



BORDER DATA WAREHOUSE 3.0

TECHNICAL MEMO 1: SYSTEM REQUIREMENTS TO IMPROVE END USER EXPERIENCE

*Whatcom Council of Governments
March 25, 2020*

INTRODUCTION

The Cascade Gateway Border Data Warehouse 3.0 Upgrade project (BDW 3.0) builds on investments made in 2016 to integrate U.S. Customs & Border Protection's (U.S. CBP) booth status data. The data warehouse, located at www.borderdata.org, stores passenger and commercial vehicle wait time, volume, and other data relating to the four land border crossings between the Lower Mainland of British Columbia and Whatcom County, Washington State. The objective of the database is to provide timely, accurate, and accessible border wait time data to a broad range of stakeholders.

This project:

- Incorporates booth status data into its data feeds
- Improves warehouse performance and output
- Upgrades commercial datasets

The project is managed by the Whatcom Council of Governments (WCOG) and all software development is being completed by IBI Group. The project is overseen by a Project Advisory Team consisting of representatives from key stakeholder agencies including B.C. Ministry of Transportation and Infrastructure (BCMOTI), the Border Policy Research Institute at Western Washington University (BPRI), Canada Border Services Agency (CBSA), Transport Canada, U.S. Bureau of Transportation Statistics (BTS), U.S. CBP, and WA State Department of Transportation (WSDOT).



PROJECT FUNDING

Funding partners include U.S. Federal Highway Administration (FHWA), BCMOTI, Transport Canada, and WCOG.

SCOPE OF THIS DOCUMENT

This technical memo outlines work completed under the Memorandum of Understanding with Transport Canada to work with regional stakeholders to identify updated user requirements which will be incorporated into the improvements made to data fields and online query and reporting tools.

IDENTIFYING NEEDS

Prior to the hiring of the development team for this project, WCOG worked with project stakeholders who frequently used the Border Data Warehouse version 2.0 to determine strengths and weaknesses in the resource to identify opportunities to improve upon its design. WCOG also discussed back-end functionality with IBI Group, who maintains the BDW version 2.0, with a focus on improvements needed to support additional functions and reduce costs of archiving the growing dataset.

Five primary needs were identified prior to the hiring of the consultant team:

- **Data accuracy:** because the current version doesn't use the booth status data from CBP, it is erroneously categorizing volumes for NEXUS and non-NEXUS passenger cars.
- **Increasing hosting expense:** because the booth status data is archived in raw format (a data field for every car) and not binned, it is growing enormously and costing more each month to host.
- **Loss of BTS:** since the BTS converted its transborder freight data query tool to Tableau, it is no longer available for the warehouse to "screen scrape" relevant regional data for local queries.
- **End of maintenance funding:** this project is the only ongoing archive of five-minute increment border wait times going back to 2007. Keeping this resource maintained and hosted is important to regional stakeholders.
- **No way to access new datasets:** the booth status data and archived commercial wait times are not currently accessible on the existing website, even though the data are being saved.



Feedback Survey

After the consultant team was brought on board, WCOG distributed a feedback survey to the project advisory team and, later, a larger stakeholder group consisting of all participants in the International Mobility & Trade Corridor Program (IMTC) to provide input on if and how they currently use BDW 2.0 and what improvements they would like to see incorporated into the new design.

Six respondents provided feedback. Answers to the questionnaire indicated what features were used (all of them) and provided ideas for additional easy-access query reports.

DESIGNS FOR API USERS

Feedback from current users of the application programming interface, or API, was essential in understanding how the current resource is used and what improvements can be made to make it more beneficial.

One of the biggest lessons has been understanding that BDW 2.0 has no record of who is using the API to access the archive. As part of the design for the new archive, the design team determined the need for an API registry that requires users of the API to sign up for a unique API key to use the system. This key registry will allow project administrators to access a list of all API users and contact them in the future regarding system changes, upgrades, or downtime).

