Washington State

County Road Administration Board

2021 Annual Report

Washington State
County Road Administration Board
2404 Chandler Court SW, Ste 240, Olympia, WA 98504-0913
360/753.5989 – www.crab.wa.gov

January 1, 2022

The Honorable Marko Liias
Washington State Senator
Chair, Senate Transportation Committee

The Honorable Jake Fey
Washington State Representative
Chair, House Transportation Committee

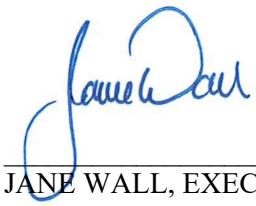
Dear Senator Liias and Representative Fey:

The County Road Administration Board remains steadfast in their commitment to achieving your legislative mandates to provide statutory oversight of the state's thirty-nine county road departments, and in so doing, to provide to you the assurance that these counties' operations remain accountable in their stewardship of public assets and public trust.

In accordance with the requirement of RCW 36.78.070, the Washington State County Road Administration Board presents to the legislature this report of the activities of the agency for the year 2021. CRAB staff continues to promote the integration of engineering, information technology, and grants administration among the counties of the state. We believe this report will accurately indicate to you, and to the people of the State of Washington, the effectiveness of that effort.

Respectfully submitted,

COMMISSIONER ROB COFFMAN, CHAIR



JANE WALL, EXECUTIVE DIRECTOR

County Road Administration Board

CRABoard Members	Term Expires
Chair Rob Coffman, Lincoln County Commissioner	2022
Vice-Chair Lisa Janicki, Skagit County Commissioner	2024
Second Vice-Chair Mark Storey, P.E., Whitman County Engineer	2022
Al French, Spokane County Commissioner	2023
Kathy Lambert, King County Council Member	2024
Grant Morgan, P.E., Garfield County Engineer	2023
Brad Peck, Franklin County Commissioner	2022
Gary Stamper, Lewis County Commissioner	2023
Doug McCormick, P.E., Snohomish County Engineer	2024

County Road Administration Board Staff

Executive Director: Jane Wall

Administration: Jason Bergquist, Executive Assistant
Toni Cox, Administrative Assistant

Engineering Services:
Andrew Woods, P.E., Deputy Director
Derek Pohle, P.E., Eng. & Adm. Support Specialist
Steve Johnson, P.E., Grant Programs Manager
Mike Clark, C.E.T., Road Systems Inventory Manager
Brian Bailey, Design System & UAS Programs Manager
Eric Hagenlock, Data Quality Assurance & Analysis Mgr

Information Services:
Tommy Weed, IT Director
Cameron Cole, GIS Administrator
Scott Campbell, Systems Security Specialist
Angela Rice, Systems Administrator
Donna Quach, Software Engineer
Nolen Young, Software Engineer

Table of Contents

FROM THE EXECUTIVE DIRECTOR

2021 was a year of both endings and new beginnings at the County Road Administration Board (CRAB). CRAB said goodbye to longtime staff members John Koster, Karen Pendleton, and Rhonda Mayner as they embarked on retirements and new adventures. Between the three of them, John, Karen, and Rhonda dedicated over 55 years of service to CRAB. Their commitment to the organization cannot be understated, and their impact will forever be felt. While goodbyes are never easy, these farewells also meant opportunities for new faces to join the CRAB family, as we welcomed IT Systems Administrator Angela Rice, Executive Assistant Jason Bergquist, and IT Director Tommy Weed. I'm a new face as well, having assumed the role of Executive Director on June 1, 2021.

My first few months at CRAB were spent listening and learning. I've had opportunities to travel around the state where I have met with our various partners and spent many hours in briefings and tutorials on everything "CRAB." My decision to pursue the Executive Director role has only been reinforced through these experiences. CRAB is a special place. We have a staff who embody the definition of public servant, dedicating their time and energy to ensure counties receive the support and services they need to be successful. And it shows. Our administrative overhead is consistently under 4%, we get resources out the door quickly, and we consistently strive to be responsive and respectful to county needs. We are grateful to the Legislature for their support, and we remain committed to continuing our legacy of exceptional work.

As we move into 2022 my goals are to build upon this excellence. We will be embarking on a strategic planning process that will help set the direction for the agency for the next several years. This process will help inform our 2023-2025 budget submittal, provide an opportunity to build upon best practices, and allow us to consider incorporating new goals and strategies for the agency as we move into the future.

As always, CRAB is ready to respond to any legislative actions directed our way, and we are eager to work with policy makers to ensure that CRAB is able to continue to offer counties and all Washingtonians the superb services it has carried out for the past 56 years.

Jane Wall,
Executive Director

ENGINEERING SERVICES

The primary responsibility of the Engineering Services Division is the creation, maintenance, and updating of summary reports, guidance materials, model documents, and the provision of training to county legislative authorities, county engineers, and their staffs.

The engineering services staff, most of whom hold professional engineer licenses, are directly responsible for the following functions:

- The administration of three grant programs: the Rural Arterial Program (RAP), the County Arterial Preservation Program (CAPP), and the County Ferry Capital Improvement Program (CFCIP);
- The administration of one revolving loan program: The Emergency Loan Program (ELP);
- The maintenance of the county road log as well as the computations and updates to the distribution of the counties' share of the motor vehicle fuel tax;
- The management of reports and other information necessary for recommendations related to the Annual Certificate of Good Practice for each county;
- The guidance and research on statutory and regulatory issues affecting county road and public works departments;
- The comprehensive and in-depth training of county commissioners and councilmembers, county engineers, and their staffs;
- The assistance in representation of county engineers' interests on a variety of state-level committees and task forces;
- The design and traffic engineering assistance to counties, as requested, including consultant selection assistance;
- The liaison services on behalf of county engineers with various state agencies, especially the State Auditor's Office and Local Programs division of WSDOT.

Ensuring compliance by Washington's county road departments with all applicable state and federal laws and regulations is one of the core functions of CRAB. At the CRABoard's April meeting, the Board approved the issuance of Certificates of Good Practice to all thirty-nine counties. Only through the tremendous work performed by the counties, strong ethic to do right with the public's trust and funds, and desire to always improve how the public is served by the county road system can this accomplishment be achieved. I would like to thank the county engineers, their tremendous teams, and CRAB staff for their hard work ensuring that all thirty-nine counties receive their certificates of good practice and continue to receive motor vehicle fuel tax, county arterial preservation, and rural arterial program funds.

2021 has been a year of challenges to one of the core duties of the Engineering Services Division – Training county legislative authorities and county road staff. With

COVID restrictions at the forefront of concern for the health and safety of county and CRAB staff, we were able to successfully transition some training to online rather than in-person. In February 2021, CRAB staff presented a 2 day (2 hours per day) training for county legislative authorities and county staff on the interaction of the legislative authority and the office of the county engineer. Historically, this training would be offered in one afternoon at Olympia with lower than desired attendance. However, by offering the training online we had approximately 75 attendees the first day and approximately 67 attendees the following day. Also, the training was recorded and placed on CRAB's website so that other interested parties could watch the training at their convenience. Due to the success of this online training, CRAB intends to offer this training annually.

CRAB was also able to do some in-person training. After numerous failed attempts (ever evolving changes in COVID protocols) to provide county engineer training, we were able to provide two classes in the first two weeks of December. Attendance was great and the conversations lively. One of the key parts of this training is the peer-to-peer interaction. We do not offer this training online for that reason. It was great to see so many county engineers along with county road managers and supervisors get together to learn, absorb, and share experiences to make the training a success.

In June of 2021, the Washington State Association of County Engineers held their annual conference at Lake Chelan. It was great to see so many county road professionals and be able to network and assist them with various questions, issues, and input on how to improve county road administration throughout the state. At the conference, CRAB had the honor of recognizing several county staff for their dedication and service to their county.

Cody Swan, P.L.S., E.I.T. from Whatcom County was recognized as the Project Manager of the Year for his work managing the Birch Bay Drive and Pedestrian Facility project. This $8.8M project restored beach habitat, constructed eco-friendly storm barriers to protect Birch Bay Drive from ocean storms, added a new pedestrian pathway along the crest of the beach stabilization, and made road improvements. His strong efforts with public outreach were noted as being a key reason the project was successful with the general public as well as the local citizens and businesses impacted daily by the construction.

Tina Nelson, P.E. from Kitsap County was recognized as the Program Manager of the Year for her work managing Kitsap County's design and construction annual program. Tina's work through the COVID pandemic was extraordinary. She was able to not only keep the counties aggressive capital program moving forward, but also address an emergency culvert failure with the design, permitting, and construction of a bridge to replace the failed culvert within seven months of the failure. For those in this industry, that is a tremendous achievement that most would think impossible to achieve.

Susan Eugenis, P.E. from Cowlitz County was recognized as the County Engineer of the Year. Susan's work to keep Cowlitz County Public Works moving forward and delivering a robust capital program were recognized. This success was while dealing with trying to fill vacancies in a third of her staff – among the vacancies being key positions such as Diking Engineer, Stormwater Engineer, and Assistant County Engineer. Susan was recognized for her excellent communication skills with her Board of County Commissioners, staff, and the public. Her outreach with local schools to promote the civil engineering field, especially to young women, and other volunteer acts were also recognized and commended with the award.

Thank you to the Engineering Services team for their efforts in 2021. It has been a year of challenges as we have all had to change the way we do business. I am proud of everyone's efforts to continue to provide a high level of customer service, continue to provide assistance and training through virtual means, and being able to facilitate face-to-face meetings for important issues that could not be handled virtually. I look forward to continuing the momentum from a strong 2021 performance into 2022.

DESIGN & UAS SYSTEMS

A critical function of the CRAB mission is to provide Washington State counties with products, services, and technical assistance that enable them to comply with standards of good practice and to operate in an efficient and effective manner.

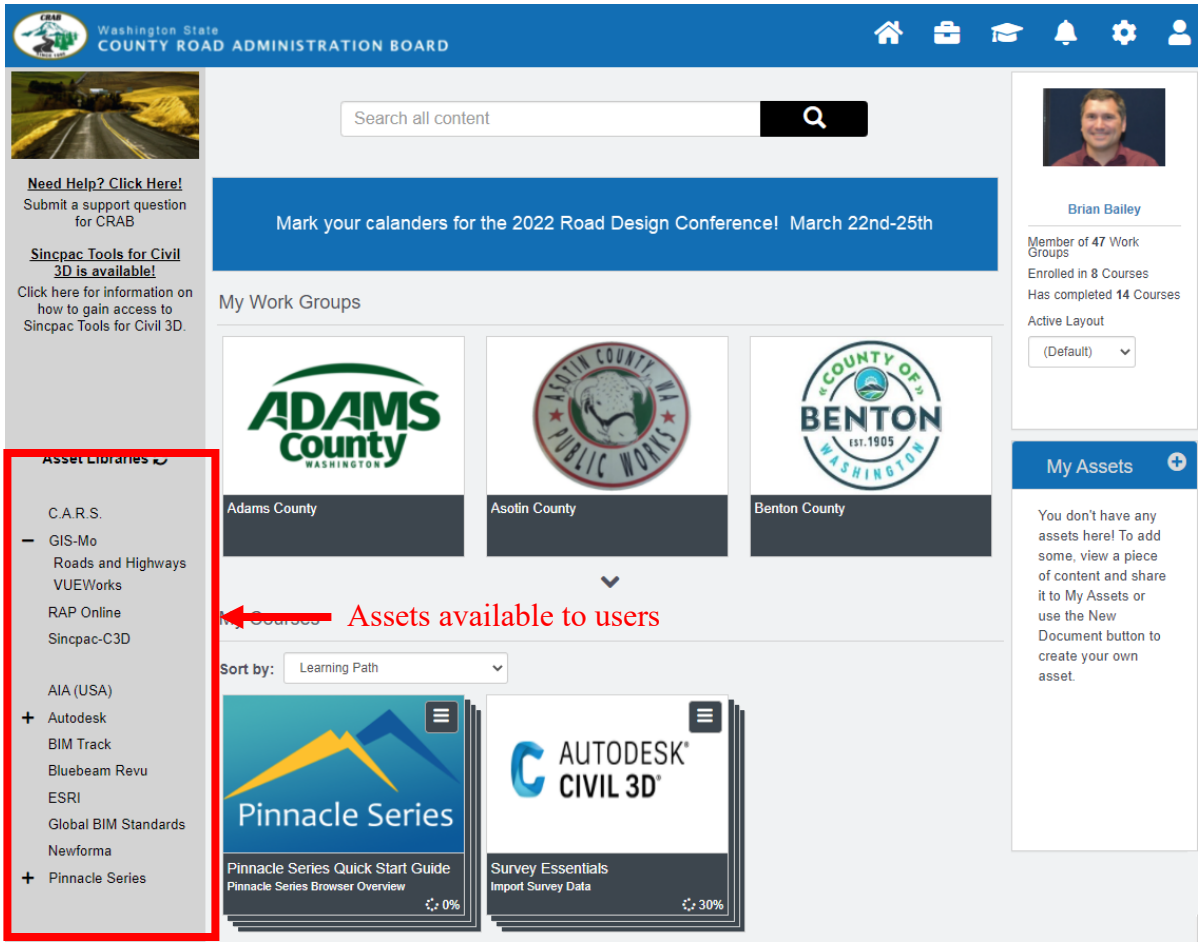
The Design Systems Program has consistently provided Washington county personnel with state-of-the-art engineering road design software including support and training since 1985. This program has enabled county design staff to effectively collect, develop and manipulate the geometric information necessary for site design and construction planning which has contained costs and improved productivity throughout the life of road projects. In addition to improved design and project savings, the savings to counties for user licensing, support, and training in design software by CRAB is hundreds of thousands of dollars each year. Because of CRAB support, our county designers maintain a sophistication and competence which enables multiple forms of analysis of surface models in 3D that allows a more realistic geometric representation of the project area, volumes involved and quantities to be moved, and promotes a better design.

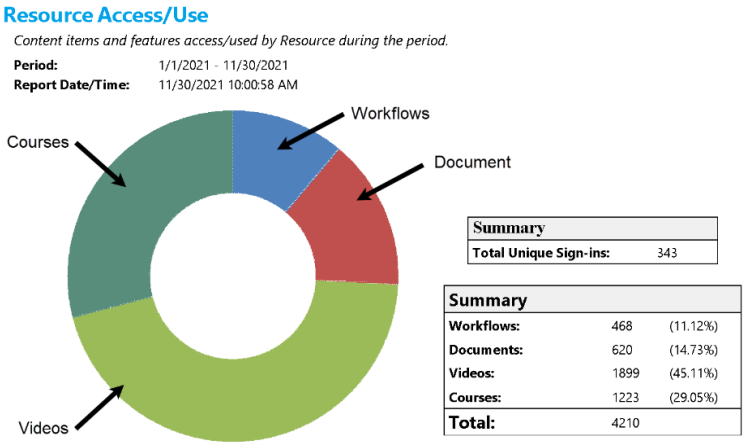
In past years, CRAB has offered in-person training classes to county design staff at CRAB's training facility or at their location for an average savings of approximately $1,000 per student. Due to COVID-19 restrictions, CRAB only held one training class this year that provided 140 person-hours of training. Fortunately, during this period, county staff also had access to our Pinnacle Series Learning Management System (LMS). This online portal was introduced in October of 2020 and has continuously provided on-demand training to users. This portal was fully funded by a grant from the Washington Traffic Safety Commission for a period of three years, costing the counties nothing for this valuable training.

Pinnacle Series

The Pinnacle Series LMS is a productivity solution that helps organizations improve learning methods and enhance information sharing. Multiple resources are combined into a single, concise interface that help users easily overcome everyday challenges they face using technology. It allows county staff improved access to training materials and support to optimize their use of technical software and maximize their workplace productivity. In addition to Pinnacle's content for design engineers, CRAB can develop content for systemic safety workflows,
custom training for software that CRAB has developed for the counties including GIS-Mo, RAP Online and C.A.R.S.

