

Terms of Reference
Bangladesh Road Safety Project (BRSP)
Consulting Services (Firm) for
Integrated Traffic Management and Incident Detection System (SP-BP-01)

1. Background

Road crash related deaths and serious injuries is a public health crisis in Bangladesh. Around 93% of the world's road fatalities occur in Low- and middle-income countries (LMICs)¹, where South-East Asia region has shown the highest increase in road fatalities compared with other parts of the world². Road crash-related deaths and serious injuries are a public health crisis in Bangladesh where the road traffic fatality rate is 102.1 per 10,000 vehicles and 13.6 per 100,000 populations, and pedestrians are the largest single victim group, accounting for 65% of road accidents³. Bangladesh has the poorest pedestrian safety record across the BBIN (Bangladesh, Bhutan, India, and Nepal) countries. A study finds that long-distance buses, are involved the most in accidents (49%) of the country, followed by mini-bus/truck drivers (23%) and heavy truck drivers (22%)⁴. Children in Bangladesh face growing road safety risks. In 1990, road crashes were the 9th leading cause of death for children aged 5 – 14 and by 2017 they had become the 4th leading cause of death. This undermines the country's effort to improve health and education outcomes for children, which are important determinants of human capital development.

2. Project Description

GoB has recently launched the Bangladesh Road Safety Project (BRSP), financed by the World Bank, *to build road safety management capacity and achieve a targeted reduction in traffic fatalities and serious injuries in Bangladesh*. The overarching vision of the project is to support GoB in establishing a functional and empowered institutional structure, capable of formulating and implementing the envisioned long-term national program to improve road safety management and outcomes in the country. In order to strengthen the capacity of all relevant government stakeholders to implement the national program in a coordinated manner, the Bank-financed project involves implementing a series of evidence-based multi-sectoral pilots for highways, urban areas and district-level interventions to build road safety management capacity and coordination framework. The successful delivery of the pilot initiatives would be the basis of national-level scaling up under the government-owned program. Secondly, the project focuses on establishing the building blocks for governance, data management and results monitoring related to road safety management, in each of the relevant ministries - Roads and Highways Department, Bangladesh Police (BP), Bangladesh Road Transport Authority, and Directorate General of Health Services.

¹WHO. 2018. Global status report on road safety 2018

²The World Bank. 2020. Delivering Road Safety in Bangladesh: Leadership Priorities and Initiatives to 2030

³Ahmed, I., Ahmed, B. and Hainin, M.R. 2014. Road Traffic Accident Characteristics in Dhaka, Bangladesh. JurnalTeknologi. 71(3)

⁴PPRC. 2014. Road Safety - Realities & Challenges by BRAC. Available from: https://issuu.com/brac/docs/pprc_roadsafetyreport

As part of priority road safety investments under component 2, the BRSP includes support for infrastructure improvements, vehicle and user safety measures, post-crash care, **and establishment of ICT systems, including implementation of an integrated traffic management and incident detection system (ITMIDS)**. Accordingly, to accomplish this, the BP now seeks consulting services from an agency with a proven track record of proficiency and success to undertake the task of designing, procuring, and implementing the ITMIDS. This system is intended to be hosted in the Bangladesh National Data Centre to enable integration with other systems and compilation of incident, crash, and traffic data.

3. Objective

The primary objective is to implement a comprehensive ITMIDS on the pilot corridors (N4 and N6).

The initial requirement of this proposal is to review the current traffic management system and incident management system in use with the view to enabling full integration in the BRSP project areas.

The secondary requirement is to identify locations and specific requirements with respect to traffic management and road safety issues on the BRSP pilot areas.

The final requirement is to manage the supply, installation of a commercial off-the-shelf web-based product, with provision for comprehensive support and maintenance program, aimed at delivery of an integrated system for all the stakeholder agencies.

4. Scope of work

The BP has already implemented a **CCTV Monitoring System** on the Dhaka-Chittagong corridor. The main components of the system are shown in Figure 1.

