

# WORK ORDER AUTHORIZATION

Agreement No. 33724 Work Order Authorization No.1

STIP Key Number: 22298

Under the terms of Agreement No. 33724 between the Oregon Department of Transportation ("State") and Portland State University ("University"), dated 2/27/20, which is hereby incorporated by reference, the following Project work is authorized:

Project Name: **Portland Oregon Regional Transportation Archive Listing (PORTAL) Maintenance and Enhancements**

State Work Order Coordinator: Chi Mai, ODOT Senior Transportation Analyst

Total Authorized Amount of this Work Order Authorization: \$668,673 (\$600,000 federal and \$68,673 University's required local match). Expenditure Account (EA) Number: C4385225

Work Order Authorization Start Date: 8/15/2020

Work Order Authorization End Date: 9/30/2023

Effective Date: No Work shall occur until signed by all Parties.	STATE Totals
Expenditure Account (EA) Number	C4385225
A. Amount authorized for this Work Order Authorization	\$668,673
B. Amount authorized on prior Work Order Authorizations	\$0
C. Total Amount authorized for all Work Order Authorizations (A+B=C)	\$668,673
D. Agreement Not-to-Exceed amount	\$3,589,200
E. Amount remaining on Agreement (D-C=E)	\$2,920,527

**STATEMENT OF WORK** is attached, and incorporated by this reference.

This Work Order Authorization may be executed in several counterparts (facsimile or otherwise) all of which when taken together shall constitute one agreement binding on all Parties, notwithstanding that all Parties are not signatories to the same counterpart. Each copy of this Work Order Authorization so executed shall constitute an original.

ACCEPTANCE OF TERMS AND ACTION APPROVED BY STATE: I acknowledge and certify that the work in this Work Order Authorization is within the scope of work of the original Agreement.



Digitally signed by Jennifer Ward  
Date: 2020.09.23 09:53:59 -06'00'

9/23/20

Name/Title

Date

ACCEPTANCE OF TERMS BY AGENCY:

Karen Rowe  
Delivery & Operations Division Administrator



9/25/2020

Name/Title

Date

APPROVED AS TO LEGAL SUFFICIENCY: Janet Borth via email dated 8/20/20

cc: PSU's Work Order Coordinator  
State's Work Order Authorization Coordinator  
ODOT Procurement Office, Agreements

**FINAL**

**Work Order Authorization 1  
For  
Intergovernmental Agreement 33724**

**Portland Oregon Regional Transportation Archive Listing (PORTAL)  
Maintenance and Enhancements**

**Work order statement of work for: Multimodal Transportation Data  
Archive**

*Updated: June 11, 2020*



# INTRODUCTION

This introduction includes the assumptions, expectations, roles and responsibilities for this work order.

The Multimodal Transportation Data Archive (“MTDA”) supports Metro’s Regional Transportation Plan, the production of regional performance measures, regional transportation agencies, consultants, and researchers at Portland State University (“PSU”) and elsewhere. The MTDA encompasses PORTAL and BikePed Portal. PORTAL is the Archived Data User Service (“ADUS”) for the Portland Metropolitan region as specified in the Regional ITS Architecture. BikePed Portal, developed by the Transportation Research and Education Center (“TREC”) at PSU serves as a regional data archive for bicycle and pedestrian counts within the Portland-Vancouver Metropolitan region. The MTDA facilitates data and information sharing for public agencies and stakeholders in the region by providing a centralized database that facilitates the collection, archiving, sharing and standardizing of regional transportation data.

PSU has been collecting and storing regional transportation data for fifteen years and has an established track record of archiving the data. With a research and educational mission, PSU/TREC provides a neutral location for storing and sharing regional data. Within the MTDA, PORTAL and BikePed Portal collect data regardless of jurisdiction and provides transparency in data access, management, and data analysis. MTDA and the PSU team also serve as testing grounds for adding new data sources, different types of data, different data storage and management methods, and visualizing data and data analyses. The MTDA and the data it collects is key to analyses that may prevent fatal and serious crashes in equity focus areas and throughout the region, may understand and model congestion outcomes, and may reduce carbon emissions through improved transportation management. In addition, this project supports the training of transportation professionals. Finally, PORTAL is developed in collaboration with partners at the Southwest Washington Regional Transportation Council (“RTC”), and TREC at PSU.