SYSTEM REQUIREMENTS

Based on the limitations identified, user feedback survey results, feedback from known API users, and current usage patterns, the project will move forward with the following requirements:

Requirement 1: The warehouse needs to categorize data for each booth and lane dynamically, using the booth status data.

Solution 1.1: The warehouse shall be restructured so that data are categorized by processing type rather than by lane.

Solution 1.2: The warehouse shall recategorize historic data to fit the new dynamic architecture.

Requirement 2: Southbound booth status data needs to be accessible for queries, reports, and visualizations.

Solution 2.1: Booth status data shall be queryable in the custom query tool.



Solution 2.2: Booth status data shall be displayed in the primary crossing visualizations.

Solution 2.3: Booth status data shall be available in the reports section.

Requirement 3: Southbound booth status data needs to be binned appropriately to reduce the size of the storage requirements and improve functionality.

Solution 3.1: Booth status data shall be binned in five-minute increment data.

Requirement 4: The warehouse needs to update its connection with the U.S. Bureau of Transportation Statistics freight data to show filtered Cascade Gateway data results.

Solution 4.1: The warehouse shall provide a feed of regionally relevant freight data from the BTS transborder surface freight database (if an API is made available by the BTS site).

Requirement 5: The warehouse needs an updated subscription service for notifications of border delays.

Solution 5.1: The warehouse shall have a subscription tool that allows users to define email/text preferences for border alerts.

Solution 5.2: The warehouse shall update all security requirements to allow for safe subscription practices.

Requirement 6: The warehouse needs an API registration function to provide contact information for agencies/organizations using the API resource.

Solution 6.1: The warehouse shall require those using the API to register for a key so that contact information can be collected on developers using the tool.

Requirement 7: The warehouse needs an updated visualization interface.

Solution 7.1: The warehouse shall maintain existing features of mapping, displays, reporting, and custom query tools, but updated to currently available software capabilities and visualizations.

Solution 7.2: The warehouse shall use Tableau to create its data visualizations and data sharing tools.

Requirement 8: The warehouse needs a dynamic web interface that detects device type for optimal layout.

Solution 8.1: The warehouse shall be designed on a web platform with a dynamic display based on device type (computer, tablet, phone).



Requirement 9: The warehouse needs to update the loop detector data in the back end of the archive.

Solution 9.1: The loop detector data shall be reviewed and updated as necessary.

Requirement 10: The warehouse needs an improved loop detector interface system for maintaining loop detector records.

Solution 10.1: The loop detector data input tool (back end) shall be upgraded to make it easier to locate and update information.

Solution 10.2: The loop detector input tool shall be upgraded to make it easier to select one or a series of loops to be used for volume counts.

Solution 10.3: The loop detector data input tool shall use improved mapping/graphics to place each loop on location.

Requirement 11: The warehouse needs to send a simplified daily email to system administrators reporting if all data feeds and backups are complete.

Solution 11.1: The warehouse shall send a simplified daily email with symbols showing whether all data feeds were received.

Solution 11.2: The warehouse shall send a simplified email stating if all backups were completed effectively.

Requirement 12: The warehouse needs an improved backend reporting system to provide monthly status reports and logs to system administrators.

Solution 12.1: The warehouse shall have a backend reporting tool to make it easier to compile monthly maintenance logs.

Requirement 13: The warehouse needs an improved method for backing up existing and backfilling missing data.

Solution 13.1: The warehouse shall have an updated backfill process for when data needs to be added in bulk.

Solution 13.2: The warehouse shall evaluate and implement an improved backup routine.

Requirement 14: The warehouse needs an improved help section function in the back-end for system administrators to easily update each page/section.



Solution 14.1: The warehouse shall have an improved help page administrative feature that shows completed pages, and which are missing.

Solution 14.2: The warehouse shall have an improved interface for adding text and images to the help sections.

NEXT STEPS

The project developers will design the upgrade based on these requirements and solutions. The next step will be to complete the Design Document for finalizing the design of BDW 3.0 (See **Appendix A: Draft Design Document**).