

**REQUEST FOR PROPOSALS FOR**

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**FOR THE**

**DESIGN, IMPLEMENTATION, & MAINTENANCE**

**OF**

**TRAFFIC SIGNAL DESIGNING SOFTWARE**

**ANNEX C: TECHNICAL BID EVALUATION CRITERIA**

The Technical Bid evaluation criteria and respective weighting are summarised in the table below:

#	Description	Basis for Score	Sub-Section Weight	Section Weight
<b>1.</b>	<b>General - Software Requirements, Import/Export, Layout Configuration</b>		100%	3%
1.1	Saving and opening design files takes only a few seconds for a common PC.	Performance evaluation according to design file size.	10%	
1.2	It is be possible to make “diff” between design files versions changes.	Ease of version comparison, interface intuitiveness, navigation and click-through speed, additional capabilities.	5%	
1.3	User manual and help guide.	Ease and usefulness of help examples, search speed, F1 function.	10%	
1.4	Function for importing from AutoCAD enables importing the parameters for inter- green time calculation (for example, clearing distances for Movements).	Convenience of function operation, processing time, additional capabilities.	10%	
1.5	Traffic count file importing function.	Convenience of function operation, processing time, additional capabilities.	10%	
1.6	Enables signal design code generator to be used for signal controller programming.	Convenience of function operation, processing time, additional capabilities.	15%	
1.7	Enables users to arrange the working layout made from chosen views and location setup.	Convenience of function operation, processing time, additional capabilities.	10%	

1.8	Layout saving and retrieving function.	Convenience of function operation, processing time, additional capabilities.	5%	
1.9	Layout sharing and importing function.	Convenience of function operation, processing time, additional capabilities.	5%	
1.10	Undo/Redo Function – Enables Undo and Redo actions for at least the last action.	Convenience and intuitiveness of function operation, processing time, number of commands backward, additional capabilities.	10%	
1.11	Includes auto-save and restore function	Convenience of function operation, processing time, additional capabilities.	10%	
2.	<b>Printing</b>		100%	5%

2.1	<p>The Bid Software enables printing out of the Signal Timing Design</p> <ol style="list-style-type: none"> <li>1. Title/Cover Page including information on intersection name, local traffic authority, designer name, design number, list of accompanying documents, versions, attached geometry designs, et al.</li> <li>2. Table of Contents.</li> <li>3. Geometry design of intersection at a 1:500 scale</li> <li>4. Schematic design of intersection via Bid Software.</li> <li>5. Table of minimum time for Signal Groups.</li> <li>6. Table of clearing distances for inter-green calculation.</li> <li>7. Inter-green matrix and parameters for calculation of the inter-greens.</li> <li>8. Table of detectors/pulses.</li> <li>9. Intersection-specific functions (if exist).</li> <li>10. Stage diagram.</li> <li>11. Inter-Stages.</li> <li>12. Flow chart / logic diagram of transition between stages.</li> <li>13. Minimum Signal Group Timing Design (skeletons).</li> <li>14. Signal Group Timing Designs including manual operation designs.</li> <li>15. List of Signal Group Timing Designs and activation schedule.</li> <li>16. Parameters table.</li> <li>17. Input (detectors) information table</li> </ol>	Range of printing options, presentation format, compliance with standards.	50%	
2.2	The printing process allows selection and arrangement of the print sections including importing and printing of external PDF files	Convenience of function operation.	10%	
2.3	The Bid Software enables exporting of the information in PDF format.	Convenience of function operation, presentation format.	10%	

