



# Traffic Operations

## 2013–15 Low Cost Enhancement Program

Final Report



## Statewide Overview

Low Cost Enhancement (LCE) projects are small, low cost — usually less than \$150,000 — projects that can be quickly implemented to reduce the potential for crashes or to reduce congestion. 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. Targeted larger-scale opportunities can be identified in priority programming through a system screening process.

### Project Type Categories

#### 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 Intelligent Transportation System (ITS) projects.

#### Signs

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

#### Other

*Minor Striping.* Project involves minor striping.

*Illumination.* Any project primarily intended to modify lighting.

*Traffic Studies.* Any research or traffic studies.

*Project Design.* Labor to design and scope projects.

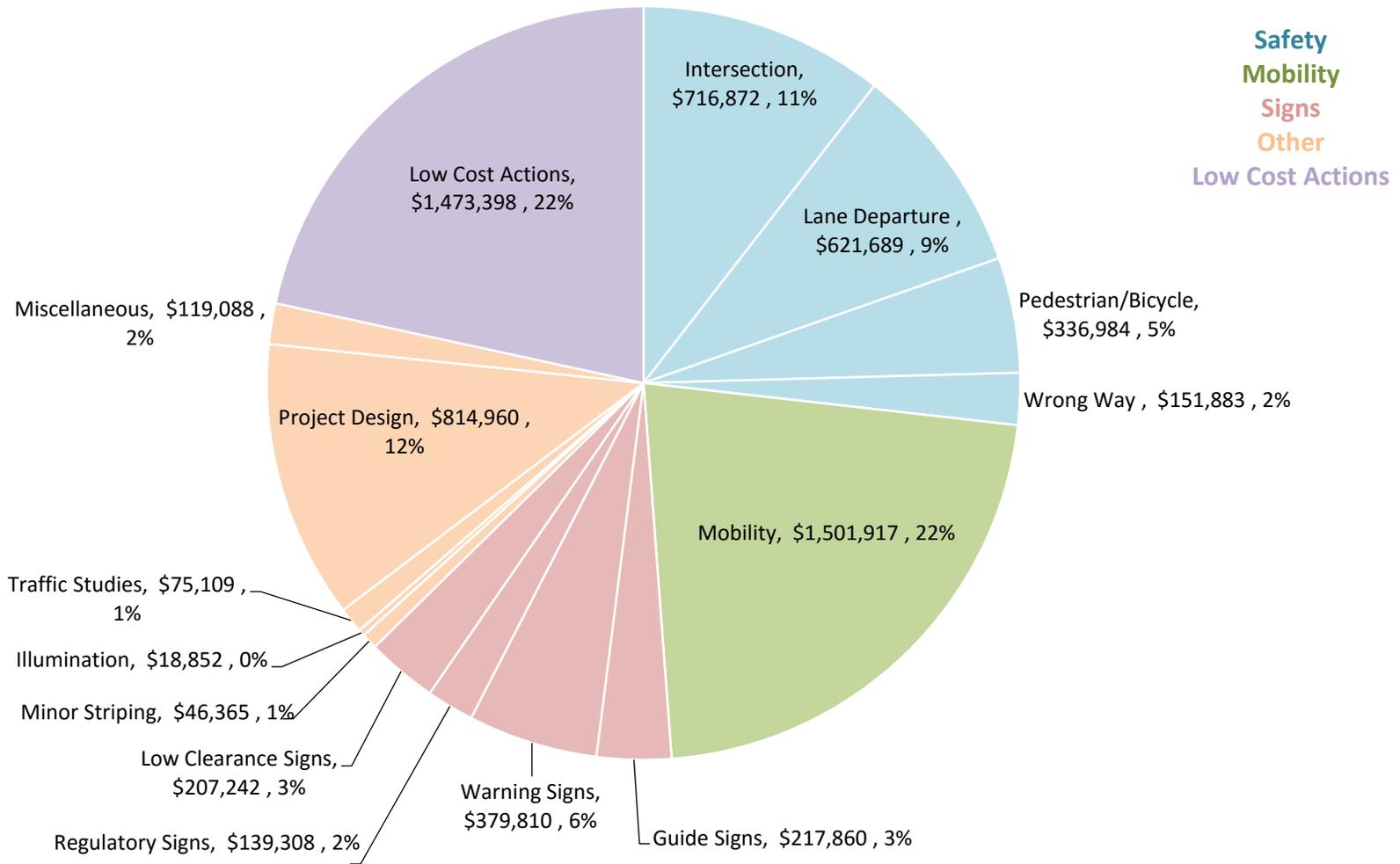
*Miscellaneous.* Activities that don't fit in another category. Examples include:

- WSP aerial markings
- Test sites
- Tort claim investigations

#### Low Cost Actions

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

Statewide Low Cost Enhancement Spending by Type of Project, 2013-2015



**Total Spending: \$6,821,338**

*Note: due to rounding, numbers do not add up to 100%*

The Traffic Operations Office's Low Cost Enhancement program, established in the mid-1990's, brings practical, low-cost solutions to statewide safety and mobility concerns. It is also a source of funding for quick responses to emerging issues. In 2013–15, the program spent \$6.8 million for this work; a budget proviso requires the Q program to spend at least \$6 million on LCE projects.

### **In 2013–15, new programs and policies helped evolve the LCE program**

Several developments have affected the LCE program this past biennium. The most important has been the launch of the Field Assessment program in July 2014. The Field Assessment program provides resources to Region Traffic offices to review and evaluate the entire highway system over a ten-year period. This additional funding allows Traffic Operations staff to proactively seek out opportunities to enhance safety and mobility. The Traffic Office uses LCE program funds to implement the projects and ideas generated by the Field Assessment program. For example, *US 2 Two Way Left-Turn Lane, East of Coulee City* (page 17) was developed through the Field Assessment program. This expands the scope of the LCE program, which has had a long-term focus on responding to constituent concerns and emergent issues.

Other developments in the program have been driven by high-level changes in WSDOT policy. Traffic Operations has increased its focus on collaboration with other groups. This includes internal collaboration with other WSDOT departments, such as Maintenance, Design, and Communications. It also includes increased collaboration with external entities, such as WSP, cities, counties, local DOTs, and neighborhood groups.

The regions have also systematically pursued opportunities to address safety and mobility concerns for pedestrians and bicyclists,

in order to help WSDOT enhance these modes of transportation, which improve mobility, health, and environment. During the 2013–15 biennium, the regions collectively spent \$337,000 on these projects, or 4.9% of the LCE budget. This is an increase of 11% over the \$304,000 spent on this category in the preceding biennium.

Major emergent needs this biennium included low-clearance signing, which is now a new project category in the reporting. In 2013–15, these projects totaled \$207,000, or 3.0% of the LCE budget.

Combined, these programs and initiatives have helped the LCE program implement more proactive and collaborative solutions.



*Olympic Region's LCE program added a wrong-way arrow on this ramp*

**Program challenges include staffing issues and spending flexibility**

Major challenges facing the program include staffing needs, especially experienced staff. A strong economy, paired with significant recent investment in transportation infrastructure across the state, has created strong 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. 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 challenge will require substantial legislative support to offset market forces that are negatively impacting agency recruitment and retention efforts.

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 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 WSDOT sustainable funding mechanism for mobility projects between \$50,000 and \$500,000, even though these types of projects can address mobility needs and forestall larger-cost projects. The LCE program does take on some higher cost projects, but not many. Of the 270 LCE projects in 2013–15, only 19 (7.0%) were over \$50,000.

**The LCE program supports Washington State's Target Zero goal for highway safety**

The LCE program has committed to the state's *Target Zero* goal of zero fatalities or serious injuries on Washington State roads by 2030.



*SWR's LCE program replaced existing advance warning signs to warn drivers of bicycles in a tunnel on US 101. The previous signs did not communicate with the other end of the tunnel*

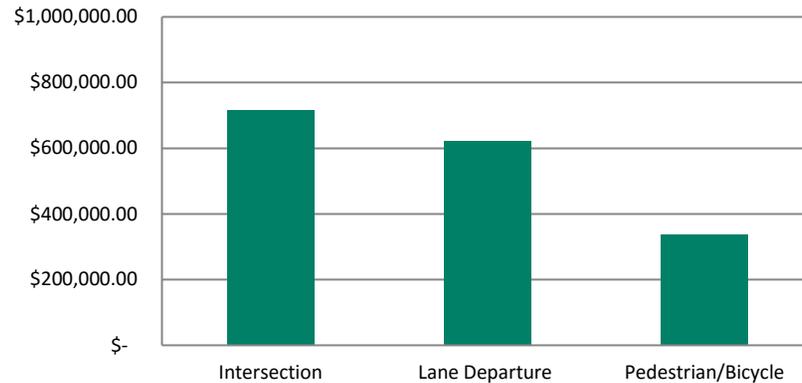
*Target Zero* is Washington's Strategic Highway Safety Plan; it sets state-wide highway safety priorities across state, local, and tribal governments.

LCE projects address key *Target Zero* priorities like intersections, lane departure, and bicycle and pedestrian safety performance. Motorcycles, another *Target Zero* category, receive the benefits of many of these safety improvements.

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.

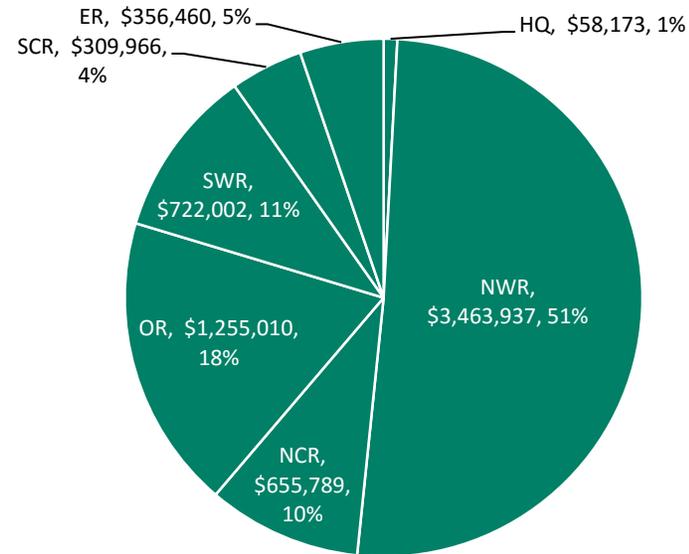
In this biennium, the program spent \$1,675,545 (25%) of its budget on projects addressing crashes involving intersections, pedestrians, bicycles, and lane departure, all categories correlating with 2013 *Target Zero* safety priorities. The Traffic Office is tracking several of these projects for safety outcomes and will share them in future reports.

**Statewide Low Cost Enhancement Spending by Target Zero Categories, 2013-2015**



The pie chart breaks out LCE spending by region. Much of the state’s 2013–15 need for LCE projects was in the greater Puget Sound area, which is why Northwest and Olympic Regions account for the majority of the spending.

