RFP # 706
PROFESSIONAL, TECHNICAL AND EXPERT SERVICES

Clark County Washington
Release date: **Wednesday, March 16, 2016**

Request for Proposal for:

# *Signal Timing, Evaluation, Verification and Enhancement*

**PROPOSALS DUE: Friday, *April 15, 2016 by 3:00 p.m.***

Proposal(s) shall be sealed and clearly marked on the package cover with RFP #, Project Title and Company name.

**Submit one (1) original and three (3) complete copies of the Proposal to:**

Clark County
Office of Purchasing
P.O. Box 5000
1300 Franklin Street, 6th Floor, Suite 650
Vancouver, Washington 98660
(360) 397-2323

Refer Questions to:
Robert D. Klug, PE
Public Works
Traffic Signals Manager
Rob.Klug@clark.wa.gov

Project Manager:
Robin A. Washington, PMP
Public Works
Capital Project Manager
Robin.Washington@clark.wa.gov

ADMINISTRATIVE REQUIREMENTS - Contractors shall comply with all management and administrative requirements established by Washington Administrative Code (WAC), the Revised Code of the State of Washington (RCW), and any subsequent amendments or modifications, as applicable to providers licensed in the State of Washington.

ALL proposals submitted become the property of Clark County. It is understood and agreed that the prospective Proposer claims no proprietary rights to the ideas and written materials contained in or attached to the proposal submitted. Clark County has the right to reject or accept proprietary information.

AUTHORSHIP - Applicants must identify any assistance provided by agencies or individuals outside the proposers own organization in preparing the proposal. No contingent fees for such assistance will be allowed to be paid under any contract resulting from this RFP.

CANCELLATION OF AWARD - Clark County reserves the right to immediately cancel an award if the contractual agreement has not been entered into by both parties or if new state regulations or policy make it necessary to change the program purpose or content, discontinue such programs, or impose funding reductions. In those cases where negotiation of contract activities are necessary, Clark County reserves the right to limit the period of negotiation to sixty (60) days after which time funds may be unencumbered.

CONFIDENTIALLY: Proposer shall comply with all applicable state and federal laws governing the confidentiality of information."

CONFLICT OF INTEREST - All proposals submitted must contain a statement disclosing or denying any interest, financial or otherwise, that any employee or official of Clark County or the appropriate Advisory Board may have in the proposing agency or proposed project.

CONSORTIUM OF AGENCIES - Any consortium of companies or agencies submitting a proposal must certify that each company or agency of the consortium can meet the requirements set forth in the RFP.

COST OF PROPOSAL & AWARD - The contract award will not be final until Clark County and the prospective contractor have executed a contractual agreement. The contractual agreement consists of the following parts: (a) the basic provisions and general terms and conditions, (b) the special terms and conditions, (c) the project description and goals (Statement of Work), and (d) the budget and payment terms. Clark County is not responsible for any costs incurred prior to the effective date of the contract. Clark County reserves the right to make an award without further negotiation of the proposal submitted. Therefore, the proposal should be submitted in final form from a budgetary, technical, and programmatic standpoint.

DISPUTES: Clark County encourages the use of informal resolution to address complaints or disputes arising over any actions in implementing the provisions of this RFP. Written complaints should be addressed to Clark County – Purchasing, P.O. Box 5000, Vancouver, Washington 98666-5000.

DIVERSITY IN EMPLOYMENT AND CONTRACTING REQUIREMENTS - It is the policy of Clark County to require equal opportunity in employment and services subject to eligibility standards that may be required for a specific program. Clark County is an equal opportunity employer and is committed to providing equal opportunity in employment and in access to the provision of all county services. Clark County's Equal Employment Opportunity Plan is available at http://www.clark.wa.gov/hr/documents.html. This commitment applies regardless of race, color, religion, creed, sex, marital status, national origin, disability, age, veteran status, on-the-job injury, or sexual orientation. Employment decisions are made without consideration of these or any other factors that are prohibited by law. In compliance with department of Labor Regulations implementing Section 504 of the rehabilitation Act of 1973, as amended, no qualified handicapped individual shall be discriminated against in admission or access to any program or activity. The prospective contractor must agree to provide equal opportunity in the administration of the contract, and its subcontracts or other agreements.

ENVIRONMENTALLY RESPONSIBLE PURCHASING PROGRAM - Clark County has implemented an Environmentally Responsible Purchasing Policy with a goal to reduce negative impacts on human health and the environment. Negative environmental impacts include, but are not limited to, greenhouse gases, air pollution emissions, water contamination, waste from the manufacturing process and waste in packaging. This policy also seeks to increase: 1) water and energy efficiency; 2) renewable energy sources; 3) use of products with recycled content; 4) product durability; 5) use of products that can be recycled, reused, or composted at the end of its life cycle. Product criteria have been established on the Green Purchasing List http://www.clark.wa.gov/general-services/purchasing/erp/environmental.html

INDEPENDENT PRICE DETERMINATION - The prospective contractor guarantees that, in connection with this proposal, the prices and/or cost data have been arrived at independently, without consultation, communication, or agreement for the purpose of restricting competition. This does not preclude or impede the formation of a consortium of companies and/or agencies for purposes of engaging in jointly sponsored proposals.

INTERLOCAL AGREEMENT - Clark County has made this RFP subject to Washington State statute RCW 39.34. Therefore the bidder may, at the bidders' option, extend identical prices and services to other public agencies wishing to participate in this RFP. Each public agency wishing to utilize this RFP will issue a purchase order (or contract) binding only their agency. Each contract is between the proposer and the individual agency with no liability to Clark County.

LIMITATION - This RFP does not commit Clark County to award a contract, to pay any costs incurred in the preparation of a response to this RFP, or to procure or contract for services or supplies.

LATE PROPOSALS - A proposal received after the date and time indicated above will not be accepted. No exceptions will be made.

ORAL PRESENTATIONS: An oral presentation may be required of those prospective contractors whose proposals are under consideration. Prospective contractors may be informed that an oral presentation is desired and will be notified of the date, time and location the oral presentation is to be conducted.

OTHER AUDIT/MONITORING REQUIREMENTS - In addition, auditing or monitoring for the following purposes will be conducted at the discretion of Clark County: Fund accountability; Contract compliance; and Program performance.

PRICE WARRANT - The proposal shall warrant that the costs quoted for services in response to the RFP are not in excess of those which would be charged any other individual or entity for the same services performed by the prospective contractor.

PROTESTS must be submitted to the Purchasing Department.

PUBLIC SAFETY may require limiting access to public work sites, public facilities, and public offices, sometimes without advance notice. The successful Proposer's employees and agents shall carry sufficient identification to show by whom they are employed and display it upon request to security personnel. County project managers have discretion to require the successful Proposer's employees and agents to be escorted to and from any public office, facility or work site if national or local security appears to require it.

REJECTION OF PROPOSALS - Clark County reserves the right to accept or reject any or all proposals received as a result of this RFP, to negotiate with any or all prospective contractors on modifications to proposals, to waive formalities, to postpone award, or to cancel in part or in its entirety this RFP if it is in the best interest of Clark County to do so.

SUBCONTRACTING - No activities or services included as a part of this proposal may be subcontracted to another organization, firm, or individual without the approval of Clark County. Such intent to subcontract shall be clearly identified in the proposal. It is understood that the contractor is held responsible for the satisfactory accomplishment of the service or activities included in a subcontract.

