Plan Overview

A Data Management Plan created using DMPTool

DMP ID: https://doi.org/10.48321/D17D4S

Title: Cascade Gateway Advanced Border Information System (ABIS) Design Project

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Funder: United States Department of Transportation (DOT) (transportation.gov)

Funding opportunity number: NOFO #20.941

Grant: https://www.transportation.gov/sites/dot.gov/files/2022-09/FY22%20SMART%20Grants%20NOFO_Final.pdf

Template: SMART Grants Stage 1 Data Management Plan (DMP)

Project abstract:

The Cascade Gateway Advanced Border Information System (ABIS) Design Project will evaluate technologies to replace and improve aging wait time systems at the region's U.S. – Canadian border crossings. The project will develop an implementation plan for a binational wait time system that will solve current system challenges and support additional features including an anti-idling system to reduce greenhouse gas emissions; data feeds to inspection agencies; an online, publicly accessible data archive; and real-time traffic operations applications including websites and variable message signs. This planning phase will assess options, coordinate stakeholder participation, and develop an installation plan for the ABIS. This project fits within two technology areas: intelligent, sensor-based infrastructure, and systems integration.

Start date: 09-01-2023

End date: 03-01-2025

Last modified: 01-22-2024

Copyright information:

Cascade Gateway Advanced Border Information System (ABIS) Design Project

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Description

This project, funded through Stage 1 of the SMART Grants program, will evaluate technologies to replace and improve aging wait time systems at the Cascade Gateway system of border crossings between the Lower Mainland of British Columbia and Whatcom County of Washington State. This Stage 1 project will focus on the systems engineering process, which will assess the state of the existing system and look toward a future improved/replacement system. This includes gathering user needs from stakeholders that include the Whatcom Council of Governments (WCOG), United States Customs and Border Protection (USCBP), the Canadian Border Services Agency (CBSA), the Washington State Department of Transportation (WSDOT), and the British Columbia Ministry of Transportation and Infrastructure (BCMOTI), resulting in the development of a Concept of Operations for the future system. The Stage 1 project will conclude with the development of a High-Level Design, System Requirements, and Implementation Plan, which will ultimately be used to procure/implement the system as part of a future Stage 2 project (note that this document refers to the current project that is funded through Stage 1 of the SMART Grants Program as “the Stage 1 project”, and a future project that is anticipated to be funded through Stage 2 of the Smart Grants Program as “the Stage 2 project”).

As such, this Stage 1 project will not involve the deployment of any new sensors or technologies that will collect new data. It will not be until the future Stage 2 project commences that data from the existing system will be evaluated against data from the future system to compare the accuracy and reliability of the two systems. The Data Management Plan will be updated as part of the future Stage 2 project.

Scope and Scale

As described previously, the Stage 1 project will not involve the collection of new data. Existing data and information will be used for the systems engineering process; to evaluate and eventually select the most appropriate technology solution, the project will be gathering and analyzing the following:

- **Existing wait time system technology, accuracy, and reliability**. The existing system collects data from in-pavement inductive loop detectors in the field and stores it in the Cascade Gateway Border Data Warehouse (see the section *Data Format and Metadata Standards Employed* for additional details). The project team will also conduct site surveys at the existing land Ports-Of-Entry (POEs), which will involve visual investigations of existing systems and equipment and result in scanned field notes and photographs in .JPG format.
- **Existing technologies applied elsewhere,** with a focus on cross-border environments, gathering information about how well they fit project parameters (analyzing accuracy, cost effectiveness, environment, mobility, futureproofing, standards and interoperability, feasibility, and anti-idling capabilities). The project team will conduct an industry scan/literature review to review current border wait time measurement technologies.

The Stage 1 project will result in presentations, documents, and reports (.PPTX, .DOCX, and .PDF formats) being produced as part of the systems engineering process.

The Stage 2 project will primarily focus on the deployment of the future system but will also include a before-and-after study that compares the accuracy and reliability of the existing condition against the future system. This section will be updated as part of the future Stage 2 project.