Pinnacle Series LMS User Portal





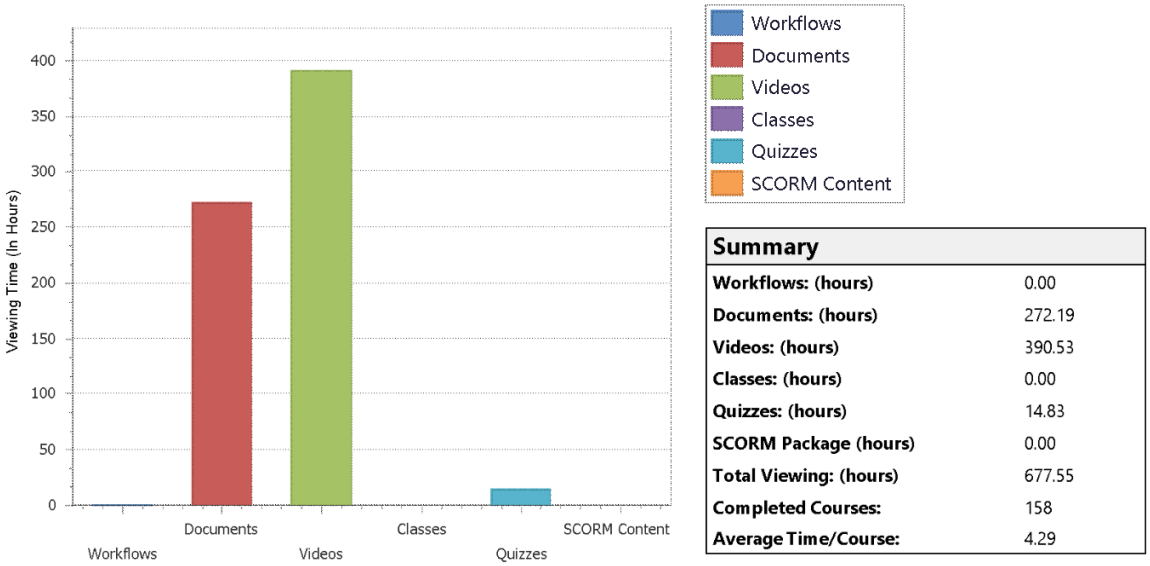
In the months spanning January 1st, 2021 to November 30th, 2021, Pinnacle had 343 unique users logged into the system and consumed a total of 2,987 individual assets and 1,223 learning path courses. The average time to consume individual content is approximately five minutes. Courses can vary in length and not all courses are completed, but reporting shows that users view 678 hours of content. This totals approximately 927 person hours of training in the eleven months of this year.

Learning Time

Amount of time users spent completing courses during the period.

Period: 1/1/2021 - 11/30/2021

Report Date/Time: 11/30/2021 10:33:31 AM



Summary	
Workflows: (hours)	0.00
Documents: (hours)	272.19
Videos: (hours)	390.53
Classes: (hours)	0.00
Quizzes: (hours)	14.83
SCORM Package (hours)	0.00
Total Viewing: (hours)	677.55
Completed Courses:	158
Average Time/Course:	4.29

Road Design Conference

For 29 years, CRAB staff has organized and facilitated the annual Road Design Conference. This conference has proved to be invaluable to the counties as an opportunity for training and for networking. These interactions provided the counties a face-to-face opportunity to meet their peers, share ideas and experiences. This event consistently provides designers, engineers, and surveyors of the 39 counties of Washington State with in-depth training and support sessions with state-of-the-art engineering design system software. Unfortunately, with the rising number of COVID-19 cases in December of 2020, CRAB decided to forego our March 2021 conference. CRAB felt it was prudent to maintain caution coming out of the winter season to avoid further spread of the virus. CRAB is however, currently in the process of planning the 2022 conference.

UAS Program

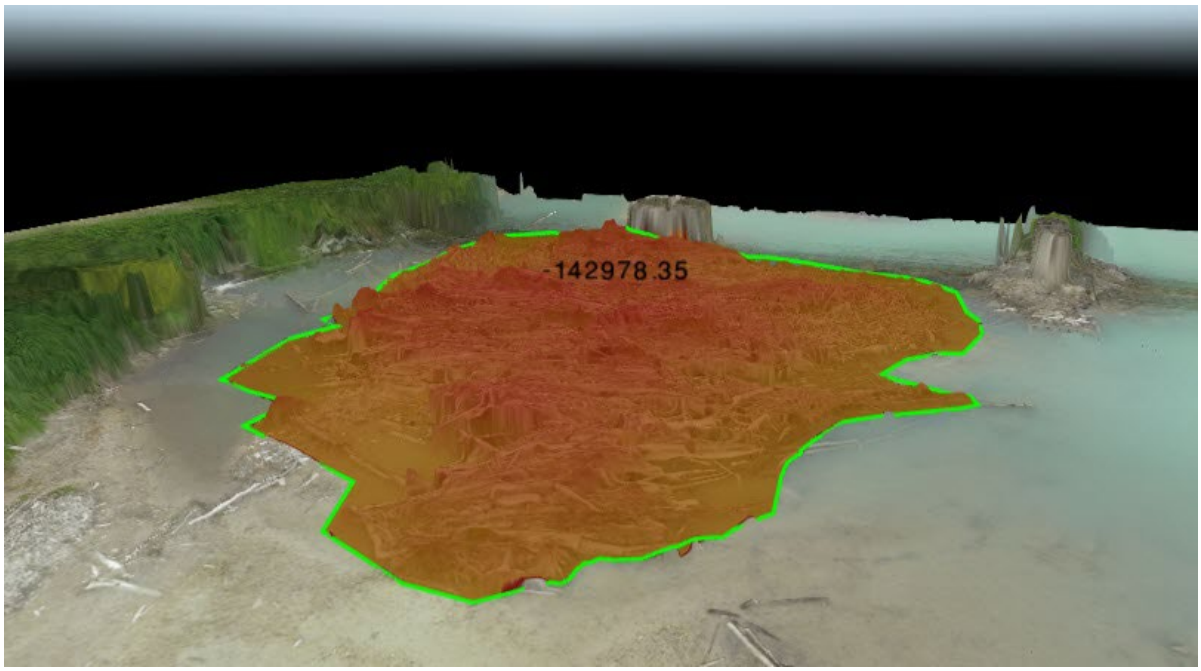
In April of 2021, the Federal Aviation Administration relaxed it rules regarding operations of Unmanned Aircraft Systems (UAS), aka drones, over people and moving vehicles. The changes in these rules have allowed for data collection over roadways without having to close roads. In September of 2020, CRAB flew several missions with Skagit county along a 1 mile stretch of Francis Rd. to collect topographic data of the roadway. This flight required us to temporarily close the road while the drone flew the mission. This exercise required four county staff, multiple county vehicles and signage to complete the flight. Following the rule change, we are able to accomplish the same mission with road warning signs, one remote pilot, one county staff and one vehicle. In addition to the reduced resources required, the public was not inconvenienced with a temporary road closure.

In September of 2021, CRAB flew another mission with Skagit County. This mission consisted of acquiring imagery of a debris pile that had formed at the base of several piers of a county owned bridge on the Skagit River. The purpose of this mission was to quantify the debris pile before the rainy season and compare it with a future flight next spring. The use of a drone in this instance exemplifies the cost savings and safety improvements for survey staff that the county would normally incur to quantify such a project.

Skagit County Project Location

Skagit River Train Trestle at SR9

Woody Debris Pile Quantity



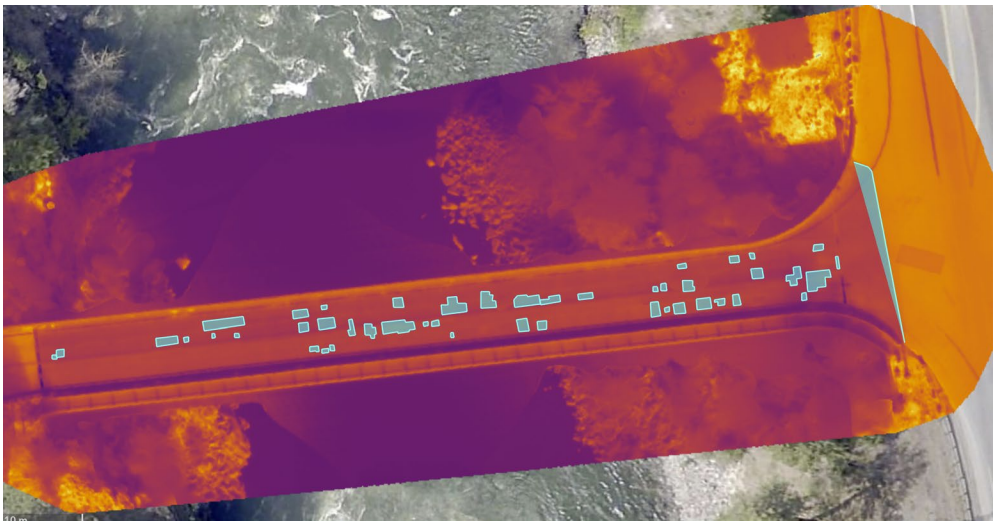
In October of 2021, CRAB began working with Spokane County on an initiative to collect thermal imagery of roadway bridges to identify concrete delamination in the bridge decks.

Chain Drag Inspection

Typically, in order to identify areas of hollow sounding delaminated concrete, a chain is dragged across the surface of the concrete. An inspector, who drags the chain, delineates these hollow areas to map out the limits of each delamination for future repairs. This practice is historically considered as the accepted practice for assessing the condition of concrete bridge decks without asphalt overlays.

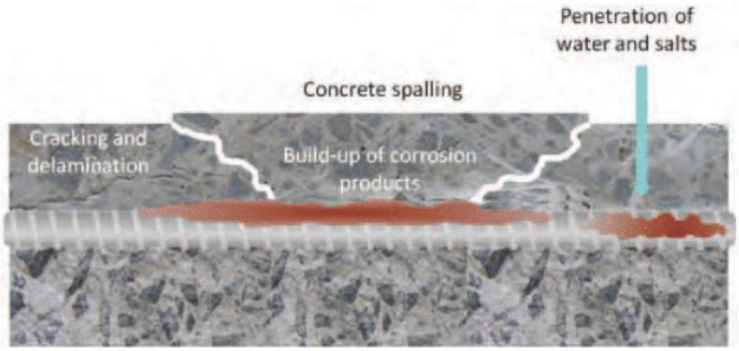
However, there are drawbacks to this traditional means of concrete evaluation. In the application of bridge deck evaluation, chain drag testing requires a lane closure and disruption of normal traffic patterns. Depending on the size of the deck and the number of inspectors performing chain drag, these closures could last for a significant amount of time. Lane closures are expensive and can cause major traffic delays as well as safety concerns for the crews in the work zone. There is also the question of the accuracy and repeatability of chain drag. This type of evaluation can be subjective based on the inspection teams experience.

Thermal Bridge Image Overlay



The image above shows one of the first thermal flights. The shaded shapes overlayed on the image represent the areas identified by the chain drag inspection.

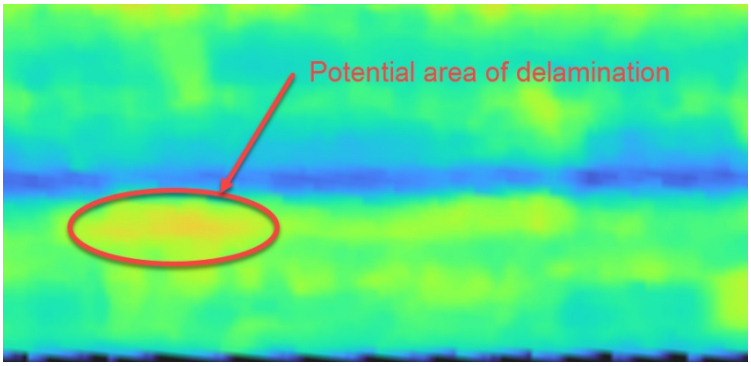
Corrosion Process



This image shows the corrosion process that can occur with these types of defects.

Bridge Deck Thermal Image

In thermal imagery, the defects in the deck have a temperature differential compared to the surrounding concrete and can show up as hot spots on the deck.



As CRAB progresses in this study in 2022, it hopes to prove that this method of collection will

- Provide cost savings
- Improve safety
- Reduce delays to the traveling public
- Be consistently repeatable
- Be objective and impartial.

INFORMATION SERVICES

Staff Update

Eric Hagenlock

Thank you and congratulations to Eric Hagenlock for taking on a different role within CRAB as the Data Quality Assurance & Analysis Manager under the Engineering Division. For sixteen years, Eric has served CRAB in many different roles in the Information Services Division. His latest role in the CRAB Information Division was as the Information Services Division Manager (IT Director). In that role, Eric led CRAB and the Information Services Division through changes in infrastructure, applications, implemented new technologies, trained, grew, and developed the current team in the Information Services Division. Eric also plays a vital role in developing and implementing existing applications that CRAB and the counties are currently using today. Those applications are CARS, RAP-Online, Mobility, and GIS-Mo.

Tommy Weed

Tommy Weed joined the CRAB family on September 27 as the new IT Director. Before joining CRAB, Tommy served as the Washington Traffic Safety Commission (WTSC) IT Director. As the IT Director at WTSC, Tommy helped the agency complete the IT modernization project that prepared the agency's IT infrastructure and environment to be fully agile for any future working conditions. Tommy has also worked for the State of Washington in multiple IT capacities, working for such agencies as the Department of Social and Health Services, the Department of Correction / Correctional Industries, and the Employment Security Department. Tommy holds an M.S. in Organizational Leadership from Southern New Hampshire University and a B.S. in Business in IT Management from Southern New Hampshire University.

Who is the Information Services Division?

The Information Services (IS) Division at CRAB is a team of Information Technology (IT) professionals dedicated to programs and initiatives at CRAB and in our counties, which protect and improve the public's investment in our transportation infrastructure.

Information Services Strategic Goal

The goal of CRAB's strategic plan for Information Services is to assist counties in developing uniform and efficient transportation-related IT resources by providing, developing, and supporting a full range of information tools and services for all aspects of transportation-related public works operations. This strategic goal has four objectives.

Objective One: *Ensure effective use of IT tools through developing or procuring appropriate applications and software and support and training.*

Objective Two*: Maintain a high level of professionalism in the use of IT in county road departments through training and support.*

Objective Three*: Enhance the effectiveness of county personnel in their projects and initiatives through IT consultation.*

Objective Four*: Promote cooperative communication, information exchange, and IT uniformity through conferences, workshops, and website activities.*

Reaching the Objective Goals

Mobility© Replacement

CRAB continues the effort to replace its flagship product, Mobility©, with a commercial-off-the-shelf (COTS) enterprise asset management system. The primary objectives of this project are to add geospatial data to the linear referencing system (LRS) used in Mobility©, add mobile data collection capabilities, and integrate efficiently with information systems outside of CRAB. Visualizing spatial data will become another tool for investigating budgets, funding, and where state and federal dollars are being utilized. It will provide access for all counties to web mapping, mobile mapping applications, and spatial editing for updating and maintaining the County Road Networks and road assets. CRAB is envisioning a future where all counties are able to utilize asset and maintenance management through GIS to make data-driven decisions and better serve the State of Washington and all of its counties.

> *"The application of GIS is limited only by the imagination of those who use it."*
>
> *~ Jack Dangermond, Esri.*

The decision to use COTS instead of the long-practiced in-house development was born from the desire to continue to offer state-of-the-art software applications with minimal increase to the IT budget, to keep pace with the rapidly advancing need of county staff, and to have systems

capable of managing the approximately $900 million spent on nearly 40,000 miles of county roads annually.

CRAB is continuing the transition from Mobility© in 2021. Over the past three years, CRAB developed a sustainable budget, worked with vendors to configure the COTS system to meet county needs, developed the migration routine from Mobility© to the new system, and accomplished the necessary train-the-trainer between the vendor and CRAB staff.

GIS-Mo Update

The GIS-Mo project team has worked diligently to deliver a state-of-the-art county road asset management system for the last three years. The project team has been commended at every step along the way for their dedication, responsiveness, expertise, and collaborative nature. CRAB staff delivered GIS-Mo training to 39 Washington State counties in 2020. In 2021 CRAB Staff continued to deliver the first phase of the GIS-Mo project to all 39 counties. Part of the first phase of delivery is the Soft-Launch of the GIS-Mo application. The Soft Launch provides all 39 counties and their staff access to VUEWorks, allowing counties to manage their assets inside GIS-MO. In the last quarter of 2021, we were successful with a few counties to go to the second part of the first phase delivery, the Full Launch of GIS-Mo. Full Launch has the capability of what's provided in the Soft Launch with the additional functions of adding work orders and reports to the VUEWorks site, which allows the counties to document and view event changes. The Full Launch will enable counties to do audit trails in GIS-Mo. This is a great accomplishment for the IS team and CRAB with the circumstances still imposed by the COVID-19 pandemic.

GIS-Mo OCIO Oversight Update

In October of 2021, we successfully passed the State of Washington Office of Chief Information Officer (OCIO), oversight of the GIS-Mo Project. The OCIO project oversight insured and progressed the project to follow the guidelines of RCW 43.105.245 and RCW 43.105.255. This major accomplishment is a significant success and speaks strongly to the GIS-Mo project moving forward positively in the correct directions.

