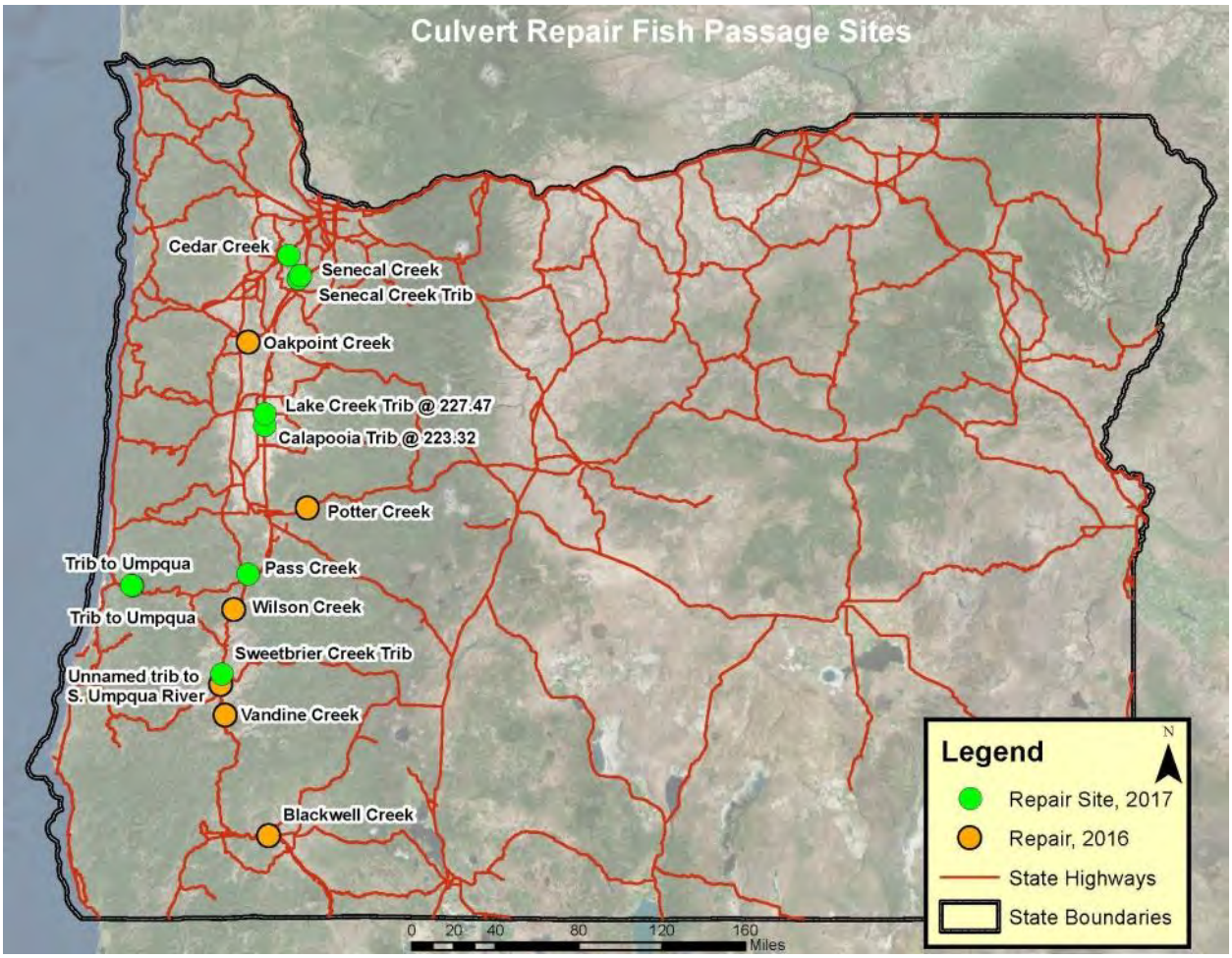
Culvert Repair Programmatic Agreement (CRPA) Pilot Final Report



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Culvert Repair Programmatic Agreement (CRPA) Pilot Final Report

Executive Summary

The Oregon Department of Transportation (ODOT) and the Oregon Department of Fish and Wildlife (ODFW) implemented a Culvert Repair Programmatic Agreement (CRPA) pilot project that allowed ODOT to make specific short-term repairs to culverts without having to meet full fish passage criteria at the repair location. This agreement allowed ODOT to make critical repairs to aging culverts in a cost effective manner, while providing a benefit to Native Migratory Fish (NMF) over the status quo by improving fish passage at each site repaired. In addition, ODOT agreed to pay $1.8 million into an ODFW-managed account that will fund five of the highest priority fish passage projects off the State highway system to offset delayed passage at culvert repair locations. When all five of the compensation projects were completed, they provided NMF access to 139.5 miles of good and excellent quality habitat.