Characteristics

The existing wait time system does not collect any sensitive information; vehicle counts and classifications are collected using inductive loop detectors, which are not capable of collecting Personal Identifiable Information (PII). The data is stored on the Cascade Gateway Border Data Warehouse, where data that includes traffic volumes, delays, and speeds is available for public consumption.

The future Stage 2 project will involve the deployment of new sensors and technologies to collect more accurate and reliable data to enable improved wait time measurement. At this time, the specific technologies for the future system have not yet been identified, so the potential extent of sensitive data that may be collected is yet to be determined. This section will be updated as part of the future Stage 2 project.

Sensitivity

Data compiled from existing research and the current system will have no sensitivity concerns. Any new data gathered from the project itself will be subject to both United States and Canada's strict privacy laws, limiting the ability to gather any sensitive or personal data from sources used to measure delay.

Value Outside of this Project

The data compiled for this project on the existing system and other technologies will be valuable to any other region looking at implementing a wait time system, especially in multi-modal environments with geographic restrictions like a border crossing.

Comparing data on the existing wait time system and the potential options from a new system will form the basis of a cost-benefit analysis for regional agencies planning to invest in a new system.

Data from the existing wait time system can be accessed publicly from the Cascade Gateway Border Data Warehouse. All data adheres to United States and Canadian privacy laws and can be exported in .CSV and .PDF (charts and tables from the Tableau dashboard, as well as custom query outputs in .CSV format). In addition, the full archive is accessible via an API in JSON format for use by other public and private entities. Existing data feeds utilized by the Border Data Warehouse include the following XML-formatted data feeds:

- Southbound loop detector data from BCMOTI, stored in 5 minute increments and available for 7 days.
- Northbound loop detector data from WSDOT, stored in 5 minute increments and available for 24 hours.
- Southbound inspection booth data (e.g. number of passengers, what state/province their license plate indicates, lane number, lane status – NEXUS vs Car vs Ready) from USCBP, stored in 10 minute increments and only one file is available at a time.

As described previously, the Stage 1 project will not involve the collection of new data. This section will be updated as part of the future Stage 2 project to reflect any new data that will be collected with the future system.

Sensitivity in Stage 1 Design Data

Data gathered as part of this specific project, the design component of the Cascade Gateway Advanced Border Information System, will not have any sensitivity issues. Data will be specific to the functioning of technology.

Data may be gathered from cross-border travelers as part of a planned passenger vehicle intercept survey in 2024/2025 to provide input on how the existing wait time system is currently being used, opinions regarding existing system accuracy, and improvements desired. The survey would be conducted in partnership with Western Washington University's Border Policy Research Institute (BPRI) and abide by all ethical specifications and informed consent requirements to outline the purpose of the brief survey, the anonymity of responses, and the voluntary nature of any survey participation.

The only other sensitivity consideration in Stage 1 would be any analysis of cross-border inspection times. Current datasets abide by U.S. and Canadian privacy laws. However, the inspection times may be considered sensitive data by federal inspection agencies and will therefore be aggregated in such a way as to prevent any individual from being able to identify patterns of behavior or actions undertaken by the inspection agency.

Sensitivity in Stage II Implementation Data

Data collected as part of the final technology chosen for the implementation phase will be subject to U.S. and Canadian privacy laws, meaning that any datapoints that can be traced back to an individual must be scrubbed from the system and not stored. This section will be updated as part of the future Stage 2 project.

Access Restrictions

Data from this Stage 1 project will not need to be restricted. Data from the Stage 2 implemented project will have data restrictions based on the needs of the parties providing the data and are unknown at this time, but archived data will be available to the public. This section will be updated as part of the future Stage 2 project.

Intellectual Property Rights

The results of the systems engineering process from the Stage 1 project, prepared by the Transpo Group USA, Inc. (Transpo) team, will become the property of WCOG and the Transpo team, but will be made publicly available and subject to public disclosure requirements. The specific systems, technologies, and sensors that may be deployed as part of the future Stage 2 project are not known at this time, so their intellectual property rights cannot yet be identified. This section will be updated as part of the future Stage 2 project.