Training

As the state of Washington and all of its counties continue to move forward from the COVID-19 pandemic, CRAB has continued evolving on how we deliver training and support. CRAB's preference has always been face-to-face interaction, which isn't possible in our current operational environment. CRAB quickly adapted by procuring the remote meeting platform Zoom in 2020 and later procured the state M365 G5 licenses that provide Microsoft Teams as an additional video conferencing platform. In 2020 CRAB staff quickly reconfigured the training curriculum to fit the current operational environment. In 2021 progress to further develop our training catalog to support online and face-to-face learning is continuously developing. The goal is to support the flexibility to provide training to our customers either remotely or in person. We saw the quick response in reconfiguring the training curriculum last year. CRAB successfully trained all 39 counties in the new GIS-Mo platform before rollout in 2021. We are taking the same approach on future GIS-Mo training for Soft and Full Launches into 2022. Full Launch training with some counties has begun in the fourth quarter of 2021. Mike Clark, Road System Inventory Manager, has started the scheduling process with each county to train remotely.

Learning Management Systems (LMS)

Brian Bailey, CRAB Design Systems and UAS Programs Manager, implemented the Learning Management System (LMS) last year in 2020. In 2021 we continued to add to the LMS learning catalog to allow CRAB to be more flexible in its learning environment provided to our customers in the counties. It will maintain the trainee's skills gained in their training or reinforce skills learned in a classroom environment, virtually or in person.

Register for Training on the CRAB website

As part of the continuous improvement and updates of our CRAB website, we upgraded our website to register for upcoming CRAB engineer training. The ability lets us register students on the web, and we can also see how many seats are available for each training and how many are waiting on the waiting list.

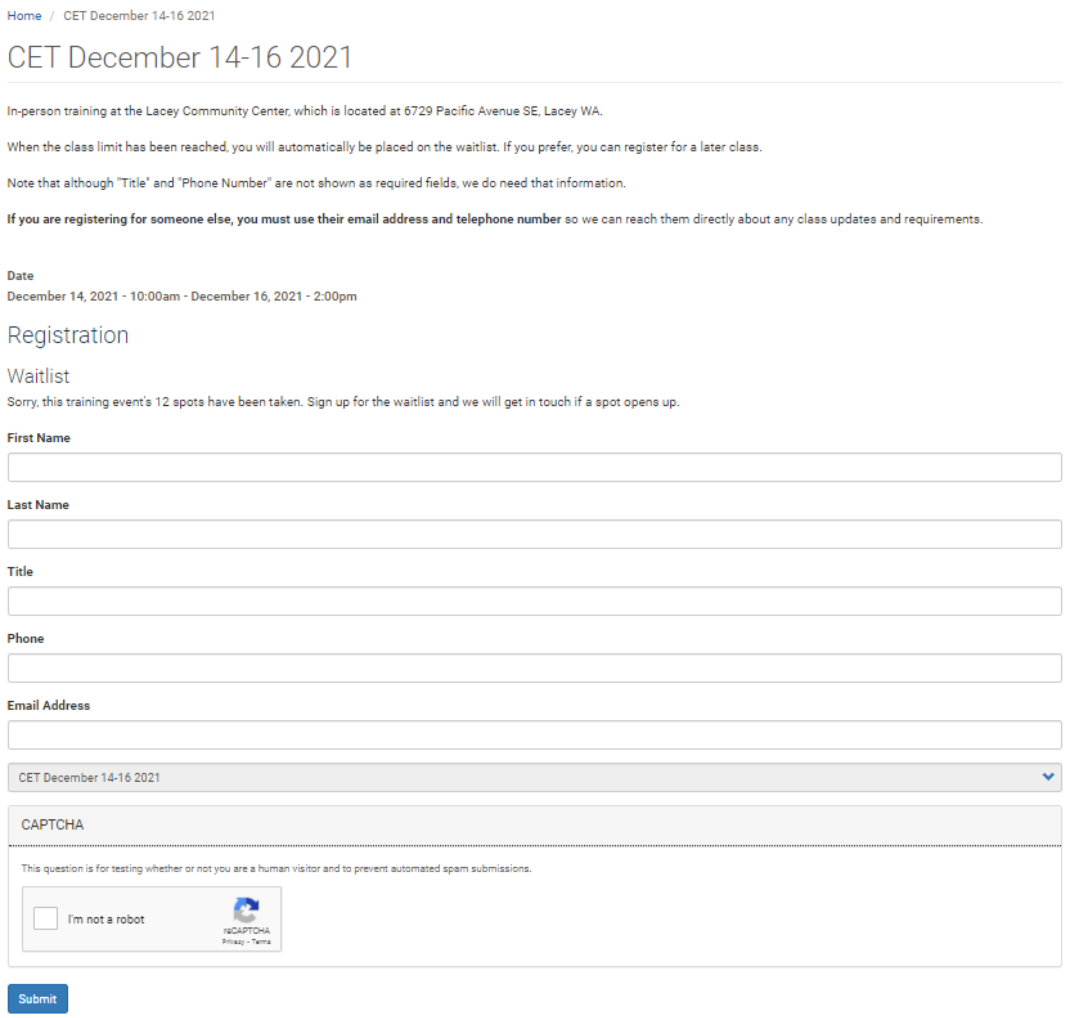
Link to training - https://www.crab.wa.gov/engineering/resources/county-engineer-training

Registration

To register, click on the desired class below.

County Engineer Training Schedule

Class	Date	Location	Max Nbr Participants	Number Registered	Number Waitlisted
CET December 7-9, 2021	07 December - 09 December 2021	Lacey Community Center	12	12	1
CET December 14-16 2021	14 December - 16 December 2021	Lacey Community Center	12	12	1
CET February 2022	08 February - 10 February 2022	CRAB Board Room	12	11	0
CET May 2022	03 May - 05 May 2022	CRAB Board Room	12	11	0



Home / CET December 14-16 2021

CET December 14-16 2021

In-person training at the Lacey Community Center, which is located at 6729 Pacific Avenue SE, Lacey WA.

When the class limit has been reached, you will automatically be placed on the waitlist. If you prefer, you can register for a later class.

Note that although "Title" and "Phone Number" are not shown as required fields, we do need that information.

If you are registering for someone else, you must use their email address and telephone number so we can reach them directly about any class updates and requirements.

Date
December 14, 2021 - 10:00am - December 16, 2021 - 2:00pm

Registration

Waitlist

Sorry, this training event's 12 spots have been taken. Sign up for the waitlist and we will get in touch if a spot opens up.

First Name

Last Name

Title

Phone

Email Address

CET December 14-16 2021

CAPTCHA

This question is for testing whether or not you are a human visitor and to prevent automated spam submissions.

I'm not a robot

reCAPTCHA
Privacy - Terms

Submit

WaTech Share Tenant

The second quarter of 2020 was a significant change to CRAB IT infrastructure. CRAB completed the move to the WaTech Share Tenant. This move allowed CRAB IT to be part of the rest of the state agencies (State Government Network) IT domain and start taking advantage that strengthens CRAB IT infrastructure such as Security.

M365

As the CRAB IT infrastructure was moved to the State Government Network, CRAB also moved all Microsoft applications to Microsoft M365 G5. With the move to Microsoft M365 G5, CRAB staff is given applications that are entirely cloud base and better security of CRAB data. M365 G5 provides added security support, software licensing of Microsoft Products, training on Microsoft products, and better flexibility to adapt to the current work environment presented during the pandemic. With the use of TEAMS, CRAB staff can work outside the office to keep the mission of CRAB moving forward. All of this is made possible through contractual agreements made with WaTech and Microsoft for a small agency as CRAB to afford an application that can positively impact how CRAB works day in and day out.

Telephony Upgrade

One of the perks of being part of the State Government Network and Microsoft 365 is upgrading our telephone systems to be integrated with Microsoft Team. The upgrade converted our office landline phone into a virtual line that works internally to our Microsoft Team application. This upgrade was another evolution of adapting to the current work environment under the pandemic. The upgrade will also provide us 65% per line saving for CRAB.

Cloud Migration

One of CRAB's IT most significant improvements in 2020 is completing and implementing the cloud migration to WaTech Cloud. The cloud migration set the foundation of CRAB IT infrastructure future and provide the flexibility of growth for our internal IT environment and our external facing clients such as those counties personnel who uses GIS-Mo.

Other Resource for Training and Support

CRAB has several resources for training and support available to Agency IT stakeholders. Formal training is typically offered several times a year at the CRAB offices and remote facilities.
CRAB also performs support through email and phone, facilitated by the Agency helpdesk system, CRAB-NET.

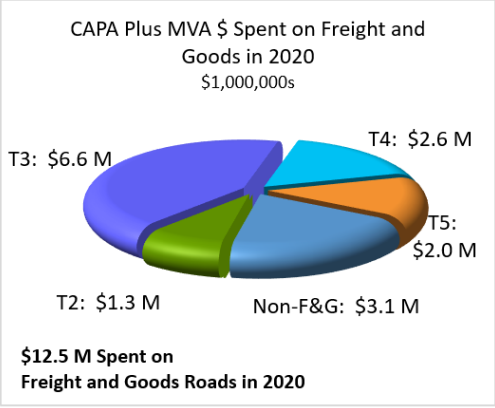
GRANT PROGRAMS

County Arterial Preservation Program (CAPP) and Rural Arterial Program (RAP)

The County Road Administration Board managed the **County Arterial Preservation Program,** and the **Rural Arterial Program** in 2020, helping Washington State counties maintain and improve the conditions of their arterial roads. The counties used $38.2 Million of these program funds for road, bridge, and drainage improvements where they were most needed. CAPP funds are distributed directly to counties each month after fuel tax revenue is deposited, allowing them to give continuous attention to their ongoing pavement preservation needs. RAP funds, however, are awarded to specific projects based on competitive rating criteria within each of the five RAP regions. RAP funding requires significant program and budgeting management by CRAB as it oversees project application, priority ranking, funding allocation and spending of Rural Arterial Trust Account (RATA) funds over a two-year biennial cycle.

County Arterial Preservation Program – CAPP

Washington state counties used $15.7 Million in County Arterial Preservation Account (CAPA) funds, Motor Vehicle Account (MVA) funds, and Transportation Partnership Account (TPA) funds in 2020 to do pavement preservation work. This amount was approximately 25% of the overall statewide cost borne by the counties to do all pavement preservation that was needed. As CAPA funds can only be applied on paved arterial roads, the counties regularly monitor their surface/structural condition to determine which roads have the greatest needs. As the chart below demonstrates, 80% of the CAPP, MVA, and TPA funds spent in 2020 were applied to county Freight and Goods routes. Making sure the surfaces of truck routes are repaired regularly, prevents major failures that would be much more expensive to repair later.



Freight and Goods Routes Tonnage Designations:

T-2: 4 million to 10 million tons per year
T-3: 300,000 to 4 million tons per year
T-4: 100,000 to 300,000 tons per year
T-5: at least 20,000 tons in 60 days and less than 100,000 tons per year

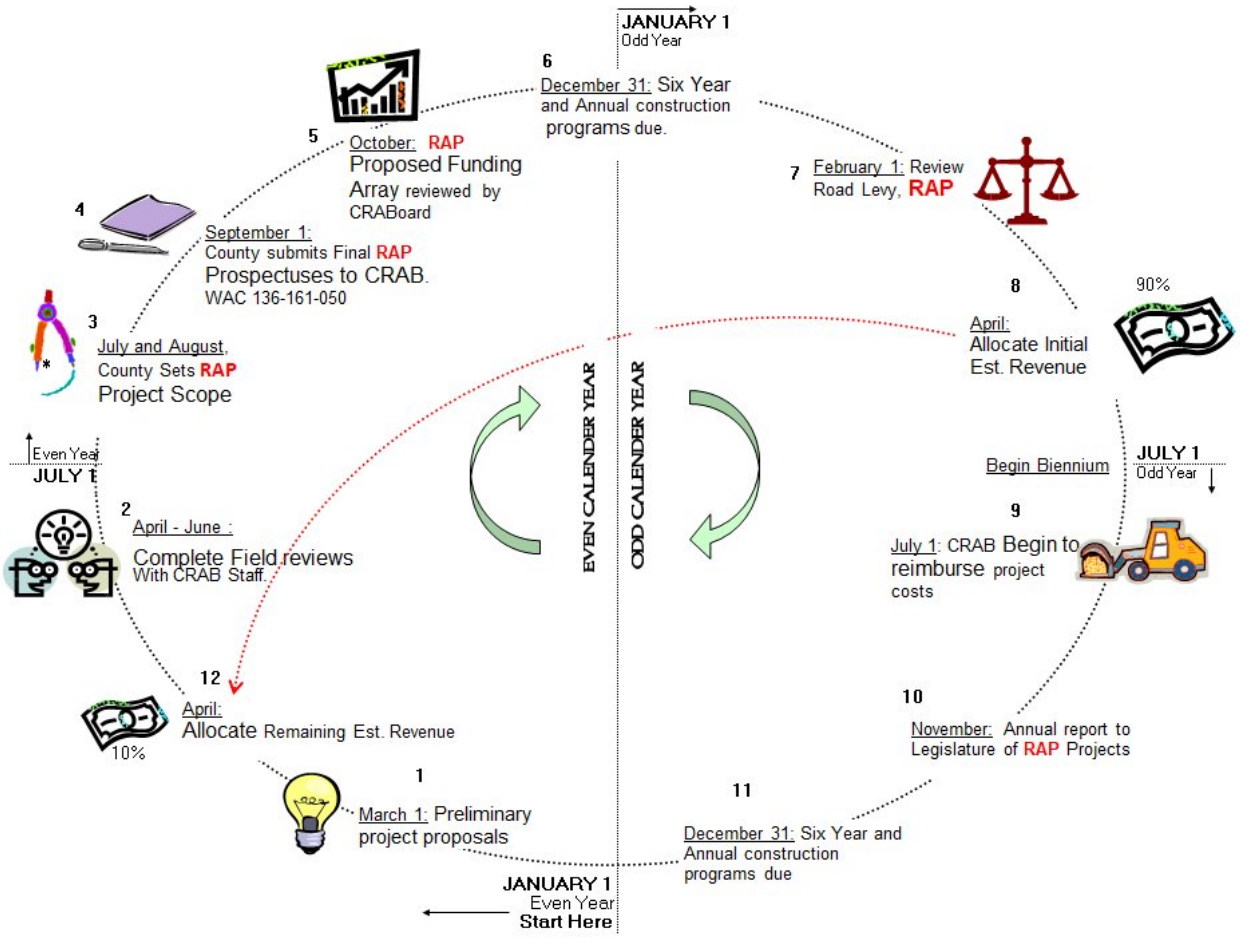
Rural Arterial Program - RAP

Some county arterial roads suffer under aggressive types of failure due to heavy trucks and increased traffic volumes when there is local growth in industry and population. These roads may require a more comprehensive approach to improvement than pavement preservation, especially when they also have width, alignment, and safety problems. Fortunately, the Rural Arterial Program provides funding to help counties address these same width, alignment, safety, and structural deficiencies (RAP - RCW 36.79.080). The counties used $22.5 million of these funds in 2020 (see table C) to improve haul and traffic capacity, and safety.

