Appendix A13

Systems Engineering Review Form (SERF)

Attachment C.3

SYSTEMS ENGINEERING REVIEW FORM (SERF)
Part 1. General Project Information

The SERF is normally submitted to the FHWA Division Office ITS Engineer/Specialist prior to obligation of initial funding for any project with ITS elements. Any project for which the SERF is not completed in full at this time will be considered as "High Risk", or requiring full oversight by FHWA, unless approved by FHWA as "Exempt". A full discussion of risk categories is available in the most recent Federal-aid Highway Program Partnership Agreement between FHWA and NYSDOT.

Please provide the following background information. In most cases, 1-3 sentences will be sufficient for each item, but you may include as much as you feel needed.

A.   Project Contact –

NYSDOT Region 5

David A. Laistner, P.E.

Senior Design Engineer

(716)847-3207

David.Laistner@dot.ny.gov

B.   Project Objectives – What is the purpose of the project? What needs (deficiencies) are being addressed?

The purpose of the Project is to reconnect the community surrounding the defined transportation corridor and improve the compatibility of the corridor with the adjacent land uses, while addressing the geometric, infrastructure, and multi-modal needs within the corridor in its current location. The transportation corridor is defined as NYS Route 33 (Kensington Expressway) and Humboldt Parkway between Best Street and Sidney Street in Buffalo, NY.

The following objectives have been established to further refine the Project purpose:
 * Reconnect the surrounding community by creating continuous greenspace to enhance the visual and aesthetic environment of the transportation corridor.
 * Maintain the vehicular capacity of the existing transportation corridor.
 * Improve vehicular, pedestrian, and bicycle mobility and access in the surrounding community by implementing Complete Street roadway design features; and
 * Address identified geometric and infrastructure deficiencies within the transportation corridor.

The Project needs relate to community connectivity and greenspace, vehicular capacity, multi-modal accommodations and access, and deteriorating infrastructure. The Project purpose and objectives were developed based on these identified needs within the transportation corridor.

C.   Project Summary – What solutions will address the needs? What major elements will be installed? What major function(s) will be performed?

The Build Alternative addresses the needs by proposing a 4,150-foot-long tunnel between Sidney Street and Dodge Street along NYS Route 33. The proposed tunnel would consist of two independent tubes, each of which would provide three travel lanes in each direction, with an 8-foot-wide outside/right shoulder and 6-foot-wide inside/left shoulder.

As part of this solution, Humboldt Parkway would be reconstructed on a new alignment around a 90-foot-wide center median on top of the tunnel. Humboldt Parkway would be shifted approximately 16 feet further from the adjoining residences, creating additional front yard space compared to the existing condition. Humboldt Parkway would include a sidewalk, parking lane, bicycle lane and one travel lane in each direction. Humboldt Parkway would also include curb bump outs for traffic calming near intersections. Approximately 3.5 feet of soil depth would be provided on the tunnel deck and planted with trees (up to 50 feet in height at maturity). Tree plantings would also be provided along the outside of Humboldt Parkway between the parking lane and the sidewalk.

The existing bridge structures over NYS Route 33 at East Ferry Street, East Utica Street, Northampton Street, and Dodge Street would be removed; the newly constructed cap over the tunnel would reconnect these streets at-grade, including additional connections at Sidney Street/Butler Avenue, Winslow Avenue, and Riley Street.

Existing signalized intersections would be updated along the reconstructed portion of Humboldt Parkway. The Best Street signalized intersections with the NYS Route 33 ramps would be replaced by a roundabout, and a roundabout would also replace

the adjacent signalized intersection between Best Street, Herman Street and West Parade Avenue. The bridge at Best Street would be replaced with a wider bridge structure to accommodate the roundabouts. The Best Street interchange ramps would be modified, providing two lanes on the NYS Route 33 eastbound and westbound off-ramps. The partial NYS Route 33 interchange between Northampton Street and East Utica Street would be eliminated.

Operation of tunnel systems in normal and emergency modes would be fully automatic, with manual override capability by operators at a human machine interface (HMI) located in a remote-operations control center (OCC) at the regional transportation management center (TMC).

ITS infrastructure proposed under this alternative would include barrier gates at tunnel entry portals for lane or tunnel closures, variable message signs in advance of the tunnel at approaching roadways and at tunnel entry portals to warn approaching vehicles in the event of an incident, vehicular collision and fire incident detection systems, video surveillance, Lane Control Signals (LCS) and communication systems.

