Washington State Department of Transportation

Traffic Operations

2015–17 Low Cost Enhancement Program

FINAL REPORT

October 2018

Statewide Overview

Low Cost Enhancement (LCE) projects are small, low cost — usually less than $100,000 — projects that can be quickly implemented to reduce crashes, reduce the potential for crashes, or improve mobility. LCEs quickly address emerging crash trends and mobility issues. These projects bring near-term relief to operational deficiencies, and are often the first step in implementing incremental, long-term corridor strategies.

Because of their low cost and quick implementation, LCE projects are often very practical solutions to emerging needs. LCE projects may often postpone or lessen the need for larger capital projects.

LCE projects generally come in three sizes:

1. **Small.** Under $5,000. When projects are under $5,000, they are often bundled together under "Low Cost Actions," but they can also stand alone.
2. **Medium.** $5,000 – $50,000.
3. **Large.** Over $50,000.

LCE projects often originate with concerned citizens, elected officials, local agencies, or region staff. Additionally, priority programming and the Traffic Office's Field Assessment Program identifies larger-scale opportunities for LCE through a system screening process.

Safety

INTERSECTION
Project addresses crash trends, contributing factors, or mobility issues at an intersection.

LANE DEPARTURE
Project addresses engineering countermeasures associated with a vehicle leaving the lane. These may include high friction surface treatment (HFST), rumble strips, guardrails, and other treatments particular to a location.

BICYCLE/PEDESTRIAN
Project addresses identified crash or risks to bicyclists or pedestrians.

WRONG WAY
Project addresses potential for wrong-way driving onto highway ramps.

Mobility

Project addresses mobility on the system; includes some Intelligent Transportation System (ITS) projects.

Signs

Projects to implement Guide, Warning, Regulatory, or Low Clearance signs.

Other

MINOR STRIPING
Project involves minor striping.

ITS SPENDING
Intelligent Transportation Systems (ITS) projects use technology to manage traffic. These could include cameras, ramp meters, Road Weather Information Systems (RWIS), fiber cables, and many other types of technologies.

ILLUMINATION
Any project primarily intended to modify lighting.

TRAFFIC STUDIES
Any research or traffic studies.

PROJECT DESIGN
Labor to design and scope projects.

MISCELLANEOUS
Activities that don't fit in another category. Examples include:

- WSP aerial markings
- Test sites
- Tort claim investigations

Low Cost Actions

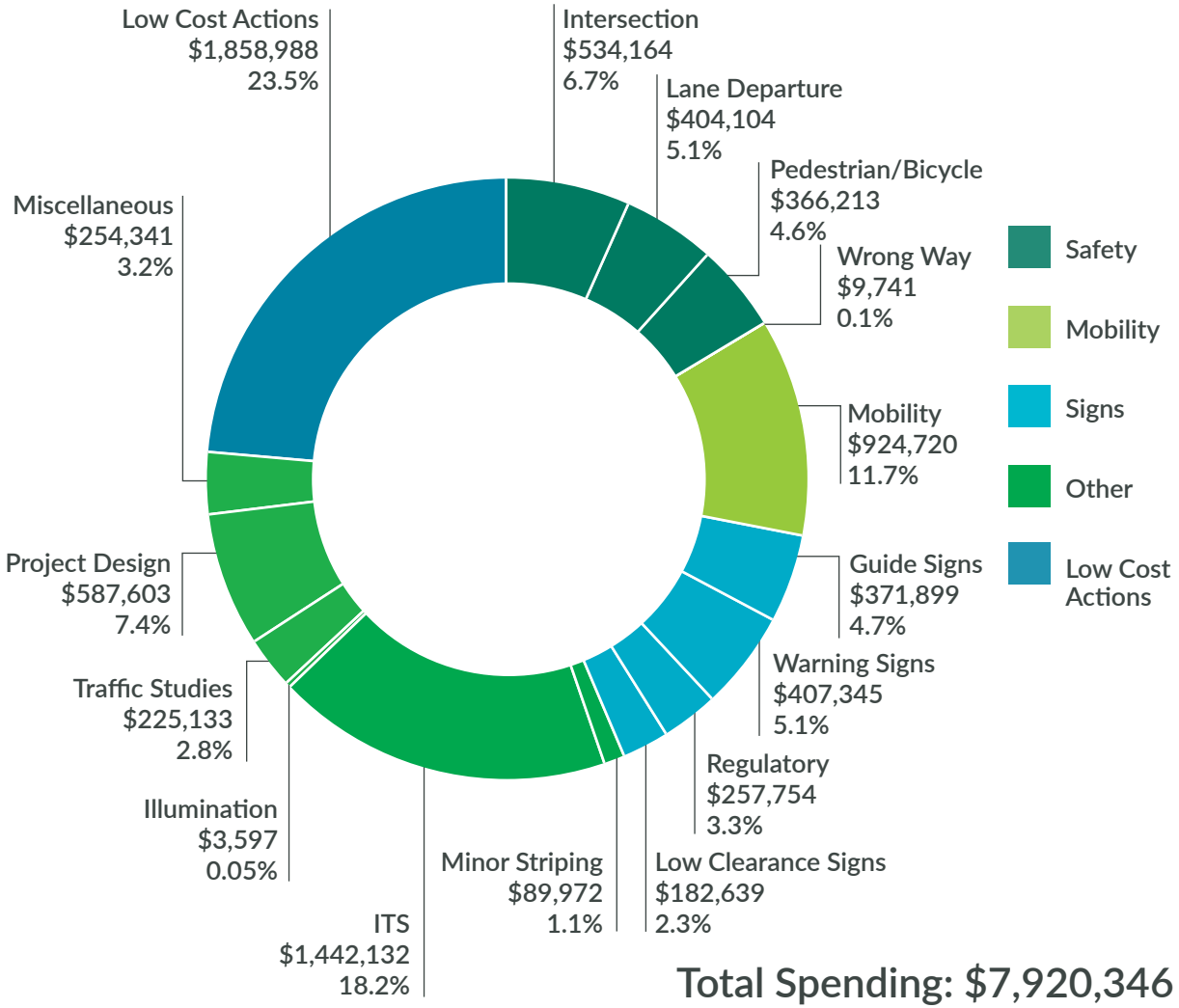
Many times, a region will bundle many small safety and mobility projects — usually $5,000 or less — under one job number. These are called "Low Cost Actions."

Statewide Overview (continued)

In 2015-17, the Traffic Office spent $7.9 million for LCE work; a budget proviso requires the Q program to spend at least $6 million on LCE projects.

Of the $7.9 million the LCE program spent in 2015-17, $7.1 million went directly to implement on-the-road projects. An additional $225,133 went to traffic studies for operational assessments, which will likely lead to new LCE projects in forthcoming biennia. This compares to only $75,109 spent on traffic studies in the previous biennium, emphasizing the Traffic Office's shift to proactively planning for projects, in addition to addressing emergent needs. The remaining $587,603 went to staff time to design projects.

Statewide Low Cost Enhancement Spending by Type of Project 2015-2017



Total Spending: $7,920,346

Note: due to rounding, the percentages will not add up to 100%

Successes and Challenges in 2015-17

The Field Assessment Program has helped the LCE Program be proactive

In July 2014, WSDOT Traffic launched the Field Assessment (FA) program, which provides funding to each region for two staff positions dedicated to proactively reviewing miles of highway for potential safety- and mobility-related projects. Funding for the FA staff comes from the Q program and the office of Capital Program Development and Management (CPDM). Once they identify these projects, staff use LCE funding to develop and implement them.

Prior to the FA program launch, most LCE projects originated with constituent complaints, or prioritized lists provided from statewide safety and mobility evaluations. Now, trained engineers in the regional traffic offices are funded to proactively identify and implement LCE projects. Staff use tools such as field reviews and reviews of safety and mobility data.

In the first three full years of its operation, the FA program identified and developed a total of 552 projects, with 341 (62%) of those constucted. Of the remaining 211 projects, 16 (8%) are pending coordination with scheduled paving projects. The remaining projects are mainly in the LCE backlog. The FA program has accelerated its timeline and now intends to complete a statewide review of all roads within seven years, down from the initial goal of ten. At the end of the 2015-17 biennium, FA staff had reviewed 48% of all state highway miles.

The project lists in this report contain many Field Assessment projects, a mark of how this new program is starting to show on-the-ground results. In addition, the report highlights several Field Assessment projects, including:

- *SR 290 Progress Road Turn Restrictions* – Design (ER), page 53
- *SR 397 at Ainsworth Ave* – Intersection Improvements (SCR), page 46
- *I-82, US 12, and N. 1ST ST LX – Interchange Striping Change* (SCR), page 48
- *SR 141 in Bingen and White Salmon* – Pedestrian Improvements (SWR), page 38

ITS preservation is 13.2% of all LCE spending for 2015-17

The ongoing preservation of ITS systems is a challenge for the LCE program. ITS systems are usually made up of multiple components. For instance, a simple system to provide real-time travel information for trip planning would be composed of the following devices: a set of closed circuit TV cameras, loop detectors, fiber optic cable, and a data station. WSDOT prefers to replace all components at once, usually when they become technologically obsolete.

Speed limits

WSDOT's Traffic office administers the process for setting statewide speed limits and lane designation restrictions such as HOVs and shoulder driving. During CY 2015, 2016, and 2017, the Traffic office approved a total of 53 speed zone and HOV designations. The majority of these approvals are for speed limit reductions, with only four speed limit increases. The Traffic Office is noticing an increase in speed limit changes over the past year. This is likely because of the Field Assessment program's proactive outreach to communities, who request these changes as part of their partnership with WSDOT to address safety and mobility concerns.

Successes and Challenges in 2015-17 (continued)

However, the service life of each component varies. For safety, mobility, and operational purposes, the WSDOT Traffic Office's policy is to use LCE funds to replace individual failing components in order to keep the full system functioning.

This spending has bitten deeply into the overall LCE budget. All regional offices performed some ITS preservation work during the 2015-17 biennium, for a total of $1,044,455. Statewide, this is 72.4% of all LCE funds spent on ITS, and 13.2% of the overall LCE budget for the biennium.

Lack of preservation funding requires regions to use LCE funds to replace critical failed components. Preservation funding is an agency-wide challenge for WSDOT.

Continuing program challenge: staffing and resources

The Traffic Office has staffing pressures

A major challenge facing the program is staffing needs, especially experienced staff.

A strong economy, paired with significant recent investment in transportation infrastructure across the state, has created competition among both private and public employers for most WSDOT job classifications. WSDOT also faces additional pressure in the form of an aging workforce as a significant number of staff will be eligible for full retirement benefits within the next five years. Further, some regional offices are having trouble finding and retaining qualified staff, especially in higher-cost-of-living regions, which limits the LCE program's ability to complete funded projects.

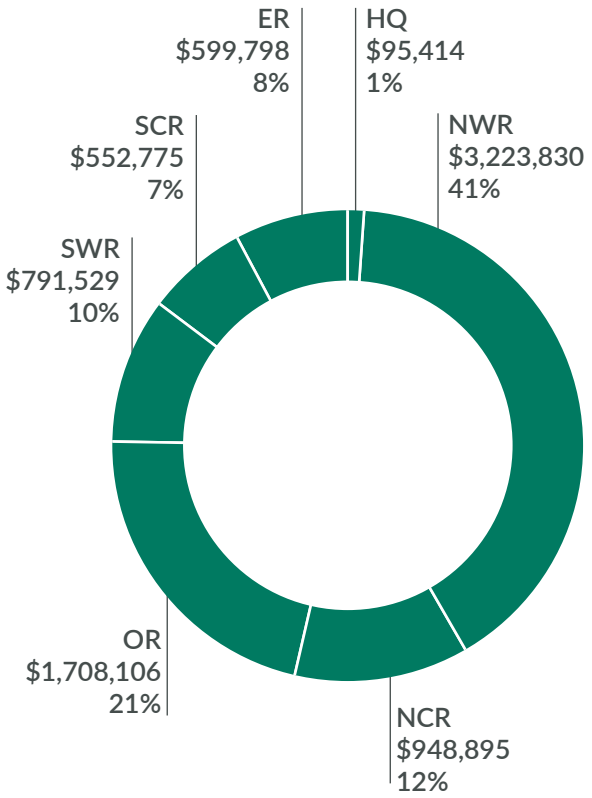
As long-time Traffic Operations personnel retire or move on to other positions, staff knowledge of how to identify, design, and implement critical projects must be developed. These factors make workforce strategies underway a crucial element in WSDOT's ability to deliver infrastructure projects around the state.

This staffing challenge also includes maintenance office staff. Traditionally, many LCE projects have been implemented by WSDOT's maintenance staff. This has allowed WSDOT to implement more projects at lower costs. However, maintenance forces have an expanding workload and do not always have time to get to new LCE projects.

Backlog of Project Work

Demand continues to grow for identified projects, but this has not come with all of the necessary resources to implement them. Although the Field Assessment program has been successful in proactively identifying projects, this has created a backlog of projects to design and implement, (see page 8).

Low Cost Enhacements: Spending by Region 2015-2017



Successes and Challenges in 2015-17 (continued)

Future LCE Projects will be larger in scale and cost

The future also requires more flexibility for spending in the LCE program for mobility-related investments. This program is the only source of money for small-scale mobility projects within WSDOT. Large-scale projects ($400,000 or more) are covered by the Improvement capital mobility program, generally through line item appropriations. Larger safety-related projects can be funded through programmatic appropriation in the Improvement capital safety program.

Currently, there is no sustainable funding mechanism within WSDOT for mobility projects between $50,000 and $500,000, even though these types of projects can address mobility needs and forestall larger-cost projects, (see pages 7–8 for more information).

Higher-Cost Projects

The lack of adequate funding for project engineering and construction is the biggest challenge that the LCE program faces, especially in delivering higher-cost (over $50,000) projects. WSDOT can deliver projects by small works contract or using state forces, but both methods take Traffic Office staff time to develop the solution. State force delivery takes WSDOT Maintenance labor time and equipment, and LCE assignments must be worked into schedules already full of routine maintenance tasks.

Meanwhile, delivery by small works contract requires plan development and review, and are not nimble or flexible enough to accommodate quick turnaround. WSDOT's contract administration processes are not streamlined for quick delivery of relatively small-scale projects. Additionally, contractor bids continue to run high, which adds to project costs.

An additional challenge is in engaging the spectrum of resources available within WSDOT to assist with projects that require more sophisticated development work than is traditionally the work of Traffic Office staff. Traffic Office personnel are not trained in the delivery of higher-cost projects, nor is the office organized for this type of delivery. These staff resources do exist in the Region Project Development Offices, but those resources traditionally are dedicated to delivering improvement and preservation projects.

2015-2017 Low Cost Enhancement Projects Over $50,000

NWR	Central Signal System Replacement	$422,114	ITS spending
NWR	SR 520 51st and 40th – Rechannelization	$399,499	Mobility
NWR	I-405 at SR 181 SB – On-Ramp Meter	$188,363	Mobility
ER	Closed Circuit Television (CCTV) Cameras	$149,081	ITS spending
NCR	SR 28 – Passing Lane MP 16–18	$126,138	Mobility Lane Departure
NWR	RWIS Upgrade Equipment	$109,018	ITS spending
NWR	SR 542 MP15.98 To MP 16.36 – Guardrail	$90,067	Lane Departure
NWR	SR 9 and SR 532 – Replacing Controller Cards	$80,614	ITS spending
NWR	ISIP 15-17 - Active Warning Signs & Pavement Markings	$80,063	Intersection
OR	JBLM Travel Time	$72,771	Mobility
NCR	SR 28 & US 97 – Brewster/Pateros/Quincy Rectangular Rapid Flashing Beacons	$67,664	Pedestrian/Bicycle
SCR	Regionwide Traveler Information Enhancements	$61,620	ITS spending
NCR	SR 243 – Shoulder Widening for WSP Enforcement Pullouts	$60,879	Miscellaneous Lane Departure
NCR	SR 28 N. Of East Wenatchee – Variable Message Sign	$51,315	ITS spending

Higher Cost LCE Projects that Traffic Office Could Implement Immediately

The Traffic Office maintains a list of projects, identified through the Field Assessment and Corridor Sketch programs, that staff could implement immediately given additional resources.