ODOT's culvert inventory has revealed that approximately 10,500 culverts are in poor or critical condition and need to be repaired or replaced in the near term to maintain the safety and integrity of the State highway system. The cost to replace all of these culverts in kind would be well over one billion dollars. This cost would be substantially higher for installation of larger culverts or bridges to meet fish passage criteria. Culvert repair work on fish-bearing streams has largely been deferred over the past 10 years because of the inability to meet fish passage design criteria with a repair, and the lack of available funding for full fish passage criteria replacements. Culvert repairs typically can be completed for 50 to 250 thousand dollars as opposed to a culvert replacement project that meets fish passage criteria that typically can range in cost from 1.5 to 5 million dollars.

In 2016 ODOT repaired six culverts in critical condition under the CRPA at a cost of $737,862.13. The cost to replace these culverts would have been 36.45 million dollars; ODOT was able to avoid over 35 million dollars of cost to repair instead of replace these failing culverts. In 2017 ODOT repaired 9 culverts at a cost of $1,965,827.00. Although the average cost of the repair work increased, the cost to replace these culverts would have been 37 million dollars. ODOT was able to avoid another 35 million dollars of cost to repair instead of replace these culverts. The difference in cost should be evaluated relative to the design life provided by the approach. The repairs have added approximately 10-25 years of life to these culverts, whereas full replacements would have provided a new design life of 50-75 years. However, even given the difference in life span for the two approaches, life cycle costs are much lower for the repair option.

Fish passage improvements at the culvert repair locations used a combination of reducing jump heights, increasing water depths, and decreasing water velocities across the range of stream discharges when Native Migratory Fish (NMF) migrate. These passage improvements are described and evaluated in a separate companion final report by ODFW (Baki 2018). These passage improvements will increase the window of hydraulic conditions necessary for successful upstream migration for both adult and juvenile NMF. The 2016 and 2017 repair projects demonstrated that fish passage improvements can be

successfully installed in culverts larger than 48" in diameter due to their larger hydraulic capacities and the ability to move equipment and materials into the culverts.

Background

In 2014 ODOT and ODFW implemented a programmatic agreement (Appendix 1) for a three-year pilot program for culvert repair. The CRPA was approved by the Oregon Fish and Wildlife Commission on October 10th 2014 as a programmatic approval under Oregon fish passage rules (OAR 635-412-0020(3)b) and allowed ODOT to make specific short-term repairs to culverts without having to meet full fish passage criteria at the repair location. This agreement allowed ODOT to make critical repairs to aging culverts in a cost effective manner, while providing a benefit to NMF over the status quo by improving fish passage at each site repaired. With the CRPA, ODOT and ODFW continued to advance the Oregon Plan for Salmon and Watersheds habitat restoration goals while allowing repairs to critical transportation infrastructure in locations that are lower priorities for fish passage. .

The CRPA included several key sideboards for ODOT to conduct the culvert repair pilot program (below). In addition, ODOT agreed to pay $1.8 million dollars into an ODFW-managed account that would fund high priority fish passage projects off the State highway system to offset delayed passage at culvert repair locations. ODOT also committed to continue funding the ODOT fish passage program to address the highest priority fish passage projects on the State highway system. Finally, ODOT funded a new transportation liaison position within ODFW to coordinate implementation of the agreement.

This CRPA pilot project is considered a success in that ODOT made meaningful progress in addressing the culvert infrastructure problem while demonstrating a benefit to NMF. ODOT and ODFW agreed to measure success by documenting the number and cost of culverts repaired under this Agreement as well as the benefits of incremental fish passage improvements provided at the repair sites, and at the off-site high priority fish passage compensation projects completed for the pilot project.

Programmatic Goals

The goals of the CRPA included:

a) Provide improved fish passage conditions at each culvert repair site.
b) Address statewide fish passage priority barriers using the $1.8 million dollar fish passage fund in the most expeditious and efficient way practical.
c) Improve State highway infrastructure conditions at each culvert repair site to address public safety.
d) Generate information on the costs, impacts, efficiency, and effectiveness of the CRPA pilot project approach.

Programmatic Sideboards

The CRPA allowed repairs to culverts that meet all of the following criteria:

a) Culverts must be located west of the Cascade crest and outside of the ODFW North Coast Watershed District.
b) Culvert repairs may provide (up to) an additional 10 to 25 years of culvert life.
c) Repaired culverts must include fish passage improvements.
d) Culverts must not be rated as a high priority for fish passage as determined by ODFW.
e) Culverts that provide access to Habitat Category 1 and tidegates are excluded.
f) Sliplining is excluded from repair options.

Note: Culverts that are not within current or historic NMF habitat are not subject to fish passage laws and regulations and may be repaired outside of this Agreement. In addition, ODOT may choose to implement full ODFW criteria fish passage or use the existing exemption or waiver process for fish passage for culvert repair or replacement outside the CRPA.