**2013-2015 Low Cost Enhancements: Spending By Region**





*Installing transverse rumble strips with LCE funds*

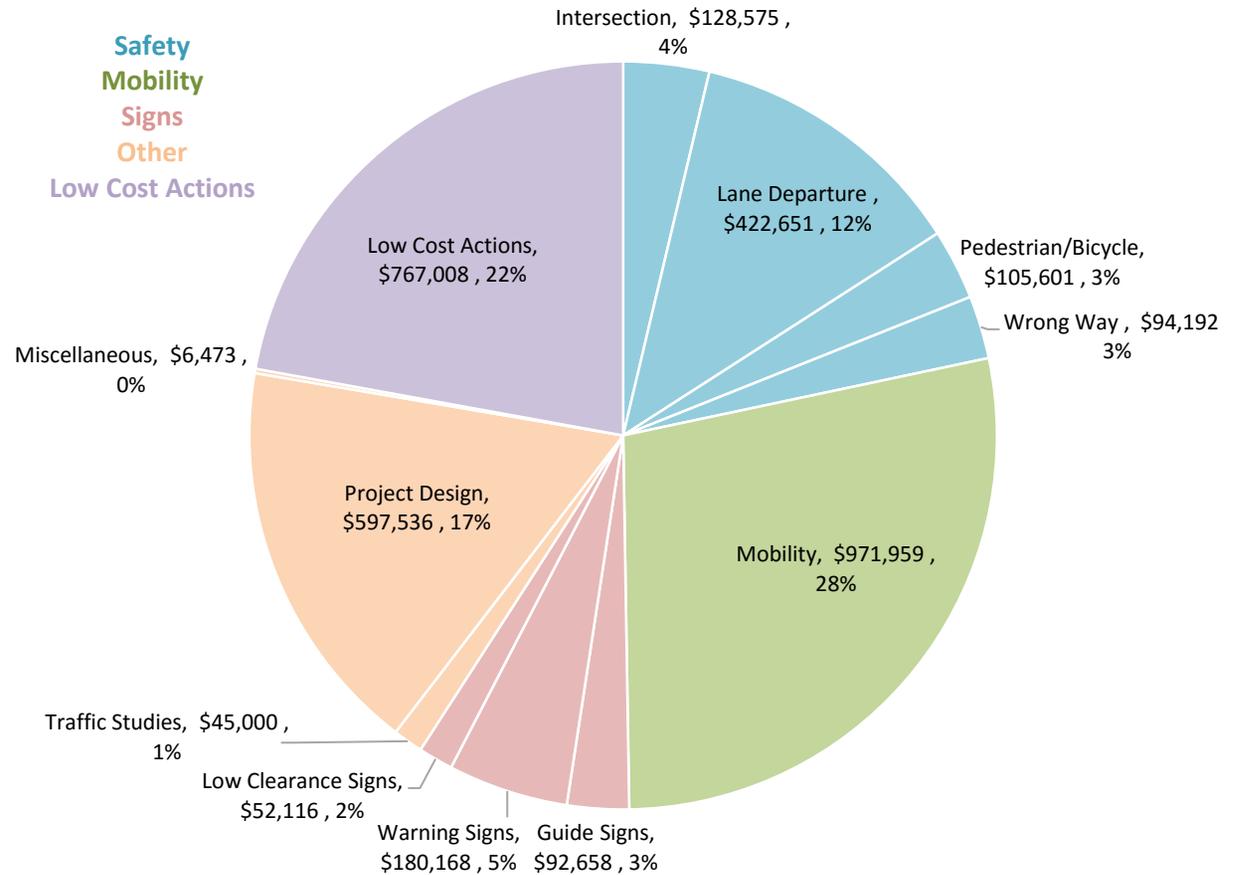
## Northwest Region

NWR delivered a wide variety of LCE projects in 2013–15. The Signal Integration projects, in the Mobility category, added camera coverage and fiber connection to 21 intersections; this allows frequent monitoring and adjustment of signals to respond to unplanned traffic patterns. Modifications can be made remotely, saving significant staff time and providing improved signal performance for travelers.

Some LCE funds were used to fill gaps in WSDOT funding policy. The region spent \$24,953 to remove two 40+ year old failing overhead sign structures, which no existing program covers, and \$20,370 to remove a raised island, outdated by today’s safety standards.

NWR completed design for two large projects now in construction in early 2015–17, *SR 520 WB at 51<sup>st</sup> and 40<sup>th</sup> Off-ramp Reconfiguration*, and *SR 181 SB to I-405 Ramp Meter Modification*. Plans for 2015–17 LCE projects include implementation of recommendations from Field Assessments and Collision Analysis reviews, upgrading trail crossings, and replacing the outdated Central Signal system.

**NWR: Low Cost Enhancement Spending by Type of Project, 2013-2015**



**Total Spending: \$3,463,937**

Northwest Region: All 2013–15 Low Cost Enhancement Projects

Design for LCE projects	\$597,536.02	Project Design	I-5 Federal Way SB Weigh in Motion Cabinet Access Safety Improvement	\$30,876.25	Mobility
High Friction Surface Treatment — 148th at I-90 and SR 526 at I-5	\$359,032.09	Lane Departure	I-5 at 164th SW Pedestrian Crossing	\$26,415.68	Pedestrian/ Bicycle
SR 20 Oak Harbor and SR 20 Spur to Pulver — Signal Integration	\$306,016.80	Mobility	I-5 Southcenter & SR 99 S Holden St Vicinity - Signing Modification	\$24,953.00	Guide Signs
King Area Low Cost Actions	\$296,655.63	Low Cost Actions	SR 20 Elk Warning Signs	\$24,644.94	Warning Signs
Snohomish Area Low Cost Actions	\$204,078.42	Low Cost Actions	Maintenance Labor to Deliver LCE projects	\$23,000.00	Low Cost Actions
SR 522 Adaptive Signal Control <sup>1</sup>	\$141,644.63	Mobility	SR 518 Signing to SR 99	\$18,533.49	Guide Signs
10 Gig Network, Phase 3	\$128,314.39	Mobility	I-5 SB Southcenter Overhead Sign Replacement	\$16,225.75	Guide Signs
I-5 Swift and Albro Signal Integration — includes on-call contract with DES	\$116,835.09	Mobility	Freeway Operations Low Cost Actions	\$15,836.63	Low Cost Actions
Uninterrupted power source for traffic signals	\$114,409.06	Intersection	I-5 at 80th & 85th Signing and Striping	\$15,356.76	Lane Departure
Mount Baker Area Low Cost Actions	\$105,738.91	Low Cost Actions	I-5 NE 175th St Advance Signing	\$14,710.98	Guide Signs
Wrong Way Traffic Control	\$94,192.08	Wrong Way	I-5 at IOWA Replace Signal Cabinet	\$14,586.32	Mobility
Curve Warning Signs — regionwide	\$89,717.57	Warning Signs	Update 5 VMS	\$13,241.39	Mobility
SR 104 Mid Block Crosswalk HAWK <sup>2</sup>	\$71,790.01	Pedestrian/ Bicycle	ITS Operations Low Cost Actions	\$13,212.19	Low Cost Actions
Additional Materials for LCE projects	\$61,946.56	Low Cost Actions	SR 518 — 51st EB Off Ramp Intersection	\$11,960.71	Mobility
SR 18 MP 14.5 — Camera	\$57,153.77	Mobility	I-5 at SR 531 Smokey Point Signing	\$11,377.61	Guide Signs
Low Clearance Signs	\$52,115.62	Low Clearance Signs	Bellingham ITS Maintenance	\$10,911.58	Mobility
SR 526 Boeing Access Active Warning Sign	\$51,344.52	Warning Signs	NB I-5 MLK ramp enhancement	\$9,017.96	Lane Departure
Pooled fund study — Managed lanes, TMC	\$45,000.00	Traffic Studies	I-5 & SR 524 Ramp Meter Modification	\$8,266.10	Mobility
Central Operations Low Cost Actions	\$43,539.98	Low Cost Actions	SR 525 Mukilteo Ferry Offload Beacons	\$7,583.78	Intersection
I-5 at SR 530 Lateral Fiber Distribution	\$34,972.58	Mobility	I-90 Fiber To Issaquah VMS	\$7,520.51	Mobility
SR 518 EB Drop Lane To I-5 NB	\$32,798.47	Lane Departure	Pedestrian View Signs	\$7,395.80	Pedestrian/ Bicycle
Camera Replacement 13–15 Phase 2	\$32,146.26	Mobility	I-5 at 164th Add Pedestrian access and Vehicle Storage	\$7,094.89	Mobility
Camera Replacement 13–15 Phase 1	\$31,260.73	Mobility	I-5 SB Exit Signing To Northgate	\$6,856.95	Guide Signs



**Northwest Region: All 2013–15 Low Cost Enhancement Projects (continued)**

US 2 Money Creek Luminaire — Intersection safety	\$6,582.56	Intersection
Curve Warning Signs 11–13	\$6,519.24	Warning Signs
Tort Claim Investigation	\$6,473.06	Miscellaneous
SR 9 MP 66 Curve Warning Signs	\$6,312.15	Warning Signs
SR167 at 277th Replace Controllers	\$5,826.69	Mobility
SR 522 at Fales Rd/Echo Lake Rd Right-Turn Modification	\$5,811.26	Mobility
SR18 Hobart Median Restripe	\$4,816.43	Lane Departure
SR 520 WBCD Phase 1 Signing — early action for bottleneck removal on SR 520	\$4,084.77	Mobility
SR 522 at Paradise Lake Rd Ptz Camera	\$3,433.79	Mobility
Additional Equipment for LCE projects	\$3,000.00	Low Cost Actions
I-5 SB to SR 518 Gore Island Removal	\$1,629.54	Lane Departure
SR 410 Elk Warning Signs	\$1,629.10	Warning Signs

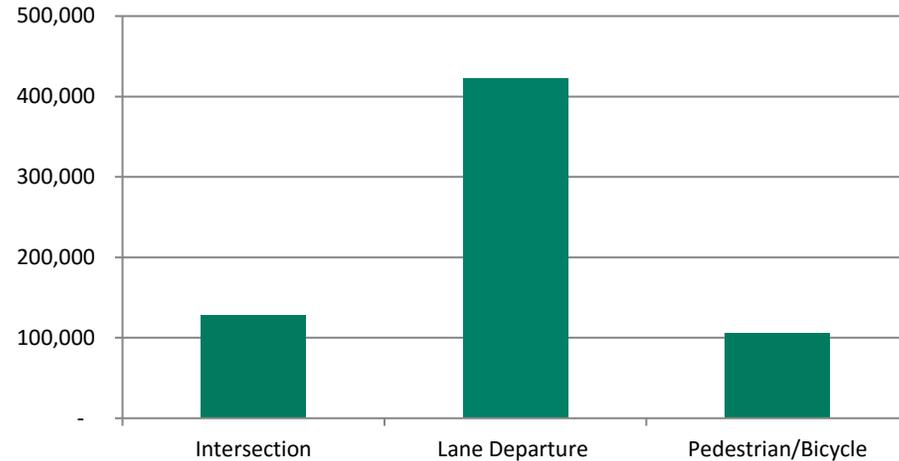
<sup>1</sup> The SR522 Adaptive Signal Control project supplements a 2013 Quick Response Safety Grant. The grant was not sufficient to complete the project. The project added adaptive signal control to ten intersections in Lake Forest Park and Kenmore.

<sup>2</sup> The SR104 Midblock Crossing HAWK project supplements a 2012 Pedestrian and Bicycle Program grant. The grant was not sufficient to cover all project costs. The project provides a High-intensity Activated CrossWalk (HAWK) in the vicinity of Edmonds City Park.

19% of NWR’s 2013–15 LCE budget spending is expected to improve intersection safety, prevent lane departure type collisions, and improve bicycle and pedestrian safety.

In addition to the Q program work to reduce lane departure and motorcycle crashes, the NW Region Traffic Office is delivering the Safety Program Curve Warning Sign project. The project brings curve warning signing up to MUTCD standard.

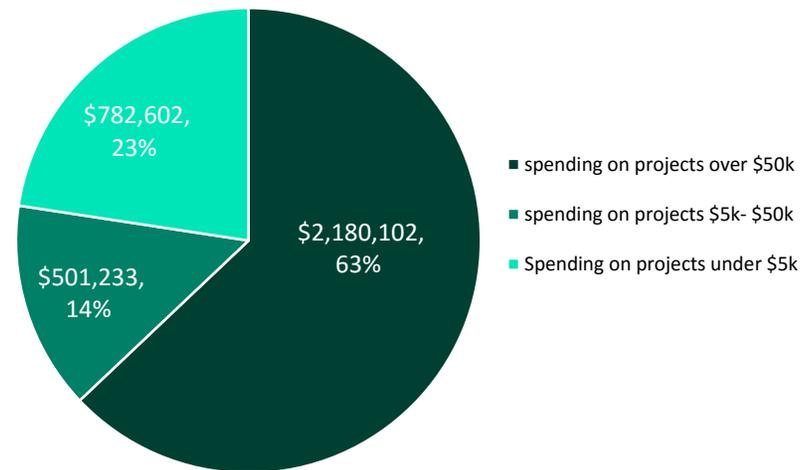
**NWR: Low Cost Enhancement Spending by Target Zero Categories, 2013–2015**



23% of NWR’s projects are Low Cost Actions or other small projects, all less than \$5,000 each, such as signing and pavement marking modifications

NWR has had good success using Small Works contracts to implement larger, over \$50k projects. The High Friction Surface Treatment project is an example. The region uses on-call contracting for conduit installation to deliver signal integration and ITS type projects.