2.4	The Bid Software warns/prevents Signal Timing Design printout when changes were made to parameters pertaining to inter-green durations or minimum green time for Signal Groups but not all relevant changes to the Signal Timing Design (inter green matrix, inter-Stages, skeletons, timing designs) were made.	Convenience of function operation, speed of warning, additional capabilities.	30%	
<b>3</b>	<b>Designing Capabilities</b>		100%	45%
3.1	<b>Basic Definitions</b>		20%	
3.1.1	Setting a minimum green time for a Signal Group (vehicles with/without flashing green, pedestrians) and warns or prevents in case of deviations (for example during inter-Stages, skeletons or Scenarios)	Convenience of function operation, speed of warning, additional capabilities.	9%	
3.1.2	Stages Sequence Chart – design includes chart describing the possible Stage Sequences of operation of the traffic lights. The information includes all the possible Stages, all possible Stage Transitions leading to the different Stage Sequences and the conditions for the Stage Transitions (or a way to link to the conditions).	Convenience of function operation, additional capabilities.	9%	
3.1.3	Defining general description parameters for each intersection such as – intersection ID, name, street, city, version, designer details, customer details, authority details, status and project.	Convenience of function operation, additional capabilities.	8%	
3.1.4	Defining Approaches and lanes for each Approach.	Convenience of function operation, additional capabilities.	5%	
3.1.5	Defining Signal Groups of all kinds – vehicles (including PT vehicles_, pedestrian, bicycles, flashing amber, transit vehicle preemption signals including characteristics of each type	Convenience of function operation, additional capabilities.	9%	
3.1.7	The Bid Software warns/prevents when the order or/and the signal lengths are not in compliance with the specific Guidelines	Convenience of function operation, speed of warning, additional capabilities.	5%	

3.1.8	Defining Stages	Convenience of function operation, additional capabilities.	9%	
3.1.9	Defining a minimum green time for a Stage	Convenience of function operation, additional capabilities.	5%	
3.1.10	Defining Stage Sequence and Stage Transition	Convenience of function operation, additional capabilities.	9%	
3.1.11	Defining Pulses	Convenience of function operation, additional capabilities.	9%	
3.1.12	Defining vehicle detectors, pedestrian push buttons, PT detectors including characteristics and parameters	Convenience of function operation, additional capabilities.	9%	
3.1.13	Defining partial group Stages for the purpose of defining Partial Inter-Stages.	Convenience of function operation, additional capabilities.	5%	
3.2	<b>Inter-Green Times Matrix Data Feeding and Calculations</b>		15%	
3.2.1	Defining and calculating conflict matrices between Movements as well as the manual input of all conflicting Movement data needed for inter green time matrix calculation.	Convenience of function operation, processing time, additional capabilities.	20%	
3.2.2	The Bid Software warns the user of missing data or other validation errors	Convenience of function operation, speed of warning, additional capabilities.	10%	

3.2.3	Where changes are made to parameters related to inter-green duration calculation and minimum green time for Signal Groups, the Bid Software consequently makes all the required changes in the Signal Timing Design or notifies the user of the need for changes required (the notification appears as long as the required changes are not implemented)	Convenience of function operation, processing time, additional capabilities.	20%	
3.2.4	Shall enable the user to override part or all the inter-green time calculation results (lengthening them, not shortening them).	Convenience of function operation, additional capabilities.	10%	
3.2.5	Defining characteristics for inter-green calculation, such as vehicle speed, acceleration, deceleration, pedestrian speed, vehicle length etc., for each Movement.	Convenience of function operation, additional capabilities.	20%	
3.2.6	Defining how the conflict points will be calculated and calculate the inter-green time according to the specific Guidelines.	Convenience of function operation, additional capabilities.	10%	
3.2.7	Defining and calculating at least two different inter-green matrices (for example long inter-green matrix for LRT Movements)	Convenience of function operation, processing time, additional capabilities.	10%	
3.3	<b>Defining and Designing Stage Transition</b>		15%	
3.3.1	Automatic calculation of Stage Transitions	Convenience of function operation, processing time, additional capabilities.	30%	
3.3.2	Manual editing of a Stage Transition (insert/delete/edit)	Convenience of function operation, additional capabilities.	30%	
3.3.3	Defining parameters for Stage Transition auto-calculation.	Convenience of function operation, additional capabilities.	15%	