The consultant under this assignment would:

- (i) Evaluate the current system to determine its suitability for the pilot corridors and any necessary enhancements required for its expansion to the pilot corridors and areas covered by the Bangladesh Road Safety Project (BRSP), as well as any other corridors designated for the same system by the Government of Bangladesh (GoB)
- (ii) Identify the locations and specific system requirements concerning traffic management and road safety issues within the BRSP pilot areas
- (iii) Assist in the procurement process of the ITMIDS
- (iv) Supervise the provision, installation/extension, maintenance, and support of the system by the system developer

The scope of this work comprises the following tasks:

- ❖ **Task 1:** Comprehensive review of the ITMIDS and other systems in operation
- ❖ **Task 2:** Develop Proposals for System Deployment along with estimated costs
- ❖ **Task 3:** Facilitate System Procurement
- ❖ **Task 4:** Oversee System Deployment
- ❖ **Task 5:** Oversee System Integration
- ❖ **Task 6:** Ensure Help and Maintenance Support by the System Developer
- ❖ **Task 7:** Design of the Traffic Control Rooms along N4 and N6

Details of each of the tasks and deliverables are as follows:

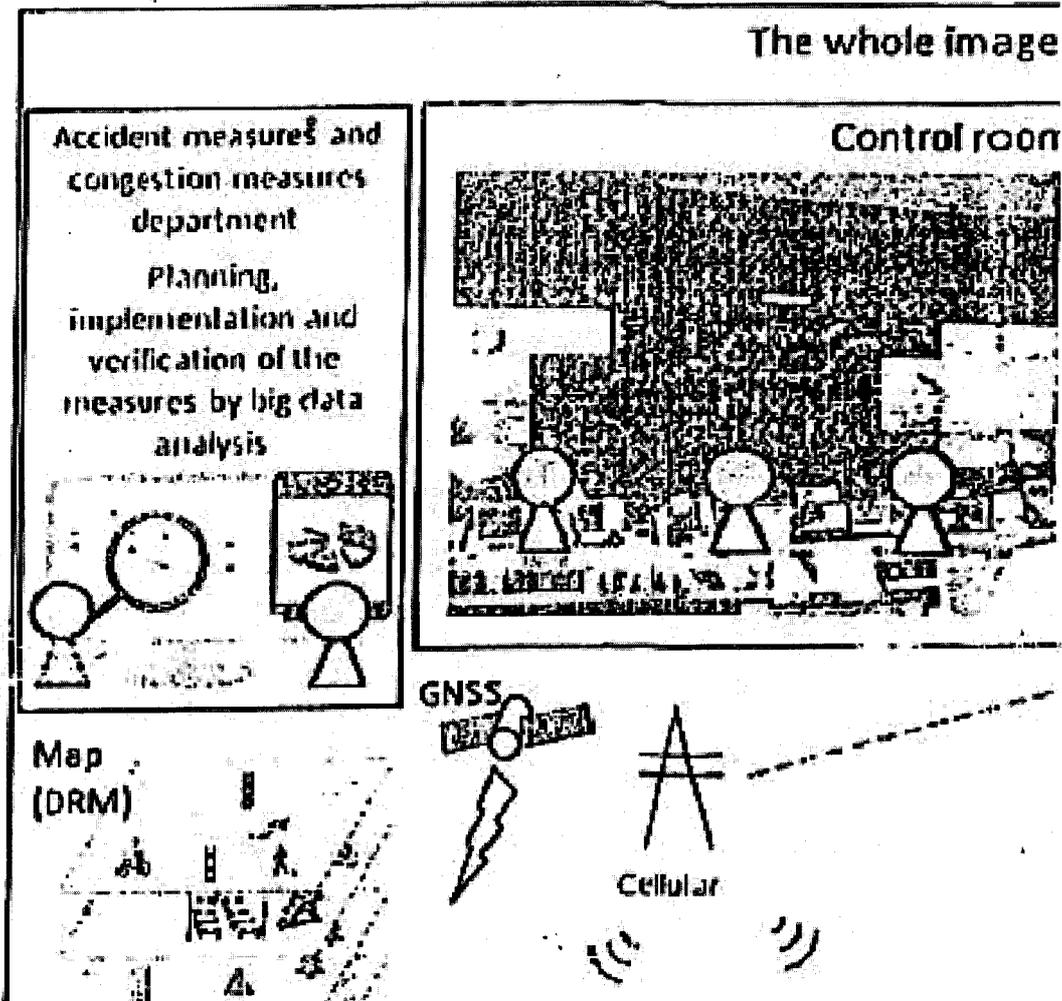


Figure 1: Key components of an Intelligent Transport System (ITS) (Source: DPP, BRSP)

Task 1: Comprehensive Review of existing systems in operation

The consultant will undertake a comprehensive review of:

- The current traffic management and incident management systems in use with the view to enabling full integration of the new system and its implementation in the BRSP pilot corridors.
- The pilot corridors and pilot areas within the BRSP to identify locations and specific requirements with respect to traffic management and road safety issues.

Deliverable: Comprehensive report outlining the findings of the review, with identified gaps and recommendations.

Task 2: Develop Proposals for System Deployment along with cost estimates

The consultant will develop proposals for the implementation and deployment of ITMIDS on the pilot corridors and pilot areas in consultation with BP. The proposals should include:

- A list of required features and functionalities of the system and the related software along with the necessary customization. Typically, this will comprise:
 - **Traffic Surveillance Camera** to monitor traffic conditions, detects incidents, and provides visual verification.
 - **Vehicle Detection System** to monitor vehicle presence and movement for traffic flow monitoring and incident detection.
 - **Variable Message Signs (VMS)** to display real-time traffic information and instructions to drivers.