VERBAL PROPOSALS: Verbal proposals will not be considered in making the award of any contract as a result of this RFP.

WORKERS COMPENSATION INSURANCE – The contractor shall comply with R.C.W. Title 51- with minimum coverage limits of $500,000 for each accident, or provide evidence that State law does not require such coverage.

FOR ALTERNATIVE FORMATS
**Clark County ADA Office; V (360) 397-2025;**
**TTY (360) 397-2445; ADA@Clark.wa.gov**

# Request for Proposals
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**Request for Proposal # 706 -** Signal Timing, Evaluation, Verification and Enhancement

# Part I Proposal Requirements

**Section IA** **General Information**

1. Introduction

The purpose of this RFP is to select a consulting firm to expand the County's existing Transportation System Management and Operations (TSMO) system.

The consulting firm will prepare design drawings for Bluetooth data collectors at or near Clark County and Washington State Department of Transportation signalized intersections within unincorporated Clark County.

The consulting firm will develop Measures of Effectiveness (MOE's) from the TSMO data systems including Purdue method of arrival on green, Bluetooth data collectors, real time - time space diagrams, and count data collected by existing and newly constructed systems.

The consulting firm will create a framework of process for before and after studies using the MOE's to determine the changes in traffic delays and flow associated with improvements to the road network.

2. Background

The Regional TSMO Plan was adopted by the RTC Board in June 2011 and identifies multiple county arterial corridors as TSMO corridors. These corridors include sections of NE Hwy 99, NE 78$^{th}$ St, NE Padden Parkway, NE 99$^{th}$ St, NE Hazel Dell Av, NE 134$^{th}$ St and NE 139$^{th}$ St.

These corridors have been selected as TSMO corridors for this project, as they are among the busiest signalized corridors operated by Clark County Public Works department. This project will help provide a structured framework with statistical basis about how signal timing modifications and capital roadway improvement projects will help move traffic more efficiently.

3. Scope of Project

The Consultant shall prepare the plans, specifications and estimates for the installation of Contractor provided Bluetooth devices at the existing intersections. The County will manage the construction contract to install the Bluetooth devices in the field.

The County will procure and install the 2070-1C CPU's in the traffic signal controllers, along with updating the controller firmware and setting up the controllers and central traffic system to gather the arrival on green data.

The Consultant shall develop evaluation methodology framework, and create cross-platform Measures of Effectiveness (MOE's), and create standard reports from the County's existing traffic measurement software systems. The Consultant's work shall include developing specific MOE's, along with a framework for Those MOE's will be based on Bluetooth speed measurement, Purdue methodology for Arrival on Green and existing data gathered in the County's ATMS.now system for real time space time diagrams and congestion of stopbar detection during yellow plus green. This data will be utilized along with the County's count station data and loop count data to develop methods to normalize the MOE's based on fluctuations of traffic volumes gathered by the count systems.

The Consultant shall develop the framework for the MOE's to be analyzed on these corridors, along with the basis for future before and after studies for capital projects, and general signal retiming projects.

The Consultant shall create a Synchro / SimTraffic model of the signals on the corridors. This County model development will include gathering turn movement data, development and calibration of the traffic model along with inputting of the traffic signal timing data.

The Consultant shall review the MOE data from before the signal retiming, and the MOE data from after the signal retiming and provide a comparison of the before and after study.

The Consultant's work shall include:

- Produce the Plans, Specifications and Estimates for the installation of the Bluetooth data stations at the intersections
- Develop the framework for the before and after studies showing the MOE's before and after the project
- Develop the format for an 11 X 17 folio executive summary with a standard layout which can be applied to any before and after study

4. Project Funding

The anticipated cost for the services described is in the range of $525,000. The proposers proposal shall include the Proposers true estimated cost to perform the work irrespective of the budgeted funds for this work.

The source of funding for this project is a combination of federal grant and local funds. Funding is limited to the assigned and approved project budget.

5. Timeline for Selection

The following dates are the **intended** timeline:

| | |
|---|---|
| Proposals due | April 15, 2016 |
| Proposal review/evaluation period | May 6, 2016 |
| Interviews/demonstration | May 18, 2016 |
| Selection committee recommendation | May 20, 2016 |
| Contract negotiation/execution | June 24, 2016 |
| Contract intended to begin | July 1, 2016 |

6. Employment Verification

"Effective November 1st, 2010, to be considered responsive to any formal Clark County Bid/RFP or Small Works Quote, all vendors shall submit before, include with their response or within 24 hours after submittal, a recent copy of their E-Verify MOU or proof of pending enrollment. The awarded contractor shall be responsible to provide Clark County with the same E-Verify enrollment documentation for each sub-contractor ($25,000 or more) within thirty days after the sub-contractor starts work. Contractors and sub-contractors shall provide a report(s) showing status of new employee's hired after the date of the MOU. The status report shall be directed to the county department project manager at the end of the contract, or annually, whichever comes first. E-Verify information and enrollment is available at the Department of Homeland Security web page: www.dhs.gov/E-Verify

How to submit the MOU in advance of the submittal date:

1. Hand deliver to 1300 Franklin St, Suite 650, Vancouver, WA 98660, or;
2. Fax to (360) 397-6027, or;
3. Call Purchasing at (360) 397-2323 for a current email address.

*Note : Sole Proprietors are exempt.*

## Section IB Work Requirements

1. Required Services

**Task 1 – ITS Plan Documentation**

The Consultant shall review the project elements and prepare an Intelligent Transportation System (ITS) plan, consistent with the process outlined in the Washington State Local Agency Guidelines, Chapter 41.3.

http://www.wsdot.wa.gov/publications/manuals/fulltext/M36-63/Lag41.pdf

**Task 2 – Bluetooth PS&E**

Design services to provide Plans, Specifications and Estimates (PS&E) to install BlueMAC Bluetooth sensors at the intersections shown on the attached exhibit the Attachment.

The Bluetooth devices are to be installed on existing traffic signal poles and luminaires, through existing conduit and junction boxes to existing traffic signal cabinets. Each intersection to receive Bluetooth devices has existing Ethernet communications, typically via fiber optic interconnect, or via Ethernet radios or VDSL Ethernet over copper communications.

The Consultant's PS&E plans for the Bluetooth system shall include traffic control plans for construction work and traffic control at and nearby the County and WSDOT intersections. WSDOT will review and approve any traffic control plans for work that affects the WSDOT right of way. The Consultant shall prepare site specific traffic control plans for each WSDOT intersection for WSDOT to approve. The County will review and approve the other traffic control plans.

The Consultant shall review the existing infrastructure and determine the specific number of Bluetooth devices and antennas to be included at each intersection. A minimum of one Bluetooth device will be installed at each intersection. The Consultant shall propose to the County four locations which will include more than one Bluetooth device and aimed antennas at these locations to allow investigation of specific Measures of Effectiveness as described in following Tasks.

The Consultant's design for the Bluetooth system will be constructed along with the County installation of the Linux CPU's that will run the Arrival on Green data. This equipment will be installed, and allowed to run, gathering "before" data that will be used in the remainder of this Contract.

**Task 3 –Synchro Model**

The Consultant shall create a Synchro model of the signalized intersections as included in the Attachment. The model shall include UDTF data fields for inserting AM peak and PM peak timing and traffic volumes for the signals. The UDTF format for traffic counts shall include 15-minute intervals data.