Pending Low Cost Enhancement Projects Over $50,000

Region	Location	Description	Category	Cost
NWR	SR202 NE 218th St	Active Warning System. Install signs with flashing beacons, detection, and power to alert motorists of vehicles waiting to turn onto SR202, as well as for vehicles stopped on SR 202 waiting to turn	Intersection	$62,000
NWR	I-90 EB Off-ramp to SR18	Active Warning System. Install power, communications, two blankout signs, and detection. The signs will alert motoristes of stopped/slowed traffic.	ITS	$385,000 of LCE funds (total project cost $635,000)
NWR	SR526, SR527, and SR96	Loop Modification, Communication, and Cameras for Adaptive Signal Control. Supplementary work to ensure fully functional adaptive signal control system as part of the SnoCo-led muti-jurisdictional effort.	Intersection Mobility	$470,000 of LCE funds (total project cost is $2,470,000)
NCR	US97 Brewster Two Way Left Turn Lane (TWLTL)	Restripe to install a TWLTL and left turn channelization at Brewster.	Mobility Lane Departure Striping	$120,000
NCR	SR282 Dodson Road Compact Roundabout	Construct a compact roundabout within existing Right of Way and pavement.	Mobility Intersection	$300,000
NCR	SR243 and Road 26 Channelization	Construct minor widening and restripe with 2019 chip seal project to provide left turn channelization.	Mobility Lane Departure Striping	$50,000 of LCE funds (total project cost $150,000)

Region	Location	Description	Category	Cost
OR	I-5 SB 54th Street Exit Only	Restriping HOV Lane and Signing	Mobility Lane Departure	$58,000
OR	US 101 MP 267.43 Palo Alto Rd	Add Left Turn Channelization	Mobility Lane Departure	$200,000
OR	SR 307 Left Turn Channelization Minder Rd MP 5.11	Add Left Turn Channelization	Mobility Lane Departure	$250,00
SWR	I-205 SB Exit 30 & SR 500 Lane Reconfiguration	Restripe the off-ramp and on-ramp to address mobility and safety for vehicles merging onto the mainline.	Intersection Mobility	$56,000
SCR	US 395 MP 23.69 Kartchner I/C NB Ramp Terminal Roundabout	This is currently a stop sign controlled intersection and has a large truck volume and could benefit from the installation of a compact roundabout.	Intersection Mobility	$100,000
SCR	SR 240 and Steptoe	This project will use a meter to address mobility issues in entering the roundabout.	Mobility	$130,000
SCR	US 395 / 27th	Install a northbound acceleration lane. This corner has a yield condition right turn onto northbound US 395. This corner also has a high crash occurrence, while most are P.D.O.	Intersection	$480,000
ER	SR 2 Hayford to Deer Heights	Restrict Turning Movements to address reduce entering-at-angle crashes	Intersection	$250,000
ER	SR 902 at Craig Road	Compact Roundabout to address entering-at-angle crashes and mitigate Tribe Casino volumes	Intersection Mobility	$400,000
ER	SR 290 at Napa St	Address “Disregard Stop and Go Light” crashes; coordination with BNSF	Intersection	$150,000

Low Cost Enhancements and Target Zero

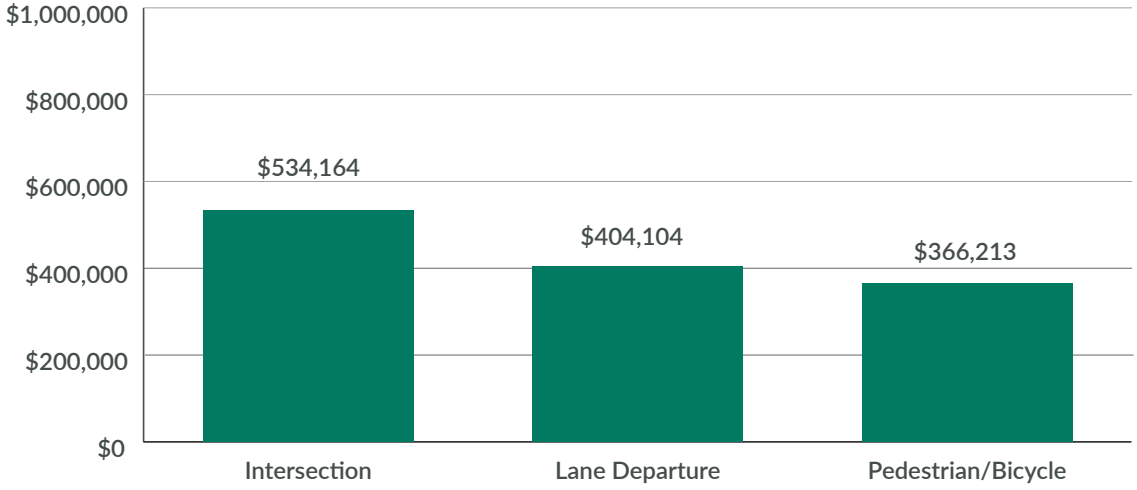
Washington State has a goal of zero deaths and serious injuries on our roads. The state's highway safety plan, Target Zero, contains hundreds of data-driven strategies intended to help reach the zero goal. A coalition of over a hundred entities – representing federal, state, local, tribal governments, as well as non-profits and for-profit companies – have come together to reduce roadway crashes through a combination of the five Es: education, enforcement, engineering, EMS, and evaluation.

WSDOT's LCE program is a major partner on this effort. The quick, responsive nature of LCE projects make them an ideal fit for addressing both recurring and emerging safety issues.

In 2015-2017, $1.3 million (16.5%) of all LCE funding went to three spending categories that directly correlate with four of Target Zero's priority areas for reducing fatal and serious injury crashes: intersections, lane departure, pedestrians, and bicycles.[1] Many other LCE projects have a less direct connection to addressing safety, such as Low Cost Actions, Warning Signs, and Minor Striping.

To improve the effectiveness of LCE engineering projects, WSDOT's regions actively coordinate with local partners, combining available resources and using multiple strategies – such as enforcement and education efforts – to collectively address traffic crashes.

Statewide Low Cost Enhancement Spending by Target Zero Categories 2015-2017



[1] For the purposes of this report, the "Wrong Way" category covers only projects to prevent drivers from going the wrong way onto highway access ramps. Therefore, these are not included in the lane departure category.

New LCE Program Initiatives

In the 2015-17 biennium, regions completed a few LCE projects that represent a departure from the usual on-the-road projects. This section shares three examples of initiatives that are helping the Traffic Office identify and plan for future LCE projects.

SPOKANE FREEWAY OPERATIONS STUDY

In the Spokane area, I-90 is increasingly experiencing both recurring and nonrecurring congestion. This is contributing to safety and mobility issues along the corridor. WSDOT's I2 program identified I-90 from the US 2 interchange through the Broadway interchange as a high collision corridor segment, and allocated funding for a safety improvement project. In consideration of operational performance, the Eastern Region Traffic Office contributed LCE funding to expand the boundaries of the study to encompass the segment in both directions, westbound to SR 904/Four Lakes Interchange, and eastbound to the Idaho State Line – the primary urban core through Spokane.

More information on this project is available on p. 51.

WSDOT SWR CURVE DATA COLLECTION & ANALYSIS

The Traffic Office is working on a long-term approach for consistent, statewide signing of roadway curves. This effort is part of WSDOT's focus on reducing run-off-the-road collisions, a key priority of Target Zero.

In the 2015-17 biennium, SWR used LCE funding to obtain updated data on their curves, in order to assess curve advisory speed limit and signing needs. The whole region hadn't been evaluated since 1998. SWR hired an outside consultant to gather and process the data using the Curve Advisory Reporting Service (CARS) program. The entire project took less than two months, which saved months of WSDOT staff time. SWR now has consistent data on the Point of Curvature and Point of Tangent, radius, length of curve, deflection angle, recommended advisory speeds, sign spacing, and signing recommendations for all curves in the region. The review identified locations in the region that warrant additional review; additionally, the report indicates which advance signs and advisory speeds to use, and calls out the number of signs required in the curves.

This approach to gathering curve data is more cost-effective than past efforts, and helps create the desired consistent, statewide approach. This work will expand to other regions in upcoming biennia.

New LCE Program Initiatives (continued)

CORRIDOR SKETCH AND I-5 PILOT PROJECTS

The corridor sketch initiative is part of an ongoing evolution of WSDOT's project planning and programming process. It relies heavily on regional partners to help identify, prioritize, and develop best solutions to operational issues on state roads.

As part of this initiative, WSDOT has launched two pilot projects to enhance the performance on segments of the I-5 corridor: the Snohomish County Line to Corson in King County, and Dupont to Trosper in Thurston County. The Traffic Office is part of a group of transportation partners working in an iterative process to develop multi-modal near-term actions for these two locations. Near-term actions are those that can be implemented within a zero- to four-year timeframe, and can demonstrably improve I-5's performance. While WSDOT and its partners ultimately intend to engage in long-term strategic planning for our state's critical I-5 corridor, which will include projects of significant scope and scale, in the interim these near-term actions are intended to directly, immediately, and accountably address the current mobility issues.

The partners refined and prioritized several potential strategies, after conferring with focus groups made up of representatives from local agencies, cities, transit agencies, JBLM, and regional planning councils in King and Thurston Counties, plus WSDOT planners, traffic engineers, and public transportation staff. From these reviews, the project's core team and senior leaders from the partner agencies develop a proposed "short list" of projects. This list has been filtered for budget feasibility, degree of consensus, complexity, risks, and expected performance improvement, among other criteria. A critical factor is sponsorship: to move forward, a project needs at least one agency to sponsor it. From this, the group is developing a final package of projects.

So far, potential near term actions include:

- Physical improvements to I-5 to decrease weaving and support congestion management
- Install Ramp Metering to create better transit access and improve traffic flow
- Transit and HOV improvements to increase the person-carrying capacity of the system, including addressing park and ride capacity and improving transit speed & reliability
- Encouraging transportation demand strategies such as remote work locations or staggered start times
- Upgrading Signals and Implement Transit Signal Priority, focused on optimizing and synchronizing the signals, for both general traffic and transit.

The intent is to have a list of near-term, low cost strategies for a defined location that may be eligible for WSDOT's LCE, planning, and public transit funding. It is unlikely that any of the strategies identified will be funded for the coming 2018 construction season. However, WSDOT and its partners hope that there may be opportunities to identify funding in the following construction season and beyond.

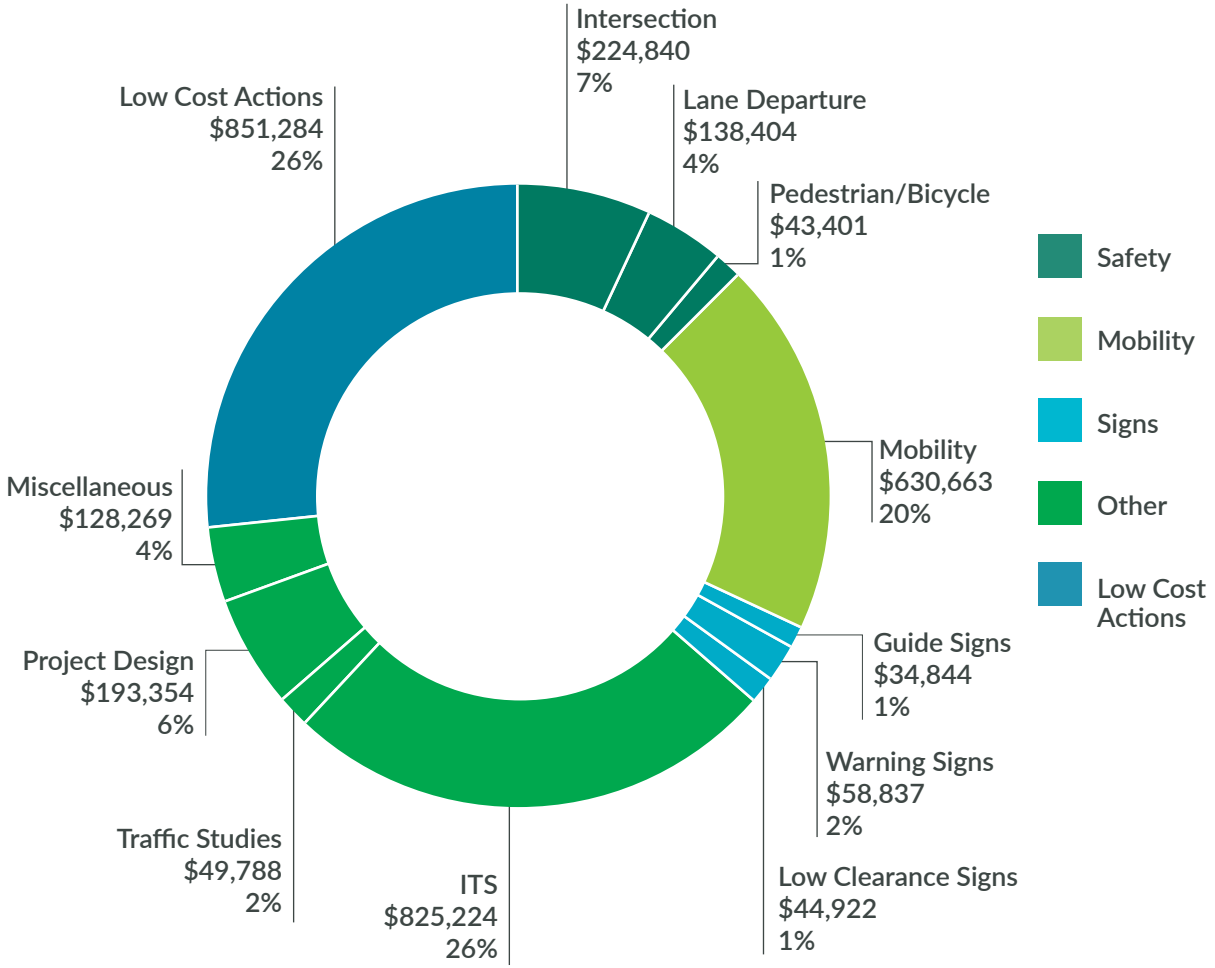
More information on Corridor Sketch is available here: https://www.wsdot.wa.gov/planning/corridor-sketch-initiative

Northwest Region

NWR spent $3.2M in Low Cost Enhancement funding in the 2015-17 biennium. One of the region's largest initiatives was a series of ITS projects, totaling $825,000, or 26% of the region's LCE budget. These included a new central signal operation system (p. 16), updates to local signal controllers, and updates to the region's Roadway Weather Information System (RWIS), which Maintenance uses for responding to winter weather and provides critical information for WSDOT's public web site. NWR also added a camera to fill in an I-5 segment lacking camera coverage, which will allow the region to verify and respond to incidents at these locations.

Many of these projects represented necessary updates to outdated or non-working equipment. A major issue found throughout NWR's 2015-17 program was the need to spend LCE funds to replace aging ITS equipment. Other funding sources weren't able to replace the central signal system, or update the RWIS equipment. Ultimately, 23% of NW Region's 2015-17 allocation – nearly all of its ITS spending – was used to replace aging equipment or related needs. This use of LCE funds to address ITS replacements reduces NWR's funds to provide safety, mobility, signing, and other important LCE projects in the region.