Project objectives for the proposed MTDA include producing applications and performance measures useful to local transportation professionals, exploring new and innovative uses of the data, and making the PORTAL and BikePed Portal data and systems more accessible to agency personnel and other stakeholders. The analyses supported by this data archive project are able to serve communities in equity focused areas that lack investment and to support the provision of reliable transit travel time for home-to-work trips for those in underserved communities.

The data stored in PORTAL includes 20-second granularity loop detector data from freeways in the Portland metropolitan region, arterial signal data, travel time data, weather data, incident data, variable advisory speed/variable message sign (“VAS/VMS”) data, truck volumes, transit data and arterial signal data. Many of these data feeds are received by PORTAL in real time or on a daily basis and for most, the retrieval and archiving process is fully automated. The 20-

second volume, occupancy and count data for Portland and Vancouver, WA-area freeways from ODOT is received in real-time and has been archived since July 2004. Weather data is retrieved from NOAA and is archived automatically. The collection and archival process for the arterial signal, travel time data and VAS/VMS message sign data is also automated. The data stored in BikePed Portal includes permanent and short duration counts, manual counts, and turning movement counts of bicycles and pedestrians at 15-minute or 1-hour intervals.

MTDA, combining PORTAL and BikePed Portal, is a valuable resource for both researchers and practitioners. The data in these systems are used by consultants, planners and researchers for projects, system monitoring, system performance evaluation and long-term planning. Studies include bottleneck identification, data quality, development of arterial performance measures, and freeway travel time evaluations. Local consultants have used PORTAL data to analyze reliability and design performance in the Highway 217 Corridor study. This two-year study evaluated alternatives for improving travel in the Highway 217 corridor. In addition, PORTAL provided data to support development of the 2035 Regional Transportation Plan, 2018 Regional Transportation Plan Performance Measures, the Regional Transportation System Management and Operations Plan and the Regional Freight and Goods Movement Plan. PORTAL, and related research projects at PSU, increase the visibility of the Portland region, provide good “marketing” for local agencies and provide national visibility. PORTAL will be a necessary tool for implementing the region’s Congestion Management Process and will add valuable information to the development of transportation system plans, corridor planning, and system management and operations. Data from BikePed Portal has been used for a number of educational and research projects. For example, the Biking and Walking Quality Counts research project developed and implemented quality control methods for BikePed Portal data. In addition, BikePed Portal has served as an example to other transportation agencies for storing and visualizing bicycle and pedestrian counts. More recently, data from BikePed Portal has been used to assess changes in bike volume in response to physical distancing.

For the 2020-2023 federal fiscal years, the funding will be \$600,000 from the Metro Regional Flexible Fund Allocation to the TSMO Program, plus \$11,145 from ODOT (e.g., for work order coordination) and \$57,528 local match from TREC at PSU for a total project of \$668,673.

Local match consists of graduate research assistant (GRA) tuition and staff programming time. Additional funding from TREC and RTC supports PORTAL.

This project provides three years of funding (with anticipated additional years of support) to sustain and enhance the Multimodal Transportation Data Archive. Advances in PORTAL and BikePed Portal will be communicated to the transportation community through digital outreach, presentations, and publications.

Projects that will use PORTAL and BikePed Portal in the course of this work plan include:

- Congestion Management Process - System Monitoring
- Clackamas Connections Integrated Corridor Management Operations Concept of Operations

- Metro Traffic Incident Management
- Update to the ODOT Region 1 Portland Region 2017-2019 Traffic Performance Report
- Region 1 Traffic Flow Maps
- Corridor Bottleneck Operation Study
- Metro validation of Sidewalk Labs Replica
- Regional mobility policy
- Automated Traffic Signal Performance Measures (ATSPM)
- Data analysis for emerging and evolving situations that arise during the period of the work plan, for example COVID-19 tracking.

Roles and Responsibilities: The project will be spearheaded by PSU, under the management of Dr. Kristin Tufte and Dr. Tammy Lee. Deliverables have been identified for each task.

## WORK PLAN

This contract is intended to cover the period of 8/15/2020 through 9/30/2023. The following is a description of the work required to carry out this research and development effort during that term.

