs will be collected on Saturday and may be adjusted based on the identified peak hours. The CONSULTANT will determine the AM, Midday, PM, and Off-peak periods for both weekdays and weekend days for which 10-hour TMCs at each of the project intersections will be collected. The CONSULTANT will supply electronic copies of all TMC count data, including the raw data directly to the CITY in PDF format.

Task Product: The counts will be submitted in PDF tabular format, broken down into each approach with each movement separated out, showing the 10 hours tabulated in 15-minute increments and one-hour totals. The count information will be submitted electronically.

Task 3: Collecting Traffic Signal Programming Data

The CONSULTANT will collect all traffic signal data programed into the existing signal controllers at the ten (10) identified intersections. The traffic signal data will include at a minimum: basic signal timings, cycle length, phasing sequence / splits and recall modes. If applicable, the CONSULTANT will also collect existing time of day (TOD) plans and offsets.

Task Product: Existing signal timing spreadsheets in PDF format.

Task 4: Field Review

The CONSULTANT will perform a comprehensive field review to include the ten (10) identified project intersections. The CONSULTANT will document any noted operational issues such as average queue lengths, queue spillback from existing turn lanes, vehicle detection mode, pedestrian features, access conflicts and geometric layout of intersections. Any hardware deficiencies noted by the CONSULTANT will be documented and immediately brought to the attention of the CITY.

Task Product: Field review report in PDF format.

Task 5: Saturation Flow Rate

Based on local knowledge of traffic patterns, the saturation flow rate will be initially assumed to be 1900 vplph for the subject roadway network. The saturation flow rate may be adjusted during the calibration of the traffic model to best replicate existing field conditions.

Task 6: Develop Software Models Reflecting the Existing Conditions

The CONSULTANT will use SYNCHRO software to model the existing conditions and timing plans for the weekday and weekend AM, Mid-Day, and PM peak periods for each identified intersection. A SimTraffic model will be used to verify that the SYNCHRO run is an accurate reflection of the existing conditions. Queue lengths observed in the field will be used to calibrate the SYNCHRO model via the SimTraffic queue lengths.

Task Product: HCM 2010 existing conditions report of all project intersections in PDF format.

Task 7: Before Travel Time and Delay Studies

The CONSULTANT will deploy and/or utilize a minimum of four (4) Bluetooth detection devices to collect travel time data and to perform travel time analysis under existing signal timings. At a minimum, travel time data will be collected and analyzed for three time periods as follows: 1) 7 AM to 9 AM; 2) 11:00 PM to 1:00 PM; 3) 4 PM to 6 PM. The travel time data will be collected during a typical weekday and weekend at the following four (4) minimum locations:

1. N. Collier Boulevard at N. Barfield Drive.
2. N. Collier Boulevard at San Marco Road.
3. S. Collier Boulevard at Winterberry Drive.
4. San Marco Road at Barfield Drive.

Task Product: "Before" travel time report of the arterial under existing conditions in PDF format.

B. DEVELOP TRAFFIC SIGNAL TIMING PLANS

Task 8: Update Controller Basic Timing Parameters

The CONSULTANT will update the controller basic timing parameters for the subject roadway network. Clearance calculations for vehicles and pedestrians will be verified / recalculated based on Section 3.6 of the *FDOT Traffic Engineering Manual* as well as any supplemental guidance from the CITY.

Task Product: Updated clearance calculations for vehicles and pedestrians will be submitted in PDF Format.

Task 9: Timing Plans, Coordination and Time of Day Settings

The CONSULTANT will develop the new timing plans for each identified intersection using SYNCHRO software to determine the optimal phasing, cycle length and splits for the arterial corridor.

The CONSULTANT will refine the offsets from the time-space diagrams generated by SYNCHRO using Tru-Traffic. The bandwidths, speeds, direction of travel, intersection names and offsets will be shown on each time-space diagram developed in Tru-Traffic.

The CONSULTANT will develop multiple traffic control timing patterns for each identified intersection within the subject roadway network. The number of timing patterns and pattern change times will be determined by the CONSULTANT and approved by the CITY. The final signal timing plans and requirements will be determined based on the field data collected by the CONSULTANT and input from the CITY. The following signal timing plans will be evaluated for potential implementation:

- Weekday AM Peak.
- Weekday AM Off-Peak.
- Weekday Midday Peak.
- Weekday PM Peak Plan.
- Weekday PM Off-Peak.
- Weekend.
- Free (Out of Coordination).

Task Product: The results of the SYNCHRO analysis and Tru-Traffic time-space diagrams will be submitted to the CITY as Draft Timing Plans for review and approval prior to proceeding with the timing implementation. Upon approval, the Draft Timing Plans will be used as Initial Timing Plans prior to fine tuning. The CONSULTANT will submit the SYNCHRO and Tru-Traffic models electronically to the CITY for each of the timing patterns.