NWR: Low Cost Enhancement Spending by Type of Project 2015-2017



Total Spending: $3,223,830

Northwest Region

All 2015–17 Low Cost Enhancement Projects

Central Signal System Replacement	$422,114	ITS spending
SR 520 at 51st and 40th – Rechannelization	$399,499	Mobility
King Area Low Cost Actions	$314,531	Low Cost Actions
Snohomish Area Low Cost Actions	$271,324	Low Cost Actions
Mount Baker Area Low Cost Actions	$194,258	Low Cost Actions
I-405 at SR 181 SB – On-Ramp Meter	$188,363	Mobility
RWIS Upgrade Equipment	$109,018	ITS spending
SR 542 MP15.98 To MP 16.36 – Guardrail	$90,067	Lane Departure
SR 9 and SR 532 – Replacing Controller Cards	$80,614	ITS spending
ISIP 15-17 - Active Warning Signs & Pavement Markings	$80,063	Intersection
Materials Lab Investigations	$70,203	Project Design
Environmental Investigations	$49,496	Project Design
Central Operations Low Cost Actions	$48,800	Low Cost Actions
Incident Response / WSP – Radio System Upgrade	$48,724	Miscellaneous
Pooled Fund Study for TMC / HOV	$45,000	Traffic Studies
Low Clearance Signs	$44,922	Low Clearance Signs
I-5 Duwamish Curves – Camera	$41,847	ITS spending
SR 202 at 244th – Flashing Yellow Arrow	$37,710	Intersection
SR 522 MP 21 – Median Turnaround	$37,554	Miscellaneous
I-5 Express Lanes At 42nd – Replace Signs	$36,224	Warning Signs
CCTV Camera Replacement – Phase 1	$35,343	ITS spending
SR 530 to I-5 On-Ramps – New ITS Loops for Future Ramp Meters	$32,142	ITS spending

CCTV Camera Replacement – Phase 2	$29,334	ITS spending
Incident Response – Automatic Vehicle Location System	$28,027	Miscellaneous
Uninterrupted Power Supply Equipment at 11 traffic signals	$27,291	Intersection
SR 522 at 47th – Access Control	$24,987	Lane Departure
Engineering Design	$23,269	Project Design
SR 9 – Camera Replacement	$22,308	ITS spending
I-90 at SR18 – Through Signing	$22,066	Warning Signs
I-5 NB Lynnwood Vicinity – Remove and Replace Signs	$21,854	Guide Signs
Freeway Operations Low Cost Actions	$20,830	Low Cost Actions
SR 20 at Newhalem – Rectangular Rapid Flashing Beacon	$17,982	Pedestrian/ Bicycle
I-5 at Bakerview – Flashing Yellow Arrow	$16,971	Intersection
I-5 at NE 80th St – Guardrail	$16,063	Lane Departure
SR 527 at 153rd – Flashing Yellow Arrow	$16,013	Intersection
SR 520 at 51st and 40th – Contract administration to complete project	$14,473	Mobility
Design	$14,133	Project Design
SR 9 at SR 530 – Flashing Yellow Arrow	$13,168	Intersection
I-405 at 124th – Replace Cabinets and Controllers	$12,913	ITS spending
ISIP Active Warning signs – Ad and Award	$11,385	Intersection
SR 9 at 164th – Eliminate Side Street Split Phase	$11,092	Mobility
I-5 at Mercer – Bluetooth Travel Time Study	$11,005	ITS spending
I-405 at SR 181 – Camera	$10,481	ITS spending

Northwest Region

All 2015–17 Low Cost Enhancement Projects (continued)

I-90 and SR 202 – Roundabout	$10,139	Intersection
SR 18 WB at Auburn Black Diamond Rd – Sign	$10,132	Guide Signs
I-5 at Swift And Albro – Finish Signal Integration Contract	$9,460	ITS spending
US 2 at Old Owen/Fern Bluff – Signal Modification	$7,743	Mobility
Utility Investigation	$7,712	Project Design
15-17 Basic Safety Signs – Engineering	$7,563	Project Design
SR 531 at 27th Ave NE – Remove WB Turn	$7,487	Mobility
SR 516 at 216th Ave SE – Poles for Pedestrian Signs	$6,886	Pedestrian/ Bicycle
Sultan Paving for Signal Upgrade	$6,297	Miscellaneous
I-5 at S 188th St – Flashing Yellow Arrow	$6,167	Intersection
I-5 Lynnwood to Mountlake Terrace Freeway Station – SB Shoulder Run	$6,019	Project Design
I-90 at SR18 – ITS for Congestion Warning System	$5,972	Project Design
SR 167 Vicinity of S 180th – Guardrail Extension	$5,942	Lane Departure
SR 524 at Damson/North Rd – Flashing Yellow Arrow	$5,933	Intersection
SR 530 and SR 531 – NB Ramp Meter Engineering	$5,575	Project Design
SR 96 Penny Creek – School Zone Flashers	$5,223	Pedestrian/ Bicycle
SR 202 at Fall City – Pedestrian Enhancement	$5,061	Pedestrian/ Bicycle
I-90 Highpoint Fiber Enhancement	$4,951	ITS spending
I-90 Traffic Analysis	$4,788	Traffic Studies
Tort Claim Investigation	$4,461	Miscellaneous
SR 169 at SE 264th – Audible Pedestrian System	$3,719	Pedestrian/ Bicycle
I-5 Mercer Meter SB Ramp – Restripe and Seal	$3,693	ITS spending
Radio Patch Incident Response / Seattle Fire Dept	$3,207	Miscellaneous
UR 2 at Bickford EB Exit – Signing	$2,858	Guide Signs
SR 531 at 27th NE – Pedestrian Button	$2,633	Pedestrian/ Bicycle
SR 520 at NE 40th St – Peak Hour Shoulder	$2,007	Mobility
SR 99 at 40th Ave W – Leased Luminaire	$1,896	Pedestrian/ Bicycle
15-17 Curve Warning – Engineering	$1,804	Project Design
ITS Low Cost Actions	$1,541	Low Cost Actions
I-90 at 148th and SR 526 at I-5 – High Friction Surface Treatment	$1,345	Lane Departure
I-5 Cameras – Ad & Award	$943	Project Design
SR 104 Mid Block Crossing	$666	Project Design
Curve Warning Signs	$546	Warning Signs

Northwest Region

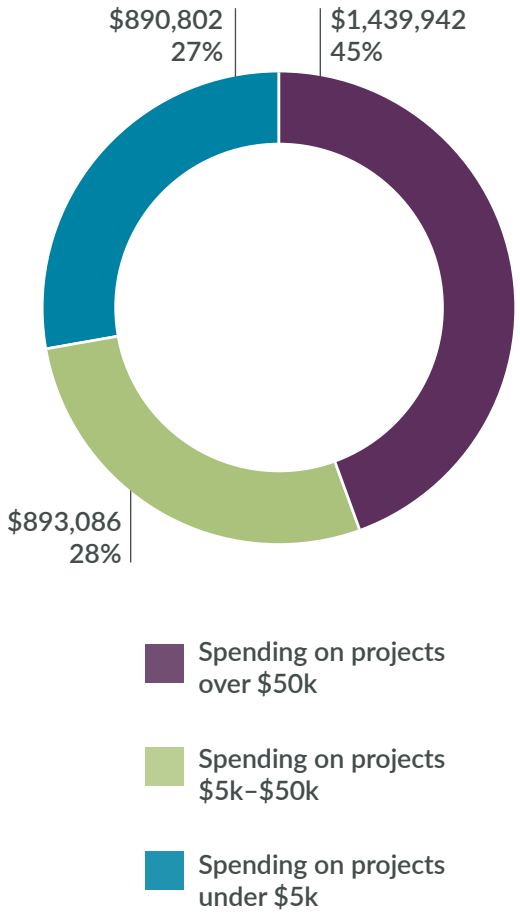
Another source of significant LCE spending for NWR was Low Cost Actions, projects installed by Maintenance staff that generally cost $5,000 or less. The region completed around 200 small actions, at a cost of $851,000 (26% of the budget).

Mobility improvements made up 20% of NWR's LCE spending. Two major mobility project include a bottleneck removal at *SR 520 at 51st and 40th – Rechannelization* (p. 17), and the installation of ramp meters at *I-405 at SR 181 SB – On-Ramp Meter* (p. 18).

NWR's fourth-largest spending category was safety projects, 13% of its 2015-17 LCE program. The final 4% of the 2015-2017 budget was spent on large sign projects, including $45,000 on low clearance signing and $36,000 to replace outdated signs on the express lanes. Additionally, Traffic and Maintenance partnered to remove a failing sign bridge on I-5 at MP 180.30 in the vicinity of 44th Ave W. The Bridge Preservation Office identified this truss sign structure as their highest priority risk-condition, due to age and corrosion on lower chords.

In 2017-19, NWR will prioritize the completion of its Field Assessment projects. It will also focus on intersections (including nonsignalized), pedestrian and bicycling safety, and freeway ramps. Planned projects include improving detection at signalized intersections to facilitate collecting count information, installing more Uninterruptable Power Supplies (UPS), connecting more signals to the central system, and adding permanent data stations. The region foresees that the allotted Q3 project amounts will not be sufficient to cover rising costs, and thus will likely use region LCE funds to supplement. For example, LCE is contributing $162,000 to fully fund the *I-5 188th to NE 80th Camera project*.

NWR: Low Cost Enhancement Spending by Size of Project 2015-2017



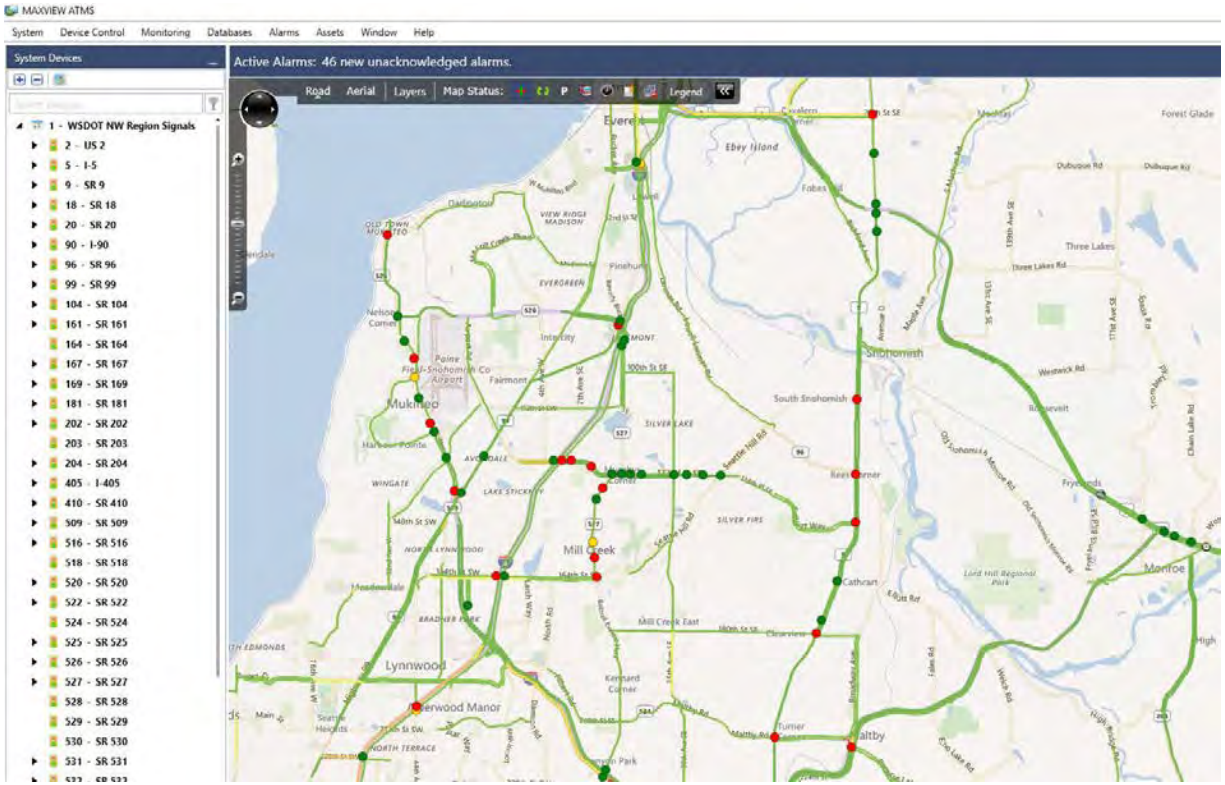
Northwest Region

2015-2017 Project Highlights

CENTRAL SIGNAL SYSTEM REPLACEMENT $422,114

By the start of the 2015-17 biennium, NWR's central signal system was at the end of its useful life. Confronted with a system no longer supported by its developer, the region undertook a search for a new system. NWR's main criteria were the ability to use existing controller software, and the capability to implement performance measures to optimize signal operation. After review, NWR purchased and installed the MaxView system at a total system cost of $770,000. The purchase include installation of software at signalized locations, seven years of system maintenance, and staff training. The region spent $422,000 in 2015-17 and will spend the remainder over the next three biennia.

All traffic signals with central connection capability are now connected to the new system. The region is in the process of upgrading existing controller modules, at a cost of about $1,000 per intersection, for the capture and transmission of high resolution data. This will allow implementation of performance measures.



An image of the MaxView system. A central system allows individual controllers to perform together, and for traffic engineers to make timing adjustments remotely. This saves considerable engineering travel time, which allows more frequent updates to timing parameters.

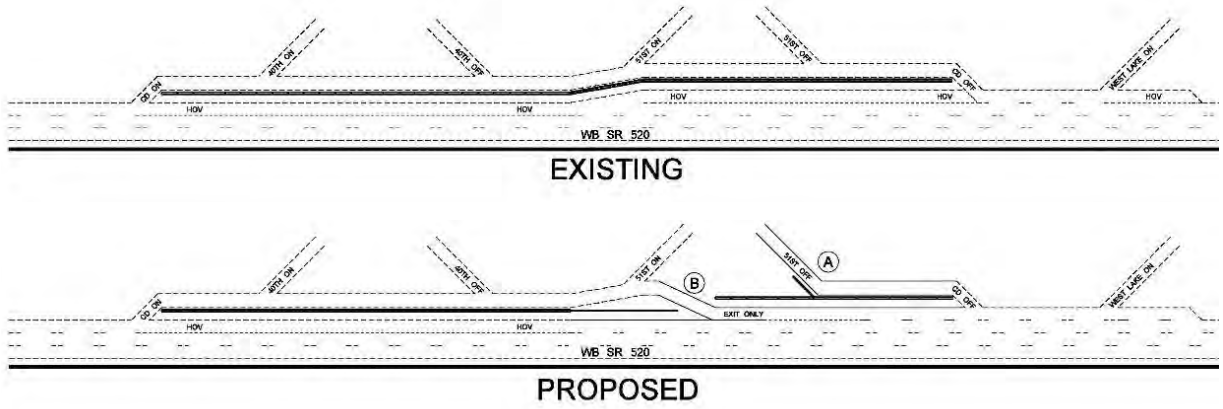
Northwest Region

2015-2017 Project Highlights

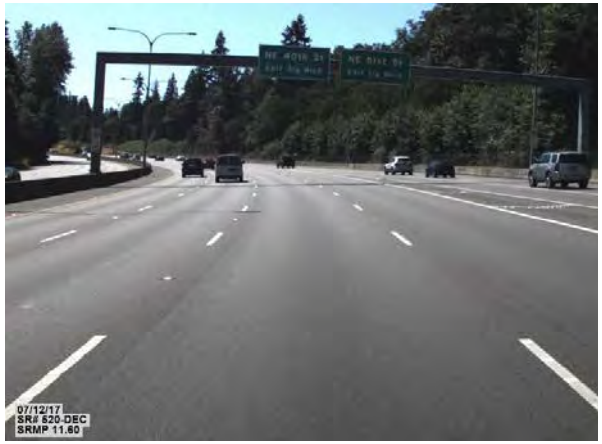
SR 520 AT 51ST AND 40TH – RECHANNELIZATION $399,499

The rechannelization removed a major choke point and resulted in free-flow traffic in this location through the AM peak. This major mobility project created more distance for vehicles to sort at the confluence of two major traffic streams on SR 520: the West Lake Sammamish on-ramp, and the 51st and 40th exits. It also reconfigured the single off-ramp serving both 51st and 40th to create separate exits for each off-ramp. This reorganized and spread out entering and exiting traffic.

The project included signing, pavement marking, and underdeck lighting. It was substantially complete in February 2016.



Schematic showing on-ramp and off-ramp connectivity before and after the rechannelization project



Westbound SR 520 view of current signing to the separated NE 40th St and NE 51st St off ramps

Northwest Region

2015-2017 Project Highlights

I-405 AT SR 181 SB – ON-RAMP METER $188,363

In 2014, this ramp in the Southcenter area of Tukwila had one metered lane plus an HOV bypass lane that extended back to the signalized intersection at SR 181. Due to low HOV and no transit use of this interchange, plus the need to accommodate I-405 construction traffic impacts, NWR removed the HOV designation and turned off the ramp meter.

To improve traffic flow, this project restored metering to the I-405 southbound on ramp by providing a meter for each of the two lanes. The project also added pavement markings and signing associated with the ramp meter.