Key objectives of the 2020-2023 work plan include:

1. Maintain the functionality and data quality of the PORTAL and BikePed Portal websites.
2. Identify and implement targeted enhancements for the PORTAL and BikePed Portal archives.
3. Increase user engagement and outreach by improving accessibility to PORTAL and BikePed Portal data.
4. Increase training opportunities and support for the PORTAL and BikePed Portal project.

The work plan is outlined in the following table and incorporates at least one of the key objectives:

Task No.	Task Name	Level of Effort
1	Maintenance	25%
2	User Engagement, Training & Support	30%
3	Enhancements	40%
4	Results Dissemination	2.5%
5	Project Management & Reporting	2.5%
TOTAL		100%

**Note:** Tasks detailed in each subsection below describe the current scope of work. Each subtask listed is based on the current feedback and interest from the 2020 Scope Survey and discussion from stakeholders. At the discretion of the TransPort TAC, these subtasks may be replaced, or added to if resources are available. Examples include: adding or replacing a new data feed, data analysis or data validation of new and existing data sources not yet identified.

## Task 1. Maintenance

**Note:** Costs for maintenance are variable. They depend on factors outside the team's control (e.g. number and type of feed issues, number of security patches, and required upgrades). The PSU team will identify how agencies can collaborate in reducing maintenance cost variability.

**Time Frame:** This task will extend throughout the life of the work order.

Task Name	Description	Comments	Deliverable	Level of Effort
1A. Data feed maintenance and upgrades	Handle any changes to data feeds feeding into PORTAL and BikePed Portal. For example upgrading or switching to new detectors at already existing locations, or expanding locations with current data feed.	Cost is variable depending on feed stability and time needed to process data feeds to improve efficiency.	Work done will be described in quarterly reports and updates to contract managers. Due quarterly	7% (\$46,027)
1B. Internal system changes, code updates.	Internal system patches, network upgrades, etc. that affect any of the databases. Ongoing upgrade of website code to support updated libraries, modernization, browser compatibility, security	Cost is variable depending on software updates.	Work done will be described in quarterly reports and updates to contract managers. Due quarterly	7% (\$46,027)
1C. Architecture evaluation, planning & Deployment	The database hardware and software infrastructure need to be evaluated and upgraded.	Need to consider cloud-based services and inclusion of a modern data management platform.	This item covers the time to evaluate and design a new software and hardware architecture for the system. Due	3% (\$19,726)

			8/31/2023	
1D. Storage and compute costs.	Costs for storage and compute infrastructure to store the PORTAL data and to support processing of that data.	Costs may vary due to variations in compute and storage costs.	This item covers the cost of paying for disk storage and compute time for the Multimodal data archive for the length of the project. Due 8/31/2023	8% (\$52,602)
TOTAL				(25%) \$164,382

## Task 2. User Engagement, Training & Support (Teaching & Education)

Based on user feedback through surveys, emails, and discussions with stakeholders and educators, the PSU team will continue to organize monthly PORTAL User Group meetings, provide training or workshops, and datasets and support for classes and research.

**Time Frame:** This task will extend throughout the life of the contract.

Task Name	Description	Comments	Deliverable	Level of Effort
2A. User engagement & communication	Continue to host monthly PORTAL User Group (PUG) meetings. Continue engagement and outreach efforts with regional MPO partners and researchers. Identify and engage new potential partners.	PUG meetings typically include a presentation from a guest speaker in the transportation and data field; and provide PORTAL and BikePed Portal updates.	PUG agendas and materials are posted on documentation website. Any new features, updates, or outages regarding PORTAL and BikePed Portal will be announced on the documentation website and summarized in monthly emails to all members. Due monthly	10% (\$65,753)
2B. Support & accessibility	Staff will provide support to regional partners on an ongoing, on-demand basis.	Level of effort varies with the number of support requests.	Staff will provide a summary of support requests from users and stakeholders in	5% (\$32,876)

			quarterly reports. Due quarterly	
2C. Education & Training	Provide datasets and support for PSU classes. Staff will offer trainings in using PORTAL and BikePed Portal, and data analysis skillset (e.g. git, SQL, R)	Level of effort varies with number of training requests and educational support.	Any materials created for trainings will be made publicly available. At a minimum, the primary academic data set will be updated each year. Due annually	10% (\$65,753)
2D. Documentation of new, updated, and existing features	Some features in PORTAL and BikePed Portal websites are under-documented. This task will produce documentation for those features, as well as maintain any new and updated features that require documentation.	In addition to announcing new and update features to PORTAL or BikePed Portal, the documentation of both websites is crucial for new and current users to understand datasets and calculations, and how to use website tools and features.	Work done will be described in quarterly reports, PORTAL User Group meetings, and documentation website. Due quarterly	5% (\$32,876)
TOTAL				(30%) \$197,258