 - **Incident Detection and Management System** to detect incidents and facilitate timely response measures.
 - **Emergency Vehicle Priority (EVP) System** to provide priority access to emergency vehicles through traffic signal adjustments.
 - **Road Weather Information System (RWIS)** to collect real-time weather data to manage adverse weather impacts on traffic.
 - **Traffic Management Centre (TMC)** to serve as the central command hub for monitoring and managing traffic operations.
 - **Communication and Networking Infrastructure** to facilitate seamless data exchange between subsystems and stakeholders.
 - **Integration and Information Management Software** to integrate data, perform analysis, and present insights to operators and decision-makers.
- Integration of the new system with the existing command and control facilities.
- Locations and type of detection equipment to address the identified requirements.
- Creation of 2 new control rooms/Command and Control Centres on the pilot corridors and areas and linking of the systems to these proposed Control Centres
- Locations, specifications, requirements, and amenities for any new control rooms
- Interlinking of the system with other data sources such as BRTA'S vehicle registration database to enable automatic number plate recognition software functionality, and auto-generation of electronic challan for the traffic rule violation (offences), etc.
- Integration of the system with other ITS projects/systems across the RHD (such as with central ITS management centre), BP, BRTA, DGHS to ensure coordinated use of the system and information sharing
- Requirements for development/enhancement of facilities and personnel to process, store and act upon the violations detected
- Quality control of the system in line with accredited software testing facilities/agencies
- Use cases of the system with a comprehensive list of User Acceptance Tests (UATs)
- Standard Operating Procedure (SOP) for the ITMIDS
- Detailed cost estimate(s) for the system with all the above features

***Deliverable:** Technical report outlining the developed proposals with detailed cost estimates, for implementing and deploying the proposed system on the project corridors and areas*



Task 3: System Procurement

Following acceptance of task 2 the consultant will assist BP with the preparation of bidding documents for purchase of the system software and hardware as outlined as outlined in Task 2. This would include, but not limited to: preparing technical and functional specifications, service level requirements, terms of reference, invitations to bid, evaluation criteria, request for proposals/quotations, evaluation summaries and draft contract documentation.