The Synchro model shall include specific calibration characteristics such as actual saturation flow rates and lane balance.

The Consultant shall take the County provided spreadsheet traffic signal timing data and convert the raw format to the specific inputs necessary for the Synchro model.

The Consultant shall suggest specific zoning strategies for the overall model, to allow for sub-models covering specific corridors to be segregated out of the large model.

The Consultant shall review the SimTraffic model, and balance the Link Origin – Destination Volume assignments, based on how the SimTraffic model is operating. This is likely important for how the interchanges interact with nearby signalized intersections.

The Consultant shall field check any aerial photography used for lane configurations in the Synchro model.

All Synchro model work shall be in the latest build of Synchro Version 9. The Consultant shall provide the entire network of intersections as a single Synchro file set to the County. The UDTF files shall be configured such that the aggregate traffic occurs on one date, to facilitate easy import of the UDTF data into the Synchro model.

**Task 4 – Traffic Count Data**

The Consultant shall provide AM and PM traffic signal turn movement counts at the locations shown in the Attachment.

The hours of turn movement counts shall be :
AM hours: 6:30 AM to 8:30 AM
PM hours: 4:30 PM to 6:30 PM

The traffic counts shall be gathered on Tuesdays, Wednesdays and Thursdays during weeks that do not include federal holidays. All traffic counts shall be gathered within 45 calendar days of each other. The traffic counts shall be gathered after September 15, 2015.

The traffic counts shall include pedestrian crossing counts and heavy vehicle turn movements.

The data shall be binned in 5-minute intervals, and reported in 5 and 15 minute intervals. The counts shall include quantities of pedestrians crossing each leg of each intersection along with heavy vehicle turn counts.

The Consultant shall review the intersection turn movement counts and use judgement to adjust them for differences between the intersections, to smooth the data for different days, along with driveway and minor street traffic movements between the signalized intersections. The County will provide any data available from permanent count stations (Wavetronix HD Count Stations) and loop detectors from the traffic signals to the Consultant for this adjustment.

The Consultant shall also perform the specialized counts and data collection as included in this document. These include calculating the saturation flow rates and lane balance for specific traffic movements at specific intersections. These specialized data counts shall be completed for 1 hour in the AM peak, and 1 hour in the PM peak.

**Task 5 – Macroscopic System Recommendations**

The Consultant shall review the Synchro model, volumes and field observations to provide recommendations to high level traffic signal operations. The type of recommendations shall include, but not be limited to:

- Lead / Lag of protected left and FYA left turns
- Coordination force off modes at signals – should the individual signals coordination force off modes be fixed, float or Max
- System cycle lengths by time of day
- Specific times of day that specific intersections could run free within the system
- Corridors and segments of corridors where adaptive signals would be worthwhile to consider

**Task 6 – Review of Potential Measures of Effectiveness Standards**

The Consultant shall review at a minimum the following County data sources:

- Central System real-time, time-space diagrams
- Purdue methodology arrival on green
- Bluetooth based corridor travel time data
- Traffic signal stopbar occupancy data
- Wavetronix HD count station data
- Traffic signal system loop count data
- Traffic signal phase gap and max occurrences
- Pedestrian phase services at signalized intersections

The Consultant shall review the interaction of the signals on the specific corridors for interaction between the signalized intersections and interchanges

The Consultant shall take the reviewed information, and prepare a working paper that investigates at least the following types of questions for Measures of Effectiveness (MOE):

- How should the MOE be evaluated based on the following types of factors:
    - Federal Functional Classification / County Classification of road.
    - Percent of the road built to standard
    - Unsignalized accesses (driveways, private and public roads) per mile
    - Average, or closest spacing of intersections, signalized or unsignalized
    - Presence, or absence of access management on corridor
    - Vicinity of braided traffic patterns through freeway interchanges and nearby spaced arterial crossings
    - Peaking effects due to specific types of land uses, such as schools and shopping.
    - Seasonal affects due to traffic around shopping centers
    - Pedestrian, bicycle and transit use across and along the corridors
- How long should a new traffic pattern be allowed to exist prior to evaluating the MOE's after modifications are made for situations such as:
    - Traffic signal retiming
    - New signal installation
    - Major phasing changes, such as conversion from protected lefts to FYA's
    - New roadway connections
    - Major improvements to existing roadways
    - Redevelopment, or new development of land

- How MOE data should be normalized based on factors such as:
    - Traffic counts on the corridor
    - Emergency vehicle preemption calls per hour
    - Transit Signal Priority operations
    - Railroad crossings
- What is the minimum and optimum aggregation of MOE data
    - Single day vs. average of multiple days
    - Should MOE data from Mondays or Fridays be compared with mid-week data
    - What is the minimum time slice of data to consider for MOE evaluation?
        - 15 minutes, 30 minutes, hourly, 2-hour data…
    - What is the minimum amount days of data to aggregate
        - Single day, weekly, 2-week…
    - What is the effective statistical level of review for the MOE
        - Average, Median, 85$^{th}$ and 15$^{th}$ percentile, 1 or 2 standard deviations, skew…
- What are other ways that the MOE's should be evaluated, such as quality of service as opposed to an average with high variation
- How will the consultant's recommendations be translated into a relatively straightforward method to gather and process the data and develop the MOE's, along with being clear to the stakeholders who are reading the MOE's.
- What should be an MOE improvement due to a roadway capacity project? This type of information would be included in a grant application justifying the requested grant funding.
- How should the MOE values change over time? As volumes increase, should the County be adjusting our expectations for the MOE's?

**Task 7 – Developing the Framework For MOE's**

Based on the findings of Task 6, the Consultant shall work with the County to develop the framework for the MOE's, to evaluate the effects of the before and after study for a County retiming of the corridors in the Consultant developed Synchro model.

The basic MOE's shall include:

Arrival on Green
- Percent of vehicles arriving on green
- Platoon ratio

Real Time – Time Space diagrams (from ATMS.now)
- Seconds of green band for corridor or segments of corridor

Occupancy Per Day (from ATMS.now)
- Percent occupancy by time of day for stopbar detectors

Bluetooth Travel Time
- Travel time along corridor

The Consultant shall take the information from Task 6 and recommend the statistical methods should be for evaluating corridors and subsets of corridors for the MOE's. The recommended methods should be broad based and not restrictive in nature.

The Consultant shall review the MOE's with respect to other data sources such as existing permanent count stations (Wavetronix HD Count stations) and induction loop detectors that report volumes to the County's central system.

The Consultant shall recommend how the transportation corridor's MOE's should be segregated. For instance, it may be that on NE 78th St, the influence of the I-5 freeway ramps cause the segment of NE 78th St from Hazel Dell to Hwy 99 have different standards than the segment of NE 78th St, east of Hwy 99. For any locations where the standards do change at an intersection, the Consultant shall recommend how that intersection is to be reviewed.

The Consultant shall recommend how the MOE's on transportation corridors should be evaluated with relation to recurring traffic peaking, and how to isolate unique events of traffic peaking that would present inconsistent MOE's.

The Consultant shall recommend how the MOE's should be statistically aggregated. The Consultant shall evaluate the statistical methods for data aggregation along with the concept of quality of service. For instance, is an average travel speed with a wide variation of travel times along the corridor better or worse than a lower average travel speed with a tighter variation of travel times?