In addition to the ITS systems proposed, other tunnel safety systems will be installed. Components of the tunnel safety system include:
- Ventilation system.
- Emergency communications system.
- Incident detection (including heat monitoring, smoke monitoring, acoustic monitoring).
- Fixed Fire Fighting System (FFFS).

System controls and ancillary equipment for the above systems would be located in three underground communication rooms, adjacent to mechanical and electrical rooms to accommodate transformers and other electrical, drainage, firefighting, emergency backup power, and other safety systems.

An emergency response plan would be prepared during Final Design in close collaboration with emergency services, the City of Buffalo Fire Department, tunnel operators and other stakeholders. Regular training and exercises for emergency responders would be a key component of the plan.

D.   Work to Date – Any preliminary planning, investigation of options, associated internal or external systems examined, etc.?

A Project Scoping Report was prepared for the project dated December 2022. In addition, ongoing Preliminary Engineering efforts are being performed to identify key systems and ITS infrastructure for the operation of the proposed tunnel.

E.   Is this project considered "Exempt"? Yes_____ No_____ If this project is determined to be Exempt, as defined in the Partnership Agreement, you may stop completing the SERF at this point. With FHWA concurrence, a Systems Engineering Analysis will not be required.

F.   Risk Assessment Guidance – Although this assessment is not a regulatory requirement, the answers to these questions will help in understanding the extent of risk involved in this project.

For each question, check Yes or No or Not Sure.

Question:	Yes	No	Not Sure
1. Will the project depend on *only your agency* to implement and operate?	X		
2. Will the project use only software proven elsewhere, with *no* new software writing?			X
3. Will the project use only hardware and communications *proven* elsewhere?	X		
4. Will the project use only *existing interfaces* (no new interfaces to other systems)?			X
5. Will the project use only *existing system requirements* that are defined in writing?	X		
6. Will the project use only *existing operating procedures* that are defined in writing?			X
7. Will the project use only technologies with service life *longer* than 2-4 years?	X		

If all of the above are Yes, that is a preliminary indication that your project is **Low-Risk**.

Part 2. Regulatory Compliance Information

Please answer each question briefly (often one paragraph is enough). If the question cannot be fully answered *now*, but will be answered during the project implementation, please indicate the step at which it will be answered. As you respond to each question on this form, the field will expand as you type.

1. Identification of portions of the Regional ITS Architecture (RA) being implemented:

*Instructions: Contact your NYSDOT Regional ITS Coordinator to get this information from your Regional ITS Architecture ("RA"). In the RA, the project might be identified specifically by name and agency, or by a more generic description (e.g. "Arterial Traffic Management"). If listed in the RA, document which inventory elements, market packages, subsystems, and/or information flows are being completed in this project. If there is **no** information in your RA, arrange with your NYSDOT Regional ITS Coordinator to provide them this information when your project is designed; they will use it in the next update of the RA.*

Please enter your response here:

The New York Statewide services ITS Architecture and Buffalo-Niagara Bi-National Regional ITS Architecture serves as the framework for the development of the project architecture.

A. Market Packages

The following Market Packages have a correlation to the project design:

Market Package	Market Package Name
AD1	ITS Data Mart
AD2	ITS Data Warehouse
ATIS1	Broadcast Traveler Information
ATMS01	Network Surveillance
ATMS06	Traffic Information Dissemination
ATMS07	Regional Traffic Control
ATMS08	Traffic Incident Management System
EM09	Evacuation and Reentry management

B. Subsystems

The following Subsystems support the above Service Package elements in the project design.

Support	Services
Archived Data User Systems	NYSDOT Main office Highway Data Services
Government Reporting Systems	NITTEC TOC Archive management System
NYSTA Traffic Control Warning System (TCWS)	511 System
NYSDOT Statewide IEN – Data Distribution	NYSDOT CARS
	NYSTA Field Equipment
Center	Private Sector Traveler Information Services
NITTEC Traffic Operations Center	
NYSDOT Region 5 Division Office	
NFBC TMC, PBA TMC	
Local Fire & Police Dispatch	
State Emergency Operations Center	

2. Identification of participating agencies roles and responsibilities:

Instructions: Can you identify all stakeholders that must participate in the <u>implementation</u> phase of this project?   What are their roles/responsibilities? Have they <u>committed</u> to the responsibilities? Some of this information might appear in your RA (e.g., "Operational Concepts" or other sections). If this will be defined in later phase of the project (e.g., Concept of Operations), the RA may be a good source to start definition.