Deliverable: Formulation of all required procurement documentation from invitation of tender to award of bid by RTHD

Task 4: System Deployment

Following procurement of the system, the consultant will guide and oversee the deployment of the system by the system developer providing the system, equipment, hardware and software. The Consultant will ensure that the rollout follows the agreed program of works and timetable developed with the BP and as per their contract with the system developer. The consultant will also conduct review of the User Acceptance Tests (UATS) and other tests of each component of the ITMIDS deployed, and assist BP to review the test results, where required.

Deliverables:

4(a): Technical report outlining detailed program of works and timetable for deployment and installation of the proposed system.

4(b): Fortnightly report with progress updates on the system deployment

Task 5: System Integration

The Consultant will ensure support and supervision during integration of the system by the system developer through appropriate APIs (application programming interfaces) with other ITS projects/systems/applications across the RHD (such as with its central ITS management centre), BP, DGHS, and BRTA to ensure coordinated use of the system and information sharing.

Deliverable(s): Fortnightly report with progress updates on the system integration

Task 6: Supervision of Maintenance Support

The Consultant shall ensure that the developer provides onsite support and maintenance for a period of 3 years from the date of installation. The scope of the help and maintenance support from the developer shall include:

- Addressing any defects in the hardware or software as per the specified service level requirements.
- Resolving problems in the production environment such as:
 - Rectifying data inconsistencies arising due to software problems
 - Resolving problems due to incorrect application settings/configuration related to application deployment
 - Offering work-around for defects
 - Implementing software patches/releases, after providing due notice to client

The Consultant shall:

- Supervise the trials and commissioning of systems carried out by the system developer and render reports to BP
- Ensure technology transfer of ITMIDS systems by the developer to BP or designated GoB Department / Nodal agency (as specified in the contract with the developer)
- Review the system Operations & Maintenance (O&M) Manual prepared by the developer and advise BP on any changes required
- Review the O&M training program conducted by the developer for designated persons and comment on its adequacy

Deliverable: *Quarterly reports on maintenance and other support*

Task 7: Design of ITMIDS control room(s) and connectivity along N4 and N6

The consultant will:

- Suggest suitable locations for establishment of ITMIDS control rooms on N4 and N6
- Provide the design specifications and amenities for the control room(s), including but not limited to, dimensions, interior design, electro-mechanical drawings, OFC layout design, electrical and data connectivity, cyber security requirements and design of both active and passive network elements

Deliverables: *Design specifications of control room(s)*

5. Duration and Location

The duration of the services will be **thirty-six (36) months** from the time of the contract signature. The services shall be delivered mainly in **Dhaka, Bangladesh**.

6. Reporting Requirements

The Consultant is expected to carry out the assignment tasks outlined in these terms of reference, in very close co-ordination with relevant government agencies, specifically BP. The consultant will report to the RTHD, BP and World Bank (WB) team. The consultant will also make presentations to the government agencies, other stakeholder departments and during the WB mission visits, as needed/upon request. Presence of relevant key professionals of consultant along with Team Leader is a must during review meetings and presentations.

7. Intellectual Property Rights (IPR)

- Any intellectual property developed or generated during the project shall be the property of the Bangladesh Government.
- The team shall ensure that all project deliverables are free of any copyright or patent infringement and do not violate any existing intellectual property rights.

8. Deliverables

The consultant shall complete outputs and deliverables as per the following table:

S.No	Required Deliverable / Output	Due Timing from commencement	No. of hard copies
1	Inception Report inclusive of all tasks with detailed work program	15 days	10