Purpose and Need

Culvert Inventory

There are approximately 35,000 culverts under the State highway system; most were installed prior to 1970 and are nearing the end of their design life. ODOT began developing systematic information on culvert infrastructure and condition in 2013. By the end of the 2016 field season, the culvert inventory had been completed on 47% of the State highway system, including all of the Highway Management Team priority routes. Priority routes are the most important highways for freight movement, connectivity with major population centers, and emergency response.

The culvert inventory has revealed that approximately 30%, or 10,500, of ODOT's culverts are in poor or critical condition and need to be repaired or replaced in the near term to maintain the safety and integrity of the State highway system. The cost to replace all of these culverts in kind would be well over one billion dollars. This cost would be substantially higher for installation of larger culverts or bridges to meet fish passage criteria.

Declining Transportation Funds

At the same time that the increased need for culvert repair and replacement is coming to light, Federal funds for highway projects have been drastically reduced (from $740 million in 2011 to approximately $300 million in 2015). State gas tax revenues, the principal funding source for the ODOT Maintenance Program, is also decreasing. Even with a new infusion of transportation funds from Oregon House Bill 2017, the need to be efficient with funding requires creative approaches for managing the State's culvert infrastructure.

Fish Passage Rules

Oregon's fish passage statues were updated in 2001. This law and the implementing regulations (OAR 635-412-0005(9) a-d) require ODOT to address fish passage whenever there is new construction, replacement, or major repair of a culvert. To meet fish passage design criteria most existing culverts need to be replaced with much larger culverts or bridges.

ODOT's Fish Passage Program

ODOT has a proven record of enhancing fish passage and contributing to the Oregon Plan for Salmon and Watersheds (March 1997). ODOT's voluntary Fish Passage Program will continue to reopen access to salmon and other NMF habitat by installing large culverts and bridges in locations that ODFW identifies as high priorities for fish passage. Since 1997, ODOT has completed 145 voluntary fish passage projects and restored access to 482 miles of high priority salmon habitat. This is a voluntary investment in fish passage because these projects were not completed as a result of a trigger event or other regulatory requirement and are picked based on fish passage priority, not infrastructure needs. .

The Charlotte Creek culvert replacement project (photos below), completed by the ODOT Fish Passage Program, is one example of ODOT's commitment to improving fish passage and supporting the Oregon Plan for Salmon and Watersheds. The project replaced an undersized culvert with a channel spanning bridge. The project opened two miles of high value habitat for salmon and steelhead at a cost of $2 million dollars.

CRPA Implementation Timeline

- October 10, 2014 – CRPA pilot project approved by Oregon Fish and Wildlife Commission
- October 2014 to February 2016 - Outreach to internal ODOT staff; developed process and procedures for CRPA implementation
- February 2016 - Report to ODOT executive management on CRPA pilot project status and shift in implementation approach; identification of dedicated funding for culvert repair
- February to July 2016 – project development of culvert repair projects for 2016
- July to October 2016 – Construction of six culvert repair projects
- November 2016 to February 2017 – Scoping for 2017 culvert repairs
- Spring 2017 – Informational update to ODFW Fish Passage Task Force and Commission on 2016 repairs
- Spring and Summer 2017 – Monitor 2016 culvert repairs for fish passage performance
- Summer 2017 – Implement nine culvert repairs under the current CRPA
- Winter 2018 – Proposal to Oregon Fish and Wildlife Commission to renew / revise CRPA. Continued monitoring of completed CRPA projects
- Summer 2018 (and beyond) – Continue to repair culverts under a revised programmatic agreement
- Fall 2018 – Report on CRPA pilot project

2015 Program Development

The approval of the CRPA in October 2014 resulted in a challenging and compressed timeline for culvert repairs to be implemented during the first year of the CRPA (summer of 2015). Culvert repairs in fish bearing streams must be constructed during the ODFW in-water work window (IWWW) to minimize potential impacts to fish. These IWWWs run for a few months during the summer for most streams in Oregon, (typically from July through September), limiting the time frame when repairs can be completed. This means culvert repairs must be identified through scoping by February of the year prior to the repair, and then designed and contracted by the beginning of the IWWW of that year.

No culvert repair projects were implemented in 2015 because of the compressed timeline and the lead time required to develop a new program. The CRPA project team spent 2015 on outreach and education, project scoping, and securing dedicated state funding culvert repair projects.