**NWR: Low Cost Enhancement Spending by Size of Project, 2013–2015**

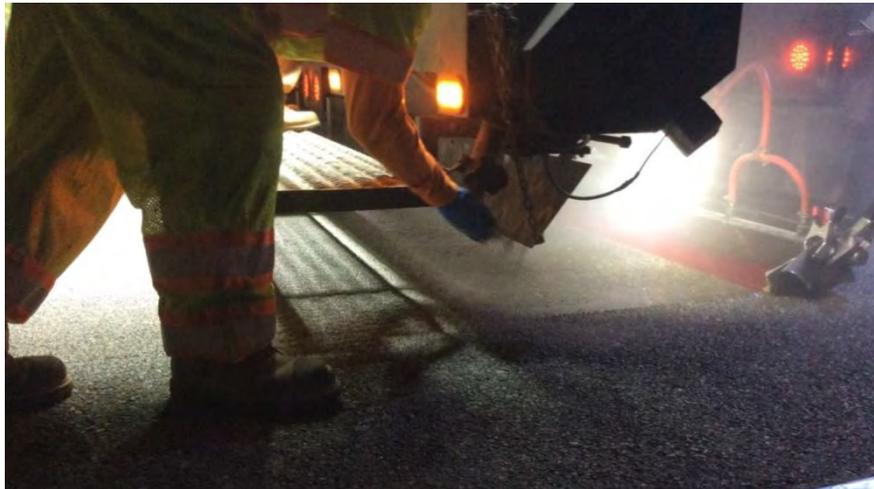


In Summer 2015, NWR installed high friction surface treatment (HFST) to increase traction on two freeway ramps. HFST treatment dramatically increases the surface friction of pavement for enhanced braking and steering control within curves. This project was the first of its kind on NWR highways, and is one of the innovations endorsed by FHWA Everyday Counts. Early indications are that the HFST is having the desired effect. WSDOT is conducting a five-year study to evaluate the effects of the HFST, and plans to publish a final report in 2020.

The two locations are:

- The Bellevue Eastgate interchange, where the 148<sup>th</sup> on-ramp leads to westbound I-90, near Bellevue College and WSP district office.
- In Everett, the eastbound SR 526 on-ramp connects to southbound I-5 near Boeing production facility.

Both locations presented similar difficulties. The driver's view of the ramp curvature is constrained by upstream features such as a crest and pier walls, and the tightest curve at both sites is situated near the middle of the ramp, where a driver would understandably wish to be accelerating. The conventional warning signs, flashing beacons, and advisory speed signs were not getting the respect of all drivers.



#### How high friction surface treatment (HFST) is installed

A specialized application truck applies a polymer resin binder, which is a high-strength glue. Then the vehicle uniformly spreads Calcined Bauxite, a hard durable aggregate. The thin overlay has a finished depth of about ¼ inch and cures in about three hours. The resulting traction with HSFT almost doubles the measured friction properties for the pavement.

## SR 522 at Fales Rd / Echo Lake Rd Right Turn Modification \$5,811

Northwest Region

NWR converted the right turn (RT) movement at this interchange from signal control to yield control at each of the EB and WB off ramps. Constituents had complained about long light cycles, during which no other vehicles were moving through the intersection while they waited at a red light.

The signal heads for the RT vehicles at both off ramps were offset a significant distance from the center of the Single Point Urban Interchanges (SPUI). This offset required abnormally long all-red clearance times to allow vehicles to traverse and clear the signalized right turns from the opposite side of the SPUI. On top of that, extended all-red intervals increased the inefficiency.

The project required the removal of the poles, mast arms, signal heads, then the addition of stop bars and yield sign installations. Finally, the region made signal timing changes. With the removal of the right turn signal control, NWR was able to eliminate two of the signal phases — right turns from each of the ramps — and remove the extended all-red periods.

Prior to this project, the total red clearance time per cycle was 21 seconds. After project completion, the total red clearance time was reduced to eight seconds, for a total reduction of 13 seconds per cycle. Assuming a daily average cycle length of 90 seconds, that would equate to 960 cycles per day with a savings of 208 minutes per day — or 52.7 days per year that the light is not RED!

The project was completed in October 2014, and the region has received many compliments from the public. In the end, the time savings to drivers is significant and RT turning vehicles no longer have to wait for the signal to cycle through abnormally long, unnecessary clearance times.



Before



After

## North Central Region

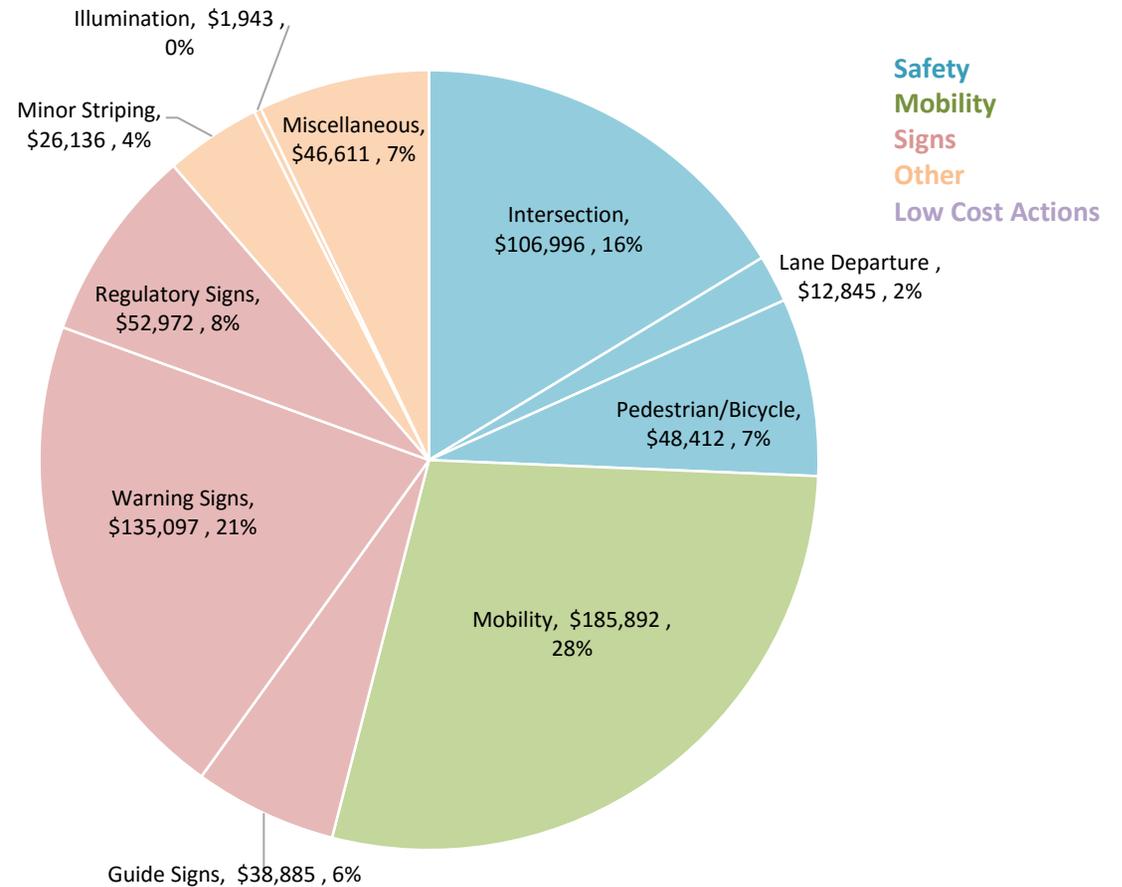
In the 2013–15 biennium, NCR reached out to cities, counties, transit agencies, and WSP as partners in identifying and delivering low cost enhancement projects.

Many of the projects that the region delivered were identified by stakeholders, part of an increasingly strong focus on community engagement within the region.

NCR continues to identify needed projects and then tries to align them with other planned upcoming projects in the area, in order to reduce cost and impacts to the public.

The WSDOT Field Assessment program has improved the proactive nature of the region’s LCE program by identifying projects to address operational and safety needs.

**NCR: Low Cost Enhancement Spending by Type of Project, 2013-2015**



**Total Spending: \$655,789**

North Central Region: All 2013–15 Low Cost Enhancement Projects

Area 1 Signing	\$82,119.93	All Sign Types	SR 172 Sprauer Rd (aka Cty Rd 8-NW) LED Stop Sign	\$5,025.66	Intersection
US 97 Hugo VMS MP 240.3	\$71,853.01	Mobility	US 2 Stevens West Camera	\$5,001.76	Mobility
Area 3 Signing	\$57,312.31	All Sign Types	SR 155 Speed Limit Rev & Warning Signs	\$4,648.88	Warning Signs
US 97/SR 20 Tonasket truck turning radius Improvement at MP 314.82	\$48,645.00	Intersection Mobility	Regionwide Minor Striping Chanel Modifications	\$4,526.61	Minor Striping
US 2, MP 90.1 Drop Arm Gate Installation for canyon closures for safety	\$46,565.16	Miscellaneous	SR 155 Nespelem School Beacons	\$3,989.63	Pedestrian/ Bicycle
US 2 Two Way Left-Turn Lane, East Of Coulee City	\$46,463.63	Intersection Mobility	Regionwide LED Stop Signs	\$3,875.02	Intersection
Area 4 Signing	\$35,254.67	All Sign Types	SR 171 and US 97A Median Alert Markings	\$3,843.26	Lane Departure
US 97A partnership with City of Chelan - Modify Existing Signal System, Roadway Striping	\$33,027.56	Pedestrian/ Bicycle Mobility	SR 17 Randolph Road Stop Bar Relocation	\$3,706.00	Intersection
SR 17 Operational Improvements	\$29,234.37	Intersection Mobility Minor Striping	SR 17 Bench Road Led Stop Signs MP 27.36	\$3,703.22	Intersection
Area 2 Signing	\$20,718.42	All Sign Types	US 2/97 Easy St Signal Network Radio	\$3,600.98	Mobility
SR 28 Quincy Cameras	\$19,424.12	Mobility	US 2/97 Rumble Removal At Bridges For Bikes	\$2,112.91	Pedestrian/ Bicycle
SR 150 Bike Beacon	\$19,308.00	Pedestrian/ Bicycle	SR 155 Remove Old School Crossing Sign	\$1,993.08	Warning Signs
US 2 Operational Improvements	\$17,634.91	Lane Departure Pedestrian/ Bicycle Warning Signs	SR 28 9th Street Camera	\$1,951.32	Mobility
SR 24 Bench Road LED Stop Signs	\$13,928.83	Intersection	US 2/97 Old Monitor Rd Median Refuge	\$1,755.91	Intersection
SR 150 ITS Radios For Chelan Area MP 7.97	\$12,215.17	Mobility	US 97A Chelan Truck Signing	\$1,589.65	Guide Signs
Regionwide Minor Enhancements for WSP — Striping and signing	\$10,180.59	Warning Signs Minor Striping	US 2/97 Monitor Signal Modifications	\$1,102.96	Mobility
SR 17 N Moses Lake Cameras MP 50-55	\$8,579.86	Mobility	SR 243 Mattawa Roundabout Camera Installation	\$915.87	Mobility
SR 285 LED Lights on Sellar Bridge Pedestrian Path	\$6,943.78	Pedestrian/ Bicycle Illumination	SR 150 Flashing Yellow Arrow Columbia Signal Installation	\$695.33	Mobility
US 2 Tumwater Canyon Detour Signs	\$5,862.12	Guide Signs	SR 17 Grape Drive Signal Modifications	\$416.76	Mobility
US 97 South of Pateros Signing	\$5,640.68	Lane Departure Warning Signs	SR 150, Restripe And Sign To Create Dedicated Left-Turn Lane	\$133.55	Minor Striping
SR 28 B-NW Striping Modification	\$5,150.10	Minor Striping	Moses Lake Rectangular Rapid Flashing Beacons (RRFBs)	\$46.03	Miscellaneous
US 2 Truck Escape Ramp striping and signing	\$5,092.32	Warning Signs Minor Striping			

NCR has many state routes with local road intersections, and therefore spends a good amount of money on those areas to reduce fatal and serious collisions. These improvements include channelization, enhanced signing, and delineation. These projects also address driver inattention by adding channelization at intersections.

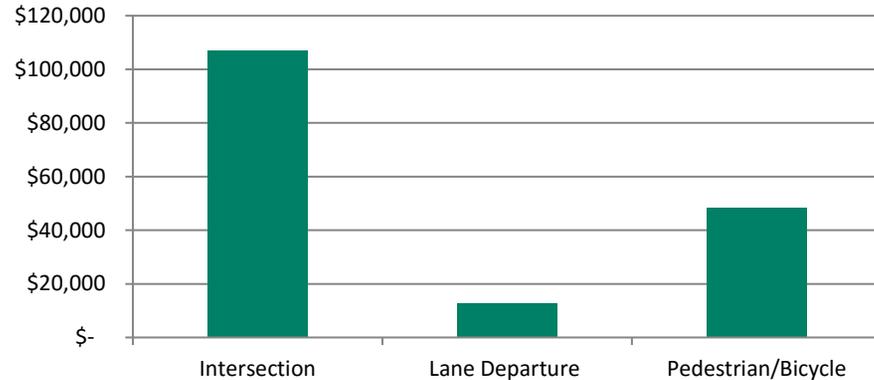
Another emphasis area is to enhance bicycle and pedestrian safety along state routes and to encourage increased use of this mode of transportation.