The Consultant shall review the existing data sources and determine the statistical relevancy of how much data should be included in order to provide a statistically significant determination of travel time, quality of service and other factors.

It is assumed that the long corridors will be broken out into sub-corridors in the MOE analysis. The following roadways shall be divided into the number of segments for analysis as detailed below.

- NE Padden Parkway / NE 78th St (from NE 94th Av to NE Hazel Dell Av)
    - 4 segments
- NE Hwy 99 (from NE 63rd St to NE 144th St
    - 4 segments
- NE/NW 99th St (from NW 9th Av to NE 32nd Av)
    - 2 segments
- NE/NW 139th St from NW 2nd Av to NE 29th Av
    - 2 segments
- NE /NW 134th St from NW 2nd Av to NE Salmon Creek Av via Tenney Rd)
    - 3 segments

The consultant shall review the traffic characteristics of the corridors, and propose splits in the corridors for the MOE analysis. Each corridor that is analyzed shall include an overlap, to show how the end of one segment of corridor with the beginning of the next corridor's segment.

**Task 8 – Evaluation of Arrival on Green by Detector Type and Location**

The County uses two types of Advance detection systems. These are induction loop detection by lane and Wavetronix Advance. The Wavetronix Advance detection detects vehicles by approach. The Wavetronix Advance detection system can be configured to have a single 5-ft long detection zone across all approaching lanes.

The Consultant shall evaluate the abilities of the Wavetronix Advance on single lane and multiple lane approaches to traffic signals. The County will configure the Wavetronix Advance detection zones on existing traffic signals at distances from the stopbar determined for study by the Consultant. The consultant shall compare the Arrival on Green reports with the existing loop detectors on the same approaches.

The Consultant shall evaluate a minimum of 3 distances from the stopbar for multiple lane approaches at each location tested. The intent is to find an appropriate spot where Wavetronix Advance detectors may replicate the advance induction loops to provide acceptable results with the Arrival on Green methodology.

In some locations, the location of the advance loops are beyond the beginning of the left and right turn lanes. This could provide situations where the arrival on green methodology provides results which are less accurate. The Consultant
shall evaluate the effect that left and right turning vehicles and the detection zones in relation to the Arrival on Green mythology.

Some locations have a standing queue of vehicles in left or thru lanes which would impede the thru traffic. The Arrival On Green methodology using advance detectors may impede the ability of following traffic to effectively travel through the intersection. This type of situation may show false information for the operation of the roads.

The Consultant shall evaluate the list of intersections in the **Attachment C** for the effect of standing queues in the thru stopline, and in the left turn lane starving the thru movement on the data gathered in the Arrival On Green data. The Consultant shall report how the standing queues of traffic effect the thruput of the information that is not represented in the Arrival On Green methodology, along with suggesting methods to offset the effects of queueing.

**Task 9 – Executive Summary Framework**

The Framework shall include a standard layout of an executive summary. The executive summary shall provide condensed information on a double sided folio sheet (11-in X 17-in) to include at least the following:

- Project name, Corridor name
- Map of limits
- Key graphics from the report, showing before and after results. The graphics could be a combination of any of the MOE's
- Key findings from the report
- Cost of work
- Benefits of work

The standard folio executive summary will be full color, with a standard layout. The intent of this executive summary is that the framework will be adaptable to show the before and after effects for a wide array of road projects, from a new road segment, a modified road segment (core road to full road), corridor signal retiming and other types of projects.

One executive summary shall be provided for each corridor sub-segment of the before and after study of the following corridors as shown in Task 7

**Task 10 – Definitions Chapter**

The Definitions chapter shall include at least the following information

- Description of each MOE
- Description of ranges of MOE's based on the findings in Task 6
- Printed examples of the MOE graphics with descriptions showing how to understand the graphics

This chapter will be a standalone chapter which can be inserted in each before and after study to show the reader how to understand the information in the rest of the document.

**Task 11 – Before and After Study Reports**

One before and after study report will be created for each of the sub-segment shown in Task 7. The Consultant shall create the before and after studies for each of these segments.

The study shall be configured to document the effects of the before and after study. The basic chapters of the before and after study and the content are to be at least as follows:

- Cover sheet
  - Dates, name of project, corridor, roadway limits etc.
- Executive Summary sheet
- Major Findings and Recommendations
- Definitions Chapter (see Task 10)
- Graphical representation, data and analysis from:
  - Arrival on Green
  - Real Time – Time Space Diagrams
  - Occupancy of stopbar detection
  - Bluetooth Travel Time

**Task 12 – Modifications to Bluetooth Reporting**

The Consultant shall work with Portland State University's Portal's feed from the Clark County BlueMAC server to provide new visualizations of the Bluetooth traffic data. The Consultant will remunerate PSU for development of data visualizations and analysis of the Bluetooth data.

The typical corridor travel times using Bluetooth data require that vehicles begin at one end of the corridor and travel the entire distance on the corridor. The turning movements that occur between crossing arterials, freeway interchanges and other major intersections yields a low amount of data in the travel time analysis for a medium to long corridor.

The Consultant shall work with PSU to take the County's XML output from the BlueMAC server and develop a new method of analyzing the corridor travel speeds and delays.

This new form of analysis will take shorter segments of arterials, and track the vehicles on shorter segments of the corridor then stitch the individual data between segments.

For example, on NE 78$^{th}$ St, there are traffic signals which will have Bluetooth data collectors at the I-5 interchange, NE Hwy 99, NE 13$^{th}$ Av, NE 16$^{th}$ Av, and further east.

A traditional travel time corridor on NE 78th St may look at the traffic that starts at the intersection of

NE Hwy 99 at NE 78th St and goes to the intersection of NE St. Johns Rd at NE 78th St. Any vehicles that enter or exit between those two points would not be included in the travel time analysis.

The modified analysis would aggregate the travel times on the corridor by taking the traffic that passed NE 78th St at I-5, NE Hwy 99, NE 13th Av and NE 16th Av, and binning the data as traffic that was on EB NE 78th St from NE Hwy 99 to NE 13th Av. Then it would bin a second group of traffic that passed NE 78th St at NE Hwy 99, NE 13th Av, NE 16th Av and NE 25th Av, and bin the second group as traveling on NE 78th St from NE 13th Av to NE 16th Av. Each successive road segment's traffic of Bluetooth travel time and delays would be based on the segment before and after to isolate the vehicles that did drive on that segment. The segments would then be aggregated into an overall corridor segment Bluetooth report of travel time and speed.

Similarly, this method will be used to generate travel times for left and right turning vehicles where the Bluetooth sensors can be connected through arterial intersections.

2. County Performed Work

**Arrival on Green**

The County will procure and install 2070-1C CPU's in the existing traffic signal controllers. These upgraded CPU's will include the Trafficware / Naztec Apogee V.76 firmware capable of gathering Purdue methodology Arrival on Green data. The County has upgraded the Trafficware / Naztec ATMS.now central system to ATMS.now 2.2, to include the Arrival on Green analysis.

County traffic engineering staff will program the CPU's and central system to gather the arrival on green data.

**Construction of Bluetooth Sensors**

The County will provide the basemaps that were used for various signal projects in the corridors to include Bluetooth sensor installation. The AutoCAD basemap includes as-designed curblines, sidewalk, traffic signal equipment, conduit and junction boxes along with public right of way. The County will provide project management assistance to certify right of way, process Public Interest Finding (PIF) paperwork for proprietary items, County purchased products, along with grant procurement and processing.