### Task 3. Enhancements

Task Name	Description	Comments	Deliverable	Level of Effort
3A. Data Quality & Validation	Work with agencies to validate data by comparing with other data sources such as RITIS, ATR, NPMRDS. Develop a data quality process to identify suspicious data.		Within one year, a process for flagging suspicious data will be identified. Within two years, suspicious data will be flagged going back to January 2018. PORTAL will	10% (\$65,753)



			institute automated data validity checks on raw data sources starting June 2021 or sooner. Freeway data will be validated first, followed by data sources prioritized by TransPort. Due June 30, 2021	
3B. Data Analysis & Products	PORTAL staff anticipates periodic requests for data analysis or one off reports from stakeholders (e.g. TREC publishing summary observations of traffic volume or bike volume in response to COVID-19).		A maximum of 30 requests for data and 3 one-time reports will be supported by this budget. Due 8/31/2023	10% (\$65,753)
3C. Visualizations	Visualization tools currently available on PORTAL and BikePed Portal will periodically be updated with additional, or replaced with different visualization applications, in response to user and stakeholder feedback.	Level of effort will depend on the number and type of request.	One additional visualization or major update will be supported by this budget. Due 8/31/2023	5% (\$32,876)
3D. Transit	Transit data useful to assessing traveler reliability will be archived and made publicly available, either as a downloadable dataset or a new user interface page.	Level of effort will depend on final deliverable at the discretion of TransPort and possible collaboration with RTC. Data will be prepared for use in analysis related to equity and access to opportunities.	Data made available on Download page, or a new Transit reliability page. Due 8/31/2023	5% (\$32,876)
3E. Arterial	There is a high interest in updating and enhancing the	PORTAL will make ATSPM	ATSPM data archived in	5% (\$32,876)

	Arterial page on PORTAL. Also useful to arterial performance, the user survey indicated a high interest in archiving ATSPM data and updating and enhancing the Arterial page in PORTAL.	data available for download but not develop web pages with the data under this scope for two reasons: 1. ATSPM will be the biggest volume of data PORTAL has ever archived and 2. Traffic signal operators have extensive visualization tools built into signal systems.	PORTAL. Enhanced Arterial page in PORTAL. Due 8/31/2023	
3F. New data sources.	As new data sources become available or partner agencies add new data sources may be included in PORTAL or BikePed Portal. For example, ATR data, Port of Portland sensors along Airport Way.	Level of effort will depend on the architecture of the new data source.	Up to one data source will be added to PORTAL at the direction of TransPort. Due 8/31/2023	5% (\$32,876)
TOTAL				40% (\$263,010)

### 3A. Data Quality and Validation

The current monitoring system data stored in PORTAL and BikePed Portal are complementary to other regional data sets including GPS data, such as the Replica data provided by Sidewalk Labs, and commercial solutions like RITIS. The system monitoring data in PORTAL and BikePed Portal are primarily sensor data. Combining different types of data - sensor and GPS - will lead to a full understanding of the transportation system. For example, sensor data is often used to calibrate other data sets due to the strength of its statistical accuracy at the sensor location.

Sensor and GPS data have different strengths and weaknesses. Sensors are location-specific, but have high accuracy and potentially lower bias at the sensed location (a physical traffic sensor has the capability to collect data on all persons or vehicles at the sensor location). In addition, all cleaning and processing done by PORTAL and BikePed Portal is publicly-available and transparent. Commercial data sources have broader spatial coverage, but may not have transparent processing, may have restrictions on sharing data and may be subject to data collection bias (e.g. is limited to only those with a specific provider or specific app use) and may

have privacy issues that may limit its use. Combining sensor and GPS datasets can provide the advantages of both.