Ramp from SR 181 (aka Interurban Ave S) to southbound I-405 showing one meter per lane

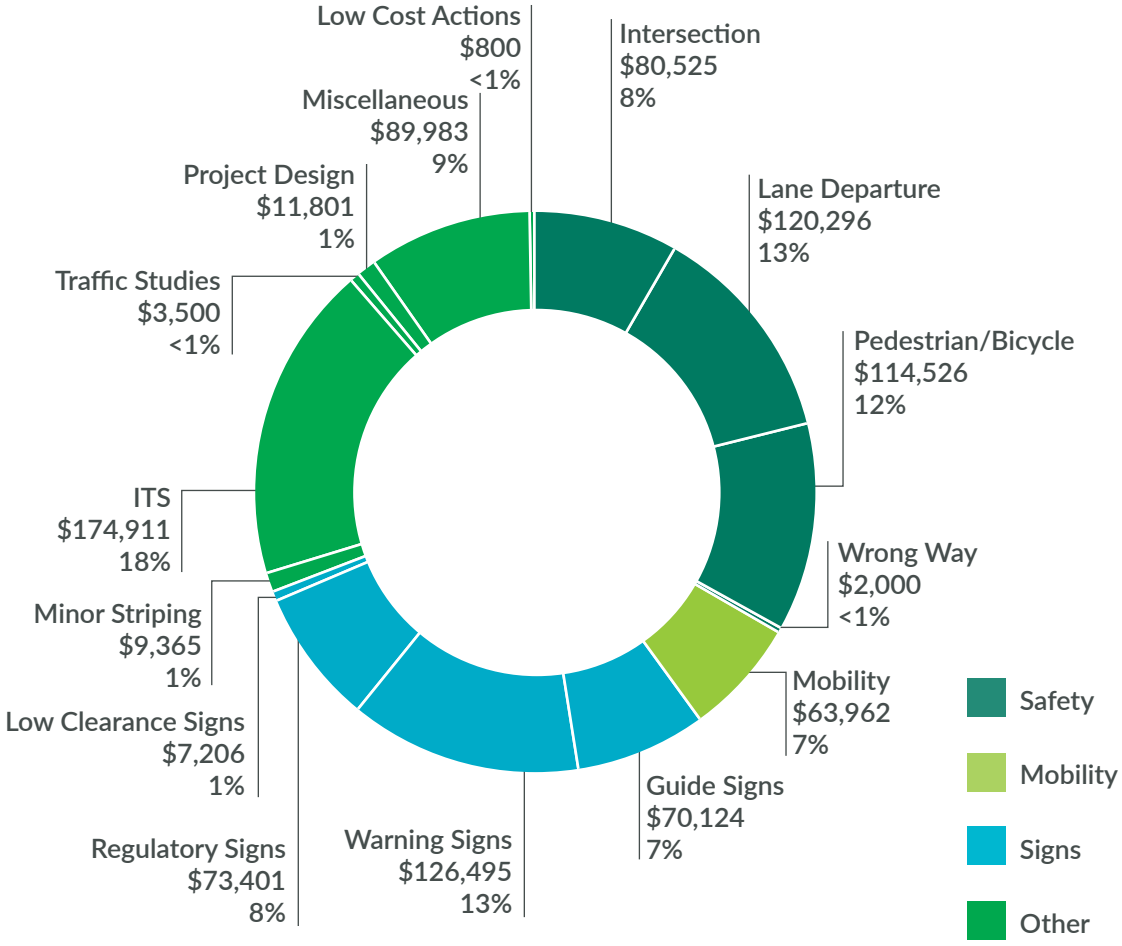
North Central Region

In the 2015-17 biennium, NCR used LCE funding and collaborated with other programs and developers to enhance and improve a wide variety of aspects of the region's transportation system, including pedestrian and bicycle safety, intersection improvements, installation of a passing lane, signing, and highway striping.

LCE funding also enabled NCR to address several significant ITS needs. The region purchased a new VMS for installation at the junction of US 2, US 97, and SR 28 north of East Wenatchee – a major decision point for westbound travelers. NCR also purchased five pan/tilt/zoom cameras and installed four at critical locations for video surveillance of road, traffic, and weather conditions. (The fifth will be installed during the 2017-19 biennium.) Additionally, the region upgraded its Traffic Management Center with a video wall, and updated the electronics in their portable Highway Advisory Radios. These additions and upgrades will enhance NCR's ability to react quickly to traffic events, and to provide the public with easy access to accurate and timely travel information. NCR plans to continue its systematic approach to filling gaps in monitoring, communications, and efficient dispersal of information in the 2017-19 biennium.

NCR recognizes the need to improve traffic signal operations. The region is now in the process of replacing outdated controllers and software with Advanced Traffic Controller

NCR: Low Cost Enhancement Spending by Type of Project 2015-2017



Total Spending: $948,895

Note: due to rounding, the percentages will not add up to 100%

North Central Region:

All 2015–17 Low Cost Enhancement Projects

SR 28 – Passing Lane MP 16–18	$126,138	Mobility Lane Departure
Area 1 Signs	$81,707	Signs
SR 28 & US 97 – Brewster/Pateros/Quincy Rectangular Rapid Flashing Beacons	$67,664	Pedestrian/Bicycle
SR 243 – Shoulder Widening for WSP Enforcement Pullouts & Safety	$60,879	Miscellaneous Lane Departure
SR 28 N. Of East Wenatchee – Variable Message Sign	$51,315	ITS spending
US 97 Field Assessment Projects	$36,961	Multiple
Area 4 Signs	$33,978	Signs
Portable Highway Advisory Radio Upgrade	$27,815	ITS spending
I-90 Gates For Ramp Closure	$26,947	Miscellaneous
SR 150 Field Assessment Projects	$26,229	Signs
US 2 Peshastin Vicinity – Camera	$24,339	ITS spending
Guide Signing Work	$23,681	Guide Signs
SR 150 Driver Feedback Signs	$23,572	Regulatory Signs Project Design
I-90 Detour Flip Signs	$23,483	Miscellaneous
SR 28 at 19th St – Intersection Camera And Radio	$23,352	ITS spending
SR 155 Driver Feedback Signs	$23,274	Intersection
Area 3 Signs	$23,064	Signs
Area 2 Signs	$21,937	Signs
SR 17 Field Assessment Projects	$20,264	Multiple
Bike Detection System	$15,842	Pedestrian/Bicycle
US 2 Field Assessment Projects	$15,536	Multiple
SR 281 Field Assessment Projects	$14,872	Multiple

US 2 West Of Leavenworth – Camera And Radio Equipment	$14,501	ITS spending
US 2 Leavenworth Area – Miovision Spectrum	$14,302	Mobility
US 2 Steven's Pass – Backup Generator	$13,989	ITS spending
US 2 at Aplets Way – Bike Detection	$11,999	Pedestrian/Bicycle
SR 153 Field Assessment Projects	$10,548	Signs
I-90 at Silica Road – Pan/Tilt/Zoom Camera	$7,542	ITS spending
SR 173 Field Assessment Projects	$7,104	Signs
SR 28 Rock Island Park And Ride - Striping, Signs, Curbs	$6,749	Miscellaneous
Regionwide Minor Striping Charges	$6,365	Minor Striping
Seal 2015 – Pavement Markings	$6,358	Intersection
Transparity Software	$6,287	Mobility
TMC Video Wall $10,000	$6,096	ITS spending
US 97 at Blewett Pass – Camera	$5,962	ITS spending
SR 20 at SR 153 – Sight Distance Improvement	$5,737	Intersection
US 97A Field Assessment Projects	$5,076	Signs
SR 17 Soap Lake Pedestrian Signing	$4,830	Pedestrian/Bicycle
SR 28 Field Assessment Projects	$4,052	Warning Signs Minor Striping
US 97A at Chelan – Crosswalk	$3,819	Pedestrian/Bicycle
SR 20 Field Assessment Projects	$3,174	Multiple
SR 243 Field Assessment Projects	$3,170	Multiple
US 2 at SR 17 – Edge Lit Stop Sign	$2,647	Intersection
SR 28 Passing Lane – Signing	$2,531	Mobility
Region Wide Minor WSP Requested Enhancements	$1,925	Miscellaneous
US 97 at Enterprise Dr. – Edge Lit Roundabout Ahead Sign	$1,284	Intersection

North Central Region

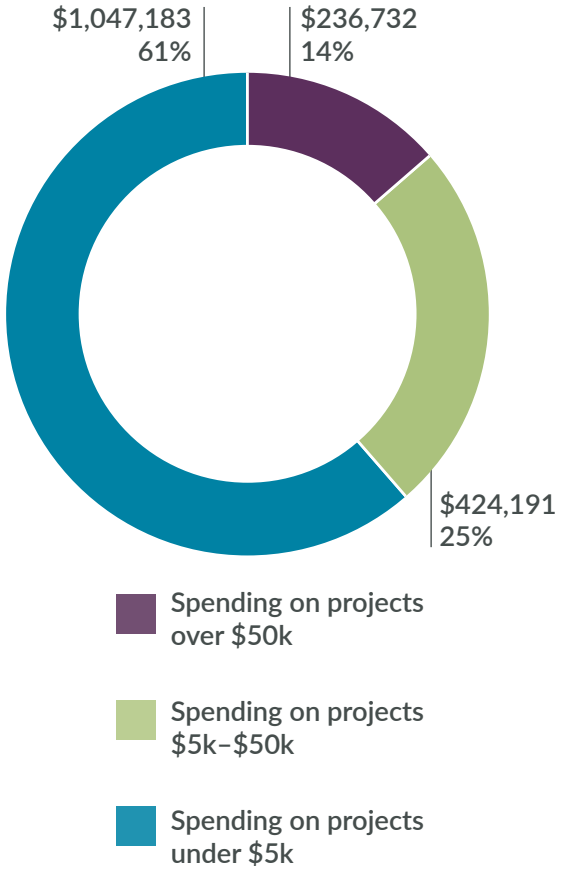
technology, which will allow remote monitoring of operations and adjustments to signal timing. NCR also began implementation of automated traffic signal performance measures in the town of Leavenworth. This will greatly improve the region's ability to respond quickly to changing traffic conditions and optimize signal performance "on the fly". This work will continue into the 2017-19 biennium, and will potentially be expanded to other locations in the region.

During the 2015-17 biennium, NCR continued its commitment to practical solutions through partnerships with cities, counties, community organizations, other state agencies, and private developers. For instance, NCR worked closely with the Washington State Patrol to establish a detour that will divert I-90 traffic onto SR 26 and county roads between Vantage and Adams Rd, 17 miles to the east, during dust storms, fires, and other emergencies. The region also added two gates for ramp closures, plus flip signs, to guide traffic through the detour. The detour has been used three times in its first year.

The project highlights on pages 22 through 24 detail other NCR partnerships from this biennium.

The traffic system improvements funded by the LCE program have been invaluable. The region is able to react quickly when needs arise, using effective – and often innovative – solutions. However, this also places an extra burden on the maintenance personnel who implement and maintain these solutions, adding work to already busy schedules. Moving forward, the region will need to examine solutions to address the growing gap between the addition of new equipment and the resources available to maintain it.

NCR: Low Cost Enhancement Spending by Size of Project 2015-2017



North Central Region

2015-2017 Project Highlights

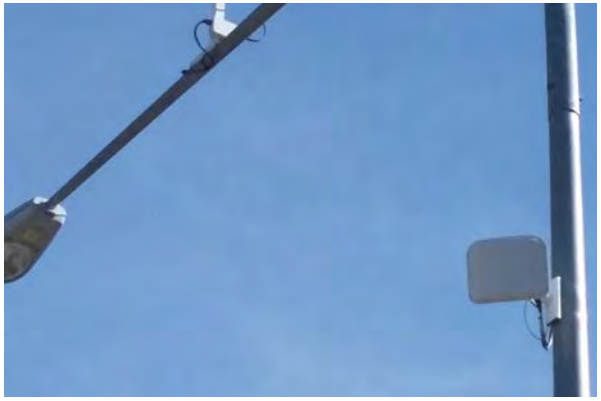
US 2 AT APLETS WAY - BICYCLE DETECTION $11,999

NCR installed new bicycle detectors at the intersection of US 2 and Aplets Way in Cashmere. The Wenatchee River Valley between Leavenworth and Wenatchee is a popular area for recreational bicycling. Numerous bike routes follow county-owned roads in the area, and all of these routes cross US 2.

After considerable research to determine the most reliable detection methods for this intersection, NCR chose microwave-based detectors. The sensor, seen in the picture of the luminaire post below, gets mounted in a location with a good view of motorists' and bicyclists' approach routes. It transmits a microwave (radar) signal, which reflects off whatever is in its field of view. The reflected signal is received and sent to a cabinet interface device, which provides an output to the signal controller telling it a vehicle – car or bike – has been detected, and to initiate the signal change.

The region also installed signs notifying cyclists that the signal system would detect them, and advising them to wait for a green light before crossing.

This project began with a constituent request for bicycle signal detection, provided to the region in October 2015 from State Sen. Linda Evans-Parlette's office. NCR met with members of the Wenatchee Velo Club in January 2016 and determined that improved bicycle detection would yield the most benefit for cyclists at the Aplets Way signal. The region completed the project in May 2016.



Microwave-based sensor mounted on nearby luminaire post

Signs notify bicyclists that the detector will change the light for them

A WSDOT employee tests the new bicycle detection system

North Central Region

2015-2017 Project Highlights

SR 28 & US 97 BREWSTER/PATEROS/QUINCY - RECTANGULAR RAPID FLASH BEACONS

$67,664 (REGION'S CONTRIBUTION)

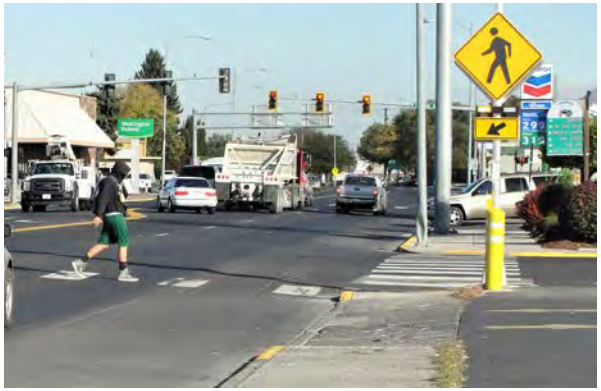
NCR is committed to Target Zero – zero traffic deaths and serious injuries in Washington State – and believes that pedestrian and bicycle safety is a critical component of that effort. The region installed Rectangular Rapid Flash Beacons (RRFBs) for pedestrian crossings at three locations during the 2015-17 biennium. The region judged that RRFBs could provide highly effective enhancement to pedestrian safety at these sites.

US 97 passes through the town of Brewster with a speed limit of 40 mph. Near the south end of town, the Gebber's Fruit packing warehouse on one side of the highway and a busy shopping center on the other generate many pedestrian crossings every day, especially at shift changes and breaks. NCR was able to enter into a partnership with Gebber's Fruit to install a RRFB system at this heavily used crossing. Gebber's Fruit provided $18,000 towards the project.

In the town of Pateros, five miles south of Brewster, a school crossing traverses US 97 in a 45 mph zone. The crossing already had advance school crossing signs with flashing beacons, plus – as requested by the city – signs informing drivers of a state law requiring vehicles to stop for pedestrians within crosswalks. Due to the higher speed limit and the fact that the highway is three lanes at that point, the region considered this an effective location to install RRFBs.

The town of Quincy has experienced eight pedestrian/vehicle collisions in the past five years in a section of SR 28 that is under one mile long. One of the busiest crossings is at 1st Ave SW, where pedestrians must cross two lanes of traffic in each direction, plus a left turn lane. Two of the eight pedestrian/vehicle collisions occurred at this location. Using LCE funding, NCR installed an RRFB there to give drivers ample advance warning of pedestrians in an area where heavy traffic, numerous driveways, businesses, and signs compete for their attention.

Before



After

North Central Region

2015-2017 Project Highlights

SR 28 - PASSING LANE MP 16–18 $126,138

NCR Traffic partnered with their regional Project Office to restripe a two-mile section of SR 28 (MP 16-18) between Wenatchee and Quincy. This project provided a passing lane for westbound traffic. It also removed existing rumble strips and replaced them in the new lane configuration.

The 27-mile section of SR 28 included in the 2017 NCR Seal project is a heavily traveled commuter route, with Average Daily Traffic of 8,300-9,400 vehicles. Prior to this project, there were 3.7 miles of passing/climbing lanes eastbound, and only 1.9 miles westbound. Because of the high traffic volumes, westbound drivers were often not able to take advantage of passing opportunities in the two-lane sections of the roadway. In the resulting congestion, drivers would at times follow other vehicles too closely, or make risky passing maneuvers. This additional passing lane allows drivers to pass slower traffic without creating conflicts within the opposing traffic lanes.

The existing wide shoulders provided sufficient pavement width to allow another two miles of passing lane by restriping, with no additional roadway expansion. The project was coordinated with the Project Office's planned paving project, reducing the construction impacts to the traveling public, as well as overall project costs.