The County will manage the construction contract to have a Contractor install the Bluetooth sensors. The County will assemble the PS&E package parts that the Consultant provides, along with creating the rest of the bid package. The County will advertise the project bid, and provide the construction management of the project. The Consultant shall be available for questions about the installation during construction.

**Synchro Model**

The County will provide the traffic signal timing and phasing data for the Consultant to use in developing the Synchro model. The traffic signal timing data will be provided in spreadsheet format, as a data export from the County's Trafficware ATMS central system.

The traffic signal timing and phasing data will be the existing coordination operation of the signals.

The County will develop and implement new timing plans based on the Consultant's Synchro model.

The County will provide traffic counts from existing induction loops and Wavetronix Count Stations to the Consultant to assist in the Consultant's smoothing of the raw count data for the Synchro model.

The County will perform the in-depth timing analysis within the Consultant developed Synchro model, and will transfer the signal timing parameters into the County's traffic signal system.

**Macroscopic System Recommendations**

The County will provide information about the overall coordination strategies that are used at County signals for the Consultant to use as a basis of their recommendations.

**Review of Potential Measures of Effectiveness Standards**

The County will review the Consultant's recommendations, and provide written feedback.

3. Deliverables & Schedule

**Task 1 – ITS Plan Documentation**

The Consultant shall complete the Systems Engineering Plan with 50% design on the Bluetooth PS&E plan submittal. This document shall be submitted with a stamped cover letter by the Consultant's professional engineer who performed, or oversaw the analysis.

**Task 2 – Bluetooth PS&E**

The Consultant shall provide Plans, Specifications and Estimates (PS&E) for the installation of the Bluetooth devices in the field. The Consultant's portion shall be to prepare a complete set of plans, including cover sheet, details, traffic control plans, along with the technical specifications (Division 8 and 9) to be inserted in a County provided boilerplate specification package.

The Plans shall be supplied at the 50%, 90% and final stages. The 50% plans shall have intersections are identified, along with the locations of the Bluetooth devices, and proposed routes for the wiring. If there are any locations where new or existing construction elements are outside the existing public rights of way, or easements, these shall be clearly identified in the Plans. These plans shall be delivered as electronic PDF's of the AutoCAD drawings.

The 90% plans shall show the nearly completed plans, with details worked out, along with any alternate routing of cables to keep equipment fully within the existing public right of way. The 90% plans shall include draft specifications and an estimate of costs for construction. The draft PS&E shall be delivered as electronic PDF's of the AutoCAD drawings.

The final PS&E package shall be delivered as a stamped original plan set including cover sheet, special provisions and engineer's estimate.

The plan sheet set shall include at least the following plans:

- Cover Sheet (1 sheet)
- Index (1 sheet)
- Notes and legend (1 sheet)

- Typical details (estimated at 2 sheets)
- Intersection Layout plans (estimated at 2 sheets)
    - These plans show overall map of limits of project, and sheet numbers of each specific intersection with work)
- Detailed installation plans (maximum of 4 intersections per plan sheet)
- County intersection traffic control plan sheets (estimated at 10 sheets)
- WSDOT intersection traffic control plans (estimated at 10 sheets)

**Task 3 –Synchro Model**

The Consultant shall provide the Synchro model files, along with the UDTF files, along with a description of how the traffic volume smoothing was accomplished.

The Consultant shall include a written description of how to use the UDTF files to translate the volume and traffic signal data into the model.

**Task 4 – Traffic Counts**

The Consultant shall provide electronic copies of the traffic count data collected for this project. The electronic copies of the data shall be provided in PDF and XLSX format.

The electronic format data shall include spreadsheets detailing how the count data was smoothed on corridors. The spreadsheets shall be accompanied by a memo describing the methods used so that future data collection efforts can follow a similar methodology of data smoothing.

The turn movement counts shall include vehicles, heavy vehicles, and pedestrians.

**Task 5 – Macroscopic System Recommendations**

The Consultant shall document in a working paper overall system recommendations based on the field observations. The system recommendations shall include descriptions of issues and benefits of each type of recommendation, for instance lagging a protected left turn phase may help the coordination of the corridor, but the early release may cause the signal to create undue delay to the opposing main street thru because of the way that lagging protected lefts operate.

**Task 6 – Review of Potential Measures of Effectiveness Standards**

The Consultant shall document in a working paper a review of MOE standards.

**Task 7 – Developing the Framework For MOE's**

The Consultant shall document in a working paper, the framework of MOE standards.

**Task 8 – Evaluation of Arrival on Green by Detector Type and Location**

The Consultant shall document, in a working paper, the arrival on green by detector type and location.

**Task 9 – Executive Summary Framework**

The Consultant shall provide a minimum of 3 draft layouts for the Executive Summary for evaluation. The layouts shall be configured for color printing, but with the ability to be printed or photocopied in black and white, while still providing clear information.

The County will work with the Consultant to select the specific layout framework which will be the standard layout that will be used for all before and after studies.

The executive summary framework shall be provided in an electronic file, in Microsoft Word or Microsoft Power Point layout.

**Task 10 – Definitions Chapter**

The Consultant shall provide draft working papers as necessary to develop the definitions chapter.

The draft working papers shall be configured into a final chapter to be included in the individual before and after reports. The definitions chapter shall be provided in Microsoft Word format, and in an Adobe Acrobat PDF format suitable for the County to print in color.

**Task 11 – Before and After Study Reports**

The Consultant shall provide one report for each section of corridor, described in the task. The Consultant shall provide each corridor's report in two formats, Microsoft Word and Adobe Acrobat PDF formats. If the Executive Summary is created in Microsoft Power Point, then the Executive Summary format shall be Power Point.

The Consultant shall divide up the specific sections of the report into individual sub-section electronic files that the County agrees to. Each corridor shall be included in a separate set of files.

**Task 12 – Modifications to Bluetooth Reporting**

The Consultant shall provide a working paper describing the work that is in this task. This task also includes several meetings with PSU, the County and the Consultant to describe the work.

The Consultant shall work with PSU to provide the modified travel time analysis in the PSU Portal system.

The work shall include integration of the County Bluetooth data into the PSU Portal, along with system analysis as described in the task and graphical and statistical evaluations developed in the Portal Graphical User Interface to represent live Bluetooth data from the County system.

The Consultant shall work with the County and PSU to develop a process where any new Bluetooth sensors can be added to the PSU Portal website.
The County will provide reports and output from transportation data systems for the Consultant to analyze.

**Evaluation of Arrival on Green by Detector Type and Location**

The County will modify the existing settings in Wavetronix Advance detectors to meet the criteria that the consultant recommends. The County will provide reports from existing systems for the Consultant's evaluation.

The County will insure that there are 2070-1C CPU's in the traffic signal cabinets that are listed as being included in the evaluation by the time the consultant contract is signed.

**Meetings with Consultant and County Public Works Staff**

The consultant shall include in their proposal at least 6 meetings with County staff. These meetings will be spread out throughout the project to cover the initial start of the project, and at key times during the project for review and discussion of the work and deliverables.