C. IMPLEMENTATION AND EVALUATION

Task 10: Deploy Traffic Signal Timing Plans

After approval of the proposed timing patterns by the CITY, the CONSULTANT will implement the new patterns based upon the traffic signal controller make, model, firmware, as well as the intersection and arterial or network configuration. The CONSULTANT will perform all implementation tasks without any required participation from the CITY. Once the new timings are implemented, the CONSULTANT will immediately assess the operation of each identified intersection and timing pattern along the arterial. The original timing plans along the arterial will be saved and reprogrammed if necessary. All signal timing implementation and operational assessment will be performed by a Professional Traffic Operations Engineer (PTOE) and an experienced IMSA Level 2 or 3 Signal Technician.

Task 11: Fine Tune Field Operations

The CONSULTANT will fine-tune the implemented timings to optimize throughput of the subject signal network while maintaining acceptable vehicular delay and queueing for the minor movements. Fine tuning will occur

immediately after timing plan implementation and at periodic intervals as needed. The monitoring and fine-tuning operation will be performed using visual observation, Tru-Traffic travel runs and Bluetooth detection travel time results.

Task 12: Post Implementation Travel Time Runs

The CONSULTANT will deploy and/or utilize a minimum of four (4) Bluetooth detection devices to collect travel time data and to perform a post implementation travel time analysis. At a minimum, travel time data will be collected and analyzed for three time periods as follows: 1) 7 AM to 9 AM; 2) 11:00 PM to 1:00 PM; 3) 4 PM to 6 PM. The travel time data will be collected during a typical weekday and weekend at the following four (4) minimum locations:

1. N. Collier Boulevard at N. Barfield Drive.
2. N. Collier Boulevard at San Marco Road.
3. S. Collier Boulevard at Winterberry Drive.
4. San Marco Road at Barfield Drive.

Task Product: "After" travel time report of the arterial under post implementation conditions in PDF format.

Task 13: Final Report

The CONSULTANT will prepare a Final Report documenting the tasks performed, data collected, analysis conducted, along with any additional findings or recommendations concerning the operation of the particular signal, arterial, or network. The Final Report will be signed and sealed by a licensed Professional Engineer.

Task Products:

- Hard copy timing sheets to be placed in controller cabinets and on file.
- Hard copy of Final Reports signed and sealed by a licensed Professional Engineer with a CD containing:
  - All SYNCHRO and Tru-Traffic electronic files.
  - All travel time results
  - All data collection electronic files.
  - A PDF version of the Final Report.
  - Photographs relevant to the intersection or arterial
  - Any other miscellaneous work products (electronic.)

D. ADDITIONAL SERVICES

Task 14: Performance Monitoring and Active Arterial Management

The CONSULTANT will provide the CITY with specialized expertise in active traffic monitoring of the subject roadway network for 60 days after completion of the retiming efforts. Bluetooth detection devices will be maintained along the corridor to allow for real-time and historical traffic monitoring. Information displayed will include real time and historical vehicular speeds and travel time data within the assigned roadway segment.

Task 14A: Maintenance of Data Collection Units

The CONSULTANT will maintain and/or utilize Bluetooth detection devices at the following four (4) locations:

1. N. Collier Boulevard at N. Barfield Drive.
2. N. Collier Boulevard at San Marco Road.
3. S. Collier Boulevard at Winterberry Drive.
4. San Marco Road at Barfield Drive.

Task Products:

- Maintenance of units as approved by the CITY.

Task 14B: Performance Measure Monitoring and Reporting

The CONSULTANT will monitor real-time and historical travel times for a period of sixty (60) days after the initial deployment unless terminated or extended by the CITY via written notice. The CONSULTANT will provide the CITY with real-time vehicular speeds and travel times as well as historical vehicular speeds and travel times within the subject roadway network.

Task Products:

- Continuous operation and maintenance of deployed units.
- Monthly graph and table of historical speeds and travel time.
- A historical performance measure report will be generated once per month in PDF format and submitted to the CITY via email.

Task 14C: Active Arterial Management

The CONSULTANT will perform sixty (60) days of active arterial management and continued operation of traffic signal system timings for the subject roadway network. The active arterial management activities will include as needed: monthly signal hardware inspections, maintenance the controller time clocks, notification to the CITY of all hardware malfunctions / anomalies, maintenance tracking of hardware malfunctions until resolved, monthly verification of signal timing plans, field response and investigation of signal operations comments / complaints from all relevant stakeholders, and draft response letters supplied to the DEPARTMENT for all stakeholder comments/complaints. Additional active arterial management tasks may include additional fine tuning of signal timings / offsets adjustments to Time-of-Day schedule and/or the re-development of signal timing plans at any location along the arterial as deemed necessary by the CITY. The CONSULTANT will perform long-term active arterial management for a period of sixty (60) days after final acceptance from the CITY of the signal retiming project unless terminated or extended by the CITY via written notice.