3.3.4	Definition of Vehicle Signal Groups as “proximate Signal Groups” and the Bid Software prevents or notifies in case of an opening interval for proximate Signal Groups of one second.	Convenience of function operation, speed of warning, additional capabilities.	15%	
3.3.5	Automatic calculation of Stage Transition based on different inter-green matrices (for example, Stage Transition based on long inter-green matrix).	Convenience of function operation, processing time, additional capabilities.	10%	
3.4	<b>Signal Group Timing Design Calculation.</b>		15%	
3.4.1	Auto calculation of minimum Signal Group Timing Designs (skeletons), according to the Stage Transition and Stage Sequence chart, and display of the relevant Signal Group Timing Design Logic Charts .	Convenience of function operation, processing time, additional capabilities.	30%	
3.4.2	Auto-calculation of maximum Signal Group Timing Designs according to traffic volumes	Convenience of function operation, processing time, additional capabilities.	5%	
3.4.3	Manual updates/creation of the Signal Timing Designs, including manual and emergency operation timing designs.	Convenience of function operation, additional capabilities.	15%	
3.4.4	Stage Transition conditions (decision point for detectors) are be displayed as part of the skeletons and Signal Timing Designs	Convenience of function operation, additional capabilities.	10%	
3.4.5	Defining multiple Programs, each with different parameters (e.g. cycle time, green times, offset...)	Convenience of function operation, additional capabilities.	15%	
3.4.6	Defining the operation schedule for the various timing designs	Convenience of function operation, additional capabilities.	15%	
3.4.7	Guiding the user how to fix whatever caused errors and warnings in the Signal Timing Design and supporting the user during the design process by helping to prevent deviations from the correct signal design rules.	Convenience of function operation, additional capabilities.	10%	



<b>3.5</b>	<b>Green Waves</b>		10%	
3.5.1	Design of a green wave between 2 or more intersections, updating the speed of the green wave and the offset for each intersection and displaying the green wave on a <b>Time-Stage diagram</b> .	Convenience of function operation, processing time, additional capabilities.	70%	
3.5.2	Updating the Programs for each intersection from the green wave diagram and warns/ prevents in case of deviations of basic validation rules	Convenience of function operation, speed of warning, additional capabilities.	10%	
3.5.3	Transmitting of synchronization Pulses between different intersections as part of Timing Design Logic, and displaying/generating a green wave diagram accordingly	Convenience of function operation, additional capabilities.	20%	
<b>3.6</b>	<b>Graphic Designing</b>		5%	
3.6.1	Importing intersection geometry design as a picture in the common formats (jpeg, png, tif, bmp) and defining of all the intersection elements including intersection approaches, lanes, Movements, signal groups, detectors	Convenience of function operation, processing time, additional capabilities.	40%	
3.6.2	Inter-green duration calculations according to graphical data of clearing distances, and updating intergreen durations according to alternation to graphical data	Convenience of function operation, additional capabilities.	20%	
3.6.3	Linkage between the elements on the graphic design and the Signal Timing Design database	Convenience of function operation, additional capabilities.	20%	
3.6.4	Automatic update of the Signal Timing Design on every change of the intersection element data including immediate feedback on errors, warnings according to signal design validation rules	Convenience of function operation, processing time, additional capabilities.	20%	
<b>3.7</b>	<b>Designing Methods</b>		5%	
3.7.1	Stage-based method.	Convenience of function operation, processing time, additional capabilities.	40%	

3.7.2	Signal Group-based method.	Convenience of function operation, processing time, additional capabilities.	30%	
3.7.3	Integrated design based on Stages and signal groups (where it is possible within the frame of the stages to control individual Signal Groups, defining of Timing Design Logic conditions for those Signal Groups to be extended or shortened, including during inter-Stages.	Convenience of function operation, processing time, additional capabilities.	30%	
<b>3.8</b>	<b>Timing Design Logic</b>		15%	
3.8.1	Defining Timing Design Logic code for signal designing including all the necessary parameters and variables	Ease of writing logic, user friendliness of presentation, processing time, user support, warnings, automated completion, advanced logic capabilities.	30%	
3.8.2	Defining the Timing Design Logic using supportive tools in a user-friendly editor.	Ease of writing logic, user friendliness of presentation, processing time, user support, warnings, automated completion, advanced logic capabilities.	30%	
3.8.3	Defining new functions that can be used for Timing Design Logic.	Ease of defining and usage of function, quantity and quality of provided functions.	30%	
3.8.4	Defining the Timing Design Logic so it can support the requirements for special LRT cases (emergency clearance, detector failure, dilemma zone operation etc.)	Ease of defining and usage of function, quantity and quality of provided functions.	10%	
<b>4</b>	<b>Quality Testing</b>		100%	35%
4.1	<b>Defining and Running Scenarios</b>		70%	