NCR spent approximately 37% of its LCE budget on projects under \$5,000 in 2013–15. As a way to improve efficiency, NCR sets up groups in each of its four maintenance areas to address minor (under \$5,000) signing or striping issues, to avoid having to develop a separate project for each sign or small striping revision.

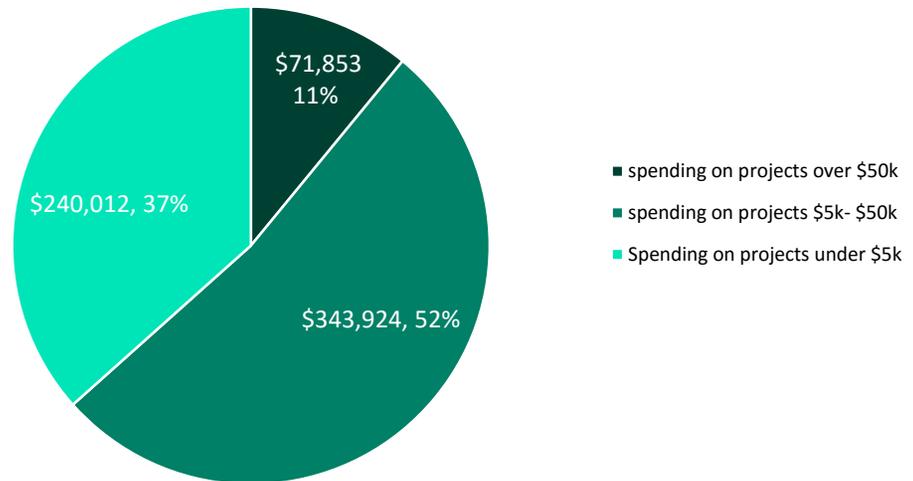
Some examples of projects under \$5,000 are: adding intersection warning signs to a location, mounting school bus turn around warning signs, enhancing delineation, and revising the pass/no-pass roadway striping.

Almost all of NCR’s projects are delivered using state forces, which not only reduces design efforts but also saves dollars in construction and inspection.

**NCR: Low Cost Enhancement Spending by Target Zero Categories, 2013–2015**



**NCR: Low Cost Enhancement Spending by Size of Project, 2013–2015**



**US 2 Two Way Left Turn Lane, East Of Coulee City \$46,464****North Central Region**

NCR restriped the existing pavement of this section of US 2 to provide a two-way left-turn lane for vehicles turning off of US 2. Several intersecting county roads and private accesses generate left turns off of US 2, which is a 50 mph two-lane road at this location. WSDOT Maintenance and local property owners reported a high frequency of near-miss accidents. The turn lane improves mobility and allows a refuge area for vehicles waiting to turn from and onto US 2. It allows vehicles to safely navigate the network of county roads, private accesses, and state highway.

The turn lane is approximately half a mile in length. The work included earthwork and paving to build up the structure of the existing shoulder to support live traffic once lanes were shifted onto it. NCR used an asphalt paver borrowed from Chelan County, vendor-supplied Hot Mix Asphalt (HMA), and state forces to complete the paving. The region administered a small maintenance contract for materials and labor for the plastic pavement markings. WSDOT crews placed the paint pavement markings.

Upon completion of the project, WSDOT received overwhelmingly favorable responses from local property owners.



*New two-way left-turn lane on US 2, east of Coulee City*

**US 2 Operational Improvements: 2<sup>nd</sup> Street Pedestrian Crossing Improvements \$2,281****North Central Region**

This project installed illumination and a marked crosswalk at US 2 and 2<sup>nd</sup> Street in the town of Coulee City, near the south end of Banks Lake. The location is in close proximity to stores and restaurants. The town requested a marked crosswalk for pedestrians wishing to travel to and from the park. There are several pedestrian attractions in the area, including a paved walkway to the lake and a bistro café on Highway 2 at 2<sup>nd</sup> Street. Before this project, there was only one marked crosswalk across US 2, on the west end of town. NCR recognized the value in providing another ADA-compliant, marked crossing opportunity at the east end, and partnered with Coulee City to install improved pedestrian features at 2<sup>nd</sup> Street. The town provided illumination, extruded curbing, and a detectable warning surface. WSDOT provided plastic crosswalk markings and pedestrian signs. WSDOT's portion of the work was accomplished with state forces. Reactions from Coulee City and local property owners have been extremely positive.



*The new crosswalk provides pedestrian access between the Community Park on the south shore of Banks Lake and the stores and restaurants on the other side of the road.*

NCR adjusted the channelization of Cunningham Road and SR 17 near Othello, WA, and added an advisory speed sign. The existing channelization of SR 17 consisted of northbound and southbound one-way left-turn lanes, one through lane in each direction, and a southbound right-turn lane. Collision history at the intersection showed a significant number of vehicles failing to yield as they entered from Cunningham Road and crossed the right-turn lane. Field reviews concluded that the right-turn lane on SR 17 was interfering with the sight distance from Cunningham.

NCR restriped the right-turn lane on the existing pavement, shifting it over and separating it from the through lane by eight feet. NCR also implemented an advisory speed of 50 mph and radar speed detection signs that display approaching cars' speeds.

The work consisted of removing the existing rumble strips and recessed pavement markers, removing existing pavement markings, installing new plastic and paint pavement markings, and installing new signs. A portion of the work was accomplished by the Regionwide Chip Seal project, which removed pavement markings and rumble strips, installing plastic markings in their place. WSDOT crews installed paint pavement markings, advisory speed signs, and power to the signs.

NCR intends for the advisory speed driver feedback sign to work in conjunction with the adjusted channelization at this intersection to improve safety for both mainline and side-street traffic.



*The project shifted the existing southbound right-turn lane eight feet out to offset it from the SR 17 mainline.*



*The project also installed advisory speed signs for SR 17 traffic approaching the intersection, with radar driver feedback signs mounted below.*

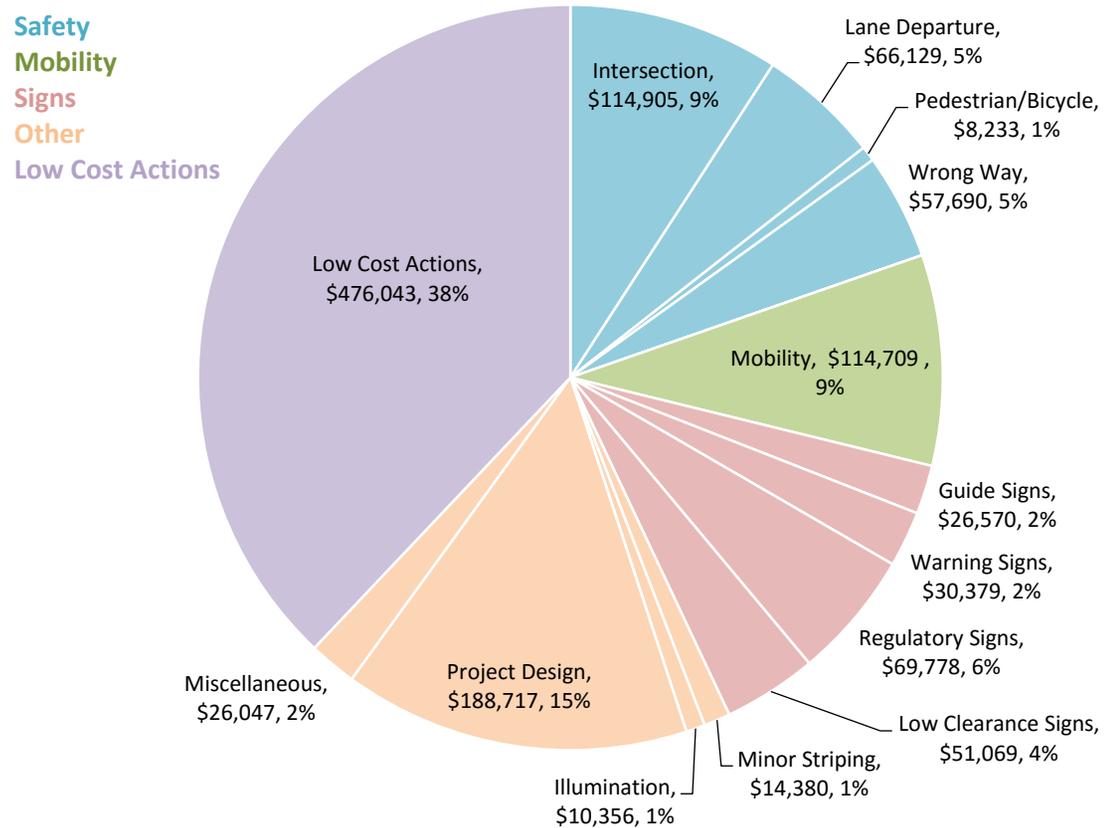
## Olympic Region

OR’s LCE program provides practical, quick responses to the region’s operational concerns. Over the decades of the program, OR has accomplished many creative, small-scale projects to improve efficiency and safety. However, these quick and simple fixes are becoming rarer, and the region increasingly requires larger and more complex projects to achieve improvements.

The state force spending thresholds set by the Legislature limit WSDOT’s in-house project delivery to projects under \$60,000. Projects over that amount require small-works contracts with outside vendors, which are typically more expensive than in-house work. Raising this threshold would increase the range, size, and number of projects that OR can take on as part of the LCE program. This would improve the region’s effectiveness within the LCE program and allow limited money to go farther on behalf of the public.

Meanwhile, OR continues to develop partnerships both internally throughout WSDOT as well as externally with local agencies and the public – helping the region to keep the program lean through financial partnerships and creative multi-agency solutions.

**OR: Low Cost Enhancement Spending by Type of Project, 2013-2015**



**Total Spending: \$1,255,010**

**Olympic Region: All 2013-15 Low Cost Enhancement Projects**

Minor Enhancements <\$5,000	476,043.13	Low Cost Actions	US 12 and Pecan Left Turn Channelization	6,951.10	Intersection
Regionwide Sign Crew	141,073.36	Project Design	SR 161 Edgewood Speed Change	6,728.20	Regulatory Signs
US 12, Pecan St Left-Turn Channelization MP 45.10 To MP 45.30	86,203.72	Intersection	SR 162 at Calistoga Signal Modifications	6,468.86	Mobility
Region Wide Pavement Markings	50,140.79	Wrong Way	US 101 at River Rd Signal Modifications	5,550.42	Mobility
QE Project Design PFA & CAD work	47,644.07	Project Design	SR 162 at Pioneer/Bowman Signal Modifications	5,439.03	Mobility
SR 302 Guide Post Delineation Improvements	45,384.73	Lane Departure	SR 116 Replace Centerline With Type "D" Durable Plastic (MMA)	5,087.38	Minor Striping
SR 507 at Vancil Rd Signal Modifications	40,361.23	Mobility	I-5 JBLM Vicinity Tree Removal to improve line of sight	5,000.00	Miscellaneous
Low Clearance Signs	26,325.55	Low Clearance Signs	SR 162 at Military Road Signal Modifications	4,821.59	Mobility
Advance Low Clearance Signs	24,743.72	Low Clearance Signs	SR 510 Roundabout Regulatory Signing	4,813.83	Regulatory Signs
SR 8 Speed Reduction	21,693.39	Regulatory Signs	SR 307 Bond Road, Little Valley Road Closure	4,715.31	Intersection
Denmark & Pecan Intersections Warning Signs	12,656.26	Warning Signs	SR 3 Downtown Shelton at Railroad Ave. Signal Modification	4,705.55	Mobility
SR 16 at Wollochet Interchange Signal Equipment Upgrades	12,391.81	Mobility	SR 109 Flashing Beacons	4,589.36	Lane Departure
SR 16 Extended "No Parking Anytime" Zones with signing	11,155.43	Lane Departure	State Patrol Aerial Surveillance Marker	4,439.80	Miscellaneous
Joint Base Lewis McChord (JBLM) Electronic Traveler Time Information Signs	10,430.00	Mobility	SR 509 Markham Re-Channelization	4,237.72	Intersection
SR 101 at Crosby Blvd LED Lighting Conversion	10,356.21	Illumination	SR 167 Speed Zone Change	4,179.13	Regulatory Signs
Us 101 Memorial Signing	10,094.91	Miscellaneous	SR 7 Alder To La Grande Speed Zone changes	4,004.72	Warning Signs
SR 410 Bonnie Lake Speed Revision	10,052.59	Regulatory Signs	SR 161 Eatonville Speed Change	3,954.77	Regulatory Signs
SR 167 Hard Shoulder Running	9,932.18	Mobility	SR 117 "Do Not Enter" & "Wrong Way" Signing	3,806.42	Wrong Way
I-5 Tacoma Dome Detour Signs	9,309.81	Guide Signs	US 101 Blyn Speed Zone Change	3,739.83	Regulatory Signs
SR 3 and Imperial Way - New Centerline Rumble Strip	8,708.73	Intersection	US 12 Westport/Ocean Shores Mileage Sign	3,645.24	Guide Signs
SR 162 at Cardinal Lane Signal Modifications	7,931.21	Mobility	I-705 Speed Limit Signing	3,472.79	Regulatory Signs
I-705 NB Off-Ramp to 21st Street Regulatory Signing	7,275.51	Regulatory Signs	SR 16 Olympic Dr Onramps - Replace Paint with Recessed Plastic	3,299.85	Minor Striping