- Outreach and Education - The CRPA team conducted significant outreach efforts to all appropriate ODOT leadership and discipline teams from October 2015 through the spring of 2016. ODOT engineers had not designed culvert repair projects in the 10 years prior, and there was a learning curve associated with repair design approaches as well as determining the appropriate risk level for a repair relative to a full standard replacement.
- Scoping Data - ODOT Geo-Environmental Section (GES) performed intensive desktop scoping of the available culvert inventory data. GES evaluated 8,500 inventoried culverts and provided Regions 1, 2, and 3 with a list of 108 culverts with a high potential for appropriate repairs to address under the CRPA. This effort generated many of the culvert repair projects for 2016 and potential projects for 2017.

Funding - Dedicated State funding was identified in spring of 2016 to accomplish culvert repairs. One of the implementation challenges for these relatively low cost repair projects is the increased overhead and process associated with federally-funded projects. It is significantly more cost effective to use State funding for these repair projects and let them through a DAS contract process, or build them with ODOT maintenance forces. One million dollars of State funding was allocated to culvert repairs under the CRPA in 2016. ODOT also established the Major Culvert Maintenance (MCM) Program in 2016 with annual funding of three million dollars for 2017 and beyond.

2016 Repair Projects

In 2016 ODOT repaired six culverts in critical condition under the CRPA at a cost of $737,862.13. The cost to replace these culverts was estimated to be $36.45 million dollars. ODOT was able to avoid over $35 million dollars of cost to address these culverts (Table 1). This cost avoidance should be evaluated relative to the design life provided by the approach. The repairs have added approximately 10-25 years of life to these culverts, whereas full replacements would have provided a new design life of 50-75

years. However, even given the difference in life span for the two approaches, life cycle costs are much lower for the repair option.

Table 1: 2016 Culvert Repairs Locations, Culvert sizes, and Repair Cost versus Replacement Costs

Region	Stream Name	Hwy	MP	diameter (ft)	length (ft)	Full Fix Cost	Repair Cost
2	Potter Cr.	OR 126	15.13	10	55	$750,000.00	$101,525.00
2	Oakpoint Cr.	OR 51	2.92	14	132	$1,500,000.00	$229,913.60
3	Wilson Cr.	I-5	150.85	7	270	$6,600,000.00	$52,868.00
3	Fair Ground Cr.	I-5	122.53	5	450	$6,800,000.00	$98,261.60
3	Vandine Cr.	I-5	110.31	8	327	$15,300,000.00	$183,800.00
3	Blackwell Cr.	I-5	40.23	9	136	$5,500,000.00	$71,493.93
					Totals	$36,450,000.00	$737,862.13

All of the 2016 culvert repair projects were repaired by invert paving. Invert paving adds a layer of reinforced concrete in the bottom of the culvert to both seal the bottom and keep water in the culvert barrel, and to provide a connection to complete the culvert circumference thereby repairing the structural capacity of the pipe. There are other repair techniques available under the CRPA but the 2016 repair locations were all metal pipes, either Corrugated Metal Pipe (CMP) or multi-plate culverts with significant invert rusting (see photo of Oakpoint Creek Culvert - to right). Several different types of fish passage improvements were included as part of these invert paving repairs (see below).

Fish Passage Improvements for 2016 Culvert Repairs

The CRPA required fish passage improvements at each culvert repair site. Table 2 summarizes the fish passage improvements at each culvert location. The narrative write-ups for each culvert repair were

provided by the ODOT/ODFW Liaison, Art Martin in the 2016 annual report and by Pete Baki in the companion final report.

Table 2: 2016 Culvert Repair Locations, Fish Passage Improvements, and Species Benefited

Region	Stream Name	Hwy	MP	Maximum Potential NMF Habitat (in miles)	Passage Improvement	Potential NMF Species Above Culvert: Cutthroat Trout	Coho Salmon	Steelhead / Rainbow Trout	Chinook Salmon	Bull Trout	Pacific Lamprey	Large Scale Sucker	Northern Pike Minnow	Mountain Whitefish
2	Potter Cr.	OR 126	15.13	1.98	Fish Rocks	X		X	●	●	X	X	X	X
2	Oakpoint Cr.	OR 51	2.92	4.00	Fish Rocks	X		●	●			X	X	
3	Wilson Cr.	I-5	150.85	1.84	Corner Baffles	X	●	X			X			
3	Fair Ground Cr.	I-5	122.53	1.19	Roughness*	X	●	X			X			
3	Vandine Cr	I-5	110.31	0.59	Corner Baffles	X	●	X			X			
3	Blackwell Cr.	I-5	40.23	1.68	Shallow V Weirs	X	●	X						

* experimental approach X = Present ● = Present and ESA listed

2017 Repair Projects

In 2017 ODOT repaired nine culverts in critical condition under the CRPA at a cost of $1,965,827.00. The cost to replace these culverts was estimated to be $37 million dollars. ODOT was able to avoid $35 million dollars of cost to address these culverts (Table 3).