Before

After

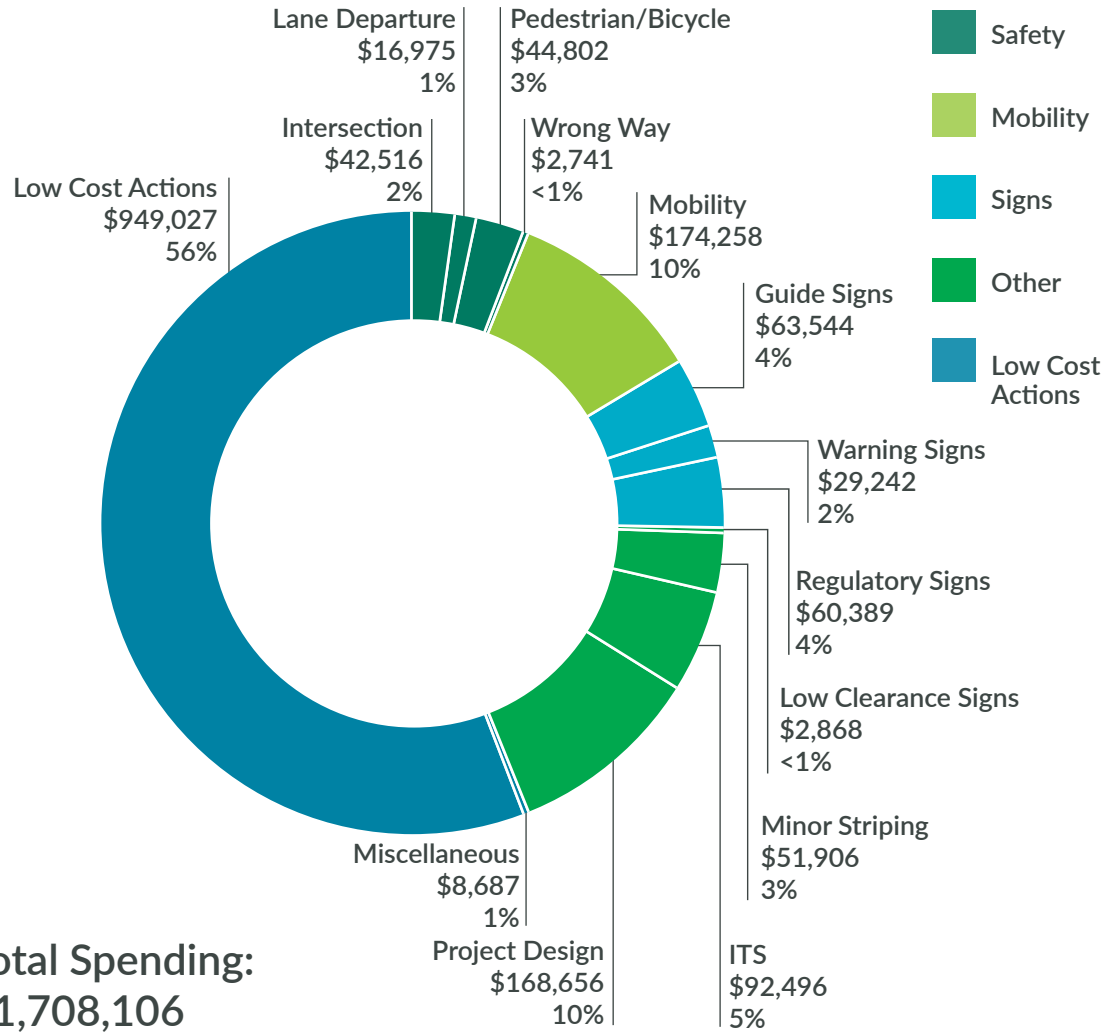
Olympic Region

OR's LCE program spent $1.7M in the 2015-17 biennium. The projects accomplished this biennium were diverse, with an emphasis on signing and minor striping changes, plus implementing practical solutions to address safety and mobility issues. This biennium, OR received several requests through the legislative process to recognize individuals for their past contributions and name highways in memory of them. These requests required many signing projects in the Olympic Region (see page 29–30). The region also strived to improve safety by restriping highways and intersections, providing more refuge areas for turning traffic, and providing additional vehicle queuing at intersections.

The program identified and tracked projects costing more than $2,000 and grouped all other projects into Low Cost Actions.

Olympic Region faced a number of LCE project delivery challenges from both design and implementation perspectives. Olympic Region Traffic has found it helpful to coordinate some design work with Region Project Office staff, especially on projects that require minor pavement widening. Olympic Region Traffic is also working with Region Maintenance staff on flexible implementation schedules because of the existing heavy workload for Maintenance staff. Olympic Region Traffic has also

OR: Low Cost Enhancement Spending by Type of Project 2015-2017



Total Spending: $1,708,106

Note: due to rounding, the percentages will not add up to 100%

Olympic Region

All 2015–17 Low Cost Enhancement Projects

State Force Work Minor Enhancements <$5,000	$881,345	Low Cost Actions
Regionwide Signing Crew	$163,961	Project Design
JBLM Travel Time	$72,771	Mobility
Low Cost Enhancements $75,000	$67,682	Low Cost Actions
SR 167 – Hard Shoulder Running – Options Analysis	$36,393	Mobility
Olympia Data Station	$27,921	ITS spending
US 101 Kalaloch Ranger Station to Lodge – Two Way Turn Lane,	$26,340	Mobility
SR 302 Pedestrian Crossing and Crosswalk - Rectangular Rapid Flashing Beacons	$19,356	Pedestrian/ Bicycle
HAR Transmitter Tr6000 (1580 Am)	$18,163	ITS spending
SR 305 MP 8.50 to 8.70 – Left Turn Lane	$17,572	Intersection
SR 510 to SR512 – Re-Routing Fiber Optic	$17,008	ITS spending
I-5 at SR 16 – Raised Pavement Markers	$16,975	Lane Departure
I-5 Billy Frank Nisqually Wildlife Refuge – Signs	$12,534	Guide Signs
Miovision Signal for Traffic flow	$12,147	ITS spending
SR 7 MP 52.16 Tacoma – Midblock Beacon	$11,824	Pedestrian/ Bicycle
US 101, US 101 couplet, US 12 in Aberdeen – Restripe	$11,505	Minor Striping
SR 16 I-5 to Union – Speed Zone Change	$10,277	Regulatory Signs
SR 410 MP 21.45 – Left Turn Lane & Storage Extension	$10,121	Minor Striping
SR 16 WB – HOV Lane Extension to I-5	$10,073	Minor Striping
SR 160 at Converse Ave Pedestrian Crossing – Rectangular Rapid Flashing Beacon	$9,942	Pedestrian/ Bicycle
SR 16 in Gig Harbor at Wollochet & Olympic Drive – Microwave Link	$9,844	ITS spending
I-5 MP 85.51-97.05 – No Parking Tow Away Zone Signs	$9,778	Regulatory Signs
American Lake Campus – Signs	$9,403	Guide Signs
SR 512 at SR 161 Off Ramps – Hard Shoulder Running	$9,254	Mobility
SR 19 MP 11.98 to 12.66 – Speed Zone	$8,607	Regulatory Signs
SR 512 at Steele & Portland Ave – Restripe	$8,435	Minor Striping
SR 3 at Pickering Road Intersection – Lane Narrowing Project	$7,767	Intersection
SR 16 Memorial Signing	$7,459	Guide Signs
Port Of Tacoma – Camera	$7,094	Mobility
Work Zone Database Update	$7,031	Mobility
SR 507 in Tenino – Speed Zone Change	$6,867	Regulatory Signs
700mhz Radios	$6,708	Intersection
SR 507 at Connor Rd – Warning Signs	$6,516	Warning Signs
SR 104 at Sequim – Guide Signs	$6,396	Guide Signs
I-5 to SR 512 – Ramp Meter	$6,121	Warning Signs
SR 7 Nisqually State Park – Signs	$5,953	Guide Signs
SR 509 Martin Memorial Highway – Signs	$5,899	Guide Signs
I-5 at Center Drive – Restripe & Sign Removal	$5,648	Mobility
SR 7 at 138th – Pedestrian Signal Upgrade	$5,572	Intersection
SR 512 MP 0.37 – Data Station	$5,367	ITS spending
SR 8 at SR 108 – Gated Intersection Signs	$5,164	Warning Signs
US 101 Dawyley Rumble Strip	$5,157	Mobility

Olympic Region

All 2015–17 Low Cost Enhancement Projects (continued)

SR 410 Ramps at 166th Ave. E	$4,897	Intersection
QE Project Documentation	$4,696	Project Design
US 101 Miller Peninsula State Park – Signs	$4,514	Guide Signs
SR 410 MP 11.6-3.02 – Traffic delineation	$4,420	Miscellaneous
SR 160 at Ridge Crest Way SE – Flashing Beacons	$4,236	Regulatory Signs
SR 702 MP 0-1.25 – Speed Limit Reduction	$4,230	Regulatory Signs
TMC Monitors	$4,216	Mobility
US 101 Amtrack – Signs	$3,773	Guide Signs
US 101 Port Of Hoodsport – Crosswalk Relocation & Signing	$3,680	Pedestrian/ Bicycle
SR 3 Belfair-Gorst – Speed Reduction	$3,492	Regulatory Signs
SR 7 Mp 54-58 – Mile Markers	$3,428	Guide Signs
SR 7 Lagrande – Signs	$3,022	Warning Signs
US 101 in Port Angeles Cost Estimate – Sign Removal	$2,832	Miscellaneous
SR 7 Interchange with I-5 & I-705 – Wrong Way Driving	$2,741	Wrong Way
Low Vertical Clearance Signs – Tracking	$2,727	Low Clearance Signs
US 101 Holiday Beach – Pedestion Warning Signs	$2,301	Warning Signs
SR 99 Stewart Memorial Highway – Signs	$2,285	Guide Signs
Sr 702 at 40th Ave S – Gated Intersection Warning Signs	$2,199	Warning Signs
SR 162 vic Orting – Speed Signs	$2,176	Regulatory Signs
Sr 307 Foss/Pungh – Shoulder Cross Hatching	$2,135	Minor Striping
SR 7, 208th to Pirnie Rd – Speed Zone Change	$2,134	Regulatory Signs
SR 16 Sprague – CCTV	$2,047	ITS spending

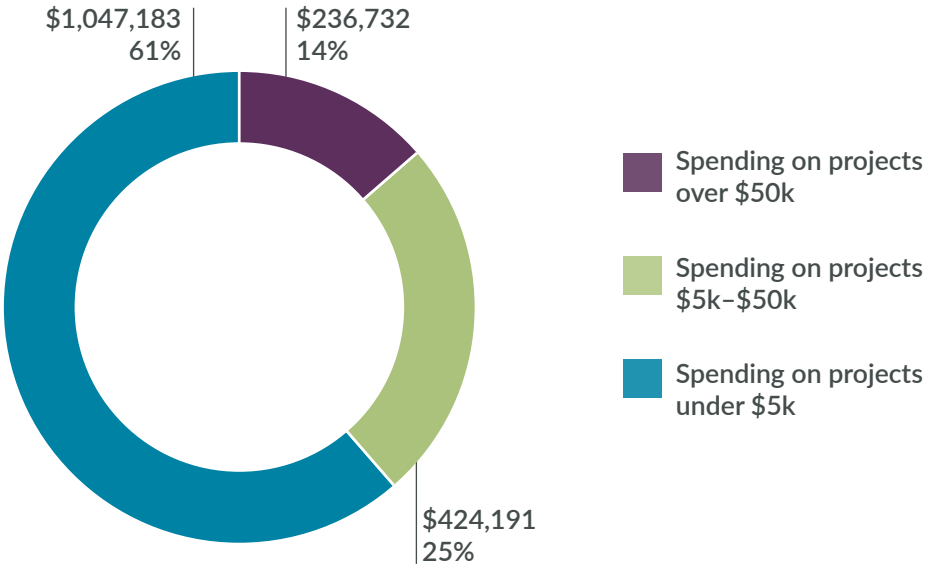
US 101 Alder Street – Striping Revision	$2,001	Minor Striping
SR 20 in Port Townsend – Roundabout Signs	$1,903	Regulatory Signs
SR 3 at Sunnyslope Rd – Intersection Warning Signs	$1,832	Warning Signs
WSP Aerial Surveillance Marker	$1,793	Minor Striping
SR 162 Mp 17.25-17.88 – Speed Reduction	$1,770	Regulatory Signs
SR 161 Pierce Transit – Restripe	$1,567	Minor Striping
SR 105 in Harriman – Centerline & Traffic Arrows	$1,557	Minor Striping
SR 303 Central Valley Interchange – Dotted extension line	$1,556	Minor Striping
SR 16 MP 28.31 – Speed Limit Attention Flags	$1,436	Miscellaneous
US 101 Skokomish Fish Hatchery – Signs	$1,254	Guide Signs
I-5 in Bridgeport – HOV Signs	$1,198	Regulatory Signs
SR 20 at Seton Rd – Fire Station Signing	$1,176	Warning Signs
SR 12 at Wishkah/S. Chehalis St. – Centerline Striping	$1,162	Minor Striping
SR 3 at Loxie Eagans – Signal Mast Arm Sign	$1,039	Regulatory Signs
SR 300 MP 2.75-2.9 – Pedestrian Warning Sign	$912	Warning Signs
SR 106 MP 5.26-7.36 – Speed Reduction	$815	Regulatory Signs
US 101 MP 319.74 – Ext 40 mph Speed Limit	$815	Regulatory Signs
SR 3 at Big Valley Rd – Signal Mast Arm Sign	$652	Regulatory Signs
SR 3 Bremerton Motorsports – Signs	$646	Guide Signs
SR 307 MP 1.16 – Speed Limit Attention Flags	$397	Regulatory Signs
Incident Response	$354	Mobility
Low Clearance Signs	$141	Low Clearance Signs

Olympic Region

seen growth in the number of requests for radar speed signs, rectangular flashing beacons, data collection devices as well as requirements to install memorial highway signs with a tight turnaround time.

Looking forward to the 2017-19 biennium, OR will continue to identify projects through the Field Assessment Program along with other LCE project identification channels. Currently-planned LCE Projects include added channelization, upgrading intersection warning signs, and ITS signing. The region will continue to focus on safety, mobility, implementing practical solutions, collaboration with local and state governments and special interest groups, and reduction in maintenance costs with each future project.

OR: Low Cost Enhancement Spending by Size of Project 2015-2017



Olympic Region—Highway Redesignation Signing Projects

2015-2017 Project Highlights

The Olympic Region works with multiple entities on re-designating highways. They recently implemented several signing projects to reflect the naming of memorial highways and the Nisqually Wildlife Refuge. While OR faced some challenges in coordinating the memorial highway designations, the region succeeded in meeting what the legislature and other stakeholders envisioned. OR also made every effort to provide interested groups with a safe viewing location before the final sign installation.

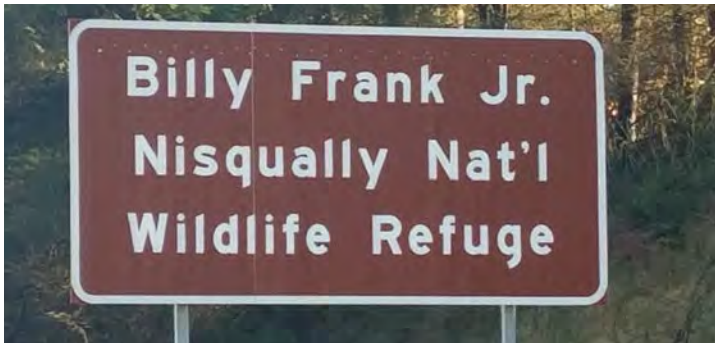
SR 509 MARTIN MEMORIAL HIGHWAY – SIGNS $5,899

The SR 509 Martin Memorial Highway – Signs project was a joint effort with the Transportation Commission on renaming MP 0.04 to 3.73 on SR 509 to the Philip Martin Lelli Memorial Highway. Lelli was a longshoreman whose work and commitment to the Port of Tacoma helped transform the port into the fifth largest container port in North America. OR installed signs with the new name.

The new signs are located on SR 509 at MP 0.42 in the northbound direction and MP 3.73B in the southbound direction.

I-5 BILLY FRANK NISQUALLY WILDLIFE REFUGE – SIGNS $12,534

Billy Frank Jr. was a Native American environmental leader and treaty rights activist, and a member of the Nisqually Indian Tribe. The U.S. Senate and House of Representatives enacted the re-designation of the Nisqually National Wildlife Refuge to Billy Frank Jr. Nisqually National Wildlife Refuge. It was signed by President Obama on December 17, 2016. OR replaced signs on I-5 to show the new name.



The new signs are located on I-5 at MP 112.89 in the northbound direction and MP 116.00 in the southbound direction.

Olympic Region—Highway Redesignation Signing Projects

2015-2017 Project Highlights

I-5 BOULEVARD OF REMEMBRANCE

The I-5 Boulevard of Remembrance was a joint effort between WSDOT and the Transportation Commission to name I-5 from MP 116 to MP 125 in honor of our World War I veterans. The memorial originally consisted of 500 English, northern scarlet, and red oak trees planted along Pacific Highway from Nisqually River to Ponders Station. The number has dwindled down to 66 surviving trees along I-5. OR installed two signs, one in the northbound direction and one in the southbound direction.

Although this highway redesignation sign project was completed using the LCE workforce, the materials were paid for out of a separate regional fund.

The new signs are located on I-5 at MP 116.58 in the northbound direction and MP 126.15 in the southbound direction.