RURAL ARTERIAL PROGRAM EXPENDITURES BY COUNTY AND LEGISLATIVE DISTRICT IN 2020

COUNTY	LEG DIST	RATA $'S RECEIVED	COUNTY	LEG DIST	RATA $'S RECEIVED
Adams	9	21,530	Lincoln	7	-
Asotin	9	79,736	Lincoln	13	842,425
Benton	8	13,502	Mason	36	42,030
Benton	16	-	Okanogan	7	631,996
Chelan	12	2,466,221	Okanogan	12	685,569
Clallam	24	97,158	Pacific	19	31,821
Clark	18	1,777,005	Pend Oreille	7	580,628
Clark	20	89,456	Pierce	2	185,197
Columbia	16	709,590	Pierce	26	174,616
Cowlitz	19	580,676	Pierce	31	29,675
Cowlitz	20	40,607	San Juan	40	29,065
Douglas	12	1,530,240	Skagit	10	-
Ferry	7	293,247	Skagit	39	-
Franklin	9	10,738	Skagit	40	36,630
Franklin	16	11,960	Skamania	14	-
Garfield	9	1,336,533	Snohomish	39	437,158
Grant	13	-	Spokane	4	2,195,585
Grays Harbor	19	586,369	Spokane	7	12,980
Grays Harbor	24	-	Stevens	7	4,771
Island	10	(203,501)	Thurston	2	27,255
Jefferson	24	473,648	Thurston	35	-
King	5	315,350	Wahkiakum	19	-
King	45	343,469	Walla Walla	16	35,918
Kitsap	35	139,817	Whatcom	42	1,850,905
Kittitas	13	36,602	Whitman	9	2,172,470
Klickitat	14	1,117,350	Yakima	14	105,420
Lewis	20	535,384	Yakima	15	32,501
					22,547,301

RURAL ARTERIAL PROGRAM
BIENNIUM CYCLE



History of RATA Funds per County from 1984 through 2020:

REGION	COUNTY	TOTAL RATA APPROVED	TOTAL RATA SPENT	% SPENT	MILES BUILT
NE	Adams	25,436,684	$ 20,159,129	79%	104
NE	Chelan	30,837,900	$ 27,252,788	88%	57
NE	Douglas	28,142,035	$ 26,922,254	96%	59
NE	Ferry	29,008,330	$ 17,116,523	59%	65
NE	Grant	34,190,468	$ 29,884,948	87%	184
NE	Lincoln	32,734,139	$ 27,230,248	83%	124
NE	Okanogan	27,295,082	$ 19,760,964	72%	57
NE	Pend Oreille	17,669,478	$ 15,914,844	90%	80
NE	Spokane	39,093,008	$ 31,872,319	82%	55
NE	Stevens	30,955,588	$ 26,634,390	86%	118
NE	Whitman	34,670,512	$ 24,326,196	70%	104
NE REGION TOTALS		$ 330,033,224	$ 267,074,605		1,008
NW	Clallam	11,778,076	10,372,922	88%	16
NW	Island	15,351,700	12,647,983	82%	22
NW	Jefferson	7,883,740	6,864,566	87%	16
NW	Kitsap	15,426,520	11,836,628	77%	30
NW	San Juan	10,882,508	8,524,517	78%	20
NW	Skagit	12,632,654	8,162,274	65%	21
NW	Whatcom	14,812,282	13,921,861	94%	38
NW REGION TOTALS		$ 88,767,480	$ 72,330,752		162
PS	King	18,734,725	15,007,206	80%	27
PS	Pierce	17,957,466	14,952,159	83%	29
PS	Snohomish	17,580,811	14,251,439	81%	21
PS REGION TOTALS		$ 54,273,002	$ 44,210,804		77
SE	Asotin	13,218,129	11,044,118	84%	27
SE	Benton	21,076,053	18,604,223	88%	56
SE	Columbia	18,412,671	13,049,531	71%	44
SE	Franklin	14,761,986	13,989,150	95%	43
SE	Garfield	17,392,743	14,878,296	86%	47
SE	Kittitas	19,017,355	18,021,971	95%	33
SE	Klickitat	25,416,853	19,288,032	76%	86
SE	Walla Walla	22,097,252	16,018,616	72%	37
SE	Yakima	29,887,791	21,731,844	73%	51
SE REGION TOTALS		$ 181,280,833	$ 146,625,781		425
SW	Clark	14,913,718	12,380,391	83%	16
SW	Cowlitz	16,253,163	12,886,771	79%	28
SW	Grays Harbor	16,674,835	14,452,330	87%	20
SW	Lewis	13,340,905	11,799,829	88%	28
SW	Mason	14,170,453	11,712,277	83%	39
SW	Pacific	13,225,074	10,401,714	79%	55
SW	Skamania	4,279,868	2,970,885	69%	16
SW	Thurston	17,842,825	14,060,271	79%	34
SW	Wahkiakum	8,566,126	5,131,412	60%	38
SW REGION TOTALS		$ 119,266,967	$ 95,795,882		273
STATEWIDE TOTAL		$ 773,621,506	$ 626,037,823	81%	1,945

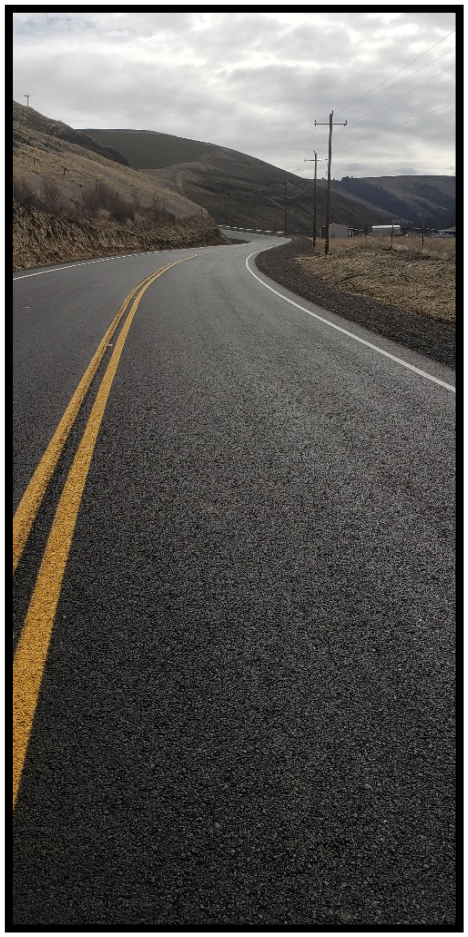
2020 – 2021 Grant Program Projects

Columbia County upgrades 1.64 miles of South Touchet Road:

South Touchet Road serves as a collector for the county with access to forest service and tribal lands. The road is a key route for the delivery of agriculture and logging products to market in addition to the movement of agriculture machinery and access to permanent residents within the S. Touchet River basin.

Total Cost: $1,930,078
RATA Funds: $1,350,000
Local Funds: $ 580,078

Contractor: Barker, Inc.



The existing road was narrow with severe distresses throughout. Two main intersections were reconfigured to assist with the movement of goods and people and improve safety throughout this section of the corridor.

The road was widened to county standard, improved horizontally and vertically to current design standards, added mailbox pullout, signing and guardrail to improve safety.

Franklin County replaces Taylor Flats Bridge #903

Taylor Flats Road is a major arterial two-lane road linking the northwestern region of Franklin County directly to Interstate-182. It provides an alternate route between SR-24 (Othello) to the I-182 urban growth area (Pasco/Richland/Kennewick) . Taylor Flats carries the highest volume of traffic in the County's unincorporated roadway system with more than 6,000 vehicles (16% truck traffic). Taylor Flats Bridge's width was 24 feet and too narrow for this level of traffic, rendering the structure functionally obsolete.

Total Cost: $1,285,619
Fed Funds: $ 993,909
RATA Funds: $ 117,800
Local Funds:$ 173,910

Contractor: Rotschy, Inc

The deficient bridge was replaced with an 80-foot-long single span concrete girder bridge. The new bridge is now 40' wide, allowing a safer crossing. Positive community feedback has been received from the time it was opened to the public.

Kittitas County replaces Manastash Road Bridge

Manastash Road provides a regionally significant east-west connection through lower Kittitas County, providing access to logging (both on DNR lands and large private parcels), recreation (USFS lands), ranching and farming areas, and rural residences. The bridge on Manastash Road was narrower than the adjacent roadway and was showing deterioration to a degree that the County restricted bridge traffic.

The new bridge is a larger structure, matching the prevailing roadway width. The replacement bridge is on a slightly different alignment than the original bridge, which allowed Kittitas County to construct the new bridge adjacent to the old bridge.

Total Cost: $2,547,335
Fed Funds: $1,917,107
RATA Funds: $566,970
Local Funds: $63,258
Contractor: Belsaas & Smith Construction

Lewis County reconstructs North Fork Road

North Fork Road is a Minor Collector that makes an east-west connection between two Major Collector routes (Jackson Hwy & Centralia Alpha Rd). It also serves as a large portion of the travel route to Thousand Trails - Chehalis RV & Camping Resort. Chehalis RV & Camping Resort is a 315-site campground in rural Lewis County and attracts thousands of visitors each year.

Total Cost: $3,301,533
RATA Funds: $2,600,000
Local Funds: $ 701,533
Contractor: Sterling Breen Crushing, Inc.

The necessary right of way was acquired, and the roadway was reconstructed to a width of 30' with recoverable slopes. Eight horizontal curve alignments were improved to current design standards, accommodations for storm water were constructed, and safety measures such as guardrail and flexible guideposts were installed.

Lincoln County repairs another section of Old Coulee Road

Old Coulee Road serves as a farm to market route between Grand Coulee and Almira. This is the second segment of Old Coulee Road to be reconstructed in the last five years. Multiple deficiencies along this section of road were in dire need of repairs and improvements. The surfacing showed signs of rutting, cracking, and multiple patches. Several vertical curves needed adjustments for safety and sight distance.

The work involves complete reconstruction of the roadway structural section and including multiple new culverts and drainage structures for more efficient drainage facilities. The widened roadway and new backslopes allow for easier agricultural efforts for neighboring landowners as well as an improved travelling surface.

Project Cost: $2,259,025
RATA Funds: $2,025,000
Local Funds: $234,025
Contractor: HLT Construction, Inc.
(earthwork, drainage, subgrade, crushed surfacing);
County Forces
(surfacing, BST, construction signing)

Mason County upgrades 1.23 miles of Matlock Brady Road

Matlock Brady road is the main east-to-west route on the south end of Mason County, and is a major haul route for timber and gravel supply companies in the area.

The road had several substandard horizontal and vertical curves, and was too narrow for the volume of traffic.

The project widened the roadway, providing improved horizontal and vertical curves, along with additional safety improvements befitting the 50 MPH standard, as well as constructing proper stormwater drainage facilities.

Total Cost: $2,000,000
RATA Funds: $1,125,000
Local Funds: $875,000

Contractor: Rognlin's, Inc

Mason County replaces Highland Road Culvert

West Highland Road is a major collector in Mason County, carrying traffic to and from Panhandle Lake youth camp, as well as connecting other routes in southern Mason County.

An unnamed tributary of Goldsborough Creek crossed W. Highland Road in an undersized culvert causing fish blockage and erosion issues.

This project installed a larger culvert to handle storm flows and allow fish passage for access to the significant upstream reach.

Total Cost: $380,000
RATA Funds: $324,000
Local Funds:$ 56,000

Contractor: Conway Construction Co.

Okanogan County resurfaces 1.31 miles of Highway 7

Highway 7, a rural major collector, is the main access for a vast agricultural area north and west of Tonasket, serving many residents, ranches, and orchards.

The roadway was exhibiting signs of distress consistent with age, use, and harsh weather. Many years and layers of BST had resulted in an uneven surface with poor ride quality. The width was also substandard, with no paved shoulders.

With a new leveling course and wearing course of HMA, the contractor was able to correct many of the surface and cross slope deficiencies, resulting in a much better ride quality. The project also added 2' of paved width, providing 11' lanes and 3' shoulders. We received many thank-you's from the public for the improvements.

Total Cost: $1,043,649
Fed Funds: $ 444,643
RATA Funds: $ 540,000
Local Funds: $ 59,005

Contractor: Selland Construction Inc.

Pierce County continues improvements along Olson Drive

Olson Drive is the primary crossroads in the Key Center Rural Activity Center. The center was established in the 1930's by the A.E. Visell Lumber Company, the C.D. Hipp Grocery Store, and Gene Brown's Garage.

Lane widths were too narrow, access to businesses in the rural center was uncontrolled, and surface water drainage was inadequate. These conditions, along with a lack of paved shoulder, posed a risk of raveling the asphalt edge over time.

This project extended improvements from a previous RATA funded project at the intersection of Olson Drive and Key Peninsula Highway. The project has provided defined access points with adequate shoulders, sidewalks, and appropriate drainage features. The public has responded positively to the project via social media, quotes include: "It will be good to give them [Key Center Patrons] a safer place to walk than on the road shoulder"; "Yaay! Much needed improvement for Key Center"; "I think it's great"; and "Fabulous!"

Total Cost: $462,064
RATA Funds: $277,600
Local Funds: $184,464

Contractor: Rodarte Construction

Spokane County reconstructs phase 4 Bigelow Gulch Road

Bigelow Gulch Road is a very important rural minor arterial and is a priority freight route that carries 14,899 ADT and is an important connector link between the Spokane Valley and the North Spokane area.

This road had a level of service of E or F, substandard grades and inadequate sight distances making it a difficult road to travel. The road was considered inadequate for the current and projected vehicles per day with its narrow lanes.

The road has been significantly upgraded to 4 lanes with 8' wide shoulders, provides appropriate clear zone recovery, and substantial structural improvements to the road making this road much safer for the traveling public and priority freight that travels daily on this route.

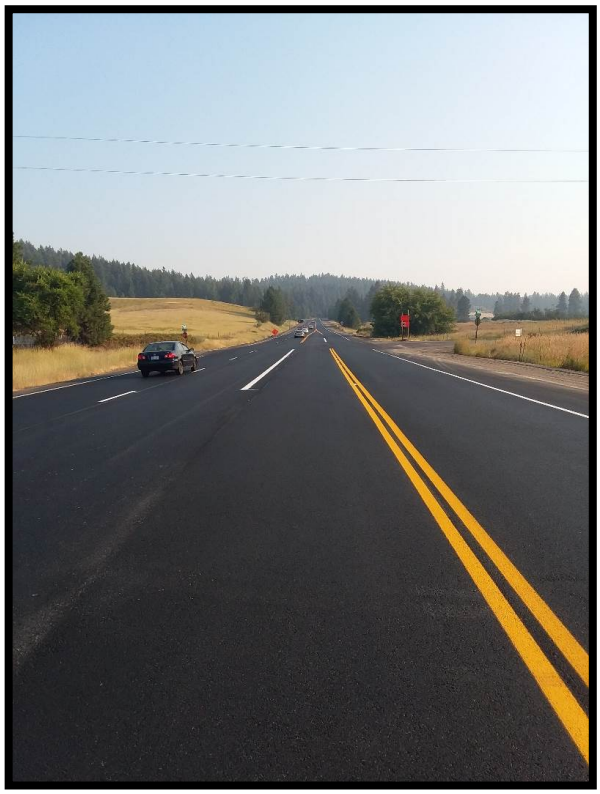
Total Cost: $18,512,869
Fed Funds: $ 7,265,277
RATA Funds: $ 5,987,480
Local Funds: $ 3,260,112
Other Funds: $ 2,000,000

Contractor: Halme Construction

Spokane County resurfaces another phase of Argonne Road

The Argonne Road/Bruce Road Corridor is a regionally significant arterial roadway from the urban area of the City of Spokane Valley to northern rural Spokane County, terminating in the Green Bluff Community. The corridor has an ADT of 8,807 and serves a multitude of users including agricultural, commercial, industrial, commuter and recreational.

A visual survey was conducted in July of 2012 and showed a moderate quantity of medium severity longitudinal cracking, medium to high severity transverse cracking, and a slight amount of low and high alligator cracking. Improvements have been needed to ensure a smooth, predictable, and safe route for all users of this roadway.



The paving preservation project constructed was a 4" grind and inlay of the two 12' travel lanes and 1' shoulder. Argonne Road is now a smooth, predictable, and safe route to travel for all users of this roadway.

Total Cost: $603,168
RATA Funds: $542,851
Local Funds: $ 60,317

Contractor: Poe Asphalt Paving Inc.

Yakima County reconstructs 1.46 miles of Summitview Road

Summitview Road is a freight route for the fruit industry. The roadway was too narrow causing conflicts between large fruit trucks and workers commuting to warehouses.

This project widened Summitview Road from 20 feet with little to no shoulders, to a 40 foot roadway with 12 foot lanes and 8 foot shoulders. Horizontal and vertical alignment improvements were also incorporated. Structural improvements were also made.

This was imperative due to the type and volume of traffic on this road. Summitview Road is a Rural Major Collector, Class 3 (T-3) truck route with an ADT of 4,900.