Table 3: 2017 Culvert Repairs Locations, Culvert sizes, and Repair Cost versus Replacement Costs

Region	Stream Name	Hwy	MP	Diameter (ft)	Length (ft)	Repair Technique	Full Fix Cost	Repair Cost
2	Trib. of Calapooia	I -5	223.32	4 (X 4)	348	replace end sections	$2,000,000.00	$280,000.00
2	Trib. of Lake Cr.	I -5	227.47	3 (X 4)	245	replace end sections	$2,000,000.00	$280,000.00
2	Senecal Creek	I -5	276.58	12	370	concrete liner	$6,000,000.00	$580,000.00
2	Trib. of Senecal	I -5	277.98	6	350	concrete liner	$4,000,000.00	$340,000.00
2	Cedar Creek	OR 99	19.22	4	202	concrete liner	$1,500,000.00	$91,832.00
3	Sweetbriar Creek	I-5	126.4	5	308	concrete liner	$12,000,000.00	$83,860.00
3	Pass Creek	I-5	165.9	12	254	invert pave	$8,400,000.00	$136,399.00
3	Trib. of Umpqua	OR 38	6.42	6	55	concrete liner	$575,000.00	$131,030.00
3	Trib. of Umpqua	OR 38	6.92	6	60	invert pave	$575,000.00	$42,706.00
					Totals		$37,050,000.00	$1,965,827.00

*The Senecal Creek project was started in 2017 and completed in 2018.

The 2017 culvert repair projects were repaired with several different techniques. Two of the projects added a layer of reinforced concrete in the bottom of the culvert to both seal the bottom and keep water in the culvert barrel, and to provide a connection to complete the culvert circumference, thereby repairing the structural capacity of the pipe. Five of the projects used a new technique for ODOT called centrifugally cast concrete. In this technique a thin layer of strong concrete is cast by a spinning head to line the full diameter of the culvert. Finally, two multiple barrel culvert facilities had the ends of the culverts replaced. The concrete segmental pipes of these crossings were located under I-5, and were in

good structural condition. When I-5 was widened, CMP pipe sections were added on either side of the highway. These CMP sections had rusted since installation, and were treated by replacing concrete similar to the other concrete lining repair projects.

Fish Passage Improvements for 2017 Culvert Repair Projects

Several fish passage improvement techniques were utilized during construction of the CRPA projects in 2017. Table 4 summarizes the fish passage improvements at each culvert location. Most of these techniques were used to buffer high velocities, provide resting and variable flow in the culverts, and provide more water depth during low flow to facilitate passage. Two of these projects included installing a rock weir downstream of the culvert outlet to back water the culvert and reduce jump heights. The narrative write-ups for each culvert repair were provided by the ODOT/ODFW Liaison Pete Baki in the ODFW companion final report (ODFW 2018).

Table 4: 2017 Culvert Repair Locations, Fish passage improvements, and Species benefited

						Potential NMF Species Above Culvert			
Region	Stream Name	Hwy	MP	Maximum Potential NMF Habitat (in miles)	Passage Improvement	Cutthroat Trout	Coho Salmon	Steelhead /Rainbow Trout	Pacific Lamprey
2	Trib. of Calapooia	I -5	223.32	2.88	Baffles in culvert	X			
2	Trib. of Lake Cr.	I -5	227.47	2.00	Baffles in culvert and rock weir in downstream channel	X			
2	Senecal Creek	I -5	276.58	2.69	Fish Rocks in culvert	X			
2	Trib. of Senecal	I -5	277.98	0.35	Fish Rocks in culvert	X			
2	Cedar Creek	OR 99	19.22	2.42	Baffles in culvert and rock weir in downstream channel	X		•	X
3	Sweetbriar Creek	I-5	126.4	0.33	Artificial Fish Rocks	X			
3	Pass Creek	I-5	165.9	4.88	Artificial Fish Rocks	X	•	X	
3	Trib. of Umpqua	OR 38	6.42	0.32	Shallow V weirs in Culvert	X			
3	Trib. of Umpqua	OR 38	6.92	0.53	Shallow V weirs in Culvert	X			
			Total	16.40					

X = Present
• = Present and ESA listed

Lessons Learned from Culvert Repair Projects

Several opportunities to improve the implementation of this pilot and revise the programmatic approach were apparent in 2016 and 2017, and are discussed below.

Data Management

Data management will become increasingly important as ODOT scopes more culvert repair projects. ODOT is currently using spreadsheets to manage scoping information. Scoping information will be standardized in these spreadsheets to ensure they are compatible with each other and ODOT's Culvert

data base the Drainage Facility Management System (DFMS). Ultimately data collected will be incorporated back into DFMS for long term storage and future reference.