**Timeline**

Task 1 – Submitted with 50% design plans
Task 2 – 50% design plans – 2 months from Notice to Proceed (NTP)
- 90% design plans – 1 month from receipt of redline 50% drawings from the County.
- Final PS&E – 1 month from receipt of redline 90% drawings from the County

Task 3 – 5 months from NTP
Task 4 – 3 months from NTP
Task 5 – 6 months from NTP
Task 6 – 6 months from NTP
Task 7 – 6 months from NTP
Task 8 – 3 months from NTP
Task 9 – 8 months from NTP
Task 10 – 8 months from NTP
Task 11 – 15 months from NTP
Task 12 – 8 months from NTP

4. Place of Performance

**See Attached List of locations included in the Attachment C**

5. Period of Performance

A contract awarded as a result of this RFP will be for (16 months) and is intended to begin on (July 1, 2016) and end (October 30, 2017).

Clark County reserves the right to extend the contract resulting from this RFP for a period of two (2) one (1) year periods, with the same terms and conditions, by service of a written notice of its intention to do so prior to the contract termination date.

6. Insurance/Bond

**A. <u>Commercial General Liability (CGL) Insurance</u>** written under ISO Form CG0001 or its latest equivalent with minimum limits of $1,000,000 per occurrence and in the aggregate for each one year policy period. This policy will renew annually.

This coverage may be any combination of primary, umbrella or excess liability coverage affording total liability limits of not less than $1,000,000 per occurrence and in the aggregate. However, if other policies are added they must be a follow-form policy in language, renewal date, and have no more exclusions than the underlying coverage. Products and Completed Operations coverage shall be provided for a period of three years following Substantial Completion of the Work.

The deductible will not be more than $50,000 unless prior arrangements are made with Clark County on a case by case basis; the criterion is the Contractor's liquidity and ability to pay from its own resources regardless of coverage status due to cancellation, reservation of rights, or other no-coverage-enforce reason. Coverage shall not contain any endorsement(s) excluding nor limiting Product/Completed Operations, Contractual Liability or Cross Liability.

**B. <u>Automobile</u>**

If the Proposer or its employees use motor vehicles in conducting activities under this Contract, liability insurance covering bodily injury and property damage shall be provided by the Proposer through a commercial automobile insurance policy. The policy shall cover all owned and non-owned vehicles. Such insurance shall have minimum limits of $500,000 per occurrence, combined single limit for bodily injury liability and property damage liability with a $1,000,000 annual aggregate limit. If the Proposer does not use motor vehicles in conducting activities under this Contract, then written confirmation to that effect on Proposer letterhead shall be submitted by the Proposer.

**C. <u>Professional Liability (aka Errors and Omissions)</u>**

The Proposer shall obtain, at Proposer's expense, and keep in force during the term of this contract Professional Liability insurance policy to protect against legal liability arising out of contract activity. Such insurance shall provide a minimum of $2,000,000 per occurrence, with a maximum deductible of $25,000. It should be an "Occurrence Form" policy. If the policy is "Claims Made", then Extended Reporting Period Coverage (Tail coverage) shall be purchased for three (3) years after the end of the contract.

**F. <u>Proof of Insurance</u>**

Proof of Insurance shall be provided prior to the starting of the contract performance. Proof will be on an ACORD Certificate(s) of Liability Insurance, which the Proposer shall provide to Clark County. Each certificate will show the coverage, deductible and policy period. Policies shall be endorsed to state that coverage will not be suspended, voided, canceled or reduced without a 30 day written notice by mail. It is the Proposer's responsibility to provide evidence of continuing coverage during the overlap periods of the policy and the contract.

All policies must have a Best's Rating of A-VII or better.

7. Plan Holders List

All proposers are required to be listed on the plan holders list.

- ✓ Prior to submission of proposal, please confirm your organization is on the Plan Holders List below:

To view the Plan Holders List, please click on the link below or copy and paste into your browser.

Clark County RFP site:
**http://www.clark.wa.gov/general-services/purchasing/rfp.html**

If your organization is NOT listed, submit the 'Letter of Interest" to ensure your inclusion. See Attachment B.

Proposals received by Clark County by proposers not included on the Plan Holders List may be considered non-responsive.

# Part II Proposal Preparation and Submittal

## Section IIA Pre-Submittal Meeting / Clarification

1. Pre-Submittal Meeting

There will be no pre-submittal meeting or site visit scheduled for this project.

2. Proposal Clarification

Questions and Requests for Clarification regarding this Request for Proposal must be directed in writing, via email, to the person listed on the cover page. The deadline for submitting such questions/clarifications is seven calendar days prior to the due date for proposals (unless otherwise specified in section 1A-5.

An addendum will be issued no later than six calendar days prior to the proposal due date to all recorded holders of the RFP if a substantive clarification is in order.

The Questions & Answers/Clarifications are available for review at the link below. Each proposer is strongly encouraged to review this document prior to submitting their proposal.

Clark County RFP site: **http://www.clark.wa.gov/general-services/purchasing/rfp.html**

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## Section IIB Proposal Submission

1. Proposals Due

Sealed proposals must be received no later than the date, time and location specified on the cover of this document.

**The outside of the envelope/package shall clearly identify**:
1. **RFP Number and;**
2. **TITLE and;**
3. **Name and address of the proposer.**

Responses received after submittal time will not be considered and will be returned to the Proposer - unopened.

Proposals received with insufficient copies (as noted on the cover of this document) cannot be properly disseminated to the Review Committee and other reviewers for necessary action, therefore, may not be accepted.

2. Proposal

Proposals must be clear, succinct and not exceed 30 pages, excluding cover page, resumes and e-verify. Proposer's who submit more than the pages indicated may not have the additional pages of the proposal read or considered.

For purposes of review and in the interest of the County, the County encourages the use of submittal materials (i.e. paper, dividers, binders, brochures, etc.) that contain post-consumer recycled content and are readily recyclable.

The County discourages the use of materials that cannot be readily recycled such as PVC (vinyl) binders, spiral bindings, and plastic or glossy covers or dividers. Alternative bindings such as reusable/recyclable binding posts, reusable binder clips or binder rings, and recyclable cardboard/paperboard binders are examples of preferable submittal materials.

Proposer's are encouraged to print/copy on both sides of a single sheet of paper wherever applicable; if sheets are printed on both sides, it is considered to be two pages. Color is acceptable, but content should not be lost by black-and-white printing or copying.
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

All submittals will be evaluated on the completeness and quality of the content. Only those Proposer's providing complete information as required will be considered for evaluation. The ability to follow these instructions demonstrates attention to detail.

Additional support documents, such as sales brochures, should be included with each copy unless otherwise specified.