Total Cost: $3,322,505
RATA Funds: $2,978,143
Local Funds:$ 344,362

Contractor: Selland Construction

TABLES

Table A

COUNTY BRIDGE DATA - DECEMBER 2021

Washington State Bridge Inventory System

Structures Greater than 20.0 Feet in Length or
Culverts Greater than 20.0 Feet in Width

COUNTY	County Owned Bridges	Good Condition		Fair Condition		Poor Condition		Structurally Deficient Bridges
		#	Deck Area (sf)	#	Deck Area (sf)	#	Deck Area (sf)	
ADAMS	111	35	71,528	75	104,667	1	560	1
ASOTIN	18	11	37,557	6	8,411	1	480	1
BENTON	50	37	91,990	13	14,707	0	0	0
CHELAN	53	33	74,849	19	107,142	1	11,820	2
CLALLAM	31	20	102,537	8	38,813	3	4,418	3
CLARK	58	31	128,783	27	62,618	0	0	2
COLUMBIA	62	25	46,010	32	50,615	5	9,255	6
COWLITZ	65	24	85,157	38	139,954	3	15,130	5
DOUGLAS	20	10	56,496	7	13,243	3	1,924	3
FERRY	23	10	9,101	11	26,855	2	2,314	2
FRANKLIN	83	64	108,850	16	23,515	3	4,421	9
GARFIELD	34	14	14,109	18	18,539	2	2,409	2
GRANT	195	135	286,422	58	107,331	2	6,060	2
GRAYS HARBOR	181	102	275,147	62	280,201	17	32,322	17
ISLAND	0	0	0	0	0	0	0	0
JEFFERSON	34	18	68,156	16	28,578	0	0	1
KING	138	51	284,666	75	358,055	12	25,742	22
KITSAP	41	35	93,981	6	19,991	0	0	0
KITTITAS	113	43	82,333	61	144,215	9	7,955	10
KLICKITAT	58	7	10,341	50	124,574	1	1,166	1
LEWIS	203	131	296,152	71	205,639	1	644	1
LINCOLN	125	81	137,041	36	43,615	8	6,537	9
MASON	54	31	80,438	21	49,082	2	40,332	2
OKANOGAN	52	25	44,788	25	91,829	2	4,700	2
PACIFIC	63	41	113,137	20	61,715	2	2,320	3
PEND OREILLE	30	22	38,326	5	100,784	3	1,490	3
PIERCE	104	66	280,981	36	107,513	2	53,850	3
SAN JUAN	4	2	3,517	2	1,140	0	0	0
SKAGIT	109	26	94,538	79	255,206	4	12,384	5
SKAMANIA	25	19	58,893	6	40,947	0	0	0
SNOHOMISH	170	72	353,120	94	434,674	4	11,994	4
SPOKANE	108	59	250,363	40	124,785	9	39,407	9
STEVENS	48	17	55,724	24	44,326	7	9,499	8
THURSTON	103	65	218,727	38	129,662	0	0	0
WAHKIAKUM	20	14	37,533	6	17,377	0	0	1
WALLA WALLA	106	74	218,074	19	36,419	13	21,545	20
WHATCOM	135	45	111,603	83	191,247	7	28,082	9
WHITMAN	250	132	240,723	117	175,235	1	1,708	1
YAKIMA	310	203	445,710	93	255,099	14	23,992	33
TOTAL	3,387	1,830	5,007,401	1,413	4,038,318	144	384,460	202

Bridge condition is determined by taking the lowest rating of four core elements of a bridge:

Core Element #1 - Substructure
Core Element #2 - Superstructure
Core Element #3 - Deck
Core Element #4 - Culvert

The four core elements are rated on a scale of 9 (Excellent) to 0 (Out of service - Beyond corrective action):

Condition Rating 9 (Excellent) to 7 (Good) - "Good" Condition
Condition Rating 6 (Satisfactory) to 5 (Fair) - "Fair" Condition
Condition Rating 4 (Poor) to 0 (Failed) - "Poor" Condition

Table B

ACTUAL COUNTY ROAD RELATED REVENUES
2020

(thousands of dollars)

COUNTY	MOTOR VEHICLE FUEL TAX					TAXES				MISC			TOTAL
	COUNTY REGULAR	TIB	RAP	CAPP	MVFT TOTAL	PROP-ERTY	TIMBER EXCISE	OTHER TAXES	TOTAL TAXES	FED GRANTS	FED LANDS	OTHER	
ADAMS	4,185	0	22	698	4,905	2,034	0	16	2,050	3,371	0	206	10,532
ASOTIN	1,518	0	80	130	1,728	1,409	2	4	1,415	383	35	544	4,105
BENTON	3,175	0	14	379	3,568	6,848	0	123	6,971	108	0	1,153	11,800
CHELAN	2,118	30	2,466	302	4,916	8,590	0	0	8,590	5,748	461	4,493	24,208
CLALLAM	2,026	0	97	173	2,296	7,654	218	28	7,900	514	347	3,479	14,536
CLARK	5,890	1,521	1,866	569	9,846	38,550	110	18	38,678	11,685	24	13,107	73,340
COLUMBIA	1,454	0	710	181	2,345	1,622	0	3	1,625	197	68	805	5,040
COWLITZ	1,998	0	621	283	2,902	10,129	918	125	11,172	2,309	51	3,784	20,218
DOUGLAS	3,773	485	1,530	384	6,172	6,667	0	35	6,702	943	0	762	14,579
FERRY	1,767	0	293	584	2,644	960	23	1	984	801	354	27	4,810
FRANKLIN	2,834	0	23	438	3,295	1,954	0	28	1,982	539	106	881	6,803
GARFIELD	1,354	0	1,337	161	2,852	814	0	3	817	64	51	130	3,914
GRANT	6,457	0	0	1,067	7,524	9,947	0	222	10,169	18	428	1,906	20,045
GRAYS HARBOR	2,317	0	586	332	3,235	6,345	1,056	39	7,440	997	142	2,509	14,323
ISLAND	2,126	0	(204)	276	2,198	9,180	5	4	9,189	1,781	0	6,674	19,842
JEFFERSON	1,399	0	474	167	2,040	3,909	173	10	4,092	333	405	1,152	8,022
KING	10,996	0	659	601	12,256	92,435	246	34	92,715	1,632	128	24,033	130,764
KITSAP	5,411	404	140	398	6,353	25,850	85	79	26,014	564	0	3,796	36,727
KITTITAS	2,051	0	37	393	2,481	6,137	0	12	6,149	549	258	952	10,389
KLICKITAT	2,700	0	1,117	470	4,287	4,839	339	19	5,197	14	82	79	9,659
LEWIS	3,181	99	535	367	4,182	13,857	2,000	25	15,882	3,695	675	5,393	29,827
LINCOLN	4,073	0	842	495	5,410	1,794	0	7	1,801	313	5	391	7,920
MASON	2,076	0	42	337	2,455	9,018	366	34	9,418	581	123	2,423	15,000
OKANOGAN	3,404	19	1,318	536	5,277	4,671	31	11	4,713	1,670	696	332	12,688
PACIFIC	1,400	0	32	823	2,255	3,171	890	29	4,090	740	13	980	8,078
PEND OREILLE	1,617	0	581	337	2,535	2,134	134	1	2,269	178	296	1,395	6,673
PIERCE	11,143	2,459	389	922	14,913	60,713	241	42	60,996	4,940	138	30,784	111,771
SAN JUAN	782	0	29	113	924	4,471	1	5	4,477	452	0	3,039	8,892
SKAGIT	3,280	0	37	457	3,774	14,855	366	62	15,283	887	321	3,446	23,711
SKAMANIA	812	0	0	459	1,271	1,931	219	6	2,156	25	2	172	3,626
SNOHOMISH	8,674	1,610	437	673	11,394	67,635	293	535	68,463	5,803	0	20,295	105,955
SPOKANE	8,099	538	2,209	943	11,789	29,508	0	0	29,508	9,218	8	3,096	53,619
STEVENS	3,527	0	5	599	4,131	5,771	324	4	6,099	3,152	132	467	13,981
THURSTON	4,871	1,535	27	449	6,882	19,073	194	7	19,274	3,818	150	6,968	37,092
WAHKIAKUM	834	0	0	139	973	359	95	1	455	0	2	788	2,218
WALLA WALLA	2,748	1	36	529	3,314	6,117	0	79	6,196	2,239	3	1,575	13,327
WHATCOM	4,256	0	1,851	460	6,567	19,584	262	38	19,884	2,408	350	4,157	33,366
WHITMAN	4,446	0	2,172	542	7,160	2,608	0	38	2,646	1,463	0	515	11,784
YAKIMA	5,431	412	138	939	6,920	13,415	36	278	13,729	0	512	4,797	25,958
TOTALS	140,203	9,113	22,548	18,104	189,968	526,558	8,627	2,005	537,190	74,132	6,366	161,485	969,141
% OF TOTAL	14.5%	0.9%	2.3%	1.9%	19.6%	54.3%	0.9%	0.2%	55.4%	7.6%	0.7%	16.7%	

Source: County Reports to D.O.T. Secretary of Transportation

Table C

ACTUAL COUNTY ROAD RELATED EXPENDITURES

Including RAP and CAPP

2020

(thousands of dollars)

COUNTY	CONST	MAINT	ADMIN & OPER	FACIL	FERRY	BOND WARRANT RET'T	TRAFFIC POLICING **		OTHER	TOTAL INCLUDES RAP & CAPP	RAP	CAPP
ADAMS	3,638	5,130	1,559	302	0	0	0		0	10,629	22	698
ASOTIN	1,494	2,222	846	0	0	0	0		0	4,562	80	130
BENTON	544	7,300	1,992	209	0	276	0	*	0	10,321	14	379
CHELAN	12,360	8,024	2,963	0	0	0	0		206	23,553	2,466	302
CLALLAM	2,593	7,814	3,726	0	0	1	500		0	14,634	97	173
CLARK	21,624	18,359	16,952	0	0	2,119	0	*	0	59,054	1,866	569
COLUMBIA	979	1,872	535	0	0	0	0	*	1,258	4,644	710	73
COWLITZ	8,608	9,385	3,758	0	0	7	0		317	22,075	621	283
DOUGLAS	3,592	5,447	3,068	83	0	533	3,386		0	16,109	1,530	384
FERRY	2,194	2,016	580	0	0	2	0	*	2	4,794	293	419
FRANKLIN	621	3,304	1,923	0	0	247	0		67	6,162	23	101
GARFIELD	2,831	1,802	229	0	0	0	0		236	5,098	1,337	161
GRANT	1,488	8,633	6,346	1,099	0	0	278		0	17,844	0	1,060
GRAYS HARBOR	5,257	9,643	1,753	43	0	0	0		20	16,716	586	332
ISLAND	3,941	8,764	5,406	0	0	0	0		0	18,111	(204)	276
JEFFERSON	1,192	4,906	1,612	160	0	41	0	*	637	8,548	474	167
KING	1,762	71,375	38,420	6,917	0	8,685	0		6,339	133,498	659	601
KITSAP	13,002	15,356	11,919	1,733	0	48	0		0	42,058	140	398
KITTITAS	3,563	6,364	1,963	0	0	0	0	*	0	11,890	37	393
KLICKITAT	2,845	4,855	1,630	0	0	0	0		0	9,330	1,117	470
LEWIS	4,655	17,057	4,024	1,159	0	0	1,476		0	28,371	535	367
LINCOLN	931	4,481	1,251	4	0	15	0	*	0	6,682	842	279
MASON	2,614	7,272	3,025	314	0	1,001	0	*	0	14,226	42	191
OKANOGAN	1,508	7,223	2,149	1,038	0	0	0		0	11,918	1,318	536
PACIFIC	1,803	2,935	1,193	53	0	0	0		0	5,984	32	0
PEND OREILLE	1,840	3,071	999	151	0	0	100		0	6,161	581	288
PIERCE	20,652	27,350	25,751	3,981	6,844	2,504	2,606		303	89,991	389	922
SAN JUAN	1,753	4,929	1,568	6	0	161	0	*	0	8,417	29	113
SKAGIT	4,066	11,388	5,872	0	1,885	19	0	*	78	23,308	37	457
SKAMANIA	39	2,189	878	8	0	0	0		0	3,114	0	105
SNOHOMISH	21,537	33,887	36,851	369	0	2,985	0		0	95,629	437	562
SPOKANE	18,421	17,680	10,634	879	0	739	19		10	48,382	2,209	943
STEVENS	392	10,032	970	0	0	0	0		0	11,394	5	599
THURSTON	9,847	12,728	11,519	0	0	0	116	*	0	34,210	27	449
WAHKIAKUM	50	1,087	400	0	1,342	0	0		76	2,955	0	44
WALLA WALLA	2,048	4,495	4,116	0	0	0	0		180	10,839	36	529
WHATCOM	13,921	12,795	6,105	30	2,809	0	0	*	0	35,660	1,851	460
WHITMAN	1,137	4,015	4,125	10	0	0	19		0	9,306	2,172	542
YAKIMA	6,621	10,690	4,675	0	0	814	0		0	22,800	138	939
TOTALS	207,963	397,875	233,285	18,548	12,880	20,197	8,500		9,729	908,977	22,548	15,695
% OF TOTAL	22.9%	43.8%	25.7%	2.0%	1.4%	2.2%	0.9%		1.1%			

Construction expenditure amounts do not include State ad & award Federal Aid participation

Source: County Reports to D.O.T. Secretary of Transportation

* Traffic Policing funds paid from diverted road levy

** Road Fund portion only

Table D

ANTICIPATED COUNTY ROAD FUND REVENUES 2021 BUDGETS

(thousands of dollars)

COUNTY	BEGIN FUND BAL	MOTOR VEHICLE FUEL TAX					TAXES			MISC			TOTAL
		COUNTY REGULAR	TIB	RAP	CAPP	OTHER STATE	PROP-ERTY	TIMBER EXCISE	OTHER TAXES	FED GRANTS	FED LANDS	OTHER	
ADAMS	6,000	4,899	0	380	788	14	2,164	0	8	1,343	1	208	15,805
ASOTIN	1,409	1,811	0	2,112	153	6	1,268	10	3	3,411	26	36	10,245
BENTON	6,000	3,571	0	0	428	152	6,258	0	130	3,842	0	2,995	23,376
CHELAN	4,664	2,357	219	3,005	341	325	8,332	0	0	10,874	260	1,479	31,856
CLALLAM	3,971	2,263	0	1,254	202	475	7,820	450	30	943	0	1,602	19,010
CLARK	11,134	7,200	163	704	700	1,365	38,777	205	85	10,241	4	18,512	89,090
COLUMBIA	605	1,180	0	557	168	73	1,782	0	2	6,049	70	924	11,410
COWLITZ	7,769	2,140	0	107	330	1,556	9,700	650	85	3,672	25	1,056	27,090
DOUGLAS	3,158	3,217	782	0	286	0	6,868	0	130	1,391	0	1,983	17,815
FERRY	250	2,024	0	2,417	340	245	900	50	1	2,399	0	367	8,993
FRANKLIN	680	2,979	0	1,737	495	135	2,500	0	35	3,450	141	868	13,020
GARFIELD	760	1,416	0	275	170	4	830	0	0	1,575	45	82	5,157
GRANT	66	5,723	0	750	1,044	0	9,500	0	103	4,508	2	592	22,288
GRAYS HARBOR	5,892	2,330	0	238	374	2,732	6,414	1,200	36	1,752	162	1,250	22,380
ISLAND	11,773	2,125	0	0	390	5,127	9,037	4	0	1,702	18	3,087	33,263
JEFFERSON	4,213	1,582	0	6	199	2,022	4,623	200	5	361	85	431	13,727
KING	42,095	11,700	-510	3,225	700	500	93,587	0	35	-4,149	140	37,118	184,441
KITSAP	21,182	5,000	99	1,154	450	1,096	29,812	0	110	1,759	0	4,444	65,106
KITTITAS	5,688	2,028	0	1,308	444	160	7,525	7	0	3,579	258	353	21,350
KLICKITAT	3,974	2,826	0	2,128	540	1,500	4,600	0	0	3,037	0	1,070	19,675
LEWIS	6,342	3,438	0	0	407	479	13,000	1,207	15	3,918	0	1,798	30,604
LINCOLN	1,097	4,642	0	365	553	384	1,880	0	14	3,245	6	181	12,367
MASON	11,519	2,427	0	876	393	210	9,048	50	20	3,661	150	772	29,126
OKANOGAN	4,063	3,507	0	1,678	605	267	4,695	35	16	2,702	666	224	18,458
PACIFIC	5,000	1,424	0	580	173	0	3,407	633	10	2,809	25	67	14,128
PEND OREILLE	750	1,640	0	36	216	92	2,000	140	1	747	375	133	6,130
PIERCE	46,938	12,120	55	472	1,075	2,764	61,564	250	7,235	6,104	100	38,486	177,163
SAN JUAN	2,459	765	0	0	130	2,860	4,499	1	5	250	0	11,392	22,361
SKAGIT	17,198	3,349	0	4,300	516	2,398	16,602	50	250	5,336	190	456	50,645
SKAMANIA	3,900	1,020	0	0	131	0	1,900	330	5	692	2	121	8,101
SNOHOMISH	25,994	9,400	4,840	1,320	750	1,993	68,810	425	495	12,888	0	32,240	159,155
SPOKANE	9,386	8,768	2,325	1,918	1,067	4,722	27,216	0	0	14,166	8	7,508	77,084
STEVENS	8,266	3,759	0	283	677	125	6,286	250	4	3,656	125	404	23,835
THURSTON	17,874	5,585	2,489	1,331	506	2,181	21,400	250	10	3,253	1	8,792	63,672
WAHKIAKUM	240	941	0	0	127	285	350	70	0	537	1	906	3,457
WALLA WALLA	7,000	3,034	6	1,752	600	138	5,757	0	80	3,904	0	377	22,648
WHATCOM	23,241	4,305	0	165	687	2,204	19,289	200	40	721	370	3,429	54,651
WHITMAN	3,081	4,700	0	618	600	0	4,200	0	32	215	0	112	13,558
YAKIMA	4,500	6,790	4,000	90	1,060	0	11,830	0	0	0	500	10,095	38,865
TOTAL	340,131	149,985	14,468	37,141	18,815	38,589	536,030	6,667	9,030	130,543	3,756	195,950	1,481,105
% OF TOTAL	23.0%	10.1%	1.0%	2.5%	1.3%	2.6%	36.2%	0.5%	0.6%	8.8%	0.3%	13.2%	