Fish presence and passage status information at ODOT culverts needs to be developed to complement the culvert infrastructure data in DFMS. ODOT does not have complete fish presence data for all culverts on the State highway system. This information gap requires field visits with ODFW and ODOT biologists to make final determinations regarding fish presence at each proposed repair location, oftentimes in advanced planning phases of project of development. A predictive model to predict fish presence at culvert locations can help project planners in early phases of project development. Better data on fish presence will allow for information to be incorporated into the advanced planning and early scoping stage of work; making the effort more efficient, and giving an indicator of what fish call will be made at the project planning and implementation stage. ODFW will still need to make final site visits to determine fish presence, but early modeled predictions can help with scoping and corridor planning projects. In addition to a GIS based modeled approach, ODOT and ODFW are working together to gather fish presence data for the entire State highway system. This effort will require several years to complete, and will likely involve a mix of using existing data, GIS analysis, and field work.

When the culvert inventory is complete for all of ODOT's culverts and DFMS is fully populated with fish presence and passage information, ODOT can more efficiently plan corridor culvert repair projects. This information will also help ODOT locate and prioritize future waivers and voluntary fish passage projects where they will provide the most benefit to NMF.

Fish Passage Improvements for Culvert Repairs

Fish passage improvements can be successfully installed in larger culverts (typically greater than 48" in diameter) as part of culvert repair projects due to their larger hydraulic capacities and the ability to move equipment and materials into the culverts. During scoping for repair projects, ODOT learned that many of the large diameter culverts that are more easily repaired under this agreement are classified as high priority for fish passage by ODFW, and are therefore by the terms of the pilot agreement ineligible for repair. Several good repair candidates were also located in the ODFW North Coast Watershed District and were also ineligible. The ability to conduct repair work on high priority fish passage streams would increase the number of large culverts that ODOT could repair for significant cost savings over replacements, as well as providing additional fish passage improvements in the most important locations for fish passage.

Results from the culvert inventory are indicating that a majority of the culverts rated in poor or critical condition are relatively small diameter (less than 48" in diameter). Culverts this small usually have limited hydraulic capacity and it is difficult to install weirs, baffles, fish rocks or other fish passage improvements inside the culvert. Additional programmatic agreement tools to allow repairs to smaller

diameter culverts would expand the number of locations where ODOT could conduct cost effective repairs.

In 2017 ODOT completed two "out of barrel treatments" to improve fish passage at repair locations under the CRPA. Examples of out of barrel treatments include rock weirs or a roughened channel at culvert outlets to address jump heights into the culvert. The installation and performance of the channel spanning weirs installed in 2017 resulted in several lessons learned, and will help inform future implementation of similar structures. These lessons include:

- Having an engineer, hydrologist, and or biologist onsite during weir construction to help field fit structures to provide the desired hydraulic relief, while also allowing for low flow passage channels for fish migration.
- Continuous monitoring of the weirs at low and high flow events. Many of these structures require several high water events to fully seal and settle, and may require adaptive management work to ensure the weirs continue to function in years following installation.
- Utilizing appropriate size and type of streambed substrate materials to prevent subsurface flow, localized scouring, and loss of weir materials during high flow events.
- Designing and constructing the weirs to backwater the culvert outlet at elevations that include the repair work in the culvert, such as the new concrete layer, fish rocks, and other infrastructure added as part of the culvert repair.

Work outside the barrel often requires additional permitting and right-of-way (ROW) acquisition. It can take a year or longer to obtain right-of-way or cultural resource compliance, and this has been the primary reason ODOT has not targeted more of these out of barrel fish passage features under the CRPA. With a longer term agreement, ODOT would have the time necessary to use out of barrel design features when appropriate.

Outreach and Education

Additional outreach and education will be necessary to educate ODOT Region staff on the opportunities associated with the CRPA. The Geo-Environmental section of ODOT has hired a new Culvert Repair Engineer to oversee the MCM program and to help train ODOT Region engineers on appropriate repair techniques. As we continue to document success under the CRPA pilot project, those examples will be rolled out to discipline and leadership teams to inspire future work under this approach.

The ODOT Culvert Repair Engineer will be developing a design process template and checklists to streamline the design / Preliminary Engineering (PE) process, and to provide more guidance to project teams. Schedules will be backed out from the IWWW to determine when major milestones must be accomplished. Each ODOT Region has a QA/QC process. A minimum review for culvert repair projects would include a plan review by the project team at concept and advanced design milestones, and at final design stages to make sure all relevant issues are addressed. A constructability review would be

helpful to ensure that proposed repairs can be implemented. Tools like standard details, increased Qualified Products List (QPL) products, and specification packages will facilitate design. Once more projects have been completed it will be easier to draw examples from previous projects to build these improved tools. Pre-construction meetings will ensure inspectors and contractors understand the projects.