SR 99 STEWART MEMORIAL HIGHWAY – SIGNS $2,285

The SR 99 Stewart Memorial Highway project was a joint effort with the Transportation Commission and Northwest Region to rename the roadway to recognize William P. Stewart, an African-American Civil War veteran. Stewart fought as a volunteer with Gen. William Smith's 18th Corps, which saw almost daily combat as it battled near Petersburg, Virginia. During that battle, Stewart and his division charged forward to capture two hundred Confederate prisoners, four cannons with horses, and ammunition. After the war, Stewart became a respected pioneer of the town of Snohomish. Stewart is buried in the Grand Army of the Republic cemetery in Snohomish, along with two hundred other civil war veterans.

One sign is northbound in OR in the vicinity of the Pierce/King County Line, and one is in NWR, southbound at the North end in Snohomish County.

The new sign is located on SR 99 at MP 5.47 in the northbound direction.

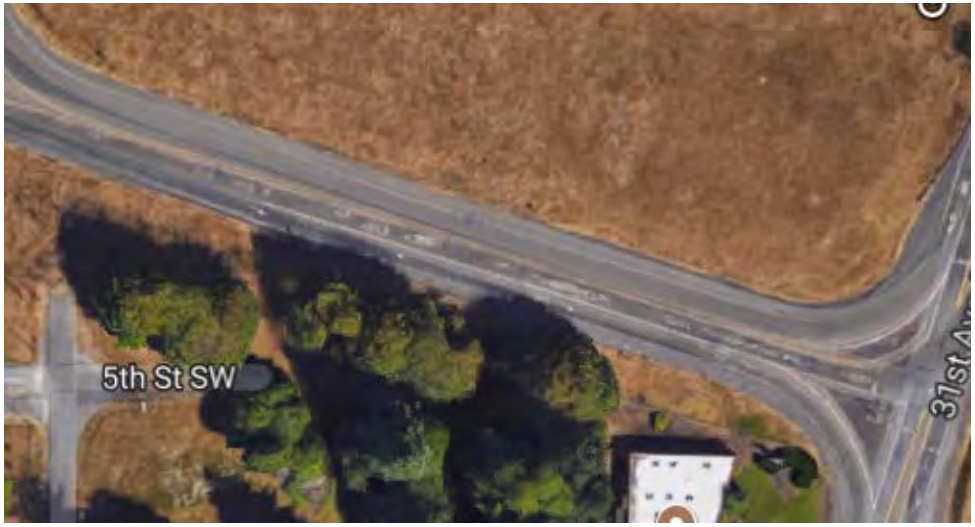
Olympic Region

2015-2017 Project Highlights

SR 512 AT SR 161 OFF RAMPS – HARD SHOULDER RUNNING $9,254

These project locations had significant congestion during peak hours, and the "before" configuration was causing ramp traffic to back up onto the 512 mainline. OR added storage capacity by restriping the off ramp from SR 512 to SR 161 from one to two lanes, and extended them by 870 feet. This helped to reduce congestion along, with the likelihood of reducing rear-end crashes.

The project was accomplished with state work force: OR's Traffic Office worked with OR Materials on the shoulder depth, and with Maintenance to do the shoulder dressing once the ramp was re-striped.



Before, the single lane of traffic caused ramp traffic to back up to the SR 512 mainline.

After the restriping project, the second lane provides more space for cars to wait on the ramp and reduced the back up.

Olympic Region

2015-2017 Project Highlights

SR 302 PEDESTRIAN CROSSING AND CROSSWALK – RECTANGULAR RAPID FLASHING BEACONS

$19,356

SR 302 is a rural two-lane roadway with a high volume of pedestrian crossings, and businesses on both sides of the highway. This project replaced existing 24/7 flashing beacons with dual-sided, pedestrian-activated Rectangular Rapid Flashing Beacons (RRFB's), along with "Stop Here for Pedestrian" signs and pavement markings. This is one example of a number of other locations where RRFB's were installed during the 2015-17 biennium.

Before

After

Before

After

Olympic Region

2015-2017 Project Highlights

SR 3 PICKERING RD INTERSECTION – LANE NARROWING PROJECT $7,767

WSDOT's Highway Safety Issues Group (HSIG) identified this as a safety project and recommended lane narrowing for this intersection. OR used a typical design concept of lane narrowing with pavement markings from the Federal Highway Administration (Publication # FHWA-HRT-08-63), narrowing the lanes to nine feet and creating more separation between vehicles. Although the lanes have been narrowed, there has been no change to the overall width of the roadway surface. The narrowing is a visual effect to alert the driver's attention to the approaching intersection. The intended outcome is reduced speed, increase awareness, and decrease severity of collisions.

This is a pilot project to continue studying the effects of lane narrowing. The region will continue to monitor and consider other changes that may be necessary to the intersection. Continued traffic studies will be part of the evaluation process.

Before:
Looking northbound on SR 3 approaching the intersection of Pickering Road. Vehicles pulling out of the side road were getting hit by the northbound traffic. The roadway section is a typical rural route, with lane widths of 11 feet from center to center of the lines. The lines are four-inch white edge lines and a narrow four-inch double yellow line on either side of the centerline, making the lane ten feet, four inches between the lines.

After:
Also looking northbound on SR 3 approaching the intersection of Pickering Road. The region crews painted eight-inch yellow lines over the narrow double yellow pattern, calling attention to the centerline. They also painted eight-inch white wide lines on the lane side of the existing edge lines, which increases the appearance of the lines and effectively reduces the lane width to nine feet between the lines. The intent of this project was to slow down the mainline traffic by visually narrowing the lanes, therefore giving the side road traffic more time to judge speeds and to cross the roadway.

Olympic Region

2015-2017 Project Highlights

SR 410 MP 21.45 – LEFT TURN LANE AND STORAGE EXTENSION $10,121

This project extended the left turn pocket for Park Ave, and added a Two-Way Left Turn Lane (TWLTL) between Park Ave and Cemetery Rd. The previous channelization did not provide enough storage length for turns onto Park Ave. OR added a TWLTL for vehicles to turn into the cemetery lot, which is also used for events. This removes vehicles from the through lane.

Before: The old configuration

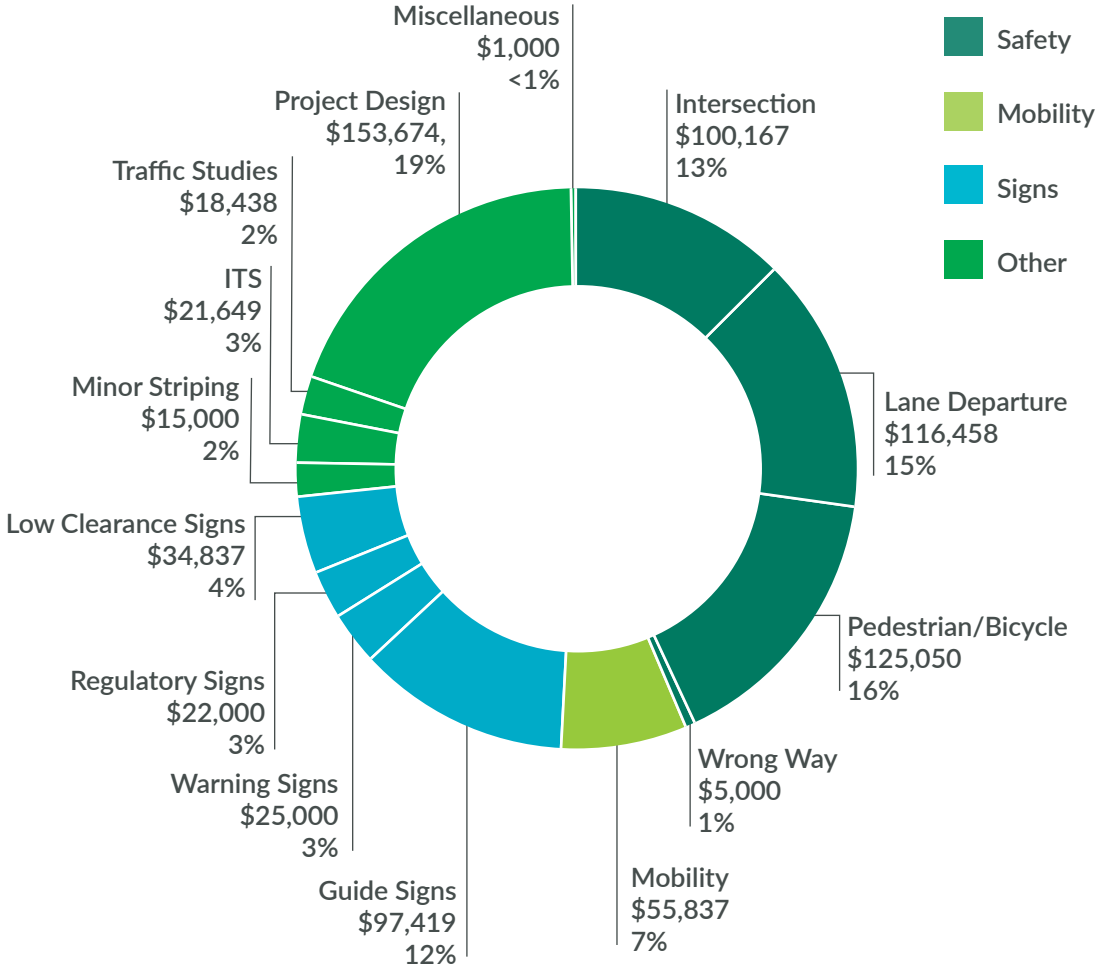
After: the arrows mark the two-way left turn lane

Southwest Region

SWR implemented a wide variety of LCE projects in the 2015-17 biennium. The region collaborated with several local agencies to deliver projects. Local agencies contributed between $25,000-50,000 total, allowing SWR to stretch LCE funding further. The region garnered a program grant from WSDOT's Pedestrian & Bicycle Safety Program that provided 80%/20% matching funds to install pedestrian activated Rectangular Rapid Flashing Beacons and advance beacons for a high speed crossing on SR 14 at the Columbia House Blvd. Interchange. The Traffic Office's Field Assessment program provided staff funding specifically for identifying safety-related Low Cost Enhancements for construction projects.

The region purchased updated software and equipment for camera and signal projects to address communication and traffic flow. SWR also modernized their Emergency Operation (EOC) and Traffic Management (TMC) Centers. These vital hubs help the region communicate with emergency responders, incident response, and maintenance staff, enhance coordination with WSP, and actively manage and operate the transportation system.

SWR: Low Cost Enhancement Spending by Type of Project 2015-2017



Total Spending: $791,529

Note: due to rounding, the percentages will not add up to 100%

Southwest Region

All 2015–17 Low Cost Enhancement Projects

Low Cost Actions	$189,810	Multiple
SWR Curve Data Collection & Analysis	$99,867	Lane Departure Project Design
State Work Force Expenditures	$92,674	Project Design
SWR Guide Sign Project	$72,419	Guide Signs
SR 14 Lyle Tunnels – Safety Enhancement	$37,402	Pedestrian/ Bicycle Low Clearance Signs
CAL/CAC/IAL/LCE Development	$31,493	Intersection Lane Departure
SR 500/SR503 at NE Fourth Plain & NE 76th – Cabinet and Traffic Signal Equipment	$28,300	Intersection Guide Signs
I-205 SB Exit 30 – Restripe / Add Lane	$28,078	Multiple
I-5 NB Exit 60 – Drop Lane/Striping	$26,294	Lane Departure Mobility
SR 6 and Stearns Road Intersection Improvements	$23,154	Intersection Pedestrian/ Bicycle
SR 500 Camas – Bike Lanes & Two Way Turn Lane	$19,663	Pedestrian/ Bicycle
Flashing Yellow Arrow Signal Upgrades	$18,193	Intersection
SR 501 at 4th Plain – Bike Lanes	$14,322	Pedestrian/ Bicycle

SR 500 at 65th St – Audible Ped System	$13,062	Pedestrian/ Bicycle
ITS Expenditures	$12,839	ITS spending
I-5 NB Exit 59 – Low Clearance Signing	$12,435	Low Clearance Signs
SR 500 at 71st St – Audible Ped System	$10,562	Pedestrian/ Bicycle
Clark County Crosswalk Enhancements	$10,480	Pedestrian/ Bicycle
TMC/EOC Expenditures	$8,777	Mobility
SR 14 in Underwood – Lower Speed Limit	$8,480	Multiple
Traffic Studies	$8,438	Traffic Studies
SR 141 in Bingen & White Salmon – Pedestrian Improvements	$8,118	Pedestrian/ Bicycle
SR 14 at Columbia House Blvd – RRFBs and advance beacons	$5,043	Pedestrian/ Bicycle
I-5 Exit 4 – Pedestrian Enhancements	$4,647	Pedestrian/ Bicycle
SR 432 WB at SB I-5 Off Ramp – Merge Improvements	$3,557	Lane Departure Mobility
Incident Response Expenditures	$2,260	Mobility
SR 14 at Camas – Speed Revision	$1,163	Lane Departure Mobility

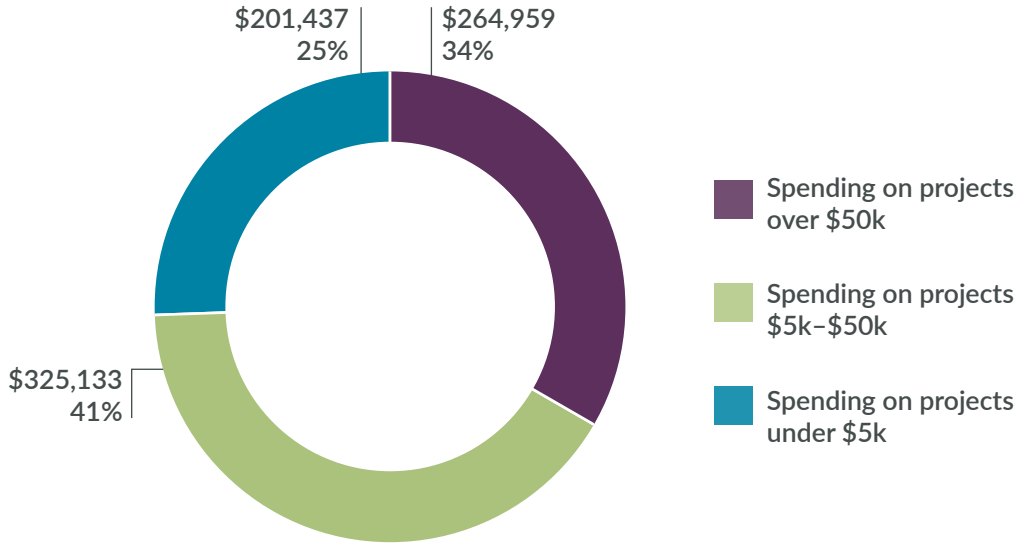
Southwest Region

In the 2017–19 biennium, SWR plans to develop and implement recommendations from 2014-2017 Field Assessment reviews, with an emphasis on high-tech Intelligent Transportation System (ITS) equipment for signal and camera systems to assist in implementing low cost operational practical solutions. SWR is moving forward in actively managing the transportation system to address both recurring and non-recurring congestion: reducing the duration of congestion, decreasing incidents, and quickly clearing the incidents that do occur, in order to prevent secondary crashes. Moving forward, SWR plans on adding a camera to an Incident Response (IR) vehicle to monitor real-time incident related traffic. They also plan on upgrading some existing cameras to allow for more compatibly for current and future communication needs.

One important mobility project will add additional ramp meters to help stabilize flow in Clark County on I-5, I-205 and SR 14. Traffic volumes are growing at a faster rate than prior to the 2009 recession, and congestion in these corridors is growing rapidly.

SWR will be looking for ways to speed up low cost operational solutions to respond to the rapidly changing traffic patterns and address the mobility needs of the traveling public.

SWR: Low Cost Enhancement Spending by Size of Project 2015-2017



Southwest Region

2015-2017 Project Highlights

SR 141 IN BINGEN & WHITE SALMON – PEDESTRIAN IMPROVEMENTS $8,118

SWR enhanced three existing crosswalks along SR 141 in Bingen and White Salmon, adding temporary bulb-outs to narrow the lanes for pedestrians. In addition, the region added driver signing advising drivers to stop for pedestrians when turning. They also improved lines of sight for both pedestrians and drivers by removing some parking spaces along the streets. In White Salmon, SWR reinforced an 18-inch centerline to narrow the lanes through town, which encourages motorists to maintain lower speeds.

SWR identified the project through the Field Assessments program, as part of their community engagement process. Part of this project area includes the Loop Trail, a walking, running, and biking path that runs along the shoulder of SR 141. The bulb-outs and signing are temporary measures that will be in place until 2019, when a construction project will update them with permanent fixtures.