Table E

ANTICIPATED COUNTY ROAD FUND EXPENDITURES 2021 BUDGETS

(thousands of dollars)

COUNTY	CONST	MAINT	ADMIN & OPER	FACIL	FERRY	BOND WARR RET'T	TRAFFIC POLICING	OTHER	TOTAL	END FUND BAL	GRAND TOTAL
ADAMS	2,170	5,911	1,519	1,833	0	0	0	195	11,628	4,177	15,805
ASOTIN	6,142	2,299	930	5	0	0	0	0	9,376	869	10,245
BENTON	5,470	11,386	2,601	200	0	202	0	128	19,987	3,389	23,376
CHELAN	18,074	8,229	2,902	0	0	0	0	352	29,557	2,299	31,856
CLALLAM	3,378	7,082	3,657	70	0	0	500	151	14,838	4,172	19,010
CLARK	19,629	28,013	27,688	0	0	0	0	2,471	77,801	11,289	89,090
COLUMBIA	4,905	1,649	700	25	0	132	0	3,879	11,290	120	11,410
COWLITZ	6,473	10,029	4,124	651	0	0	0	655	21,932	5,158	27,090
DOUGLAS	2,609	8,117	3,414	50	0	530	0	1,697	16,417	1,398	17,815
FERRY	4,447	3,082	1,036	0	0	0	0	0	8,565	428	8,993
FRANKLIN	5,921	4,481	1,820	20	0	0	0	173	12,415	605	13,020
GARFIELD	1,836	2,032	279	0	0	0	0	175	4,322	835	5,157
GRANT	6,723	8,462	5,863	115	0	0	150	875	22,188	100	22,288
GRAYS HARBOR	5,915	9,630	1,950	0	0	0	0	239	17,734	4,646	22,380
ISLAND	5,874	8,362	3,983	1,070	0	0	825	3,262	23,376	9,887	33,263
JEFFERSON	2,479	5,465	1,531	100	0	46	720	12	10,353	3,374	13,727
KING	-7,741	53,410	40,560	0	0	5,911	7,500	42,918	142,558	41,883	184,441
KITSAP	16,561	13,070	17,659	70	0	49	2,900	4,845	55,154	9,952	65,106
KITTITAS	8,271	6,838	2,996	0	0	0	0	116	18,221	3,129	21,350
KLICKITAT	11,010	5,400	1,550	0	0	0	0	256	18,216	1,459	19,675
LEWIS	6,901	13,539	4,032	0	0	0	0	2,454	26,926	3,678	30,604
LINCOLN	2,488	6,874	1,347	0	0	241	0	96	11,046	1,321	12,367
MASON	5,019	9,641	4,062	420	0	0	0	1,650	20,792	8,334	29,126
OKANOGAN	4,348	8,545	2,162	135	0	0	0	9	15,199	3,259	18,458
PACIFIC	3,494	4,303	2,086	0	0	0	339	0	10,222	3,906	14,128
PEND OREILLE	452	3,960	728	0	0	0	0	154	5,294	836	6,130
PIERCE	25,522	49,631	28,561	1,074	441	6,241	2,954	33,626	148,050	29,113	177,163
SAN JUAN	3,070	5,179	1,861	8,500	0	85	0	988	19,683	2,678	22,361
SKAGIT	21,169	12,960	4,092	0	3,300	0	1,350	955	43,826	6,819	50,645
SKAMANIA	800	2,874	838	20	0	0	0	0	4,532	3,569	8,101
SNOHOMISH	44,554	34,311	40,548	2,120	0	695	0	17,468	139,696	19,459	159,155
SPOKANE	28,934	23,902	14,602	2,513	0	1,798	70	625	72,444	4,640	77,084
STEVENS	5,629	10,300	1,038	550	0	0	0	250	17,767	6,068	23,835
THURSTON	16,473	21,576	12,338	0	0	88	137	14	50,626	13,046	63,672
WAHKIAKUM	1,012	905	277	0	1,190	0	0	27	3,411	46	3,457
WALLA WALLA	8,214	6,193	3,373	0	0	0	0	302	18,082	4,566	22,648
WHATCOM	14,355	16,722	7,353	437	3,231	0	0	2,784	44,882	9,769	54,651
WHITMAN	3,071	7,689	1,447	522	0	0	123	221	13,073	485	13,558
YAKIMA	18,595	11,029	4,289	0	0	321	527	1	34,762	4,103	38,865
TOTAL	344,246	453,080	261,796	20,500	8,162	16,339	18,095	124,023	1,246,241	234,864	1,481,105
% OF TOTAL	23.2%	30.6%	17.7%	1.4%	0.6%	1.1%	1.2%	8.4%	84.1%	15.9%	

Table F

COUNTY ROAD LEVY SUMMARY

As shown in 2021 Budgets

(thousands of dollars)

COUNTY	Unincorp Valuation Road District	County Road Highest Lawful Road Levy	Levy Shift from Road to Current Exp. (RCW 84.52.043)	County Road Property Tax Revenue Planned	(RCW 36.33.220) Road Levy Diversion				Revenue Remaining in Road Fund
					Operating Transfer	Payment for Services	Diversion from Road To Current Expense	County Road Property Tax Exp. for Other Purposes	
					Traffic Policing expense paid by:				
ADAMS	1,598,294	2,045	0	2,045					2,045
ASOTIN	1,252,778	1,844	600	1,244					1,244
BENTON	5,217,108	8,031	0	6,980			589		6,391
CHELAN	7,291,978	9,026	700	8,326	50	120			8,156
CLALLAM	6,981,250	7,768	0	7,768		500			7,268
CLARK	34,008,474	45,788	0	44,215			4,533		39,682
COLUMBIA	875,312	1,935	0	1,935				Divert - Current Expense 90	1,845
COWLITZ	7,667,932	12,903	3,050	9,853					9,853
DOUGLAS	4,703,040	6,960	0	6,960					6,960
FERRY	631,445	1,421	0	1,421				Divert - Current Expense 530	891
FRANKLIN	3,022,763	3,672	1,200	2,472					2,472
GARFIELD	440,712	865	30	835					835
GRANT	5,924,479	10,085	0	10,085		150			9,935
GRAYS HARBOR	3,438,507	6,509	0	6,507		680			5,827
ISLAND	14,373,323	9,356	0	9,356	940				8,416
JEFFERSON	4,433,508	4,708	0	4,708			720		3,988
KING	51,795,736	94,573	0	94,573	7,500				87,073
KITSAP	26,713,441	29,999	0	29,999	2,900				27,099
KITTITAS	6,722,412	7,451	0	7,451			200		7,251
KLICKITAT	3,098,105	4,928	0	4,928					4,928
LEWIS	7,452,169	12,923	0	12,816	1,494				11,322
LINCOLN	1,355,086	2,358	0	2,358			500		1,858
MASON	8,730,129	11,321	1,080	10,126			1,080		9,046
OKANOGAN	3,326,531	5,008	300	4,696					4,696
PACIFIC	2,465,937	3,407	500	2,907		339			2,568
PEND OREILLE	1,501,651	2,213	200	2,013		100			1,913
PIERCE	59,132,289	77,371	0	77,371	2,955			Divert - Traffic and Courts 15,149 *	59,267
SAN JUAN	8,170,743	4,917	0	4,917			350		4,567
SKAGIT	10,630,690	18,127	386	16,286			1,350		14,936
SKAMANIA	1,549,241	1,991	0	1,991					1,991
SNOHOMISH	65,673,202	69,065	0	69,065	5,041				64,024
SPOKANE	21,047,808	33,647	6,100	27,547					27,547
STEVENS	4,038,465	6,487	150	6,284					6,284
THURSTON	19,275,720	24,045	2,750	21,295		137	1,500		19,658
WAHKIAKUM	525,743	622	250	351					351
WALLA WALLA	3,227,867	6,693	0	6,404					6,404
WHATCOM	17,334,983	23,276	0	20,566			807		19,759
WHITMAN	1,897,394	4,269	0	4,260		123			4,137
YAKIMA	8,787,785	15,616	4,738	10,903	525				10,378
TOTALS	436,314,031		22,034	563,817	21,405	2,149	11,628	15,769	512,866

* Increased by voter approval (RCW 84.55.050)

Table G

COUNTY ROAD MILEAGE - 1/1/21

	RURAL ROADS - LANE MILES				URBAN ROADS - LANE MILES				SYSTEM LANE TOTAL	TOTAL ARTERIAL	TOTAL COLLECTOR	TOTAL ACCESS
	ARTERIAL	COLLECTOR	ACCESS	TOTAL	ARTERIAL	COLLECTOR	ACCESS	TOTAL				
ADAMS	0.00	1,296.33	2,146.26	3,442.58	0.01	7.44	21.51	28.96	3,471.54	0.01	1,303.77	2,167.77
ASOTIN	0.94	303.21	331.25	635.40	30.39	12.85	118.81	162.05	797.46	31.33	316.06	450.06
BENTON	0.00	579.49	786.15	1,365.64	7.94	96.59	255.18	359.72	1,725.36	7.94	676.08	1,041.34
CHELAN	44.58	375.91	697.23	1,117.72	10.78	40.95	108.20	159.93	1,277.65	55.36	416.86	805.43
CLALLAM	0.00	241.58	533.69	775.27	6.08	23.10	166.39	195.57	970.84	6.08	264.68	700.08
CLARK	29.96	515.24	552.02	1,097.22	209.77	143.44	862.42	1,215.62	2,312.84	239.73	658.68	1,414.44
COLUMBIA	0.00	458.20	542.27	1,000.47	0.00	0.00	0.00	0.00	1,000.47	0.00	458.20	542.27
COWLITZ	1.24	390.19	517.02	908.45	20.12	31.02	92.61	143.75	1,052.20	21.36	421.21	609.63
DOUGLAS	0.00	778.51	1,956.50	2,735.01	53.43	29.84	126.05	209.32	2,944.33	53.43	808.35	2,082.55
FERRY	0.00	465.02	928.83	1,393.85	0.00	0.00	0.00	0.00	1,393.85	0.00	465.02	928.83
FRANKLIN	0.00	672.00	1,215.24	1,887.24	7.57	15.49	42.58	65.63	1,952.88	7.57	687.49	1,257.82
GARFIELD	0.00	426.05	464.05	890.11	0.00	0.00	0.00	0.00	890.11	0.00	426.05	464.05
GRANT	5.19	1,732.79	3,035.07	4,773.06	31.17	38.78	125.15	195.11	4,968.16	36.37	1,771.57	3,160.22
GRAYS HARBOR	13.66	474.77	528.29	1,016.71	1.13	37.73	65.72	104.58	1,121.29	14.79	512.50	594.00
ISLAND	0.00	363.91	539.69	903.60	34.64	35.59	190.14	260.37	1,163.97	34.64	399.50	729.83
JEFFERSON	0.00	277.58	504.57	782.15	0.00	0.00	10.27	10.27	792.42	0.00	277.58	514.84
KING	81.66	402.99	762.05	1,246.71	255.43	197.16	1,263.56	1,716.14	2,962.85	337.09	600.15	2,025.61
KITSAP	27.54	252.37	383.81	663.72	207.92	134.63	809.93	1,152.48	1,816.20	235.46	386.99	1,193.75
KITTITAS	0.00	596.53	513.49	1,110.02	1.34	19.60	18.27	39.21	1,149.23	1.34	616.13	531.75
KLICKITAT	0.00	766.44	1,370.50	2,136.94	0.00	0.00	0.00	0.00	2,136.94	0.00	766.44	1,370.50
LEWIS	0.00	532.16	1,423.02	1,955.17	26.88	18.83	70.52	116.22	2,071.40	26.88	550.99	1,493.53
LINCOLN	37.92	1,277.95	2,499.01	3,814.88	0.00	0.00	0.00	0.00	3,814.88	37.92	1,277.95	2,499.01
MASON	0.00	527.10	613.98	1,141.08	1.30	17.81	54.87	73.98	1,215.06	1.30	544.91	668.85
OKANOGAN	0.00	980.47	1,668.82	2,649.28	0.00	5.60	14.26	19.87	2,669.15	0.00	986.07	1,683.08
PACIFIC	0.00	260.64	426.21	686.85	0.00	0.00	0.00	0.00	686.85	0.00	260.64	426.21
PEND OREILLE	0.00	361.71	740.42	1,102.13	0.00	0.00	0.00	0.00	1,102.13	0.00	361.71	740.42
PIERCE	127.44	374.70	496.65	998.79	589.13	350.25	1,287.43	2,226.81	3,225.60	716.57	724.95	1,784.08
SAN JUAN	0.00	177.39	359.99	537.37	0.00	0.00	0.00	0.00	537.37	0.00	177.39	359.99
SKAGIT	18.72	621.24	742.23	1,382.19	36.05	37.65	142.76	216.46	1,598.65	54.77	658.89	884.99
SKAMANIA	17.78	163.14	268.87	449.79	0.00	0.00	0.00	0.00	449.79	17.78	163.14	268.87
SNOHOMISH	108.10	552.66	900.69	1,561.45	168.57	232.95	1,265.14	1,666.65	3,228.10	276.67	785.60	2,165.83
SPOKANE	24.40	1,315.37	2,887.58	4,227.35	171.01	107.38	590.93	869.32	5,096.68	195.41	1,422.76	3,478.51
STEVENS	0.00	1,121.66	1,844.58	2,966.24	0.00	0.00	0.00	0.00	2,966.24	0.00	1,121.66	1,844.58
THURSTON	8.57	455.31	698.74	1,162.63	137.95	99.54	675.02	912.51	2,075.14	146.52	554.86	1,373.76
WAHKIAKUM	0.00	163.64	112.14	275.78	0.00	0.00	0.00	0.00	275.78	0.00	163.64	112.14
WALLA WALLA	4.73	841.11	904.37	1,750.20	37.54	29.45	82.53	149.52	1,899.72	42.26	870.56	986.90
WHATCOM	0.00	577.04	909.66	1,486.70	49.94	87.42	245.23	382.59	1,869.29	49.94	664.46	1,154.89
WHITMAN	0.00	1,227.96	2,552.35	3,780.32	0.00	0.00	0.00	0.00	3,780.32	0.00	1,227.96	2,552.35
YAKIMA	8.70	1,286.03	1,547.36	2,842.09	100.99	115.12	242.79	458.90	3,300.99	109.69	1,401.15	1,790.15
STATEWIDE	561.13	24,186.38	39,904.62	64,652.13	2,197.09	1,966.22	8,948.26	13,111.57	77,763.71	2,758.22	26,152.60	48,852.88
EASTERN	126.46	16,862.74	28,631.33	45,620.53	452.18	519.10	1,746.26	2,717.54	48,338.07	578.64	17,381.84	30,377.59
WESTERN	434.67	7,323.64	11,273.29	19,031.61	1,744.91	1,447.12	7,202.00	10,394.03	29,425.64	2,179.58	8,770.76	18,475.30