S.No	Required Deliverable / Output	Due Timing from commencement	No. of hard copies
2	Task 1: Comprehensive report outlining the findings of the review process	2 Months	10
3	Task 2: Technical reports covering the proposals developed to implement and deploy the proposed systems on the pilot corridors including the Quality control document, SoP for O&M of the system, list of features and functionalities, list of User acceptance Tests, and detailed cost estimate.	4 months	10
3	Task 7: Report with design specification for control rooms.	7 months	10
4	Task 3: Creation of draft bidding document	9 months	10
5	Task 4: 4(a) Technical report outlining detailed program of works and timetable for deployment and installation of the proposed system	Within one month of award of works to the system developer	10
	4(b) Deployment progress update reports (Note: Weekly updates to be provided through online/offline meetings)	Monthly from award of contract to system developer	10
6	Task 5: System integration progress updates	Fortnightly after system deployment	10
7	Task 6: Maintenance and help status update reports	Every month following installation until exit of System Developer	
General tasks	<ul style="list-style-type: none"> • Facilitate meetings of system integrator with key GOB stakeholder agencies • Provide procurement and bid document support • Review the User Acceptance Tests (UATS) and other tests of each component of the ITMIDS deployed, and assist BP to review the test results, where required • Facilitate and supervise system integration in pilot corridors/districts/areas • Provide any needed support on System integration and maintenance issues identified by system developer • MOUs between BP and other agencies on information access and exchange 	Continuous/ as needed	
8	Draft Final Report (DFR) on all tasks	33 months	10
9	Final Report (following GOB response to DFR)	36 months	10

9. Key professionals and estimated person-months

The available time of both the Team Leader and the other team members on the ground shall be carefully phased to match the work program which will be designed around the client's views of priorities, absorptive capacity and any other GOB factors on sequencing of targets and activities and finalized during the inception stage of these services.

The estimated person months are provided in the table below – **Consultants should note that these are just indicative and shall have their own estimate commensurate with the scope and tasks.** Adequate person months of professional/technical/support staff inputs shall be provided by the selected Consultant. Key Personnel inputs should be available during the entire assignment period and should be supported by adequate technical support staff person months. Considering the demanding timeline; all team members should be ready and mobilized by the time of the inception report to complete the activities in a timely manner.

#	Key Personnel	No. of Experts	Estimated Person- Months
	Key Expert		
1	Team Leader/Traffic Management Systems Specialist	1	36
2	Deputy Team Leader/Traffic Incident management specialist	1	36
3	System Hardware Specialist (Systems Engineer)	1	24
4	Electrical Engineer	1	36
5	Computer Engineer (Software Developer)	1	36
6	Systems Integration Specialist	1	12
7	Data Analyst	1	36
8	OFC Specialist (Network Engineer)	1	12
	Total	8	228

10. Expertise requirements for key personnel

Details regarding professional qualifications, skills, experience, and indicative person-months required are provided in the table below. The maximum age limit for all key positions/personnel mentioned is 65 years at the bid due date.

Expert	Qualifications	Experience
KE1: Team Leader (Traffic Management Systems Specialist)	Bachelor's Degree in Electrical/Electronics Engineering/ Computer Science OR Bachelor's degree in Civil Engineering with Masters or equivalent professional certification in Electrical/Electronics Engineering/ Computer Science . <u>15 years of overall experience</u>	<ul style="list-style-type: none"> • Minimum experience of 10 years in implementing Intelligent Transportation System (ITS) projects. • Must have been team leader or deputy team leader in design, development and operation of at least 3 projects with similar incident management/video-based surveillance systems based on enterprise solution, • Proficiency with traffic control systems and advanced software; Knowledge of ITS