## Section IIC Proposal Content

| | | |
|---|---|---|
| 1. | Cover Sheet | This form is to be used as your proposal Cover Sheet<br>**See Cover Sheet - Attachment A** |
| 2. | Project Team | The proposal shall include a description of the project team. This description shall include the principals working on the project along with the team members who will be performing the majority of the work. The project team description shall include the specific roles and responsibilities that each member will perform on the project. |
| 3. | Management Approach | The proposal shall include a detailed description of how the project will be managed, including specifics of how the consultant will work through the wide variety of work crossing multiple critical elements and multiple specialties of work in this proposal . |
| 4. | Respondent's Capabilities | The proposal shall include resumes and descriptions of the project team's capabilities in automated traffic signal performance measures, experience working with Bluetooth data and high resolution traffic signal data. The proposal will also include the consultant's experience in obtaining and normalizing traffic count data across multiple days to generate traffic count for implementation in their development of the Synchro model. The Consultant will also describe their experience in timing NTCIP based signalized corridors using Traffic Responsive and Time of Day modes, Specific understanding of coordinated operation of Trafficware Apogee version 76.12F or newer controller firmware is a plus, however experience in coordinated operations of other NTCIP based traffic signal controllers is also valuable. |
| 5. | Project Approach and Understanding | The proposal shall include a detailed discussion of considerations which will be given to develop specific automated performance measures for traffic signals, including how specific criteria should be developed to set thresholds for quality of service and other statistical measures for delay, travel time, and other measures to determine the operation of the arterial system. |
| 6. | Proposed Cost | M*ultiple lines that detail team hourly rates, expenses, overhead.* |
| 7. | Employment Verification | **Please refer to section 1A.6. – e-Verify**<br><br>**IMPORTANT NOTE:** Include this portion of the response immediately **AFTER** the cover page, if not already on file with Clark County. Current vendors on file can be viewed at: http://www.clark.wa.gov/general-services/purchasing/documents/e-verifylog.pdf |

# Part III Proposal Evaluation & Contract Award

## Section IIIA Proposal Review and Selection

1. Evaluation and Selection:

Proposals received in response to this RFP will be evaluated by a Review Committee. Committee review results and recommendations may be presented to an appropriate advisory board prior to the consent process with the Clark County Board of Commissioners.

2. Evaluation Criteria Scoring

Each proposal received in response to the RFP will be objectively evaluated and rated according to a specified point system.

**A one hundred (100) point system will be used, weighted against the following criteria:**

*Define how you will evaluate each proposal and the point allocation per section.*

| | |
|---|---|
| Proposal approach/quality | 25 |
| Creativity / Experience | 35 |
| Work history / Examples | 20 |
| References | 20 |
| Total Points | 100 |

## Section IIIB Contract Award

1. Consultant Selection

*The County will award a contract to the highest scoring Proposer. Should the County not reach a favorable agreement with the highest scoring Proposer, the County shall suspend or terminate negotiations and commence negotiations with the second highest scoring Proposer and so on until a favorable agreement is reached.*

2. Contract Development

The proposal and all responses provided by the successful Proposer may become a part of the final contract.

*The form of contract shall be the County's Contract for Professional Services.*

3. Award Review

The public may view proposal documents after contract execution. However, any proprietary information so designated by the Proposer as a 'trade secret' will not be disclosed unless the Clark County Prosecuting Attorney determines that disclosure is required. At this time, Proposers not awarded the contract, may seek additional clarification or debriefing, request time to review the selection procedures or discuss the scoring methods utilized by the evaluation committee.

4. Orientation/Kick-off Meeting

An orientation / Kick-off meeting will be held within fourteen calendar days of the signing of the Contract. This meeting will allow the consultant to provide their proposed schedule and communicate any data requirements from the County.

**Request for Proposal # 706 -** Signal Timing, Evaluation, Verification and Enhancement

## Attachment A COVER SHEET

General Information:

Legal Name of Applicant/Company/Agency _____

Street Address _____ City _____ State _____ Zip _____

Contact Person _____ Title _____

Phone _____ Fax _____

Program Location (if different than above) _____ Email address _____

Tax Identification Number _____

**ADDENDUM:**

Proposer shall insert number of each Addendum received. If no addendum received, please mark **"NONE".**

No. _____ Dated: _____ No. _____ Dated: _____ No. _____ Dated: _____.

***NOTE: Failure to acknowledge receipt of Addendum may render the proposal non-responsive.***

→ Does the proposal comply with the requirements contained within the RFP?
A "No" response may disqualify the proposal from further consideration.

☐ Yes ☐ No

→ Did outside individuals or agencies assist with preparation of this proposal?

☐ Yes ☐ No *(if yes, describe.)***

I certify that to the best of my knowledge the information contained in this proposal is accurate and complete and that I have the legal authority to commit this agency to a contractual agreement. I realize the final funding for any service is based upon funding levels, and the approval of the Clark County Board of Councilors.

_____ _____

Signature, ***Administrator of Applicant Agency**** Date

*(*Enter the appropriate signature title)*

**Request for Proposal # 706 -** Signal Timing, Evaluation, Verification and Enhancement

**Attachment B LETTER OF INTEREST**

Legal Name of Applicant Agency _____

Street Address _____

City _____ State _____ Zip _____

Contact Person _____ Title _____

Phone _____ Fax _____

Program Location (if different than above) _____

Email address _____

- All proposer's are required to be included on the plan holders list. If your organization is NOT listed, submit the 'Letter of Interest" to ensure your inclusion.

In the body of your email, request acknowledgement of receipt.

Email Attachment B *to:* *Beth.Balogh@clark.wa.gov*

Clark County web link:
**http://www.clark.wa.gov/general-services/purchasing/rfp.html**

**This document will only be used to add a proposer to the plan holders list. Submitting this document does not commit proposer to provide services to Clark County, nor is it required to be submitted with proposal.**