County Road Log Data certified 7/30/2021 by the County Road Administration Board

Table H

COUNTY ARTERIAL PRESERVATION PROGRAM

2020 ACCOMPLISHMENT SUMMARY

COUNTY	1/1/19 Eligible Arterial System C/Line (miles)	Total CAPP * Available ($1,000)	Total CAPP * Expended ($1,000)	Total Eligible Expenses ($1,000)	CAPP* Contri-bution (%)	2020 Arterial Prep/ Repair ($1,000)	2020 Arterial Sealcoat C/Line (miles)	2020 Arterial Overlay C/Line (miles)	2020 Total Resurf. C/Line (miles)	2020 Percent System Resurf'd
ADAMS	547.15	697.9	697.9	836.6	83.4	163.8	31.8	0.0	31.8	5.8
ASOTIN	100.25	129.8	129.8	273.0	47.5	0.0	14.4	0.0	14.4	14.4
BENTON	296.55	379.4	379.4	480.5	79.0	118.0	17.3	0.0	17.3	5.8
CHELAN	235.50	301.8	301.8	7,663.9	3.9	5,752.4	32.0	1.6	33.6	14.3
CLALLAM	135.38	173.1	173.1	209.3	82.7	209.3	0.0	0.0	0.0	0.0
CLARK	413.38	568.9	568.9	5,499.7	10.3	488.8	17.7	12.6	30.3	7.3
COLUMBIA	141.44	181.0	73.4	95.6	76.8	58.6	0.0	0.1	0.1	0.1
COWLITZ	221.26	283.2	283.2	1,596.0	17.7	780.6	33.8	0.5	34.3	15.5
DOUGLAS	296.48	383.8	383.8	479.9	80.0	65.9	12.0	0.4	12.4	4.2
FERRY	177.63	583.6	419.2	564.0	74.3	325.0	5.7	0.0	5.7	3.2
FRANKLIN	342.88	437.8	101.0	101.0	100.0	101.0	0.0	0.0	0.0	0.0
GARFIELD	126.18	161.1	161.1	245.6	65.6	25.5	8.4	0.0	8.4	6.7
GRANT	830.74	1067.3	1060.4	1,060.4	100.0	493.4	68.0	0.0	68.0	8.2
GRAYS HARBOR	259.05	331.6	331.6	887.0	37.4	342.3	7.0	3.0	10.0	3.9
ISLAND	214.96	275.5	275.5	1,012.1	27.2	328.7	8.9	2.4	11.3	5.3
JEFFERSON	130.34	167.2	167.2	580.1	28.8	21.8	4.1	0.4	4.5	3.4
KING	449.96	601.1	601.1	5,424.7	11.1	1,524.7	0.0	11.5	11.5	2.6
KITSAP	307.27	398.4	398.4	1,605.0	24.8	621.0	0.0	9.4	9.4	3.1
KITTITAS	304.56	392.8	392.8	835.9	47.0	63.2	31.9	0.0	31.9	10.5
KLICKITAT	368.25	470.2	470.2	559.7	84.0	0.0	17.3	0.0	17.3	4.7
LEWIS	286.54	367.1	367.1	1,169.4	31.4	146.9	22.8	3.5	26.3	9.2
LINCOLN	386.72	494.6	278.6	554.0	50.3	119.8	16.0	0.0	16.0	4.1
MASON	263.42	336.9	191.0	191.0	100.0	0.0	3.8	0.0	3.8	1.4
OKANOGAN	418.60	535.7	535.7	1,018.1	52.6	230.0	45.4	0.0	45.4	10.8
PACIFIC	119.83	822.7	0.0	546.3	0.0	257.7	0.0	1.4	1.4	1.2
PEND OREILLE	167.49	337.0	288.0	288.0	100.0	139.9	6.6	0.0	6.6	4.0
PIERCE	680.94	921.8	921.8	4,366.6	21.1	0.0	58.9	4.5	63.4	9.3
SAN JUAN	88.69	113.1	113.1	403.7	28.0	0.0	14.5	0.0	14.5	16.4
SKAGIT	356.74	456.9	456.9	2,481.9	18.4	34.6	44.3	2.0	46.3	13.0
SKAMANIA	90.45	458.9	104.9	104.9	100.0	104.9	0.0	0.0	0.0	0.0
SNOHOMISH	515.12	673.4	561.9	6,646.0	8.5	2,421.9	28.0	6.9	34.9	6.8
SPOKANE	719.33	942.9	942.9	3,640.5	25.9	1,376.5	52.4	0.7	53.1	7.4
STEVENS	468.41	599.4	599.4	1,848.4	32.4	759.4	38.5	0.0	38.5	8.2
THURSTON	344.31	449.4	449.4	1,187.3	37.9	649.1	0.0	2.1	2.1	0.6
WAHKIAKUM	78.31	138.5	44.2	44.2	100.0	0.0	5.1	0.0	5.1	6.5
WALLA WALLA	412.86	528.5	528.5	781.9	67.6	162.7	22.8	0.0	22.8	5.5
WHATCOM	358.28	460.3	460.3	4,267.4	10.8	49.5	21.8	8.3	30.1	8.4
WHITMAN	424.31	542.2	542.2	1,613.7	33.6	253.1	18.4	3.9	22.2	5.2
YAKIMA	726.01	939.1	939.1	1,166.0	80.5	242.8	37.2	0.0	37.2	5.1
TOTAL	12,805.6	18,103.9	15,695.0	62,329.6	25.2%	18,432.8	746.7	75.2	821.9	
									% System Resurfaced:	6.4%

* Includes $2,422,000 statewide Motor Vehicle Account (**MVA**) contribution for County Arterial Preservation and carried forward CAPA amounts from prior yerars.

Table I

COUNTY FREIGHT AND GOODS SYSTEM - 1/1/2021

COUNTY	Freight and Goods System - Truck Route Class					Total	Total	%
	T-1	T-2	T-3	T-4	T-5	FGTS	Adequate	Adequate
ADAMS			151.938	224.106	289.265	665.31	271.988	40.9%
ASOTIN		0.15	26.960	19.858	17.800	64.77	55.310	85.4%
BENTON			254.718	111.134	34.968	400.82	168.083	41.9%
CHELAN			47.400	97.035	39.920	184.36	60.020	32.6%
CLALLAM			73.030	61.550	11.010	145.59	3.750	2.6%
CLARK		12.25	232.210	146.920	0.000	391.38	310.690	79.4%
COLUMBIA			10.303	48.585	147.254	206.14	11.200	5.4%
COWLITZ		0.87	63.570	67.710	3.000	135.15	116.640	86.3%
DOUGLAS			8.090	84.350	171.070	263.51	15.310	5.8%
FERRY			109.250	112.970	0.000	222.22	25.780	11.6%
FRANKLIN			111.390	154.030	252.650	518.07	248.210	47.9%
GARFIELD			0.000	11.910	131.086	143.00	120.146	84.0%
GRANT		10.19	269.065	258.058	305.103	842.42	58.200	6.9%
GRAYS HARBOR			210.913	7.120	0.000	218.03	191.429	87.8%
ISLAND			7.945	63.162	0.000	71.11	69.891	98.3%
JEFFERSON			37.420	35.225	65.750	138.40	108.055	78.1%
KING	0.45	31.88	277.623	92.691	0.000	402.64	367.938	91.4%
KITSAP	0.82	2.39	225.233	103.218	0.000	331.66	288.641	87.0%
KITTITAS		0.82	168.104	172.741	0.080	341.75	260.762	76.3%
KLICKITAT			242.720	194.353	0.000	437.07	148.820	34.0%
LEWIS		1.98	124.934	261.394	102.441	490.75	270.306	55.1%
LINCOLN			165.130	259.970	377.274	802.37	467.030	58.2%
MASON		0.20	104.648	85.837	0.000	190.69	56.367	29.6%
OKANOGAN			100.505	117.324	181.684	399.51	6.287	1.6%
PACIFIC			0.000	136.489	0.000	136.49	27.274	20.0%
PEND OREILLE			38.393	125.397	62.208	226.00	0.490	0.2%
PIERCE	5.90	52.90	315.765	29.450	7.700	411.72	382.635	92.9%
SAN JUAN			23.901	64.133	0.000	88.03	56.319	64.0%
SKAGIT		3.87	146.291	90.364	0.000	240.53	112.036	46.6%
SKAMANIA			20.908	60.314	0.000	81.22	80.802	99.5%
SNOHOMISH	1.94	10.43	327.184	106.801	60.569	506.92	313.826	61.9%
SPOKANE	5.70	15.75	463.021	106.913	109.260	700.65	399.955	57.1%
STEVENS			92.160	164.520	78.950	335.63	12.820	3.8%
THURSTON		15.56	263.366	108.852	4.131	391.91	369.424	94.3%
WAHKIAKUM			17.115	39.662	5.300	62.08	45.356	73.1%
WALLA WALLA			97.677	261.860	31.156	390.69	51.450	13.2%
WHATCOM		6.36	165.250	26.730	0.000	198.34	69.680	35.1%
WHITMAN			209.080	206.308	94.983	510.37	228.172	44.7%
YAKIMA		6.38	406.220	213.390	52.190	678.18	668.240	98.5%
TOTAL	14.80	171.98	5,609.43	4,532.43	2,636.80	12,965.45	6,519.33	50.3%

County Road Log Data Certified 7/30/2021 by the County Road Administration Board

Table J

2020 COUNTY FORCES SUMMARY

COUNTY	2020 County Forces Limit	2020 Proposed County Forces Construction Expenditure	2020 Actual County Forces Construction Expenditure	% Expended of County Forces Limit
ADAMS	823,950	0	0	0.0%
ASOTIN	808,610	75,000	0	0.0%
BENTON	1,789,809	225,000	69,711	3.9%
CHELAN	1,269,498	100,000	0	0.0%
CLALLAM	1,268,023	75,000	59,068	4.7%
CLARK	3,390,290	173,000	223,262	6.6%
COLUMBIA	808,250	0	2,874	0.4%
COWLITZ	1,268,796	495,000	47,952	3.8%
DOUGLAS	1,283,146	940,000	724,524	56.5%
FERRY	810,023	809,400	176,764	21.8%
FRANKLIN	1,275,213	55,000	38,899	3.1%
GARFIELD	807,386	10,000	0	0.0%
GRANT	1,307,393	830,000	117,464	9.0%
GRAYS HARBOR	1,270,525	180,000	0	0.0%
ISLAND	1,269,571	882,840	212,552	16.7%
JEFFERSON	1,262,449	25,000	3,243	0.3%
KING	3,502,441	324,900	13,516	0.4%
KITSAP	1,811,929	861,000	291,641	16.1%
KITTITAS	1,267,161	0	0	0.0%
KLICKITAT	815,130	300,000	453,999	55.7%
LEWIS	1,279,140	840,000	614,549	48.0%
LINCOLN	824,473	819,357	797,551	96.7%
MASON	1,269,484	1,025,000	617,578	48.6%
OKANOGAN	1,279,676	105,000	651,613	50.9%
PACIFIC	807,542	20,000	14,410	1.8%
PEND OREILLE	809,250	430,000	0	0.0%
PIERCE	3,493,568	263,300	138,028	4.0%
SAN JUAN	804,677	300,000	148,141	18.4%
SKAGIT	1,277,705	687,800	25,387	2.0%
SKAMANIA	805,082	0	0	0.0%
SNOHOMISH	3,455,182	1,437,000	601,139	17.4%
SPOKANE	3,442,914	0	104,647	3.0%
STEVENS	1,283,121	65,000	57,515	4.5%
THURSTON	1,812,269	634,600	308,592	17.0%
WAHKIAKUM	804,982	86,000	0	0.0%
WALLA WALLA	1,275,673	630,000	297,014	23.3%
WHATCOM	1,801,002	1,150,000	82,942	4.6%
WHITMAN	1,288,026	490,000	269,191	20.9%
YAKIMA	1,822,609	0	0	0.0%
TOTAL	57,745,965	15,344,197	7,163,766	12.4%

PAVEMENT PRESERVATION

Whether the public is taking trips by automobiles, wheeled all-terrain vehicles, motorcycles, bicycle, transit, or walking, the benefits of maintaining roads in a safe and serviceable condition are paramount. With increased truck traffic affecting conditions on the counties 77,764 lane miles of paved and gravel roads, they are competing on limited budgets to maintain current assets. Many are forced to be reactive versus proactive for preventative maintenance. Counties are doing less with less and the long-term effect of this is very concerning. Agencies are trying to deal with impacts from climate change, transitory inflation, Covid, new science, changing workforce, permitting, funding for safety projects, capital projects, bridge repair/replacement, ADA compliance, fish barrier culvert replacement and pavement preservation projects. When faced with all these challenges counties must develop sound management practices to preserve their investments in infrastructure.

A **Pavement Management System (PMS)** collects and monitors information on the current condition of the roads, in addition to determining maintenance priorities. This can be conducted using a variety of new technology analyzing pavement life cycles, to assess overall system performance and costs, and to determine the alternative strategies necessary to prevent significant road deterioration. A key element of a PMS is its ability to provide pavement preservation alternatives based upon a predictive pavement deterioration model. An effective pavement management system depends on reliable, accurate, and complete data.

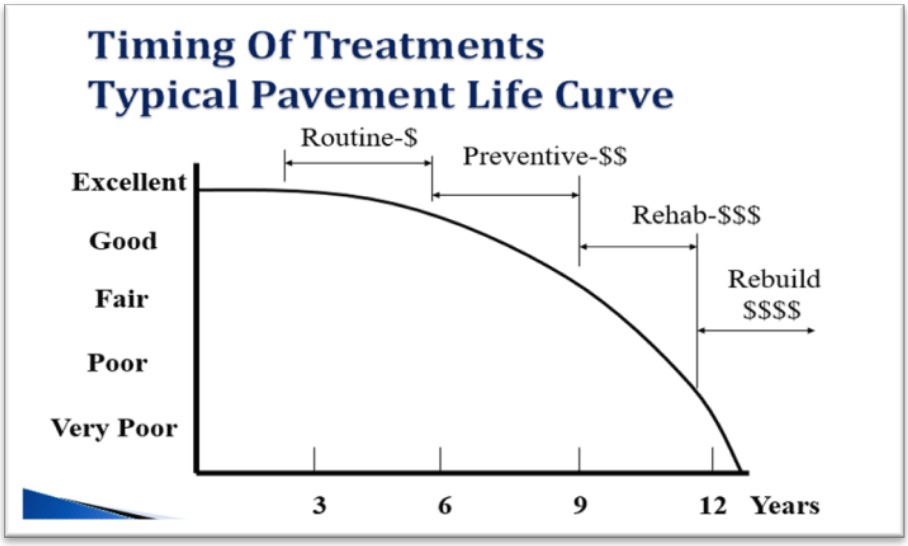
Photo –Thurston County Public Works **(asphalt cold milling process)**

Pavement condition data is a critical component of a pavement management system. It is this data, collected consistently and over a period, that enables the current network condition, triggering of pavement preservation and rehabilitation treatments and/or strategies, and prediction of future conditions. Pavement condition data is used to model pavement performance, to trigger various actions ranging from maintenance to rehabilitation to reconstruction, to evaluate program effectiveness, and to satisfy many other purposes. Network condition data—combined with inventory, traffic, and cost data—allows a pavement management system to analyze and compare pavement sections to find the most cost-effective and beneficial combination of sections and treatments.

While there are many different methodologies used for assessing pavement condition, ranging from manual surveys to fully automated procedures, the need for quality and accurate data remains the same. As the needs and uses of network-level condition data evolve, so has the technology to collect it.

In practical terms, pavement preservation boils down to three sound principles: The **Right Treatment**, at **The Right Time**, on **The Right Road**. The best return on Pavement Preservation dollars is a pro-active approach in maintaining structurally sound pavements in good condition. The intent of a pavement preservation treatment is to extend pavement life at a level that is cost effective and maximizes the service life of the roadway asset.

The cost of pavement preservation increases exponentially (deferred maintenance) with pavement deterioration. Failure to maintain a roadway network at the optimal time dramatically increases maintenance cost, decreases drivability and, may expose the public to increased risk of higher accident rates.



The "True Value" of Pavement Preservation

The most ineffective, costly way of responding to roadway complaints is a "Worst First" policy. If an agency has postponed maintenance, then structural damage is being done to the road and it will require a major rehabilitation to correct. The "Worst First" strategy waits until roads in the system reach a level where pavement preservation is the most expensive technique available. Sadly, "Worst First" is very appealing politically: it reassures the public that they have been heard because the worst roads are being rehabilitated first. However, this costly and ineffective policy will eventually return all your paved roads to gravel roadways.

All 39 counties roadway and pavement information is located in their county road log. The road log is updated annually as part of the process. Maintenance of the road log is done using CRAB's new GIS-Mo platform comprised of several software solutions: Esri Roads & Highways, DTS VUEWorks, DTS MobileVUE, and CRAB VisRate. The VUEWorks software has modules in it to help you develop and manage your pavement management asset system.