Expert	Qualifications	Experience
		<p>technologies and communication networks.</p> <ul style="list-style-type: none"> • Familiarity with industry standards and regulations. • Experience in stakeholder engagement.
<p>KE2: Deputy Team Leader/ Traffic Incident Management Specialist</p>	<p>Bachelor's Degree in Electrical/Electronics Engineering/ Computer Science</p> <p>OR</p> <p>Bachelor's degree in Civil Engineering with Masters in Transportation Engineering or any relevant subject</p> <p><u>12 years of overall experience.</u></p>	<ul style="list-style-type: none"> • Must have minimum experience of 7 years in implementing ITS projects, and/or large-scale MIS for the Highways / Transportation sector. • Must be familiar with Incident Detection Response Technologies, such as, traffic surveillance cameras, roadway sensors and incident management software. • Must have experience in implementing at least 2 similar projects using enterprise solution.
<p>KE3: System Hardware Specialist (Systems Engineer)</p>	<p>Minimum Graduate in Computer Science & Engineering/ Computer Science/Electrical Engineering or related field.</p> <p>Professional Certification on Hardware of different OEM</p> <p><u>10 years of overall experience</u></p>	<ul style="list-style-type: none"> • Must have minimum experience of 7 years of experience in Computer Networking and system solution of Surveillance systems. • Must have minimum experience of implementing at least two ITS/ large scale, web-based data systems. • Must have experience in installing, configuring, and testing operating systems, application software, and system management tools along with server administration, storage system development, raiding or clustering design and system performance testing.
<p>KE4: Electrical Engineer</p>	<p>Minimum - Graduate in Electrical Engineering</p> <p><u>10 years of overall experience</u></p>	<ul style="list-style-type: none"> • Must have experience in implementing minimum 2 projects on Video-based Surveillance Systems. • Must have familiarity with the design, installation and maintenance of electrical systems and components, including power distribution, control systems, sensors, and communication network.

Expert	Qualifications	Experience
KE5: Computer Engineer (Software Developer)	Bachelor's or Master's degree in Computer Science, Software Engineering / Information Technology, Electrical Engineering, or related field. <u>10 years of overall experience.</u>	<ul style="list-style-type: none"> ● At least 7 years of software development experience, preferably in transportation or Intelligent Transportation Systems (ITS). ● Proficiency in Java, C++, Python, or similar programming languages. ● Experience in developing software for advanced traffic management, incident detection, and data visualization. ● Familiarity with traffic signal control systems, dynamic message signs, and vehicle detection systems. ● Understanding of networking principles and traffic management communication protocols. ● Knowledge of ITS technologies, including traffic surveillance cameras and sensors. ● Familiarity with industry standards in traffic management and road safety.
KE6: Systems Integration Specialist	Bachelor Degree in Electrical/Electronics/Computer Science/ IT Engineering or Systems Engineering. Professional Certification on Hardware/Software of different OEM. <u>10 years of overall experience</u>	<ul style="list-style-type: none"> ● Must have minimum experience of 7 years of experience in Video-based Surveillance System integration and/or Intelligent Transportation Systems (ITS), traffic control systems, preferably in transportation or infrastructure. ● Must have experience in integrating complex systems in at least 2 projects of ITS/Video-based Surveillance Systems through API development. ● Must have familiarity with relevant industry standards and protocols for system integration. ● At least 3 years of experience in testing, validating, and documenting integrated systems.
KE7: Data Analyst	Bachelor Degree in Electrical/Electronics/Computer Science/ IT Engineering or Systems Engineering	<ul style="list-style-type: none"> ● Must have 5 years experience of working in any ITS/Big Data Analysis/analysis on video/images projects.

Expert	Qualifications	Experience
	Professional Certification on Data Management Systems <u>10 years of overall experience.</u>	<ul style="list-style-type: none"> ● Must have familiarity with data models, collection methods and reporting packages, analysing large datasets, and cloud infrastructure and computing. ● Proficiency in tools used in traffic management systems. ● Familiarity with traffic sensors, cameras, GPS devices, and other data collection technologies. ● Experience in data pre-processing, cleaning, and transformation techniques. ● Knowledge of statistical analysis and data visualization techniques. ● Proficiency in programming languages for data analysis.
KE8: OFC Specialist (Network Engineer)	Minimum Graduate in Electrical/Telecommunication Engineering/ Computer Science & Engineering. Professional Certification on Networking. <u>10 years of overall experience</u>	<ul style="list-style-type: none"> ● Must have minimum experience of 5 years of experience in Optical Fibre Networking and data connectivity of ITS/ Video-based Surveillance System. ● Must have experience in implementing at least 2 projects on ITS/Video-based Surveillance System. ● Knowledge of network architecture and protocols (e.g., TCP/IP, UDP, Ethernet).