Task Products (as needed):

- A Maintenance Inspection Checklist will be submitted once per calendar month to the CITY via email reporting the status of the traffic signal hardware, signal timing plans and maintenance of controller time clocks.
- Technical Memorandum denoting all findings of field response and signal investigation callouts.
- Written notification to the CITY of all hardware malfunctions / anomalies via email.
- Written notification to the CITY upon completion of maintenance activities.
- Draft response letters supplied to the CITY via email for all stakeholder comments / complaints.
- Technical Memorandum denoting.

Task 15: Intersection Geometry Modifications (4 locations)

The CONSULTANT will review the following intersections for geometry modifications, or alternative operations per FDOT Intersection Control Evaluation (ICE) considerations. Intersections under evaluation include N. Collier Blvd at N. Barfield Dr, San Marco Rd at Heathwood Dr, San Marco Rd at Barfield Dr, and Bald Eagle Dr at Elkcam Cir. An intersection Geometry Modifications report will be provided.

Task 16: ITS Project Review Report and Presentation

The CONSULTANT will prepare an ITS project review report and make a presentation regarding alternative ITS approaches—considerations will include isolated operations with improved timing plans (minor modifications), an interconnected system via fiber (possibly to Collier County), and a connected system using wireless (Bluetooth) option. Emergency preemption evaluation and recommendations will be provided as well. ITS budget recommendations will be developed and presented in a final report. The final report will be presented to staff and city council documenting improvement recommendations.

Schedule of Work: Work will be completed as noted in the scope of services. This is based on the issuance of the Notice to Proceed in October. The data collection and in accordance with scheduled plan submittals described below:

Compensation: In accordance with the parent agreement, the City will compensate the Consultant in accordance with the amount provided in the schedule below.

TASK	SERVICE	Fee	
A. DATA COLLECTION AND SOFTWARE MODEL DEVELOPMENT (Subconsultant, no mark-up)			
1	Seven (7) Day Volume Counts – 4 Locations	$ 2,278.88	LS
2	Turning Movement / Pedestrian Volume Counts – 10 Locations	$ 10,278.08	LS
3	Collecting Traffic Signal Programming Data	$ 1,442.22	LS
4	Field Review	$ 4,222.40	LS
5	Saturation Flow Rate Studies	$ 1,463.03	LS
6	Develop Software Models Reflecting the Existing Conditions	$ 8,179.48	LS
7	Before Travel Time and Delay Studies	$ 2,814.54	LS
B. DEVELOP TRAFFIC SIGNAL TIMING PLANS (Subconsultant, no mark-up)			
8	Update Controller Basic Timing Parameters	$ 2,594.40	LS
9	Timing Plans, Coordination and Time of Day Settings	$ 10,125.28	LS
C. IMPLEMENTATION AND EVALUATION (Subconsultant, no mark-up)			
10	Deploy Traffic Signal Timing Plans	$ 17,283.52	LS
11	Fine-tune Field Operations	$ 17,283.52	LS
12	Post Implementation Travel Time Runs	$ 3,104.12	LS
13	Final Report	$ 3,199.30	LS

D. ADDITIONAL SERVICES (Subconsultant 14A thru 14C, no mark-up)				
14	Performance Monitoring and Active Arterial Management	$	8,793.16	TME
14A	Deployment of Data Collection Units (Included)	$	6,963.40	LS
14B	Performance Measure Monitoring and Reporting (60 Days / 4 Locations)	$	7,768.32	LS
14C	Active Arterial Management (Hourly As Needed)	$	8,793.16	TME
14C (1)	Monthly Inspection and Report (60 Days / 10 Locations)	$	4,901.42	LS
15	Intersection Geometry Modifications (4 locations)	$	26,978.36	LS
16	ITS Project Review Report and Presentation	$	24,411.64	LS
	Reimbursable Expenses (as provided for in master contract; no mark-up)	$	1,000.00	TME
	TOTAL	**$**	**173,878.23**	

LS or FF = Lump Sum or Fixed Fee; TME = Time and Materials Estimate

TREBILCOCK CONSULTING SOLUTIONS, P.A.

Date: September 21, 2022

Signature of Authorized Company Officer

Norman J. Trebilcock, AICP, PTOE, PE, President
Name and Title