Please enter your response here:

NYSDOT will be the lead agency for overseeing the design and construction for the project. NYSDOT will also be the lead agency responsible for operations and maintenance. NYSDOT may share information with local law enforcement and county/municipal roadway jurisdictions. ITS information will be shared with TRANSCOM, NYS police, other regional transportation authorities, adjacent counties, local traffic management and emergency response services. The appropriate level of information will be shared with the public through NYSDOT's both website and phone-based systems.

3. Procedures and resources necessary for operations and management of the system:

Instructions: Can you identify all stakeholders that must participate in <u>operations, management and maintenance</u> of the system throughout its life cycle? What are the roles, responsibilities, and resources required from each stakeholder? Examples include: money, special equipment, staff time, special expertise, provision of data, and many more. You should consider hardware, software, and communications issues.

Please enter your response here:

NYSDOT currently has sufficient, designated staffing and resources to ensure the continuous operation and maintenance of the systems to be integrated and deployed as part of this project.

4. Requirements definitions:

*Instructions: Are the system requirements (functional and performance) already well-defined **in writing**?*

*If yes, indicate where they can be found (e.g., Std. Specs). If they will be defined in later phase of the project, the applicable high-level functional requirements in the RA may be a good starting point for writing them. The focus is on **"what"** functions must be performed – **not** on **"how"** the technology will be used to perform them.*

Please enter your response here:

High-Level

- The System provides video surveillance coverage.
- The system shall facilitate dissemination of traffic information in advance of critical decision points along the route.
- The system shall be capable of incident detection.
- The system shall be capable of guiding the travelers of any lane closures along the route.

Device Specific

- Thirty-two (32) CCTV camera deployments are anticipated inside the tunnel. These cameras shall have the ability to provide coverage within the tunnel and at entry and exit portals. Beyond the tunnel footprint, a relocated camera at the Best Street and NYS Rt. 33 interchange and a new camera just north of Hamlin Rd. will have the ability to provide ½ mile coverage in both directions along NYS Rt. 33.
- Twenty (20) Variable message Signs (VMS) mounted to the ceiling of the tunnel and at tunnel entry portals will be installed inside the tunnel.
- Seven (7) Variable Message Signs (VMS) mounted on ground mounted, cantilever, and overhead span structures are anticipated in this project beyond the tunnel footprint to provide advance critical information about Tunnel conditions or incidents to motorists.
- Twenty-Eight (28) Lane Control Signals (LCS) on the eastbound NYS Rt.33 tunnel tube and Twenty-Eight (28) LCS on the southbound side of the roadway inside the tunnel are anticipated in this project.
- Installation of ITS conduit within the tunnel structure and project limits, including ITS Junction Boxes and ITS Fiber Optic Cable is anticipated in this project.

5. Identification of applicable ITS standards and testing procedures:

Instructions: Do you know yet if any ITS Communications Standards are applicable to this project? If they are applicable, will you use them? If your RA identifies specific Architecture Flows, you can ask your NYSDOT Regional ITS Coordinator to produce a "Standards Report" for those Flows; it will identify ITS Standards to consider.

Please enter your response here:

NYSDOT ITS standards, including NTCIP center-to-field communications standards will be incorporated into the project's design. Systems verification will be through the various levels of testing required by NYSDOT pursuant to Standard Specifications.

6. Analysis of alternative system configurations and technology options to meet requirements:

Instructions: Have you considered alternative designs yet? This could include system configurations, different organizational roles; alternative hardware, software, or communications technology. If you cannot yet make a choice of available alternatives, this analysis will occur in later phase of the project (High-Level Design).

Please enter your response here:

NYSDOT has guidelines for typical field equipment deployments of standard ITS devices that will be used to determine the best alternative that will allow the system to achieve the functional requirements. System communication alternatives made available by the present-day Information Technologies industry, will be evaluated as part of the project's High-Level Design. The evaluation will comprise an analysis of performance, cost, operational effectiveness, and compatibility with legacy systems. The most suitable configuration to the scope of the project will be proposed for the project's design.

7. Procurement options:

Instructions: Have you considered different procurement options for each of the project phases (design, implementation, operation, and management)? These options could include: off-the-shelf vs. custom, lease vs. buy, fixed-price vs. cost-reimbursable, etc. Procurement options must consider the level of staff technical expertise, existing agency procurement practices, who will be the project manager, and whether you need a systems engineer and/or system integrator.

Please enter your response here:

The proposed project will be procured through NYSDOT's standard procurement process, via "DESIGN-BUILD" delivery.

Comments or Additional Information (if needed):

Attachment C.3   4