Compensation Projects

The CRPA included a provision that ODOT provide ODFW with 1.8 million dollars to address the highest priority fish passage projects in the State. This funding is intended to offset the delay in achieving full fish passage criteria at the culvert repair locations. This compensation package, in addition to the passage improvements at each repair location, demonstrated a clear benefit to NMF over providing full passage at each of the repair locations at the time of installation. The Compensation Projects are detailed in the companion final report by ODFW (Baki 2018). Benefits of the compensation projects are summarized below.

ODFW requested grant applications for projects to fund with the compensation funding. These projects were evaluated for benefits to NMF based on habitat quantity and quality, species composition, funding need and cost / benefit ratio, and contribution to fish conservation and recovery. Projects identified in the 2013 ODFW Fish Passage Priority List and/or a Conservation and Recovery Plan were given preference. Five projects were selected for funding (Table 5). Two of these projects were completed in 2016, two more were completed in 2018, and one project was constructed in 2018 and 2019. When all five projects were completed, they provided access to 139.5 miles of good and excellent quality habitat for many species of Native Migratory Fish (Table 6). It is important to note that these five projects were

intended to offset the delay in meeting full fish passage criteria at all culvert repair projects under the CRPA for the 3 year pilot project.

Table 5: ODFW Compensation Projects for the CRPA. Project funding, benefit to NMF, and project location.

Compensation Projects		Habitat Benefits				Project Funding		Location	
Project Name	Basin	*Actual / Projected Completion	Access provided to NMF Habitat (in miles)	Habitat Quality	Degree of Barrier	Project Cost	Funding contributed by ODOT	Latitude °N	Longitude °W
E. F. Millicoma River	Coos	*2016	16.0	Good	Partial	$1,902,427	$150,000	43.4381	-123.9481
Odell Creek Dam	Hood	*2016	3.5	Good	Complete	$425,054	$65,000	45.6517	-121.5413
Oak Ranch Creek	Nehalem	*2018	9.5	Excellent	Partial	$825,221	$285,000	45.9472	-123.0991
Opal Springs Dam	Deschutes	2019	110.0	Good	Complete	$7,353,439	$1,200,000	44.4866	-121.2982
Dairy Creek	Columbia/Willamette	*2018	0.5#	Excellent	Partial	$6,570,000	$100,000	45.7016	-122.7810

#includes > 3000 acres of floodplain lakes and sloughs

Table 6: ODFW Compensation Projects for the CRPA. Fish Species Benefited at each Project site.

Compensation Projects	Fish Species Benefited								
Project Name	Cutthroat Trout	Coho Salmon	Steelhead / Rainbow Trout	Chinook Salmon	Bull Trout	Pacific Lamprey	Large Scale Sucker	White Sturgeon	Mountain Whitefish
E. F. Millicoma River	X	●	X	X		X			
Odell Creek Dam	X		●			X			
Oak Ranch Creek	X	●	X	X		X			
Opal Springs Dam			●	X	●		X		X
Dairy Creek		●	●	●		X		X	

X = Present

● = Present and ESA listed

Monitoring Strategy

ODFW and ODOT have developed a monitoring strategy to evaluate fish passage performance at each of the repair culvert locations. This strategy documented pre-project conditions, (Project initiation forms - Appendix 2), post project conditions (as-builts for each repair Appendix 3, post project photographs – Appendix 4), and initial evaluation of fish passage improvements (above). Finally, each culvert repair location was evaluated during both high flows (spring runoff, and winter high flows) and low flow

conditions (summer and fall low flow). The monitoring results will be provided in a separate report (under development).

Conclusion

The CRPA pilot project proved to be a valuable method of extending the working life of failing and degraded culverts in ODOTs highway infrastructure, while providing enhanced passage for NMF. Annual cost avoidance in the tens of millions of dollars were realized through the ability to fix culverts under a streamlined programmatic process, and access to over 16.4 miles of habitat were enhanced for NMF at culvert enhancement locations. In addition, five additional projects completed through the ODFW managed compensation fund provided habitat access for NMF to over 139 miles of stream habitat and an additional 3,000 acres of floodplain, lake, and slough habitats.

The 2014 – 2017 pilot project was evaluated by both ODOT and ODFW at its completion in 2018, and because of the success of the project in meeting the predetermined goals, a similar programmatic was approved by the Oregon Fish and Wildlife Commission for 2018 through 2022. This renewed project will be extended from the western side of Oregon to a statewide project area, and will increase the compensation funding to the ODFW managed account from 1.8 million to 2 million dollars to fund high priority passage barriers off of the state highway system. Additional compensation funding will be provided by increasing the fund by $50,000 for each project past 40 projects. Continued monitoring and reporting of the success of the program will inform future adaptations and program development.

Appendix 1: Culvert Repair Programmatic Agreement

ODOT CULVERT REPAIR FISH PASSAGE PILOT PROGRAMMATIC AGREEMENT

FINAL 10-10-2014

The parties to this Programmatic Agreement, (hereafter "Agreement") are the Oregon Department of Fish and Wildlife (ODFW), and the Oregon Department of Transportation (ODOT), both agencies of the State of Oregon.