**Olympic Region: All 2013-15 Low Cost Enhancement Projects (continued)**

SR 3 Gorst Area Traffic Arrows	3,280.20	Minor Striping	SR 161 Jovita Blvd Signs	2,094.72	Regulatory Signs
SR 104 Kingston Crosswalk	3,237.03	Pedestrian/ Bicycle	SR 705 NB Left Side Exit Supplemental Left Plaque	2,010.82	Miscellaneous
SR 16 Fort Nisqually Signs	3,219.21	Guide Signs	SR 510 MP 14.04 in Yelm Curve Delineation Enhancement	1,952.68	Lane Departure
SR 512 Fish Hatchery Signs	3,204.72	Guide Signs	SR 16 Right Lane Ends	1,780.26	Warning Signs
SR 509 - Replaced Missing Segment of Srvievw Video	3,160.85	Miscellaneous	SR 303 Ridgetop Interchange Signal Upgrade	1,643.44	Mobility
SR 3 at Pickering Rd Warning Signs and Rumble Strips	3,095.04	Warning Signs	I-5 at 54th interchange Fife Wands Restricting Left Turns	1,532.43	Intersection
I-5 at MP 127.54 NB off-ramp Chevron Sign Replacement	3,046.91	Lane Departure	SR 303 Ridgetop Blvd Lane Use Signing	1,507.99	Wrong Way
SR 117 POW/MIA Signs	2,995.00	Guide Signs	SR 99 54th St. Channelization	1,409.16	Minor Striping
Sprague Ave Sign	2,886.20	Guide Signs	US 12 Aberdeen Replacement Guide Sign	1,341.28	Miscellaneous
SR 12 Right Lane Pavement Markings	2,556.37	Intersection	I-5 Advance Sign for Rochester	1,310.11	Guide Signs
SR 305 Winslow Cameras	2,547.57	Mobility	Lavender Festival Signing	1,215.11	Warning Signs
SR 162 at 136th - Removed Brush	2,486.41	Mobility	I-5 To SR 163 Speed Zone Change	1,110.44	Regulatory Signs
SR 166 New Crosswalk and Signage	2,390.38	Pedestrian/ Bicycle	SR 16 Cross Hatching On-Ramp from 24th St NW	1,019.63	Minor Striping
SR 3 Deer Creek/Agate Area - no passing zone, rumble buttons, signs	2,272.14	Warning Signs	SR 115 LED Chevron Sign Repairs	909.85	Warning Signs
SR 3 North Ally Loop Center Island 2nd Stop Sign	2,235.33	Wrong Way	SR 7 and 66th Ave Stop Sign	663.43	Regulatory Signs
SR 167 to NB SR 161 Installed Directional Guide Signing	2,234.16	Warning Signs	SR 105 Cranberry Pedestrian Signs	506.94	Pedestrian/ Bicycle
SR 705 To SR 509 Advisory Speed	2,212.08	Warning Signs	I-5 NB MP 86 NB Off Ramp - Extension Line for Right Turn	284.23	Minor Striping
SR 510 Red Wind Casino Pedestrian Updates - Enhanced Signing & Signal Operations	2,098.88	Pedestrian/ Bicycle			

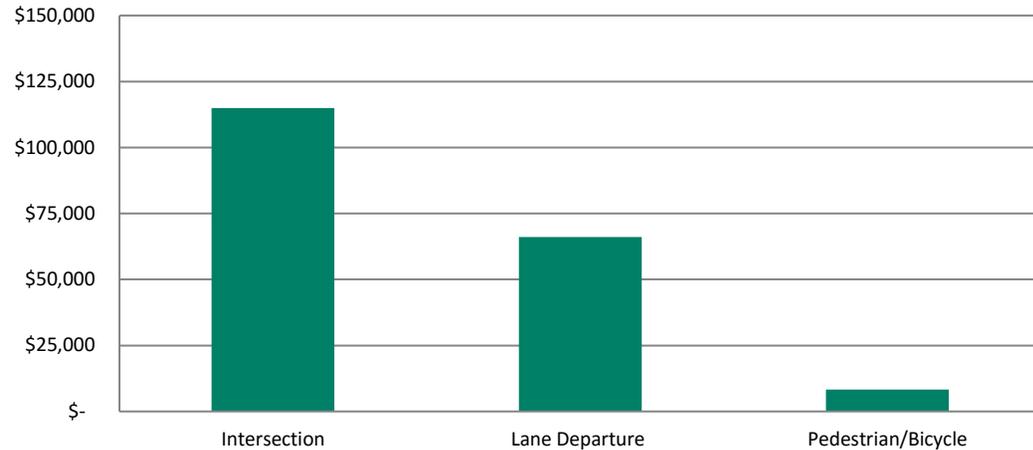
As noted in the graph, the majority of Olympic Region’s spending in the Target Zero categories is on improving intersections. Intersections are a primary location of collisions in the region. An example of this kind of project is the re-channelization striping and wands placed at the intersection of SR 509 and Markam Rd near Brown’s Point (see project highlights for more information).

An example of lane departure spending is the rumble strips placed on SR 302 in Pierce County.

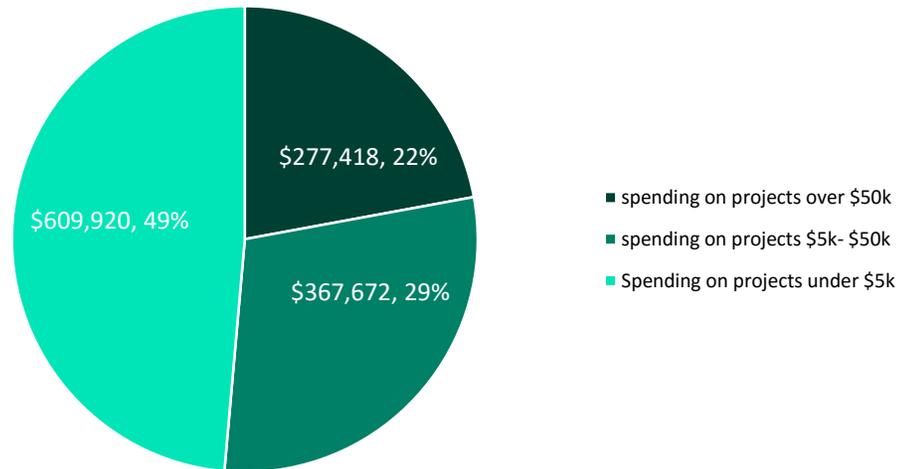
About half of the Olympic Region’s LCE expenditures are in smaller projects below \$5,000. This kind of work typically involves the addition of small signing projects, minor striping, or guideposts. Projects in the \$5,000 to \$50,000 group usually involved larger signs or groups of signs, striping and grinding, or flashing beacons.

An example of a project in the over \$50k group is the re-channelization work done at US 12 and Pecan Street near Rochester. This work included widening shoulders, paving the intersection, restriping and adding signs (see project highlights for more information).

OR: Low Cost Enhancement Spending by Target Zero Categories, 2013-2015



OR: Low Cost Enhancement Spending by Size of Project, 2013-2015



**SR 307 Bond Road, Little Valley Road Closure \$4,715****Olympic Region**

This project included the installation of new intersection warning signs, street name signs, and Do Not Enter signs. SR 307 Bond Road is a rural, two-lane corridor in Kitsap County. Little Valley Road intersected SR 307 in an area with limited sight distance due to the curvature of SR 307. Because of this, and because residents on Little Valley Road had better routes for accessing the state system, OR worked with Kitsap County to close the connection between Little Valley Road and SR 307.

OR removed the existing SR 307 striping and restriped the intersection, removing left-turn pocket to Little Valley Road. The region also installed temporary traffic revision ahead signs to advise drivers of the closure.



*Region Wide crews worked with Kitsap County. The county physically closed the road, and State Forces restriped SR-307 to remove the left-turn pocket.*

**SR 302 Guide Post Delineation Improvements \$45,385****Olympic Region**

OR added guardrail and guideposts in various areas of the corridor. In addition, the region added 3M™ Linear Delineation System to guardrail, as well as wide 8-inch striping on the pavement, to make the highway delineation more visible.

SR 302 is a rural two-lane highway in Pierce County connecting SR 3 and SR 16 near Purdy. WSDOT acquired the road from the County in the early nineties, and the road has experienced significant growth in traffic since that time. The highway has many curves and narrow shoulders. Meanwhile, several cross streets and driveway intersect it along its 16 mile length. It also has a history of run-off-the-road type crashes.



*OR crews installed 8" wide lines for the edge lines, plus installed LDS panels on the guardrails. They also increased the guideposts for more delineation.*

**US 12, Pecan St Left-Turn Channelization MP 45.10 To MP 45.30 \$86,204**

**Olympic Region**

OR added a left-turn channelization of the US 12/Pecan Street intersection. US 12 in this area is a two-lane, 50 mph rural highway. The highway rises just to the west of the intersection to go over a railroad track. The road has several intersecting streets, most of which already have left-turn channelization.

This project involved narrowing the shoulders in order to provide enough width to include the center left-turn lane. This was complicated by the fact that the existing shoulders were not deep enough to carry highway traffic, so the entire intersection was paved in order to provide that strength for the shoulders. State forces were responsible for design, the preparation activities for the paving, signing, installation of final pavement markings including recessed RPMs, and traffic control. A local asphalt company did the paving.



*Instead of cutting out the shoulders and building back up using state forces, OR set up a small works contract and overlaid the whole area to provide structural strength and ended up with a better looking project for the same or less money.*

**SR 509 Markham Re-Channelization \$4,238**

**Olympic Region**

This project involved a strong collaborative effort to restripe this rather small, complicated intersection in order to better define traffic and pedestrian movements. In the Tacoma area, SR 509 changes from a divided, multilane freeway to a rural, two-lane, 35 mph highway. At this point, two minor streets and a driveway, all in close proximity to one another, intersect the route as it heads north toward Federal Way. The project itself consisted of grinding out the old stripes and installing new paint stripes, pavement marks and traffic wands.

WSDOT staff, the county, and neighborhood representatives worked on the design of the intersection.