Each county also needs to develop budget and deterioration curve scenarios which help with the "what-if" approach, prioritizing list based on the risk and condition modules and deterioration curves. This should be based on your county needs and expectations of your road network.

There are three levels of work on pavements:

1. Routine maintenance (pothole repair, patching, crack sealing, etc.), done on an as-needed basis
2. Preservation or rehabilitation (installing a new wearing surface, a seal coat or overlay), done on a cyclic basis
3. Reconstruction (remove and replace the pavement and base structure), done when the road has failed or needs widening or realigning

VUEWorks has the ability to use both Pavement Surface Condition (PSC) 100-0 scale and Pavement Condition Index (PCI) 100-0 scale rating methods for each paved surface segment. The PSC formula uses the severity and extent recorded for transverse, longitudinal, and alligator cracking as well as patching to calculate one score for each surface condition segment. The PCI formula could use up to 20 distresses for asphalt concrete pavements or Hot Mix Asphalt and up to 19 distress types for Portland Cement Concrete. As PCI is becoming the industry standard, CRAB will be working with the counties to switch from PSC to PCI.

There are three phases in the life of a pavement:

1. PSC above 60 - When the pavement is in good or better condition and does not need preservation work, only routine maintenance.

2. PSC from 60 to 40 - When pavement preservation work is needed and is most cost effective.
3. PSC less than 40 - When the pavement is in such poor condition that pavement preservation is no longer cost effective, and reconstruction is needed.

Currently, counties perform a visual rating of their paved arterials and collector roads, which must be rated at least once every two years (WAC 136-320); local access roads are rated based on each counties schedule. Rating can be done by county staff (full time or part time) or by an automated pavement rating service. When county staff do the visual rating, they usually drive the roads at low speed and rate the surface distresses. The time needed depends on the rating method and the number of miles rated. Depending on the number of miles rated, it will take anywhere from one to three months. Many of the 39 counties use computerized data collection, entering the data directly into a computer; counties using paper need to enter their data.
Once all the data is uploaded, managing it within VUEWorks takes only a few hours at first. The engineering analysis of the proposed preservation program can take as long as needed to develop. VUEWorks collects and organizes pavement condition inspections into surface condition segments. The road number, "from" and "to" mileposts, lanes rated, and rating date, identifies surface condition segments. The severity and extent of up to 12 visible distresses can be recorded for flexible pavement types (8 for rigid pavement types).

To assist in pavement condition rating, CRAB developed a software package called VisRate. VisRate can be installed on laptops and used in the field by pavement raters to efficiently record pavement distresses. After pavement raters have finished collecting data, VisRate can upload the data to the VUEWorks database, transforming the information into rating segments. Using the pavement condition rating information stored in VUEWorks, the data can be used to create projects, assess risks, valuation, provide budget forecasting and can better predict pavement performance.

Pavement Preservation Options:
Within each Pavement Managers "Tool Box" are numerous pavement rehabilitation options. The key is being able to select the correct rehabilitation that will function in the environmental conditions, handle traffic loading, and provide safety to the public, all the while being cost effective. The following is a list of some Pavement Preservation options:

Asphalt Overlay – An overlay course consisting of a mix of asphalt cement and a well graded (also called dense graded) aggregate. A well-graded aggregate is uniformly distributed throughout the full range of sieve size and is mixed at a central mix plant and hauled to the laydown machine.

Asphalt Concrete Pavement (ACP) - commonly called asphalt, blacktop, or pavement, is a composite material commonly used to surface roads, parking lots, and airports.

Bituminous Surface Treatment (BST) – includes various composite layered pavement treatments that may be applied over existing ACP, Hot Mix Asphalt (HMA), or BST roadways, or are used to build up new roadway surfaces. They generally consist of uniformly sized gravel spread over a liquid asphalt layer, which solidifies when it cures. This process creates a thin structure with a very rough surface. Chip seals are the most common form of BST. Slurry seals (also a type of BST) consist of a premixed thin layer spread over the roadway surface.

Chip Seal – A surface treatment in which a pavement surface is sprayed with asphalt (generally emulsified) and then immediately covered with aggregate and rolled. Chip seals are used primarily to seal the surface of a pavement with non-load associated cracks and to improve surface friction, although they also are commonly used as a wearing course on low volume roads.

Photo – Cowlitz County Public Works **(Chip Sealing)**

Photo – Walla Walla County Public Works **(Chip Sealing)**

Cold In-Place Recycling (CIR) – A process in which a portion of an existing bituminous pavement is pulverized or milled, the reclaimed material is mixed with new binder and, in some instances, virgin aggregates. The resultant blend is placed as a base for a subsequent overlay. Emulsified asphalt is especially suited for cold in-place recycling. Although not necessarily required, a softening agent may be used along with the emulsified asphalt.

Cold Milling (aka -Mill & Fill)– A process of removing pavement material from the surface of the pavement either to prepare the surface (by removing rutting and surface irregularities) to receive overlays, to restore pavement cross slopes and profile, or even to re-establish the pavement's surface friction characteristics.

Photo - Clark County Public Works **(Milling)**

Crack Filling – The placement of materials into non-working cracks to substantially reduce infiltration of water and to reinforce the adjacent pavement. Working

cracks are defined as those that experience significant horizontal movements, generally greater than about 2 mm (0.1 in.). Crack filling should be distinguished from crack sealing.

Photo –Grays Harbor County Public Works **(Crack Sealing)**

Crack Sealing – A maintenance procedure that involves placement of specialized materials into working cracks using unique configurations to reduce the intrusion of incompressible material into the crack and to prevent intrusion of water into the underlying pavement layers. Working cracks are defined as those that experience significant horizontal movements, generally greater than about 2 mm (0.1 in.). Crack sealing has an excellent performance despite its use where chip sealing or dig-outs may have been a better choice.

Emulsified Asphalt – An emulsion of asphalt cement and water, which contains a small amount of an emulsifying agent. Emulsified asphalt droplets, which are suspended in water, may be either the anionic (negative charge) or cationic (positive charge) type, depending upon the emulsifying agent.

Fog Seal - A fog seal is a light application of a diluted slow-setting asphalt emulsion to the surface of an aged (oxidized) pavement surface. Fog seals are low-cost and are used to restore flexibility to an existing HMA pavement surface. They may be able to temporarily postpone the need for a surface treatment or non-structural overlay.

A fog seal is designed to coat, protect, and/or rejuvenate the existing asphalt binder. The addition of asphalt will also improve the waterproofing of the surface

and reduce its aging susceptibility by lowering permeability to water and air. To achieve this, the fog seal material (emulsion) must fill the voids in the surface of the pavement. Therefore, during its application it must have sufficiently low viscosity to not break from the emulsified state before it penetrates the surface voids of the pavement. This is accomplished by using a slow setting emulsion that is diluted with water. Emulsions that are not adequately diluted with water may not properly penetrate the surface voids resulting in excess asphalt on the surface of the pavement after the emulsion breaks, which can result in a slippery surface.

The use of a fog seal on top of a chip seal has become the industry standard and is good insurance to protect a new chip seal.
The benefits are numerous:

- A fog seal puts more asphalt between the "chips," to hold the rock better, greatly reducing aggregate loss.
- Much less sweeping needed over the first winter.
- The black color gives better contrast for striping.
- The aesthetics of a black street are more acceptable to the Public
- It takes away some of the coarseness, slightly smoothing the surface

Photo –Island County Public Works **(Chip seal with fog seal)**

Hot In-Place Recycling (HIPR) – A process which consists of softening the existing asphalt surface with heat, mechanically removing the surface material, mixing the material with a recycling agent, adding (if required) virgin asphalt and aggregate to the material, and then replacing the material back on the pavement.

Hot Mix Asphalt (HMA) – High quality, thoroughly controlled hot mixture of asphalt cement and well-graded, high quality aggregate thoroughly compacted into a uniform dense mass.

Microsurfacing – A mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and other additives, properly proportioned, mixed and spread on a paved surface.

Open-Graded Friction Course (OGFC) – An overlay course consisting of a mix of asphalt cement and open graded (also called uniformly graded) aggregate. An open-graded aggregate consists of particles of predominantly a single size.

Pavement Reconstruction – Construction of the equivalent of a new pavement structure which usually involves complete removal and replacement of the existing pavement structure including new and/or recycled materials.

Rejuvenating Agent – These products are added to existing aged or oxidized HMA pavements in order to restore flexibility and retard cracking.

Rubberized Asphalt Chip Seal – A variation on conventional chip seals in which the asphalt binder is replaced with a blend of ground tire rubber (or latex rubber) and asphalt cement to enhance the elasticity and adhesion characteristics of the binder. Commonly used in conjunction with an overlay to retard reflection cracking.

Sand Seal – An application of asphalt material covered with fine aggregate. It may be used to improve the skid resistance of slippery pavements and to seal against air and water intrusion.

Sandwich Seal – A surface treatment that consists of application of a large aggregate, followed by a spray of asphalt emulsion that is in turn covered with an application of smaller aggregate. Sandwich seals are used to seal the surface and improve skid resistance.

Scrub Seal – Application of a polymer modified asphalt to the pavement surface followed by the broom scrubbing of the asphalt into cracks and voids, then the application of an even coat of sand or small aggregate, and finally a second brooming of the aggregate and asphalt mixture. This seal is then rolled with a pneumatic tire roller.

Seal Coat– a final coat of bituminous material applied during construction to a bituminous macadam or concrete for sealing the surface of the pavement.

Slurry Seal – A mixture of slow setting emulsified asphalt, well-graded fine aggregate, mineral filler, and water. It is used to fill cracks and seal areas of old pavements, to restore a uniform surface texture, to seal the surface to prevent moisture and air intrusion into the pavement, and to provide skid resistance.

Photos–Skagit County Public Works **(Chip seal and wheel path application)**

Federal Requirements

In the immediate future Federal Highway Administration (FHWA) requirements may lead to additional data collection requirements. FHWA requires that IRI (International Roughness Index) be collected annually on roads comprising the NHS system, which typically includes interstates, while the non-NHS routes may still be collected on a 2-year cycle (FHWA 2010) AASHTO R 43. The national standard in the United States for IRI thresholds for all road classifications range from 96 in/mi to 170 in/mi indicating "acceptable" road segments, and IRI less than 95 in/mi are considered to be "good" road segments.

MAP-21 created a performance-based and multimodal program, establishing new requirements for setting performance targets for Interstate pavement (and bridges on the National Highway System) condition as part of an Asset Management Plan.

While many transportation agencies across the United States collect individual pavement distresses at the network level and then use those to create various individual indices, other agencies collect an overall condition indicator, such as present serviceability rating (PSR), present serviceability index (PSI), pavement condition index (PCI) and Washington State – Pavement Surface Condition (PSC).

Friction Testing

Several counties are in the process of updating their roadway safety plans, which may include using the FHWA Systemic Safety Project Selection tool. Some data points to reducing runoff the roadway accidents using low-cost countermeasures.

In general, the friction of most dry pavements is high; however, the same pavement under wet conditions can present a friction problem. Surface friction data allows agencies to identify potential low friction pavements that, in conjunction with accident history and roadway geometrics are used to minimize wet weather skidding accidents. This will allow county traffic engineers to be both proactive and reactive when developing potential safety projects and assist in assuring the best use of public funds.

Washington State Department of Transportation measures surface friction every two years on all state-maintained roads using a friction testing truck and trailer. To conduct friction tests, water is applied to the pavement surface in front of the test wheel on the trailer. A brake is applied to the test wheel and when the wheel locks, the drag and load (horizontal and vertical forces) are measured to derive the amount of surface friction.

Geographic Information Systems (GIS)

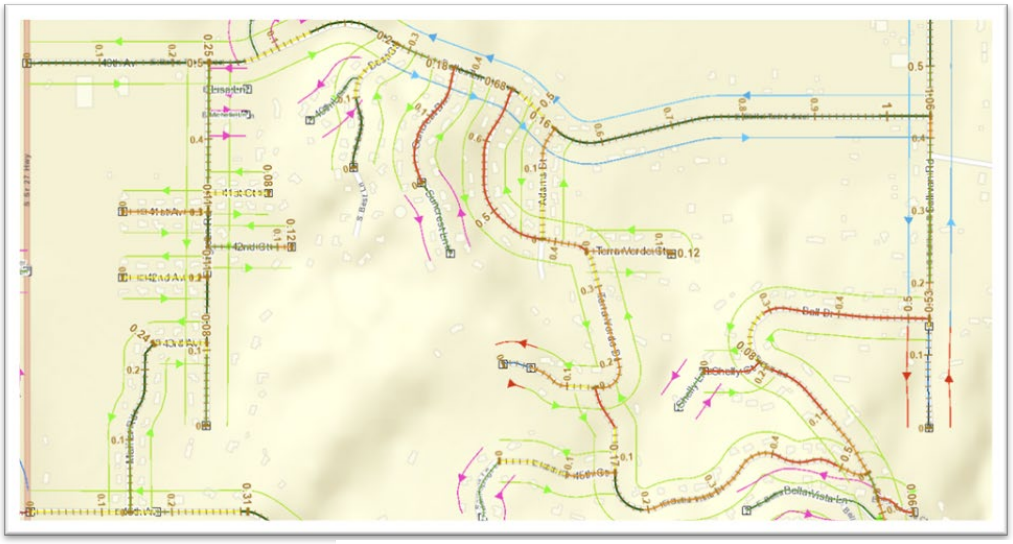
GIS, as used in the context of asset management, are tools designed to integrate data and provides a platform for examining, visualizing, and managing pavement data. The condition survey data elements can be visualized on a map if the data has been located geographically. For example, GIS can be used to plot the collected data on a shape file of the road network to check the accuracy of the segmentation process and the collected latitude and longitude data. If a segment has been missed, a faulty beginning point assigned, or the data otherwise improperly segmented, it is often readily apparent by visualizing the data using the GIS. The ability to examine the data visually is useful in many ways, such as comparing data from each side of a divided highway or comparing radius of curvature with the map display of the location and seeing gaps or overlaps.

The County Road Administration Board is transitioning from the legacy Mobility application, and the Linear Reference System (LRS) it manages, with a modern, innovative, commercial-off-the-shelf (COTS) Transportation asset management systems (TAMS) named GIS-Mo. This geospatial emphasis software system will improve the county engineer's data-driven decision-making capabilities.
The software used to manage the assets will consist of an Esri Roads & Highway platform and VUEWorks asset management system. The primary objective of GIS-Mo is to improve the timeliness, accuracy, completeness, uniformity, integration, and accessibility of just under 78,000 lane miles of Washington State county roads, and hundreds of thousands of road related assets.

Future Technology - Automated Pavement Distress Analysis

With advances in new and innovative technology with mobile asset collection, windshield surveys could be replaced with an automated collection of data and images. Automated methods for quantifying pavement distress measurements have shown some interesting results. How great would it be to collect pavement images, batch them on a server, and have it produce accurate pavement distress maps that you can overlay in a GIS? Infrared and lidar are currently being used for pavement management by some agencies, and the technology is here!

Most pavement inspections involve intricate processes where pavement expert's rate segments visually, from field visits and at times in the office. This introduces a lot of subjectivity in the rating results and typically culminates in a Road Log showing pavement ratings by segments.



Screen shot from VUEWorks Spokane County with surface types

Impacts To Roadway Surfaces

Traffic engineers are tasked to utilize safety technology for keeping cars on the roadway. This includes installing recessed centerline rumble strips & recessed markers, shoulder rumble strips, and recessed pavement striping (thermoplastic). These added safety features (most alert the driver that they are leaving the travel way) in the roadway prism are providing great results for reducing run-off-the roadway departure collisions, however they are also proving to be a structural weak point in our paved roadway surface. The tendency is for water to pond in these recessed areas, which weakens the layers, creating delamination and collects debris. A higher frequency of street sweeping is required at these locations as well as applying an asphalt rejuvenator every 3-4 years.

The pavement segments that are receiving the rumble strips should be in good condition and the depth should be thick enough to support them. Grinding rumble strips into inadequate pavement has led to premature pavement failure. Installing rumble strips in a Bituminous Surface Treatment road is not recommended unless the BST was applied over an existing HMA or ACP.

Recessed shoulder rumble strips

Centerline recessed pavement marker strips

In closing, strong communication with decision makers and a long-term commitment is necessary to be successful. Why build what you cannot maintain! Failure to maintain a roadway network at the optimal time dramatically increases maintenance cost, decreases drivability and, may expose the public to increased risk of higher accident rates. The cost of pavement preservation increases exponentially with pavement deterioration. Therefore, the three sound principles for pavement preservation should be followed - The **Right Treatment**, at **The Right Time**, on **The Right Road.**

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