Data Archiving

Part of the project scope requires data to be dynamically stored in the Cascade Gateway Border Data Warehouse, an online archive of five-minute increment wait time data for all four Cascade Gateway ports-of-entry that dates back to 2005.

The archive is owned and maintained by the Whatcom Council of Governments, who shares the data with the public and partner agencies through its website at www.borderdata.org. It is anticipated that data from the future system will continue to be stored in a similar manner. This section will be updated as part of the future Stage 2 project.

Licensing

No licensing will be required in the Stage 1 project. If third-party data components are used as part of Stage 2 implementation, any licensing agreement will require these data to be shared publicly in the Cascade Gateway Border Data Warehouse.

As described previously, the Stage 1 project will not involve the collection of new data. Data from the existing system will continue to be available through the Whatcom Council of Governments via the Cascade Gateway Border Data Warehouse. It is anticipated that data from the future system will continue to be stored in a similar manner. The System Requirements that will be developed as part of this Stage 1 project will include a requirement to support and adhere to the U.S. Federal Government DCAT-US Metadata Schema. This section will be updated as part of the future Stage 2 project.

Project files may include reference documents, reports/documents from other projects, native report files, etc., which will be stored on SharePoint and accessible by WCOG and the Transpo team, as well as on Transpo's project servers, where data will be retained per company policies for a minimum of 7 years.

Planned Research Outputs

Text - "Concept of Operations"

Based on a current state and user needs assessment, a review of existing border wait time measurement technologies, and a state of the practice (SOP) review, and the development of three candidate conceptual system approaches, a formal ConOps document, which will be consistent with the Institute of Electrical and Electronics Engineers (IEEE) 29148-2018 standard and the FHWA Systems Engineering Guidebook for ITS, will be developed.

Text - "System Requirements"

Building on the ConOps, the project will develop a formal System Requirements document. As stated in the FHWA Systems Engineering Guidebook for ITS, system requirements define what the system is to do, through statements defining system capabilities, conditions, and constraints.

Text - "High Level Design/Implementation Plan"

The High-Level Design builds upon the Concept of Operations and the System Requirements by defining how the system is to be built. This design takes the previously defined requirements (i.e., “what the system will do”) and translates them into hardware and software components that can be built.

This will include an Implementation Plan outlines the work steps, phased schedule, and cost estimates for the pilot deployment of the system during Stage 2.

Text - "Current State Assessment/User Needs Report"

- Review of system documentation and as-built drawings to gain a deeper understanding of the hardware and software currently deployed.
- Review of reports and other planning documents to quantify the issues related to data accuracy and reliability.
- Site Surveys of the existing ports of entry to better understand the existing infrastructure, technologies, and systems deployed in the field, as well as current operational characteristics, such as traffic conditions and queueing patterns. These assessments will be performed on both sides of the border, covering approaches to each port of entry.
- Discussions and interviews with the Project Advisory Team to better understand current operations and the issues that staff are dealing with.

Text - "Review of Existing Border Wait Time Measurement Technologies "

- Conduct a State of the Practice (SOP) review of the potential set of technologies, their applicability to the Cascade Gateway POEs, and their pros and cons.
- Provide an infographic that details the types of technologies that have been deployed at the major crossings.
- Develop case study summaries with lessons learned from existing and emerging implementations that also consider examples where vehicle automation and smart mobility are being considered to support future border crossing solutions.
- Offer preliminary recommendations tailored to the unique challenges and opportunities at the Cascade Gateway POEs.

Planned research output details

Title	Type	Anticipated release date	Initial access level	Intended repository(ies)	Anticipated file size	License	Metadata standard(s)	May contain sensitive data?	May contain PII?
Concept of Operations	Text	Unspecified	Open	None specified		None specified	None specified	No	No
System Requirements	Text	Unspecified	Open	None specified		None specified	None specified	No	No
High Level Design/Implementation Plan	Text	Unspecified	Open	None specified		None specified	None specified	No	No
Current State Assessment/User Needs Report	Text	Unspecified	Open	None specified		None specified	None specified	No	No
Review of Existing Border Wait Time Measurement Te ...	Text	Unspecified	Open	None specified		None specified	None specified	No	No