Before and after pictures of intersection at SR 141 and Main Street in White Salmon. The bulb-out on the right shoulder removes one parking space to increase sight distance for NB drivers. SWR used lane narrowing to maintain low speeds.

Temporary sign located in bulb-out at SR 141 and Humboldt in Bingen (MP 0.05). The sign makes drivers aware of the crossing and the bulb-out reduces the length of the crosswalk.

Southwest Region

2015-2017 Project Highlights

SR 500 CAMAS – BIKE LANES & TWO WAY LEFT TURN LANE $19,663

SWR built a Two Way Left Turn Lane (TWLTL) at Everett and Garfield Streets, and added new bike lanes on 14th, Everett, and Garfield. The new design removed designated parking spots to create a bike lane. Removal of parking on all streets improved driver sight distance and allowed space for bike lanes. Studies have shown that narrowing lane width helps reduce driver speed. The region anticipates more uniform operating speed for the modified roadway.

WSDOT and the City of Camas worked together on the design concept, with WSDOT providing the funding to implement the project. NE 14th Ave, Everett St, and Garfield St connect City Center and Lacamas Lake, while passing through a neighborhood, a school zone, and series of crosswalks. The City of Camas wanted to promote slower speeds and add a bike lane to promote multi-modal travel, in order to connect cyclists from City Center to the bike network at Lacamas Lake.

Example of old & new configuration, from NE Everett St in Camas.

Southwest Region

2015-2017 Project Highlights

SR 6 AND STEARNS ROAD INTERSECTION IMPROVEMENTS $23,154

SWR Traffic upgraded signing and realigned the trail crossing for improved visibility at the intersection of SR 6 and Stearns Road. To calm traffic speeds, the region added a median and rumble strips, extended the no pass zone, and narrowed the lanes around the curve. The project added also Rectangular Rapid Flash Beacons (RRFBs) and advanced flashing beacons to warn motorists of foot traffic at the crossing. White candlestick delineators mark the edge of the left shoulder for motorists, and also direct pedestrians to the appropriate crossing and to physically separate them from the roadway.

SWR worked with Washington State Parks & Recreation and Lewis County Community Trails Board on this project. With the opening of a new pedestrian foot bridge along an existing trail, all partners expressed concern about pedestrian safety and the increase of foot traffic at the trail crossing. SWR implemented this project to boost driver awareness of the pedestrian crossing.

Rectangular Rapid Flash Beacon (RRFB) on right shoulder of SR 6 at Stearns Road.

Southwest Region

2015-2017 Project Highlights

SR 14 IN UNDERWOOD – LOWER SPEED LIMIT $8,480

Recent collisions and an increase in truck traffic in the vicinity of the Community of Underwood on SR 14 generated a need for new interventions in this high-use recreational area. SWR reduced the speed limit from 50 mph to 40 mph, and narrowed lane width in order to slow SR 14 drivers through the Cook-Underwood Road and the SR 141-ALT intersections. The region also added a solar-powered LED Blinker Sign to warn SR 14 drivers of the upcoming intersections.

SR 14/SR 141-ALT MP 63.55 looking west. The region installed new pavement markings: an eight-inch white stripe and a four-inch skip white stripe, narrowing lanes to ten feet in both directions.

Southwest Region

2015-2017 Project Highlights

I-5 NB EXIT 60 DROP LANE SIGNING/STRIPING $26,294

At the exit 60 off-ramp on I-5 northbound, SWR revised the overhead signing to match the existing striping, added Lane Ends supplemental signs, and removed the ground mounted Right Lane Must Exit signs. During their Field Assessment survey, Southwest Region noted that exit signing and striping could be changed to give clearer direction to drivers. This three-lane section of I-5 is in close proximity to the Exit 59 on-ramp, and the grade is on an incline with a vertical curve. Because of a high number of trucks using the third lane, the region decided not to make this an exit-only ramp. SWR coordinated with an upcoming construction project to make minor revisions to the striping, which added drop lane merge arrows and guide posts.

Before

After

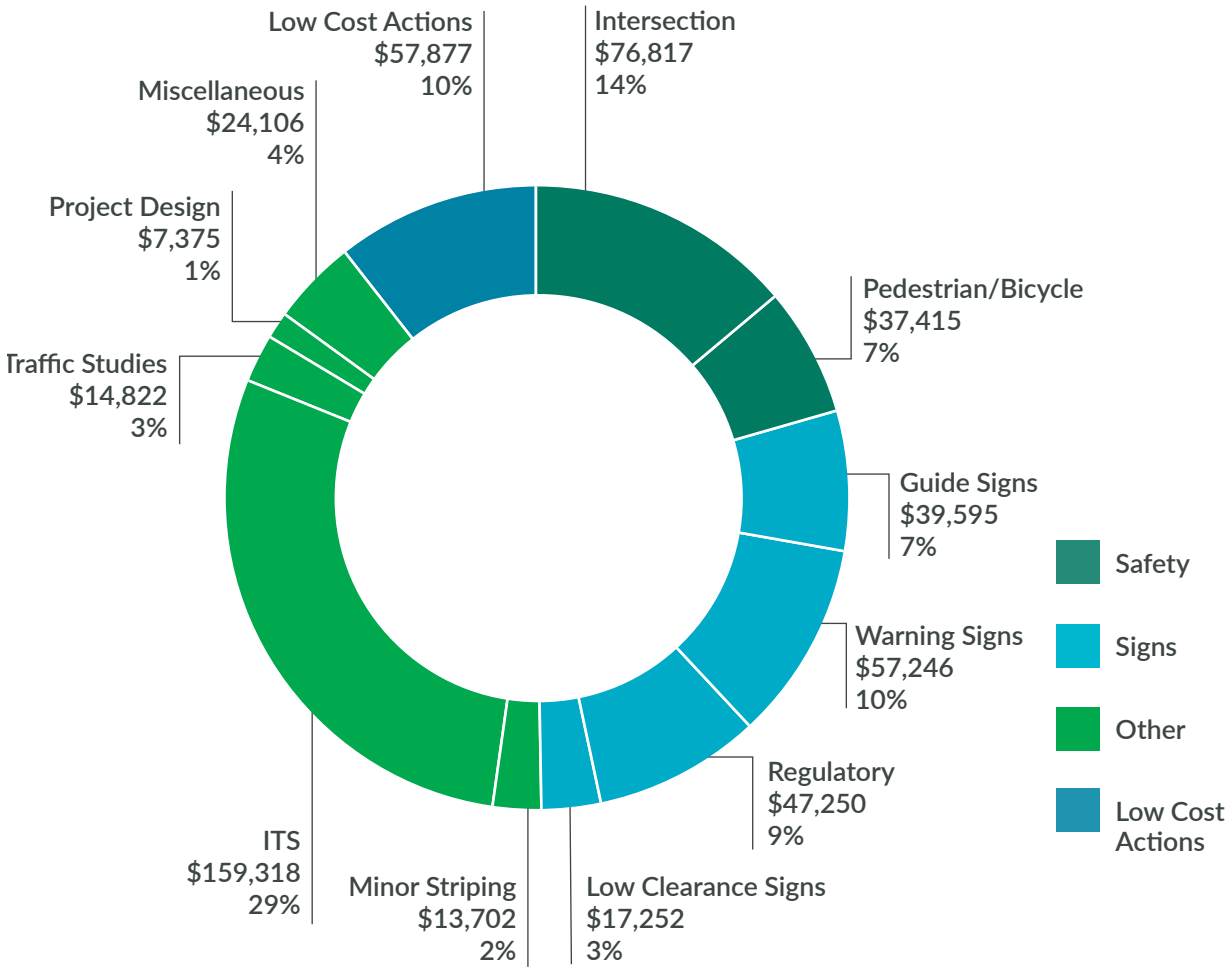
South Central Region

South Central Region (SCR) spent $550,000 on Low Cost Enhancement (LCE) projects in the 2015-17 biennium. The region's main focus remains traffic safety for those who travel on the highway system. Over the last few years, SCR has also initiated more LCE projects to benefit pedestrian and bicycle users.

To maximize the benefits of the LCE funding, the region works hard to build partnerships and collaborate on projects. SCR's greatest partner from biennium to biennium has been WSDOT's local Maintenance Office. The region has also been working more and more with smaller, local communities to address issues of local concern. The LCE projects help the region leverage local funding contributions to develop and implement projects.

In addition to partnerships and bike/pedestrian projects, SCR continues to focus on signing and ITS projects, which account for nearly two-thirds of the region's 2015-17 LCE funds. The signing efforts typically are single installations to meet an emergent need to address safety or guidance. ITS deployments continue to help the Transportation System Management and Operations efforts of the region. Unlike most of the regions in Washington where ITS efforts are urban-centered, SCR's greatest ITS effort is based on the rural I-90 Snoqualmie Pass corridor.

SCR: Low Cost Enhancement Spending by Type of Project 2015-2017



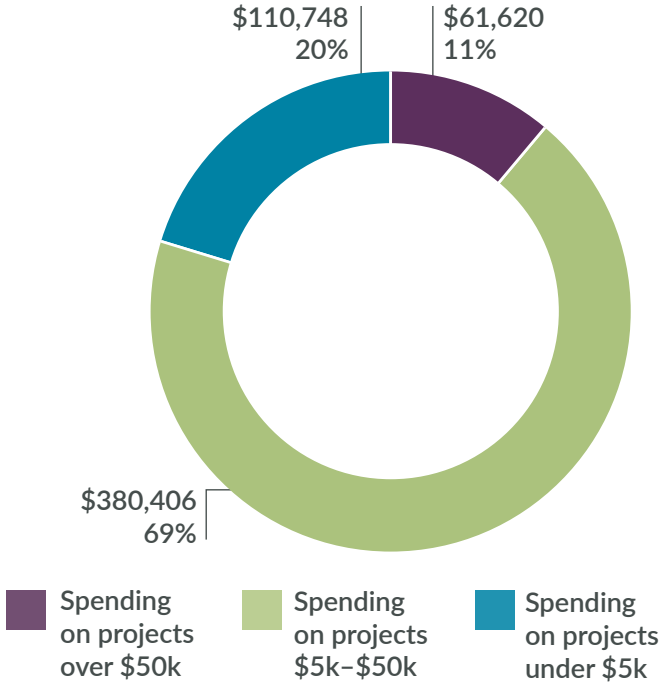
Total Spending: $552,775

Note: due to rounding, the percentages will not add up to 100%

South Central Region

The Field Assessment (FA) program, which emphasizes interaction with the WSP, maintenance, and local communities, has continued to be an excellent way for SCR to identify potential LCE projects. The FA program initiated many of SCR's showcase LCE projects. All of SCR's highlights on the following pages are FA projects.

SCR: Low Cost Enhancement Spending by Size of Project 2015-2017



South Central Region

All 2015–17 Low Cost Enhancement Projects

Regionwide Traveler Information Enhancements	$61,620	ITS spending
Low Cost Enhancements	$57,876	Low Cost Actions
US 395 at Pasco North – One-Way Signing	$37,750	Regulatory Signs
I-182 Richland to Rd 100 in Pasco – Fiber	$28,710	ITS spending
SR 22 at Division And Meyers – Flashing Beacons	$26,626	Intersection
SR 397 – Freeway Ends Flashing Beacons	$22,326	Warning Signs
I-90 – Construction Active Warning System	$21,729	ITS spending
US 395 – Signal reconfigurations on Hilderbrand Rd in Kennewick	$20,000	Intersection
Minor Sign Modifications	$17,734	Signs
I-90 Portable Workzone Station	$17,610	ITS spending
Regionwide Low Clearance Signings	$17,252	Low Clearance Signs
Mobility Performance Monitoring	$15,000	ITS spending
I-90 Exit 47 – Gore Area LED	$14,822	Traffic Studies
SR 240 at Hagen Rd – Shoulder Widening	$14,699	Intersection
SR 224 Bombing Range Signal – Advance Pedestrian Station (APS)	$12,487	Pedestrian/ Bicycle
I-90 – Travel Time Data	$10,880	ITS spending
I-90 at Cabin Creek – Inset Striping Test	$10,499	Minor Striping
US 12 between Naches and Yakima along Greenway – Pedestrian Path Signs	$9,982	Pedestrian/ Bicycle
Regionwide Work Zone Traffic Calming	$9,626	Warning Signs
I-90 at Ryegrass – Elk Fence	$9,621	Miscellaneous
I-90 Upper Kittitas County – Guide Signs	$9,450	Guide Signs
SR 125 Multiple Post Sign Improvements	$9,406	Signs

South Central Region

All 2015–17 Low Cost Enhancement Projects

Regionwide No-Passing Survey	$7,375	Project Design
US 12 MP 430-434 – Single Post Sign Improvements	$6,998	Signs
SR 24 Yakima River Bridge Glare Screen	$6,796	Miscellaneous
US 12 at Clinton St – Left Turn Prohibition	$6,035	Intersection
US 12 at 16th Ave – Greenway Bike/Pedestrian Crossing	$5,840	Pedestrian/ Bicycle
US 12 at White Pass – Congestion Sign	$5,652	Pedestrian/ Bicycle
US 395 MP 37.37 – Eltopia Southbound Rumble Strips	$5,500	Warning Signs
Regionwide Moveable "Your Speed Is" Signs	$4,423	Miscellaneous
US 12 MP 367.41 – 4th St Intersection Improvements	$4,117	Multiple
North Yakima Area Communication	$3,768	ITS spending
US 12 at Old Naches – Signal ADA Enhancements	$3,453	Pedestrian/ Bicycle
I-90 Taneum Creek Vicinity – Elk Fence	$3,267	Miscellaneous
SR 125 Sign Improvements	$3,150	Intersection
US 395 in Kennewick – Sports Complex Signing Modifications	$2,819	Guide Signs
I-182 MP 12.94 – WB Offramp 12B Improvements	$2,600	Guide Signs
I-182 – Road 100 Interconnect	$2,530	Intersection
US 395 MP 56.65 – Lind Road Fog Line	$2,308	Regulatory Signs
I-82, US 12, and N. 1st St – Interchange Striping Change	$1,965	Regulatory Signs
SR 127 – Single Post Sign Improvements	$1,963	Regulatory Signs
US 97 Signing Project	$1,877	Intersection

SR 224 at Bronco Rd – Intersection Improvements	$1,652	Regulatory Signs
SR 821 – Yakima River Canyon Byway Sign Design	$1,247	Guide Signs
SR 397 South of Pasco – Intersection Warning Sign Improvement Project	$1,226	Regulatory Signs Guide Signs
SR 22 East of Toppenish – Centerline Rumble Strips	$1,200	Intersection
SR 225 at SR 240 – Intersection Improvements	$1,117	Guide Signs
I-182 – Multiple Post Sign Improvements	$1,100	Intersection Regulatory Signs
SR 397 at Ainsworth Ave – Intersection Improvements	$1,030	Guide Signs
SR 125 Tree Trimming	$1,000	Guide Signs
SR 224 at Kennedy Rd – Guide Signs	$1,000	Guide Signs
SR 224 at Keene Rd – Intersection Improvements	$899	Regulatory Signs Guide Signs
I-90 – Denny Creek Exit Sign	$630	Guide Signs
SR 22 at Wine Country Rd – Pavement Marking Modification	$586	Minor Striping
SR 397 MP 19.87 – Northbound Left Turn Improvements	$578	Guide Signs
SR 22 East of Toppenish – Signing Project	$500	Warning Signs
SR 823 Rest Haven Interchange Vicinity – Signing Improvement Project	$400	Regulatory Signs
US 12 MP 327-380 – Single Post Sign Improvements	$267	Regulatory Signs
I-182 at Queensgate – Interchange Sign Improvements	$200	Guide Signs

South Central Region

2015-2017 Project Highlights

SR 397 AT AINSWORTH AVE - INTERSECTION IMPROVEMENTS $1,030

Heavy trucks did not have the necessary radius to complete right turns from Ainsworth Street NB onto SR 397. Meanwhile, SB SR 397 had long queue lengths. This project removed the northbound SR 397 left turn lane and restricted this turning movement. This also shifted NB lanes to the left and added a hatched area on the right to provide an appropriate turning radius for trucks. SCR changed the SB SR 397 lane configuration from a straight through, left turn lane, and right turn lane to a double left turn configuration. The region also added route follow-through signs.

SCR identified this project during a Field Assessment survey. The region coordinated this project with a planned paving project, reducing costs as well as impacts to the traveling public. SCR worked with the City of Pasco on this project.