*Old intersection configuration*



*New intersection configuration*

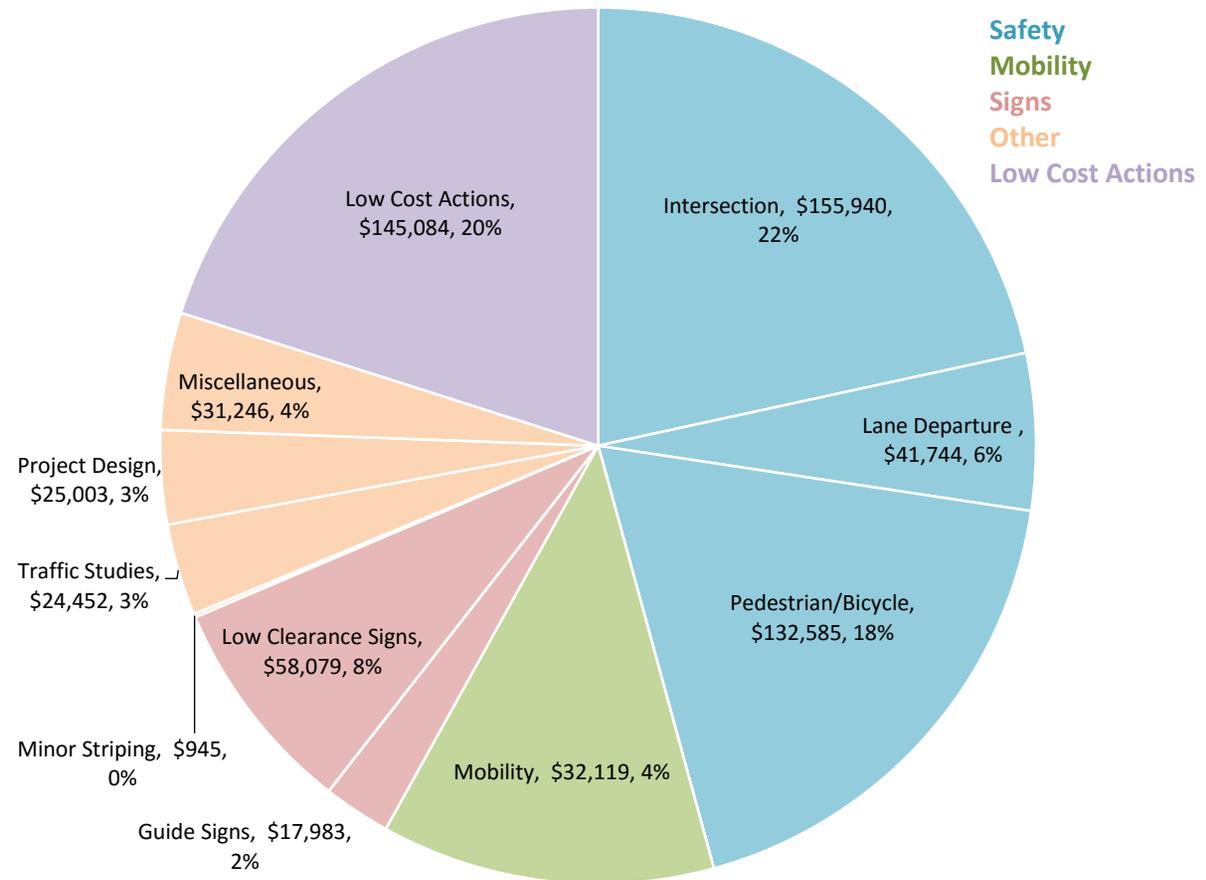
## Southwest Region

SWR implemented a large variety of LCE projects in the 2013-15 biennium. In the past, complaints from citizens have been the primary source for generating projects. The Field Assessment program is introducing a new level of review of the region’s highway system. Through this program, along with the ongoing corridor sketches and increased community engagement efforts, SWR anticipates an increase in proactive safety projects in the upcoming years.

SWR’s goal is to always have twenty or more projects (\$6,000 - \$80,000) scoped, estimated, designed, and prioritized for future consideration.

In the 2015–17 biennium, SWR plans to deliver several pedestrian and bike improvements, and additional tunnel safety enhancements.

**SWR: Low Cost Enhancement Spending by Type of Project, 2013-2015**



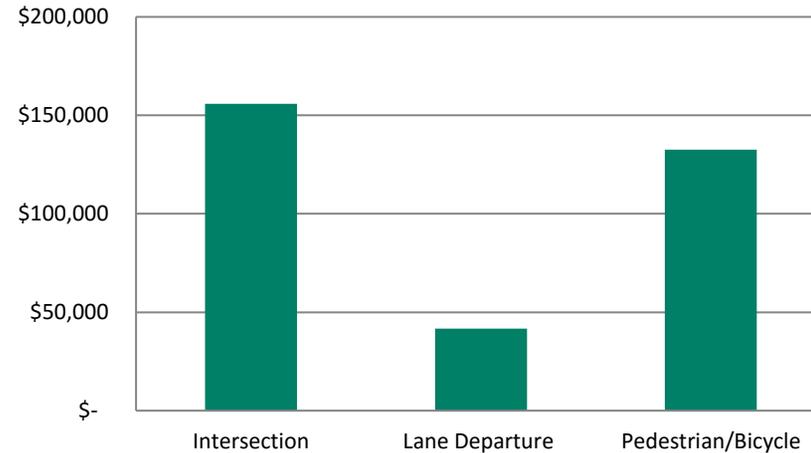
**Total Spending: \$722,002**

**Southwest Region: All 2013-15 Low Cost Enhancement Projects**

Low Cost Actions <\$5,000	\$145,084.07	<b>Low Cost Actions</b>	CAL/CAC/IAL/LCE Development - review, analysis and scoping	\$16,868.56	<b>Project Design</b>
SR 14 Tunnels Bike/Low Clearance Signing	\$102,259.15	<b>Pedestrian/Bicycle Low Clearance Signs</b>	Incident Response Expenditures	\$13,317.35	<b>Miscellaneous</b>
US 97/SR 14 Intersection right-turn lane	\$97,971.07	<b>Intersection</b>	TMC Equipment	\$11,871.98	<b>Mobility</b>
Pattern Mill Grinder for removing rumble strips and Recessed Pavement Markers	\$34,844.10	<b>Lane Departure</b>	State Contribution for signal controllers at 78th St Vast Project	\$10,000.00	<b>Mobility</b>
Low Clearance Signing	\$33,079.24	<b>Low Clearance Signs</b>	I-5 Traffic Camera Woodland	\$8,325.57	<b>Mobility</b>
Flashing Signal Upgrades around the region	\$32,406.52	<b>Intersection</b>	State Force Work – Others	\$8,135.07	<b>Project Design</b>
SR 508 Baily Bridge: One Lane Bridge, Truck Detour, and All Way Stop Signing	\$25,859.47	<b>Intersection Mobility</b>	SR 500/76th Audible Pedestrian Signal	\$7,582.71	<b>Pedestrian/Bicycle</b>
Traffic Studies - equipment and labor	\$24,452.32	<b>Traffic Studies</b>	Intelligent Transportation System Expenditures	\$7,255.66	<b>Mobility</b>
SR 500 Camera At 54th	\$23,110.67	<b>Mobility</b>	SR 503 Goerig Street Curve Safety	\$6,900.56	<b>Lane Departure</b>
US 101 Tunnel Safety Signing for Bicyclists	\$21,938.69	<b>Pedestrian/Bicycle</b>	SR 14/I-5 Ramp Meter Enhancement	\$6,254.22	<b>Mobility</b>
I-5 Exit 5 Pedestrian Crosswalk and ADA ramp relocation	\$20,676.41	<b>Pedestrian/Bicycle</b>	SR 14 Tunnel 1&5 - Bike access to push buttons	\$5,128.75	<b>Pedestrian/Bicycle</b>
SR 14/15th Street "Prepare to Stop When Flashing" sign	\$18,576.86	<b>Intersection</b>	US 12 right-turn lane in Mossyrock - scoping for potential project	\$2,339.97	<b>Intersection</b>
Columbia Hills State Park Gateway Signs	\$17,983.19	<b>Guide Signs</b>	Merge Arrows	\$945.78	<b>Minor Striping</b>
WSP Aerial Marks	\$17,928.92	<b>Miscellaneous</b>	I-5/SR 502 NB Off-Ramp - scoping potential project	\$905.63	<b>Intersection</b>

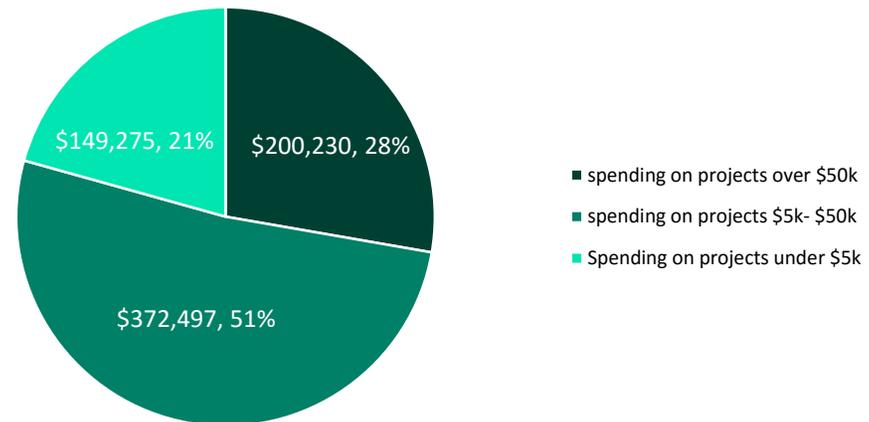
Pedestrian and bicycle projects are a priority for SWR, based on WSDOT’s growing emphasis on multi-modal transportation and increased community engagement. The intersection spending includes one large project, *US 97/SR 14 Intersection Right-Turn Lane*, at \$97,971.07.

**SWR: Low Cost Enhancement Spending by Target Zero Categories, 2013-2015**



SWR spent 21% of their LCE funding on approximately 60 low-cost actions, small-scale projects under \$5,000, often generated by constituent requests. For instance, SWR received multiple requests for School Bus Stop Ahead signs. The region makes it a priority to have signs available for installation, often getting them installed within a few days. Although these projects seem minor, they are a good example of the LCE program providing timely, cost efficient delivery as well as community engagement.

**SWR: Low Cost Enhancement Spending by Size of Project, 2013-2015**



With more staff to identify, scope, design, estimate, and prioritize safety projects, SWR could invest in additional higher-cost projects.

**SR 14 Tunnels Bike/Low Clearance Signing \$102,259**

**Southwest Region**

This project improved the existing bicycle warning signs and low clearance signs at this location. SWR replaced and relocated ten bike signs, making them more accessible to cyclists compared to previous designs. The region also replaced low clearance signing for the tunnels with signs that meet current standards and display the correct heights. The end result of the project is improved safety within the tunnels for bicyclists and ensuring large loads receive the proper information regarding tunnel height.



*Tunnel 5 Low Clearance*



*New Sign at Tunnel 2*

**Flashing Yellow Arrow Signal Upgrades \$31,092**

**Southwest Region**

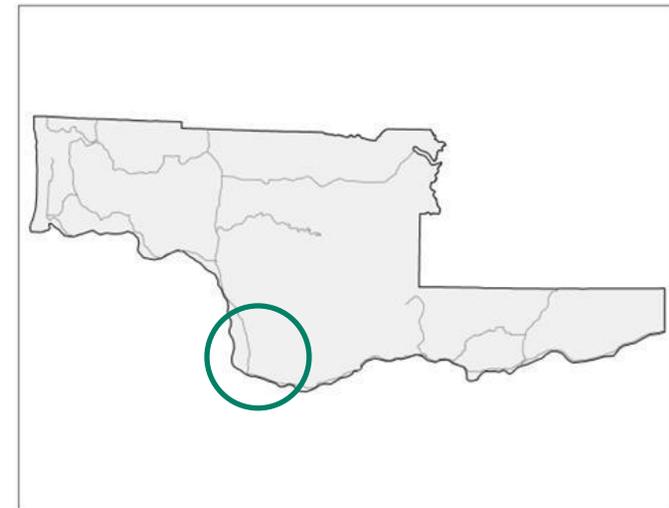
SWR converted six state-owned signals from protected-only left-turn movements to protected/permissive movements using Flashing Yellow Arrow Signals.

State highways are experiencing increased traffic volumes and subsequent congestion, especially within urban areas. This congestion is particularly evident at busy intersections. Allowing additional permissive left-turn movements can assist in improving mobility.

Changing a *protected only left-turn movement* to a *protected/permitted left-turn movement* can improve efficiency: protected/permissive control allows left turning vehicles to proceed during the through movement and reduces delay. This not only allows traffic to make the left-turn movement during the green arrow indication, but also during times when there are sufficient gaps in oncoming traffic.



*Flashing yellow arrow signal display at I-5/39<sup>th</sup> Street Interchange*



*Map of SWR*

*SWR completed six Flashing Yellow Arrow Upgrade projects near Vancouver*

**US 97/SR 14 Intersection Right-Turn Lane \$97,971**

**Southwest Region**

SWR designed a right-turn pocket along SR 14 WB for the US 97 NB movement. The construction squared up the intersection and flattened the approach where US 97 and SR 14 intersect.

Second, sight distance for SR 14 traffic is limited due to terrain. This project eliminated or minimized traffic conflicts, and increased sight distance. The majority of traffic on US 97 NB turns right at the intersection.

This project addressed two areas of concern at this intersection. First, there was a speed differential: traffic on SR 14 is 55 MPH, while traffic on US 97 is entering the intersection from a stop condition.

Traffic and Maintenance partnered on the project, with Maintenance supplying labor and base rock. Traffic provided funding for materials and other associated costs.



US 97 SB

Before

SR 14 WB



US 97 SB

After

SR 14 WB

**I-5 Exit 5 Pedestrian Crosswalk and ADA ramp relocation \$20,676**

**Southwest Region**

This project relocated a crosswalk to a better defined location and brought the ramps into ADA compliance. The changes provide clear delineation and increased visibility for pedestrian traffic.