**Proposals may be considered non-responsive if the Proposer is not listed on the plan holders list.**

# ATTACHMENT C

Signal Timing Evaluation Verification and Enhancement (STEVE) Appendix

| Intersection | | AM Count | PM Count | Bluetooth | 2070-1C | Synchro Model | WSDOT Intersection |
|---|---|---|---|---|---|---|---|
| # | Name | | | | | | |
| 1 | NW 139th St at NW 2nd Av | Y | Y | Y | Y | Y | |
| 2 | NE 139th St at NE 3rd Ct | Y | Y | Y | Y | Y | |
| 3 | NE 139th St at NE Tenney Rd | Y | Y | Y | Y | Y | |
| 4 | NE 139th St at NE 10th Av | Y | Y | Y | Y | Y | |
| 5 | NE 139th St at I-5 SB onramp | Y | Y | Y | Y | Y | |
| 6 | NE 139th St at I-5 NB offramp | Y | Y | Y | Y | Y | |
| 7 | NE 139th St at NE 20th Av | Y | Y | Y | Y | Y | |
| 8 | NE 139th St at NE 23rd Av | Y | Y | Y | Y | Y | |
| 9 | NE 139th St at NE 29th Av | Y | Y | Y | Y | Y | |
| 10 | NE Tenney Rd at NE 136th St / Fred Meyer | Y | Y | Y | Y | Y | |
| 11 | NE Tenney Rd at NE 10th Av | Y | Y | Y | Y | Y | |
| 12 | NE 10th Av at NE 136th / Roundabout | Y | Y | Y | | Y | |
| 13 | NE 134th St at I-5 SB onramp | Y | Y | Y | Y | Y | Y |
| 14 | NE 134th St at I-5 NB offramp | Y | Y | Y | Y | Y | Y |
| 15 | NE 134th St at NE 20th Av | Y | Y | Y | Y | Y | |
| 16 | NE 134th St at NE 23rd Av / I-205 NB offramp | Y | Y | Y | Y | Y | Y |
| 17 | NE 134th St at NE 27th Av | Y | Y | Y | Y | Y | |
| 18 | NE 134th St at NE 29th Av | Y | Y | Y | Y | Y | |
| 19 | NE 134th St at Salmon Creek Av | Y | Y | Y | | Y | |
| 20 | NE 20th Av at NE 144th St | Y | Y | Y | Y | Y | |
| 21 | NE Hwy 99 at NE 20th Av / Safeway | Y | Y | Y | Y | Y | |
| 22 | NE Hwy 99 at NE 129th St | Y | Y | Y | Y | Y | |
| 23 | NE Hwy 99 at NE 117th St | Y | Y | Y | Y | Y | |
| 24 | NE Hwy 99 at NE Parkview Dr | Y | Y | Y | Y | Y | |
| 25 | NE Hwy 99 at NE 107th St | Y | Y | Y | Y | Y | |
| 26 | NE Hwy 99 at NE 104th St | Y | Y | Y | Y | Y | |
| 27 | NE Hwy 99 at NE 99th St | Y | Y | Y | Y | Y | |
| 28 | NE Hwy 99 at NE 96th Way / Winco | Y | Y | Y | Y | Y | |
| 29 | NE Hwy 99 at NE Hazel Dell Plaza / Wal Mart | Y | Y | Y | Y | Y | |
| 30 | NE Hwy 99 at NE 88th St | Y | Y | Y | Y | Y | |
| 31 | NE Hwy 99 at NE 78th St | Y | Y | Y | Y | Y | |
| 32 | NE Hwy 99 at NE 72nd St | Y | Y | Y | | Y | |
| 33 | NE Hwy 99 at NE 68th St | Y | Y | Y | Y | Y | |
| 34 | NE Hwy 99 at NE 63rd St | Y | Y | Y | Y | Y | |
| 35 | NW 9th Av at NW 99th St | Y | Y | Y | Y | Y | |
| 36 | NE 99th St at NE Hazel Dell Av | Y | Y | Y | Y | Y | |
| 37 | NE 99th St at NE 7th Av | Y | Y | Y | Y | Y | |
| 38 | NE 99th St at I-5 interchange | Y | Y | Y | Y | Y | Y |
| 39 | NE 99th St at NE 25th Av | Y | Y | Y | Y | Y | |
| 40 | NE 99th St at NE 32nd Av | Y | Y | Y | Y | Y | |
| 41 | NE Hazel Dell Av at NE 94th St | Y | Y | Y | | Y | |
| 42 | NE Hazel Dell Av at NE 88th St | Y | Y | Y | | Y | |
| 43 | NE Hazel Dell Av at NE 81st / NE 82nd St | Y | Y | Y | Y | Y | |
| 44 | NE Hazel Dell Av at NE 78th St | Y | Y | Y | | Y | |

## ATTACHMENT C

| Intersection | | AM Count | PM Count | Bluetooth | 2070-1C | Synchro Model | WSDOT Intersection |
|---|---|---|---|---|---|---|---|
| # | Name | | | | | | |
| 45 | NW 78th St at NW Lakeshore Dr | Y | Y | Y | Y | Y | |
| 46 | NW 78th St at NW 9th Av | Y | Y | Y | Y | Y | |
| 47 | NE 78th St at NE 5th Av | Y | Y | Y | | Y | |
| 48 | NE 78th St at I-5 interchange | Y | Y | Y | Y | Y | Y |
| 49 | NE 78th St at NE 13th Av | Y | Y | Y | Y | Y | |
| 50 | NE 78th St at NE 16th Av | Y | Y | Y | Y | Y | |
| 51 | NE 78th St at NE 25th Av | Y | Y | Y | Y | Y | |
| 52 | NE 78th St at NE 30th Av | Y | Y | Y | Y | Y | |
| 53 | NE 78th St at NE St. Johns Rd | Y | Y | Y | Y | Y | |
| 54 | NE 78th St at NE 47th Av | Y | Y | Y | Y | Y | |
| 55 | NE 78th St at NE Padden Parkway | Y | Y | | | Y | |
| 56 | NE Padden Parkway at NE Andresen Rd | Y | Y | | | Y | |
| 57 | NE Padden Parkway at I-205 SB offramp | Y | Y | | | Y | Y |
| 58 | NE Padden Parkway at I-205 NB onramp | Y | Y | Y | Y | Y | Y |
| 59 | NE Padden Parkway at NE 94th Av | Y | Y | | | Y | |
| 60 | NE 78th St at NE 58th Av | | | Y | Y | | |

| Specialized Intersection Counts | | Saturation Flow Rate | Dual Left Lane Balance |
|---|---|---|---|
| # | Name | | |
| 15 | NE 134th St at NE 20th Av | NBL, NBT<br>SBL, SBT<br>EBL, EBT<br>WBL | NBL<br>SBL |
| 27 | NE Hwy 99 at NE 99th St | NBL<br>SBL<br>EBL | SBL |
| 31 | NE Hwy 99 at NE 78th St | NBL<br>SBL<br>EBL<br>WBL | NBL<br>EBL |
| 38 | NE 99th St at I-5 interchange | NBL, NBR<br>SBL<br>EBL<br>WBL | none |
| 44 | NE Hazel Dell Av at NE 78th St | NBL<br>SBL<br>EBL<br>WBL | SBL |
| 48 | NE 78th St at I-5 interchange | NBL, NBR<br>SBL<br>EBL<br>WBL | none |
| 53 | NE 78th St at NE St. Johns Rd | NBL<br>SBL<br>EBL<br>WBL | EBL<br>WBL |

## ATTACHMENT C

| Specialized Intersection Counts | | Saturation Flow Rate | Dual Left Lane Balance |
|---|---|---|---|
| # | Name | | |
| 56 | NE Padden Parkway at NE Andresen Rd | WBR<br>SBL<br>WBL | none |

| Comparison of Wavetronix to Advance Induction Loops | | Approach to Analyze |
|---|---|---|
| # | Name | |
| 1 | NW 139th St at NW 2nd Av | WB (2 approach lanes) |
| 23 | NE Hwy 99 at NE 117th St | NB (2 approach lanes)<br>SB (2 approach lanes) |
| 29 | NE Hwy 99 at NE Hazel Dell Plaza / Wal Mart | NB (2 approach lanes)<br>SB (2 approach lanes) |
| 56 | NE Padden Parkway at NE Andresen Rd | EB (2 approach lanes)<br>WB (2 approach lanes) |

| Locations To Analyze Effect of Left and Right Turns on Arrival On Green | | Approaches To Analyze |
|---|---|---|
| # | Name | |
| 21 | NE Hwy 99 at NE 20th Av / Safeway | NB and SB |
| 22 | NE Hwy 99 at NE 129th St | NB and SB |
| 23 | NE Hwy 99 at NE 117th St | NB and SB |
| 36 | NE 99th St at NE Hazel Dell Av | WB |
| 53 | NE 78th St at NE St. Johns Rd | EB and WB |

| Movements To Evaluate For Queuing and Arrival On Green | | Approaches to Evaluate |
|---|---|---|
| # | Name | |
| 15 | NE 134th St at NE 20th Av | NBT<br>WBL effect on WBT |
| 21 | NE Hwy 99 at NE 20th Av / Safeway | NBT<br>SBL effect on SBT |
| 31 | NE Hwy 99 at NE 78th St | EBT<br>WBT |
| 37 | NE 99th St at NE 7th Av | EBT<br>WBT |
| 38 | NE 99th St at I-5 interchange | EBT |
| 48 | NE 78th St at I-5 interchange | WBT |
| 56 | NE Padden Parkway at NE Andresen Rd | EBT<br>WBT |