4.1.1	Defining and/or generating a large number of Scenarios (more than 1000) for a design	Convenience of function operation, processing time, additional capabilities.	15%	
4.1.2	Analyzing of LRT delay, based on the generated Scenarios	Convenience of function operation, processing time, additional capabilities.	15%	
4.1.3	Defining random Scenarios generated from parameters or characteristics (e.g. vehicle demand, PT demands).	Convenience of function operation, processing time, additional capabilities.	10%	
4.1.4	Defining a large number of constrained Scenarios automatically generated according to set of definable rules for the creation of these Scenarios. The Scenarios are defined for vehicles (including PT vehicles manifesting realistic PT behavior).	Convenience of function operation, processing time, additional capabilities.	5%	
4.1.5	Spontaneous (not pre-defined) Scenario generation according to detector activation (vehicles (including PT vehicles), pedestrian buttons, et al)	Convenience of function operation, processing time, additional capabilities.	5%	
4.1.6	Displaying of Signal Groups Timing Design Logic Chart that includes the display of Signal Groups and detector status according to the Scenarios, second by second	User friendliness of presentation, processing time, additional capabilities.	10%	
4.1.7	Displaying the logic code flow second by second.	User friendliness of presentation, processing time, additional capabilities.	10%	
4.1.8	Logging of the virtual controller run time data, second by second, including detector status, variable values, and other data needed to analyze the Scenario run result	User friendliness of presentation, processing time, additional capabilities.	10%	
4.1.9	Displaying warning in event of errors/ logic failure / deviations from basic design rules	User friendliness of presentation, processing time, additional capabilities.	5%	

4.1.10	Output of performance measures from Scenarios, such as delays, queue length, level of service, green durations, etc.	Convenience of function operation, user friendliness of presentation, processing time, additional capabilities.	10%	
4.1.11	Ability to transition from one Scenario to another and updating variables and parameters.	Convenience of function operation, processing time, additional capabilities.	5%	
4.2	<b>Traffic Simulation</b>		30%	
4.2.1	A simulation component is implemented as an embedded module that can be directly operated from the Bid Software.	Convenience of function operation, processing time, additional capabilities.	40%	
4.2.2	A simulation component is implemented as a simulation virtual controller add-on to the Bid Software (in the form of, for example, Vissim, AimSun, or TransModeler); and (ii) the transfer and translation of the signal design produced in the core of the Bid Software to said simulation virtual controller add-on is done automatically	Convenience of function operation, processing time, additional capabilities.	15%	
4.2.3	The simulation embedded module/add-on produces simulation run results that enable analysis of the signal design and output performance measures such as delays, queue length, level of service, green durations, etc.	Convenience of function operation, user friendliness of presentation, processing time, additional capabilities.	15%	
4.2.4	Displaying Signal Group Timing Design Logic Chart that includes the display of Signal Groups and detectors status second by second	User friendliness of presentation, processing time, additional capabilities.	10%	
4.2.5	Displaying the logic code flow second by second.	User friendliness of presentation, processing time, additional capabilities.	5%	
4.2.6	Logging of the virtual controller run time data, second by second, including detector status and variable values and all the data needed to analyze the run result	User friendliness of presentation, processing time, additional capabilities.	5%	

4.2.7	Displaying warning in event of errors / logic failure / deviations from basic design rules	User friendliness of presentation, processing time, additional capabilities.	5%	
4.2.8	The simulation module/add-on enables the running of scenarios according to pre-defined rules, and the transition between scenarios for designing analysis	Convenience of function operation, processing time, additional capabilities.	5%	
<b>5</b>	<b>Logic Code Debugging Capabilities</b>		100%	2%
5.1	Displaying the run time log, line by line, synchronized with the running code and jump from the log line to the logic code or the logic flow chart	Convenience of function operation, user friendliness of presentation, processing time, additional capabilities.	30%	
5.2	Displaying error and warnings in the code and /or logic flow chart, emphasizing logical failures (according to design rules and pre-defined conditions) in the logic code with suggestion of errors and warning corrections	Convenience of function operation, user friendliness of presentation, processing time, additional capabilities.	40%	
5.3	Breakpoints in the logic code and / or logic code chart	Convenience of function operation, user friendliness of presentation, processing time, additional capabilities.	30%	
<b>6</b>	<b>General Impression – General Impression of the Bidder and the Bid Software</b>	<b>Bidder</b> – professionalism, responsiveness, R&D capabilities, human resources, organization, sales, experience in design. <b>Bid Software</b> – user-friendly display, general performance, functionality, additional capabilities.	100%	10%