The crosswalk at this pedestrian island receives heavy foot traffic. It was not well maintained, and had limited pedestrian visibility. The project relocated crosswalks and the ADA Ramp, and added delineation for clear visibility.



Before – from street level



After – from the overpass

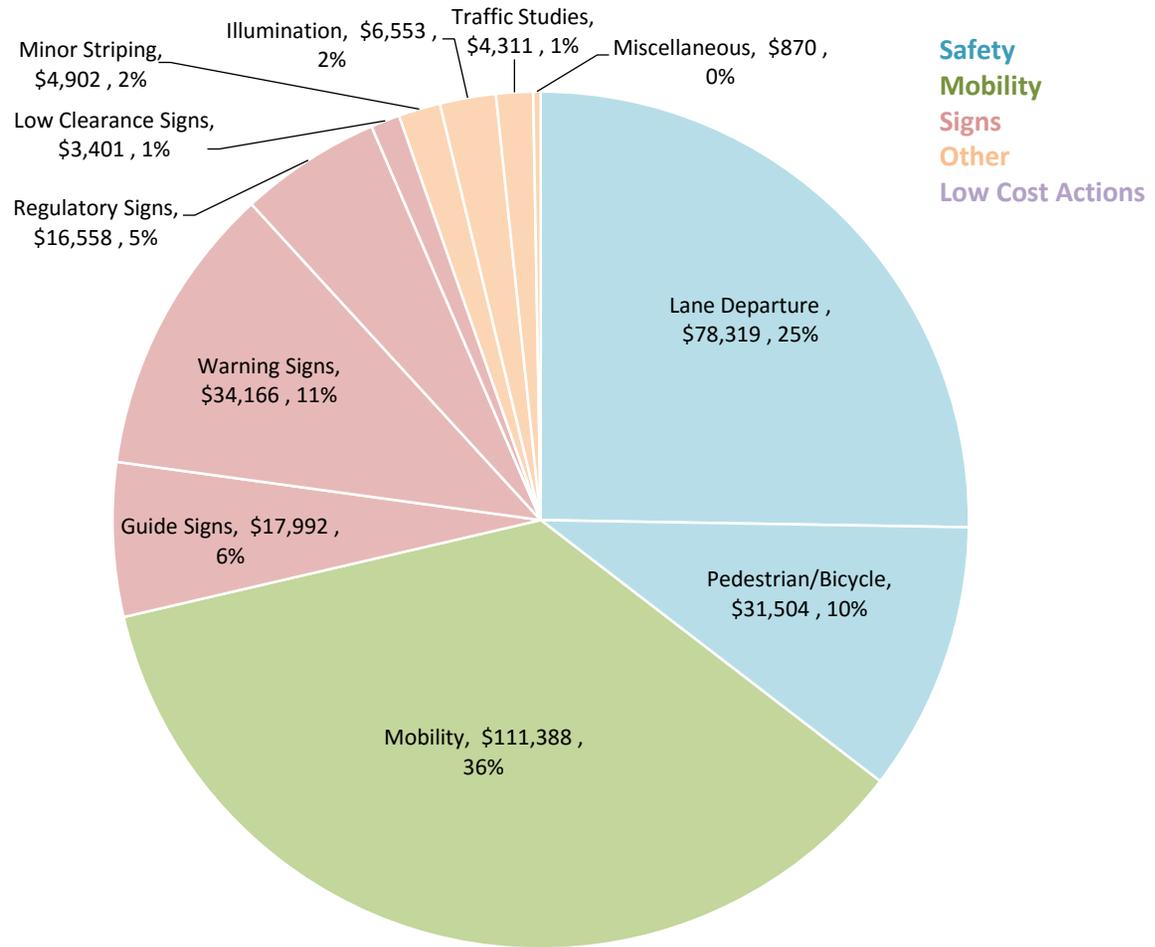
## South Central Region

SCR’s Low Cost Enhancement projects have greatly benefited from internal partnerships with Maintenance, and external partnerships with the State Patrol and the traveling public. Accepting input and suggestions from these sources has led to more diverse ideas that help the region focus on improving safety and traveler information. These partnerships have been cultivated during the 2013–15 biennium, especially the relationship with the State Patrol.

In this biennium, SCR designed a project to realign an intersection on US 12 that ended up being more than the region could afford. Additional funding in the LCE program will allow the region to tackle some of these larger projects.

The Field Assessment program started ten months before the end of the biennium. The recommended projects will begin to be addressed in the 2015–17 biennium. This new program will be an excellent source of safety-related Q projects.

**SCR: Low Cost Enhancement Spending by Type of Project, 2013-2015**



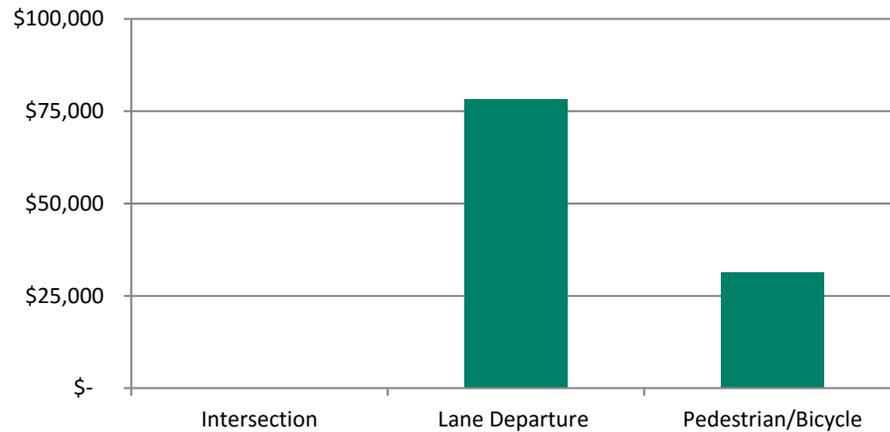
**Total Spending: \$309,966**

South Central Region: All 2013-15 Low Cost Enhancement Projects

Minor Signing Modification	\$38,168.09	All Sign Types	US 2 White Pass Camera	\$4,499.70	Mobility
I-90 Easton Pole And Guardrail	\$36,736.31	Lane Departure	Regionwide Timemark Traffic Counters	\$4,311.03	Traffic Studies
US 12 Interstate Bridge Pedestrian Railing	\$18,247.37	Pedestrian/Bicycle	I-90 Organized Chain Up Signing	\$3,835.16	Regulatory Signs
Tri-Cities Flow Map Radar Units	\$18,077.86	Mobility	SR 395 Kartchner Right-Turn Pocket	\$3,460.12	Mobility
I-90 Vantage Bridge - Retroreflective strips for barriers	\$16,750.95	Lane Departure	US 12 Interstate Bridge Clearance Signs	\$3,400.86	Low Clearance Signs
US 12 Nine-Mile And I-90 Ryegrass Cameras	\$15,632.07	Mobility	US 12 Touchet River Bridge Pedestrian Railing	\$3,327.76	Pedestrian/Bicycle
I-90 Portable Work Station Maintenance And Upgrade	\$15,458.56	Mobility	I-90 Rocky Canyon Lane Delineation	\$3,208.34	Lane Departure
Regionwide, Portable Rumble Strip Test	\$11,631.14	Lane Departure	I-82 Nob Hill On-Ramp Merge Arrows	\$2,769.92	Minor Striping
I-182 Fiber To Road 100	\$10,889.59	Mobility	US 12 MP 154 Curve Warning Chevrons	\$2,648.88	Warning Signs
SR 906 Radar "Your Speed Is Sign" Signs	\$10,177.26	Warning Signs	SR 395 Lane Ends At Columbia Drive sign	\$2,242.47	Warning Signs
Regionwide Wireless Communication Backbone Redundant	\$8,693.88	Mobility	Sky Meadows Wireless Communication Upgrade	\$2,220.13	Mobility
Portable Work Station Communication Upgrade	\$8,177.62	Mobility	US 12/125 Lane Delineation Barriers	\$2,123.93	Lane Departure
SR 240 & US 395 Signal Clock Syncing	\$7,385.39	Mobility	I-90 VMS Blanking Functionality	\$2,109.76	Mobility
I-90 Gold Creek Chain-Ups power supply	\$7,324.84	Mobility	US 395, Serial Servers For Radar Units	\$1,405.30	Mobility
Area 3 Lane Delineation - Barrier Delineators	\$6,833.60	Lane Departure	I-90 Roadway/Weather Information - Solar Sensor	\$1,189.09	Mobility
I-82 Firing Center Park & Ride Lighting	\$6,553.23	Illumination	SR 14 Guardrail Terminal Berms	\$1,034.46	Lane Departure
SR 125, Valley Grove Vicinity - Curve Flashing Beacon	\$6,374.95	Warning Signs	SR 240 Steptoe Roundabout Arrows	\$1,016.06	Minor Striping
I-82 Emergency Call Box Install	\$5,000.60	Pedestrian/Bicycle	SR 12 Dayton Lane Drop Arrows	\$890.89	Minor Striping
16th Ave Bike Path Widening	\$4,928.74	Pedestrian/Bicycle	US 97 Dry Creek Temporary Rumble Strip Test	\$870.30	Miscellaneous
Regionwide Portable Message Signs - Modems	\$4,864.50	Mobility	I-90 Denny Creek Exit Sign	\$575.73	Guide Signs
SR 124 Estes Memorial Overpass Sign	\$4,693.94	Guide Signs	I-90 Cabin Creek Vicinity Inset Striping Test	\$225.21	Minor Striping

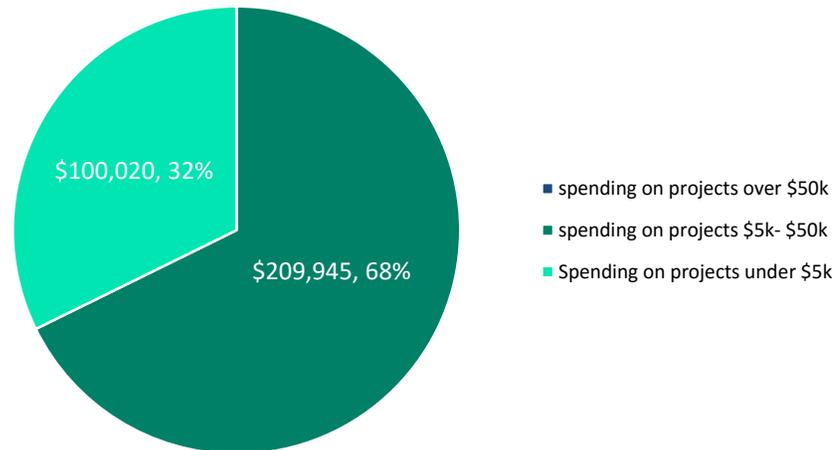
LCE funds are used to address emergent needs that can be addressed for low cost. In the 2013–15 biennium, there were opportunities to affect collisions in the Lane Departure and Pedestrian/Bicycle categories for a low cost, therefore the region created the projects to do so. Next biennium may look different as the region’s needs will shift.

**SCR: Low Cost Enhancement Spending by Target Zero Categories, 2013-2015**



A majority (68%) of SCR’s projects fell into the \$5,000-\$50,000 category. Since the region only received \$310,000 for the biennium, it is imperative to try and spread this money as wide as possible to try and cover emergent needs. For example, an addition of a left-turn lane will cost approximately \$100,000 if widening is required. Therefore, if the region did only three left-turn lanes per biennium, there would be nothing left for other emergent needs.

**SCR: Low Cost Enhancement Spending by Size of Project, 2013-2015**



**16th Ave Bike Path Widening \$4,929****South Central Region**

This project added shoulder width to reduce conflicts between vehicle traffic and the Yakima Greenway's bicycle and pedestrian users. It was generated by a citizen concern: a road user notified SCR that semi-trucks were turning wide from the US 12 off-ramp onto 16<sup>th</sup> Avenue and going onto the shoulder. This shoulder allows Yakima Greenway users to cross a shared-use path from the north side of US 12 to the south side.

WSDOT Maintenance crews completed the project a few weeks after initial contact by the citizen, who was very pleased with the work and how quickly it was done. His final comment was: "HEY, The widening on 16th Avenue overpass is a great idea. I have used it several times."

**SR 125 Valley Grove Vicinity - Curve Flashing Beacon \$6,375****South Central Region**

For this project, SCR staff installed a flashing beacon to alert drivers to the proximity of the Valley Grove intersection to the curve. The work was done in consultation with the WSP and Maintenance.

Studies indicate that the value of a flashing beacon is lost over time as people become accustomed to its presence. For this project, SCR worked with a manufacturer to build a beacon that only flashes when drivers are exceeding the curve warning speed. Since this curve is posted at 45 mph, this means the beacons won't flash unless a vehicle is going over 45 mph. The region hopes the fact that the beacon will not flash all the time will increase its effectiveness.