Before

After

South Central Region

2015-2017 Project Highlights

US 12 BETWEEN NACHES AND YAKIMA ALONG GREENWAY – PEDESTRIAN PATH SIGNS

$9,982

SCR believed that this popular pedestrian and bicycle route could benefit from improved separation between the bike lane and roadway. The project shifted the through lanes over 3.5 feet, added tubular markers between the shared use path and the traveled way, and added green paint to the crosswalks. In addition, the region updated and relocated the bicycle/pedestrian signs.

SCR identified this project during a Field Assessment survey. The region coordinated this project with a planned paving project, reducing costs as well as impacts to the traveling public. SCR worked with the Yakima Greenway Association, local bicycle groups, and the City of Yakima on this project.

Before

After

Installing green paint on crosswalks

After

South Central Region

2015-2017 Project Highlights

I-82, US 12, AND N. 1ST ST LX – INTERCHANGE STRIPING CHANGE $1,965

The old configuration of this interchange contained a short merge, which created a great deal of weaving traffic. This project converted one lane, previously an option off, to a drop lane. This reduced the number of through lanes on N. 1st St to the SR 823/I-82 on-ramp from two to one, making it consistent throughout the interchange. The region changed the beginning of the eastbound I-82 entrance ramp to a drop lane. These adjustments removed the lane shifting factor.

SCR also relocated or removed signage to match the new configuration. These changes reduced mismatches between lane delineation, signage, and driver expectations.

SCR Traffic identified this project during a Field Assessment survey. The region coordinated this project with a planned paving project, reducing costs as well as impacts to the traveling public.

Before - NB on First Avenue at the interchange with SR 12

Before - NB on First Avenue approaching the interchange with SR 12

After - NB on First Avenue at the interchange with SR 12

After - NB on First Avenue approaching the interchange with SR 12

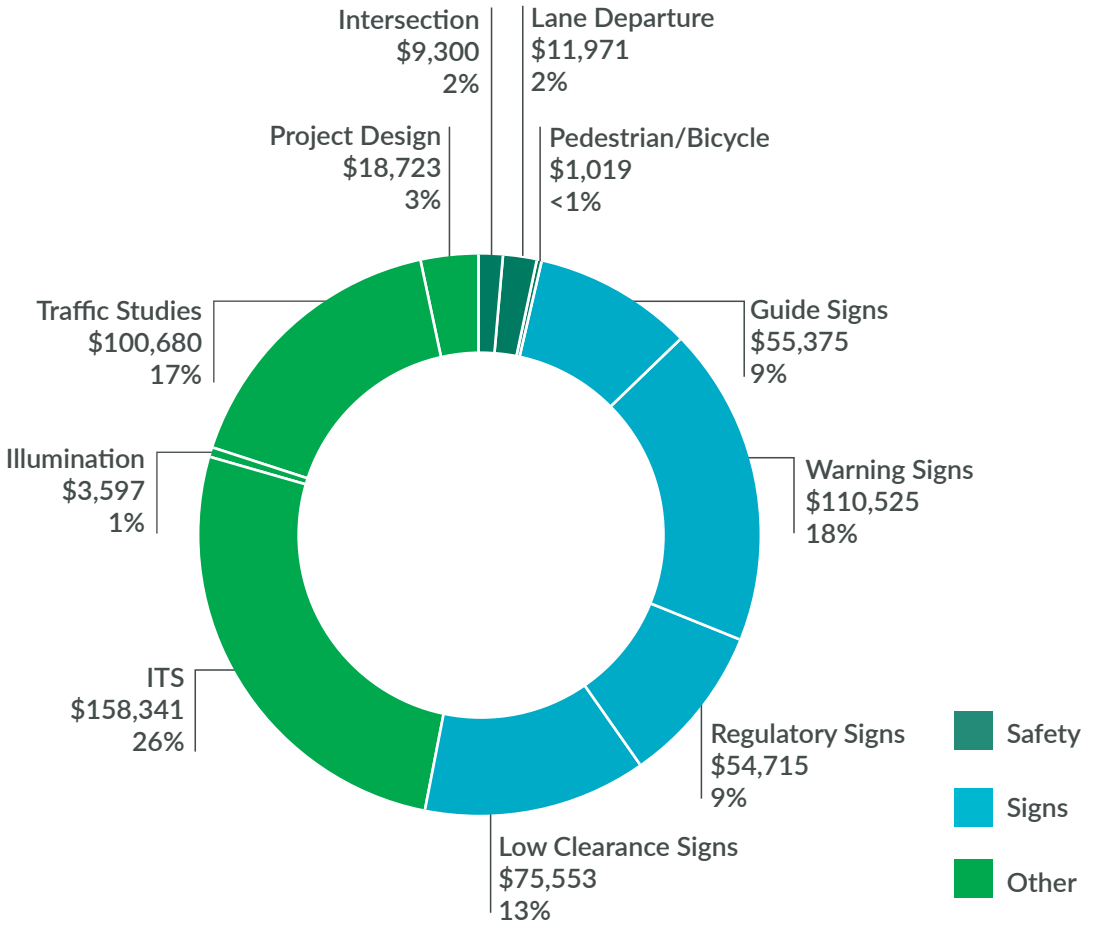
Eastern Region

In 2015-17, Eastern Region continued to focus on addressing constituent requests, which often turn into LCE projects. These smaller projects (often less than $5,000) usually involve minor adjustments to signing location, messaging, and speed zone changes. They are generally accomplished by Maintenance Area sign crews, and then charged to groups set up for each of ER's four Maintenance Areas. One larger signing effort, prompted by an ongoing WSDOT initiative, was the update to bridge low clearance signing.

Eastern Region has had two historical challenges in delivery of its LCE program: lack of staff availability to proactively identify and implement desired changes to the system, and the lack of staff available to design larger or more complex LCE projects. Consequently, these projects can sometimes be identified, but project design and implementation may be delayed until resources are available.

The region is taking steps to address these challenges. The new Field Assessment program has provided funding to dedicate staff to proactively review the regional highway system. Additionally, the LCE program for the 2017-19 biennium is funded at a level that will allow ER to fill a LCE designer position to focus on larger-cost projects, as well as other projects that ER expects to identify through Field Assessment surveys. As the

ER: Low Cost Enhancement Spending by Type of Project 2015-2017



Total Spending: $599,798

Note: due to rounding, the percentages will not add up to 100%

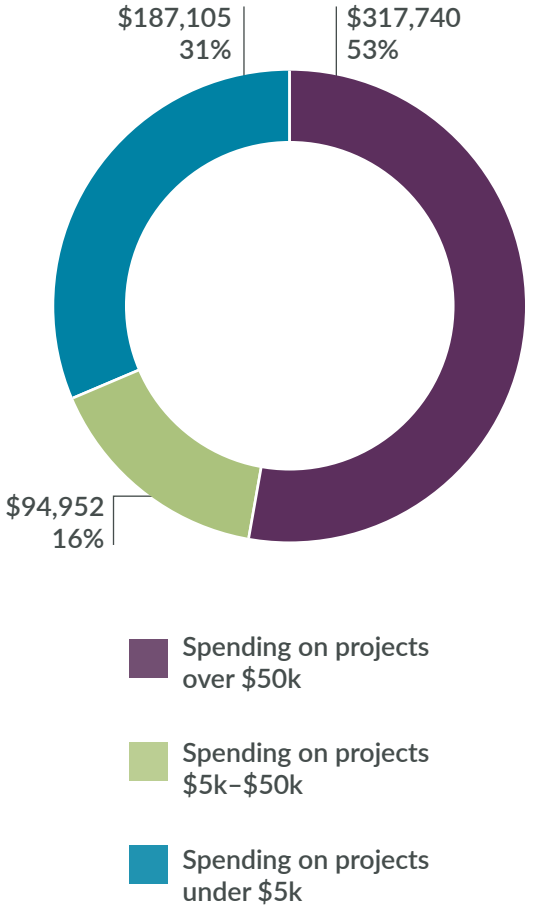
Eastern Region

Field Assessment program matures, the region's goal is to identify the majority of LCE projects through the Field Assessment program, with fewer resulting from constituent requests/inquiries. The future of LCE project identification in ER, outside of the region's Preservation Program and priority programming processes, will be through a collaboration between Planning's Corridor Sketch efforts and Traffic's Field Assessment program. Corridor Sketch efforts (see p. 11) will perform the advance work to coordinate with partners and agree on conceptual strategies, while the Field Assessment program will dive deeper into the safety and operations of the system to identify specific solutions. ER's Planning and Traffic offices will collaborate to develop the resulting projects.

All 2015–17 Low Cost Enhancement Projects

Closed Circuit Television (CCTV) Cameras	$149,081	ITS spending
I-90 Operations Study – Four Lakes to Geiger/Broadway to Idaho State Line	$93,106	Traffic Studies
Low Clearance Bridge Signing	$75,553	Low Clearance Signs
ER Maintenance Area 3 Customer Response Signing	$53,787	Signs
ER Maintenance Area 4 Customer Response Signing	$48,389	Signs
ER Maintenance Area 1 Customer Response Signing	$40,763	Signs
ER Maintenance Area 2 Customer Response Signing	$34,951	Signs
2016-17 Field Assessment Projects	$23,748	Signs
US 395 MP 170.7-183.69 – Two Advanced Warning Systems	$18,567	Warning Signs
US 2 MP 281.61-282.67 – Guardrail	$11,971	Lane Departure
SR 902 at Craig Road – Compact Roundabout	$10,360	Project Design
SR 290 Progress Road Turn Restrictions – Design	$9,300	Intersection
US 2 Hayford Road to Hazelwood Road – Channelization	$8,362	Project Design
US 395 Deer Park Study	$7,574	Traffic Studies
SR 27 Freeman School – Flasher Replacement	$5,070	ITS spending
Eastern Region Fiber Connection	$4,190	ITS spending
SR 291 at Swenson Road – Lighting Upgrade	$3,597	Illumination
SR 291 at Swenson Road – Rectangular Rapid Flashing Beacon	$1,019	Pedestrian/Bicycle
US 2 MP 293.8-300.11 – Advanced Warning System	$408	Warning Signs

ER: Low Cost Enhancement Spending by Size of Project 2015-2017



Eastern Region

2015-2017 Project Highlights

I-90 OPERATIONS STUDY—FOUR LAKES TO GEIGER/BROADWAY TO IDAHO STATE LINE

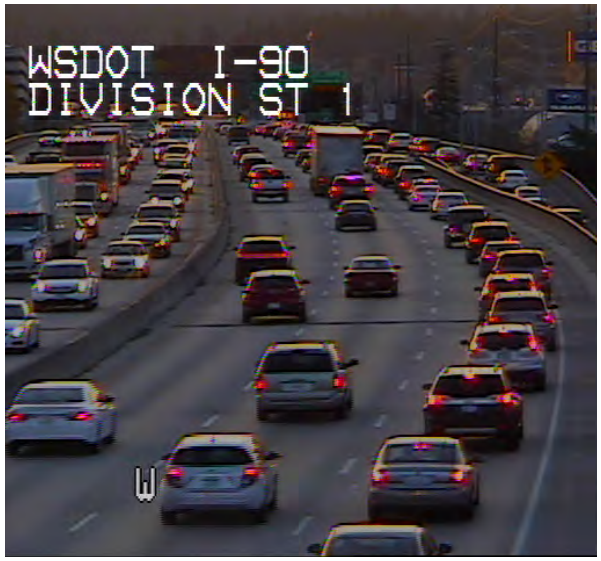
$93,106

WSDOT hired a consulting firm to perform a study addressing safety and operations on I-90 in the Spokane area, between Four Lakes and the Idaho State Line. The study was originally funded by the I program for Garden Springs to Broadway, but the contribution of LCE funds allowed WSDOT to expand the study limits on either side, to Four Lakes and the state line. The study examined crash history and operational performance in closer detail and found both safety and mobility performance have been affected by the increased congestion. Crashes have steadily increased over the past five years and are occurring on almost a daily basis. Ramp spacing, weather, and poor driving behavior contribute to the majority of these crashes. Likewise, volumes have increased by about 10% from 2012 to 2015. This, along with the crashes, has led to queuing at off-ramps and less reliable travel times, especially in the peak commute hours.

The consultant and WSDOT staff developed a list of over thirty practical solutions that could address safety and mobility without adding lanes. They reduced it to the top six:

- Active Traffic Management
- Ramp Metering
- Potential Ramp Closures
- Wrong Way Notification
- Traffic Incident Management
- Work Zone Management

ER added a third IT driver in April 2017, and is planning a ramp metering and wrong way signing project for 2019. The ER Traffic Office will be using these practical solutions to develop additional safety and mobility projects along this corridor.



Congestion on I-90 is becoming the norm

Eastern Region

2015-2017 Project Highlights

SR 902 AT CRAIG ROAD – COMPACT ROUNDABOUT $10,360

ER is partnering with the Spokane Tribe on this ongoing project. ER and the Tribe agreed that the intersection of SR 902 and Craig Road will experience an increase in traffic due to the Tribe's casino project, and that a roundabout is the best intervention to manage mobility at this location. ER funded a portion of the design with 2015-17 LCE funds, plus additional funds from 2017-19 LCE, while the Tribe is contributing mitigation funds to the project. It will be included in a P1 paving project, SR 902 Medical Lake to I-90 Paving, scheduled for 2018.

This project was identified in the region's Field Assessment of SR 902, and will address the entering-at-angle crash history at the intersection. The project is estimated at $350,000, and is a prime example of what ER is now able to accomplish with the additional funding the region received for 2017-19.

Nineteen Entering-At-Angle crashes occurred at SR 902 / Craig Road in the 2012-2016 timeframe

Eastern Region

2015-2017 Project Highlights

SR 290 PROGRESS ROAD TURN RESTRICTIONS – DESIGN $9,300

ER used 2015-17 LCE funds to design this project installing a traffic island to restrict left turns from Progress Road to SR 290. As part of this work, ER also conducted public outreach. The region then constructed the project with 2017-19 LCE funds. It corresponded with a P1 paving project, which reduced the construction impacts to the traveling public, as well as overall project costs.

This project, identified during a Field Assessment survey, addressed the location's entering-at-angle crash history. Prior to this project, Progress Road ended in a T-intersection with no movement restrictions onto E Trent Road, aka SR 290. SR 290 is a five-lane Urban Principal Arterial under the jurisdiction of the City of Spokane Valley. Crash history for this location from January 2011 to December 31, 2015 shows 21 recorded intersection-related crashes. Preliminary data from 2016 shows an additional nine recorded crashes. Twenty of the 30 were entering-at-angle crashes, 18 of them involving a driver making a left turn from southbound Progress Road to eastbound SR 290. None of these crashes resulted in serious injuries or fatalities. In each of the 18 crashes, the driver on SR 290 was driving westbound.

After evaluating several options, WSDOT chose to install raised channelization – a 4" sloped curb/island in the median – to prohibit southbound left turns. The raised median does not have an opening for pedestrians, and there is little pedestrian activity in this location. As a result, ER closed the legal crosswalks at the intersection and installed "No Pedestrians" signing. The design includes joints that will allow for a pass-thru for a future pedestrian crossing, if necessary.

ER worked with The City of Spokane Valley on this solution, including robust public engagement efforts at their request. Spokane Valley provided names of parcel owners in proximity to the intersection in order to notify them of the proposed change, the alternatives, and the preliminary recommendation. WSDOT sent out just over 900 letters, describing the proposed change and inviting recipients to an informal Open House held on May 4, 2017. Three respondents sent emails, and 20 people attended the Open House. All comments were in favor of restricting southbound left turns.

SR 290 and Progress Road Intersection - Raised Left Turn Channelization & Southbound Progress Road Turn Restriction

Headquarters

During the 2015-17 biennium, Traffic's Headquarters Office traffic held $300,000 of LCE funding in reserve for important emerging projects statewide. The Headquarters Office distributed all but about $95,000 of this reserve to Region Traffic Offices for implementing projects, such as the Bicycle/Pedestrian safety project *SR 28 & US 97 – Brewster/Pateros/Quincy Rectangular Rapid Flashing Beacons* in NCR (see p. 23).

With the remaining $95,000, HQ supported a few key projects of statewide benefit. For instance, halfway through the biennium, HQ Traffic took on SafetyAnalyst staffing responsibilities from another office in WSDOT. SafetyAnalyst is a software package used to identify roadway safety priorities. Other HQ LCE spending supported the Region Traffic offices by providing funding to support key priorities, including training and equipment.

2015-2017 Final Data

State Force Labor	$34,021	Project Design
Safety Analyst Support	$37,906	Traffic Studies
Victim Memorial Sign Charges	$10,998	Guide Signs
Real Time Technology Solutions	$10,193	ITS spending
Traffic Office Training	$2,296	Miscellaneous

MORE INFORMATION

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