Sensor data collected by PORTAL and BikePed Portal also have data quality issues due to a number of factors such as non-normal conditions (e.g., construction projects obstructing or damaging sensors, interference with radar due to foliage growth, etc.). BikePed Portal already has a QA/QC process in place. PORTAL will also develop a similar QA/QC process and use other data sources (e.g. ATR) to validate.

### 3B. Data Analysis & Products

The PSU team has received requests in the past to perform data analysis type tasks that are reproducible and can process large amounts of data. This task allows us to work on these types of requests where it would be more efficient for the PSU team to process large amounts of data resulting in a consumable data product for the requesting stakeholder. Other requests have also included a dashboard to provide a high level summary of data relevant to a specific type of user, for example BikePed Portal has begun to receive feedback on updating its dashboard.

### 3C. Visualizations

The visualization features in PORTAL and BikePed Portal make data easier to understand and absorb and provide a high level resource for operations and planning staff. Current visualization features in PORTAL and BikePed Portal will require maintaining and updating to different ways of presenting data as more data (size and type) become available and as users and stakeholders make requests to enhance a page to add, replace, or change how data are visualized.

### 3D. Transit

The user survey indicated a moderate interest in transit (primarily TriMet) data. PORTAL currently receives and archives quarterly on-time performance and passenger census data. At the discretion of TransPort and depending on the level of interest and resources during the lifetime of this scope, transit data will be made available as a download only option or may be fully developed into its own webpage on PORTAL. If a dedicated transit page is determined to be the final deliverable, RTC and C-Tran will also be invited as a stakeholder.

### 3E. Arterial

The user survey indicated a high interest in archiving ATSPM data and updating and enhancing the Arterial page in PORTAL. The process of updating the Arterial page will include: 1) user and stakeholder outreach to identify specific changes and enhancements; 2) prioritize tasks identified to enhance and improve the page; 3) if the level of effort is higher than expected, TransPort will provide guidance the most important tasks to address during this scope; 4) execute tasks as identified.

### 3F. New Data Sources

The PSU team anticipates within the next three years new data sources may become available, or partner agencies will add new data sources, replace old data sources, or want to add data sources new to PORTAL or BikePed Portal. Any new data sources being added will be at the discretion of TransPort. This task will also cover the planning and assessment on the level of effort needed to add a new data source (e.g. new data architecture, size of data, value to stakeholders and power users).

### Task 4. Results Dissemination

The PSU team will disseminate results of this project through a variety of mechanisms including presentations, papers, and digital communication (e.g. website, email, etc.) when appropriate. The PSU project manager will attend TransPort meetings and will provide TransPort with regular updates. TransPort is a subcommittee of the regional Transportation Policy Alternatives Committee (TPAC). TransPort is the regional Intelligent Transportation Systems (ITS) coordinating committee for the Portland region.

**Time Frame:** Ongoing throughout the contract. Due quarterly

**Deliverables:** Dissemination activities are to be reported in quarterly project reports and are subject to approval of the TransPort. Activities and products may include, but not limited to, participation in TRB workshops, presentations to local and regional groups, papers published at workshops and conferences.

**Level of Effort:** 2.5%

**Cost Estimate:** \$16,438

### Task 5. Project Management & Reporting

The PSU project manager will provide monthly progress briefings to TransPort and will submit quarterly progress reports and a final report at the project's conclusion. Quarterly reports will include achievements of the past quarter, objectives for the upcoming quarter and any current challenges or issues. Documentation such as before and after screenshots will be included as appropriate. The quarterly reports will be accompanied by invoices showing expenses and local match. A final end-of-contract report will summarize accomplishments under the work order. Ongoing throughout the contract project task status will be posted on [GitHub](#) (access available upon request) and contract managers and stakeholders can monitor progress there.

**Time Frame:** Reports due quarterly and at project end.

**Deliverable:** Quarterly progress reports, final summary report

**Level of Effort:** 2.5%

**Cost Estimate:** \$16,439

# BUDGET

The project is cost-reimbursable. All costs are billed only when and if incurred.

Task Number	Task Name	Budget
Task 1	Maintenance	\$164,382
Task 2	User Engagement Training & Support	\$197,258
Task 3	Enhancements	\$263,011
Task 4	Results Dissemination	\$16,438
Task 5	Project Management & Reporting	\$16,439
	Total	\$657,528