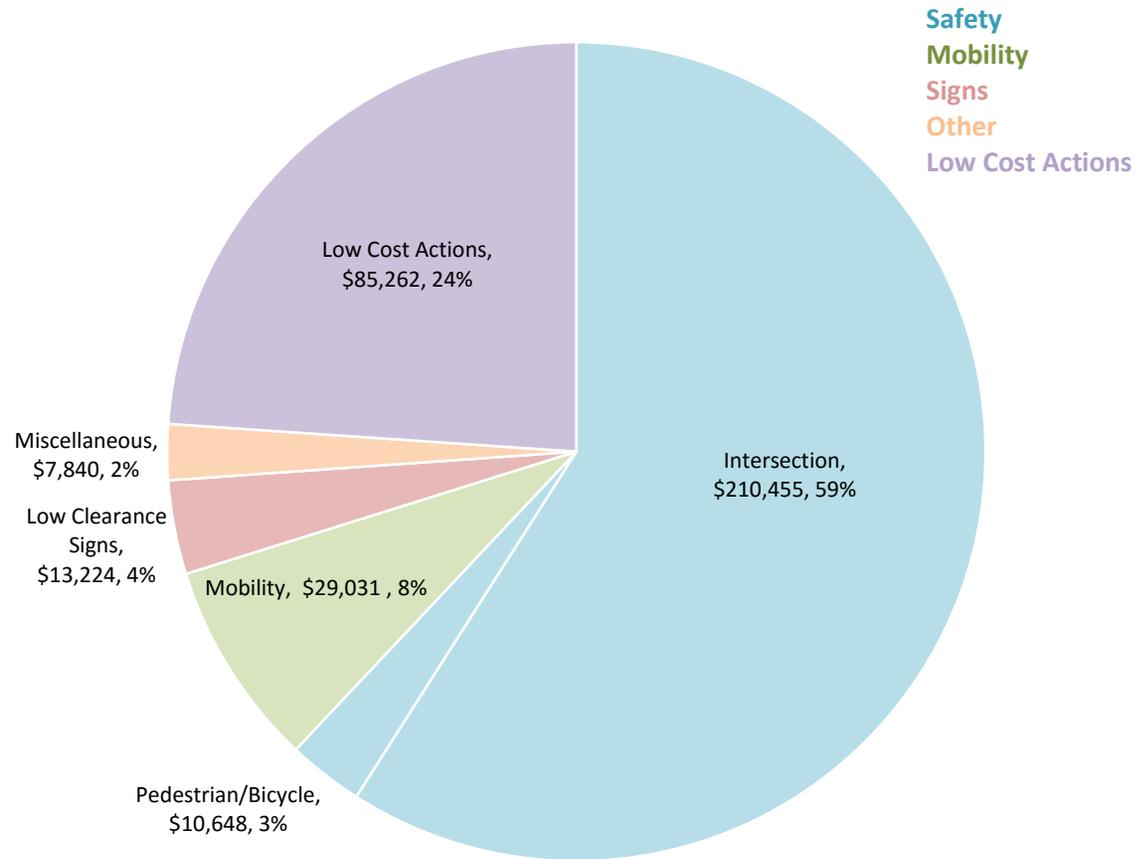
## Eastern Region

Staffing issues are at the forefront of ER’s LCE program performance. Other projects, either additional Traffic Office assignments or work to assist other offices, consume Traffic’s limited staff time and resources. Because of this, most of the 2013–15 projects were the result of emerging issues, rather than from operational analysis.

ER plans to take a more proactive approach in identifying more potential projects from both Traffic and Field Assessment efforts.

In 2013–15, ER’s Maintenance Area Low Cost Actions captured multiple signing and striping related projects. Signal Operations staff identified and implemented projects related to that area, such as *I-90/Sullivan Rd EB Ramp Signalized Right Turn*, as well as signal backplates, controller updates, and detection.

**ER: Low Cost Enhancement Spending by Type of Project, 2013-2015**



**Total Spending: \$356,460**

ER also began design work last biennium on a project to implement turn movement restrictions on US 2 just east of Hayford Road. The size of this \$200,000+ project requires staff effort to coordinate with Airway Heights, developers, and the public. Current staff availability and other work commitments have pushed this work to the 2015–17 biennium.

**Eastern Region: All 2013–15 Low Cost Enhancement Projects**

Wood Road/Espinola Intersection – Left-Turn Lane	\$114,230.52	Intersection
I-90/Sullivan EB Off Ramp signalized right turn	\$56,578.70	Intersection
ER Maintenance Area 1 - Low Cost Actions	\$53,887.20	Low Cost Actions
Eastern Region HAR Communication Equipment	\$21,410.95	Mobility
US 2 - Hayford Rd To Hazelwood Rd Channelization	\$19,953.74	Intersection
Eastern Region Signal Backplate Enhancements	\$19,692.52	Intersection
ER Maintenance Area 2 - Low Cost Actions	\$14,695.27	Low Cost Actions
I-90 Schoessler Road low clearance signing	\$13,223.51	Low Clearance Signs
ER Maintenance Area 4 - Low Cost Actions	\$11,151.30	Low Cost Actions
US 195 Thorn St Vic. Channelization	\$8,170.17	Pedestrian/Bicycle
SR 270 Signal Detection Modification signal operation improvement	\$7,839.89	Miscellaneous
TMC Software Upgrade to connect remote ITS devices	\$7,620.54	Mobility
ER Maintenance Area 3 - Low Cost Actions	\$5,528.30	Low Cost Actions
Upgrade Pedestrian Push Button & Modify Signal Timing Colfax	\$2,477.40	Pedestrian/Bicycle

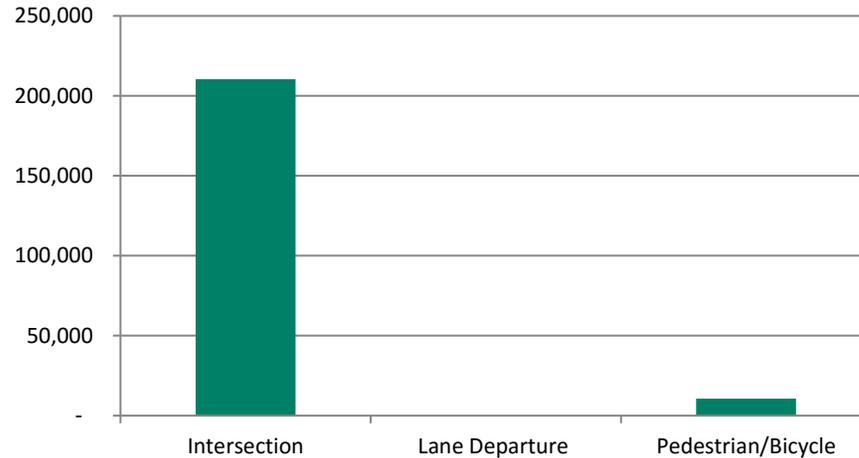
ER’s LCE projects are primarily generated by what the region encounters via constituent contacts, region interjection, and emergent statewide issues such as low clearance signing and wrong-way drivers.

The region’s crash analysis and operational reviews have had some degree of focus on intersection-related crashes (Target Zero Priority Level One) as they historically comprise 40% of crashes in Washington.

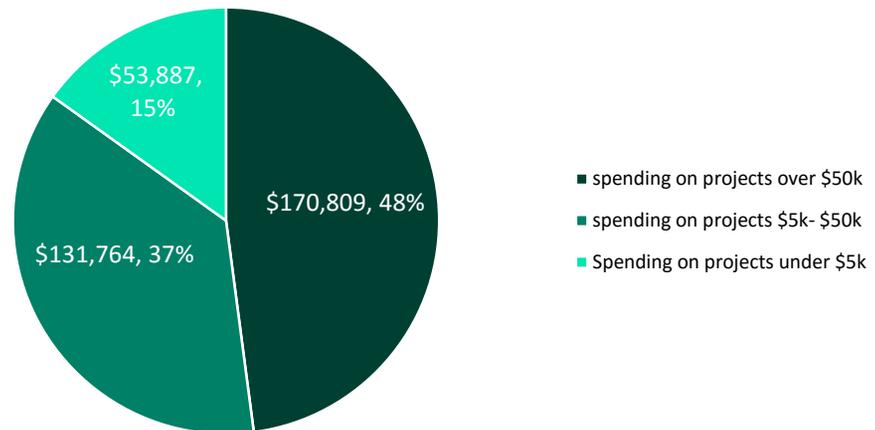
ER only has time to do one or two larger projects per biennium with current staff. It is difficult for the region to deliver projects with larger PE costs because the additional staff time to develop them pulls them from other Q Program duties (the Signal Operations staff member was the design lead for *190/Sullivan EB Off Ramp*). With more funding available, the region should be able to accomplish the larger projects and other work simultaneously.

In 2013–15, there were two projects that cost over \$50,000: *SR Wood Road/Espanola intersection – Left-turn lane* (\$114,231) and *190/Sullivan EB Off Ramp* (\$56,579), which are highlighted on the following pages.

**ER: Low Cost Enhancement Spending by Target Zero Categories, 2013-2015**



**ER: Low Cost Enhancement Spending by Size of Project, 2013-2015**



**I-90/Sullivan EB Off Ramp Signalized Right Turn \$56,579****Eastern Region**

This project altered the lane alignment and re-channelized the off-ramp to create two signalized right-turn lanes at the intersection. The work addressed weaving movements at the I-90/Sullivan interchange in the City of Spokane Valley. Drivers making a right turn from the eastbound off-ramp then crossed three through-lanes in order to access the left-turn lanes at either Mission Ave or Broadway Ave. In addition to the weaving, many drivers stopped in the free-flow right-turn lane in order to cross the through lanes, particularly during high-volume times. During heavy volumes times, some drivers stopped in the free lane wanting to merge left, causing near rear-ends or drivers pulling up along the left side of the stopped vehicle, making two abreast.

The collision analysis indicated a high percentage of rear-end collisions related to the eastbound free right turn. In the last four years, the intersection had a total of 32 collisions: 16 (50%) occurred on Sullivan Rd and 16 (50%) occurred on the EB off-ramp. Of the 32 intersection-related collisions, 15 (47%) were related to the EB free right movement and an

additional 11 (34%) were rear end collisions on the ramp.

The new design provides positive lane guidance for drivers and reduced lane changes and merging. The modified angle creates better sight distance towards southbound Sullivan vehicles. New raised islands prevent two vehicles from being abreast, while the truck apron on the outside allows trucks to maneuver the intersection. Additionally, the altered lane alignment upstream provides clearer direction for drivers and eliminates the potential of left-turning traffic and right-turning traffic from affecting each other.

This low-cost enhancement project minimized driver error and reduced conflict. Since the newly-renovated intersection opened in July 2014, there has been only one reported rear-end collision on that movement.

*Before**After*

**Wood Road/Espinola intersection – Left-turn lane \$114,231****Eastern Region**

ER widened US 2 to provide left-turn channelization for the Wood/Espanola Road Intersection.

The region first identified the intersection as a candidate for restriping for left-turn channelization based on a screening of routes in the region with the required 39' minimum width. The intersection was also experiencing collisions associated with mainline turning movements. However, the road lacked sufficient pavement width to restripe the intersection per Minor Operational Enhancement Matrix 2-6Q.

The region revisited the project as part of a review of the *Espanola Road to I-90 – Paving project*, to identify opportunities to contribute funding from the Q2 program to provide minor operational enhancements.

No intersection-related collisions have been recorded since the turn lane was constructed in 2014.

*Before**After*

## Headquarters

During the 2013–15 biennium, Headquarters Traffic reserved funding for emerging statewide needs. The table shows the projects implemented with these funds.

WSDOT will use Connecting Washington funding will to increase regional LCE funding for 2015–17, and again during the 2017–19 biennium. Funding is also being reserved for emerging statewide needs for 2015–17.

### Headquarters: All 2013-15 Low Cost Enhancement Projects

Bridge Vertical Clearance Signs - Measurement Collection	\$29,353.34	Low Clearance Signs
DUI Signs - traffic control for unveiling	\$8,154.74	Guide Signs
I-5 Purple Heart Trail Signs	\$6,772.75	Guide Signs
Motorcycle Safety Sign Project	\$8,843.65	Warning Signs
State Force Work	\$3,703.02	Project Design
Sign Retroreflectivity Study	\$1,345.70	Traffic Studies

**Total Spending: \$58,173**

Safety  
 Mobility  
 Signs  
 Other  
 Low Cost Actions

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