I. PURPOSE

1. It is the policy of the State of Oregon to provide for upstream and downstream passage for native migratory fish in all waters of this state in which they are currently or have historically been present, as described in Oregon Revised Statute (ORS) 509.585, Oregon Administrative Rule (OAR) 635-412-0020, and envisioned by the Oregon Plan for Salmon and Watersheds (Executive Order 99-01).

2. It is the Mission of ODOT to provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians.

3. Pursuant to ORS 509.585 and OAR 635-412-0020, certain actions, or "trigger events,"[1] at "artificial obstructions"[2] where native migratory fish (as defined in OAR 635-412-0005(32)) are currently or were historically present require the review and approval of fish passage by ODFW or the Oregon Fish and Wildlife Commission (OFWC) prior to those trigger events occurring. OAR 635-412-0020(3)(b) allows ODFW to grant "programmatic approval" of a fish passage plan for multiple artificial obstructions of the same type.

4. ODOT owns and operates a number of culverts as part of its transportation system. ODOT desires the opportunity to conduct repair activities on their culverts to meet the original life expectancy of the culvert structure. These activities (Appendix A) may constitute a fish passage trigger event as defined by OAR 635-412-0005(9).

5. This Agreement is intended to serve as the ODFW fish passage approval for the short-term repairs of ODOT culverts associated with this pilot project that meet the requirements and conditions of this Agreement (including Appendix A).

6. The goals of this Agreement include:
   a) Provide improved fish passage conditions at each culvert repair site
   b) Address statewide fish passage priority barriers using the $1.8 million dollar fish passage fund in the most expeditious and efficient way practical
   c) Improve state highway infrastructure conditions at each culvert repair site to address public safety
   d) Generate information on the costs, impacts, efficiency, and effectiveness of the culvert repair pilot project approach

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[1] *"Trigger events"* for the purposes of this Agreement shall mean, with respect to an "artificial obstruction" (defined in OAR 635-412-0005(3)) located where native migratory fish are currently or were historically present: "construction" activities (defined in OAR 635-412-0005(9)), "fundamental changes in permit status" (defined in OAR 635-412-0005(25)), or "abandonment".

[2] *"Artificial obstruction"* means any dam, diversion, dike, berm, levee, tide or flood gate, road, culvert or other human-made device placed in the waters of this state that precludes or prevents the migration of native migratory fish.

II. APPLICABILITY

1. This Agreement applies to ODOT, including its independent contractors, when repairing ODOT owned culverts. It does not apply to other State or local agencies, or private persons.

2. This Agreement applies when ODOT culvert repair actions covered by this pilot project constitute a "trigger event" to Oregon's Fish Passage Policy. The Agreement identifies and determines how ODOT shall proceed as per the terms of this Agreement. ODOT remains responsible to address and comply with fish passage laws for activities and situations not covered by this Agreement.

3. Under this Agreement only ODFW may determine that native migratory fish are not currently and were not historically present at a site; however ODOT may assume presence of native migratory fish.

4. This Agreement applies to culverts that meet all of the following criteria:
   a) Culverts located west of the Cascade crest;
   b) Culverts located outside of the ODFW North Coast Watershed District,
   c) Culverts not rated a "High priority" as determined by ODFW.[3]
   d) Culverts located in or which would prevent access to Habitat Category 1[4] habitat are excluded.
   e) Culverts with tide gates are excluded.
   f) Culvert slip-line repair treatments are excluded.

III. PROVISIONS OF THE AGREEMENT

1. ODOT will be permitted to conduct the culvert repair activities described in appendix A through the 3-year term of this Agreement. Culvert replacements are not authorized by this Agreement.

2. ODOT will ensure that fish passage improvements[5] occur at each culvert repaired under this Agreement, with the goal of maximizing native migratory fish passage to the extent feasible at each site.

3. ODOT will provide $1,800,000 to an ODFW fish passage account to offset the delay in full fish passage as a result of this Agreement.

4. ODFW will manage and administer these funds to specifically address high priority fish passage projects statewide regardless of ODOT ownership and independent of geographic location. ODFW will use generally accepted accounting practices to manage these funds

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[3] High priority fish passage barriers will be determined using the 2013 Priority Oregon Fish Passage Barrier Priority List (or as amended) and the ODFW-ODOT 2006 culvert priority list. ODOT culvert repair projects will be vetted through ODFW District staff prior to implementation to ensure repair projects do not coincide with high priority barrier locations. These lists of high priority fish passage barriers will be updated as appropriate.

[4] Habitat Category I is defined in OAR 635-415-0025(1) and includes habitats that are irreplaceable, essential habitat for a fish or wildlife species, population, or a unique assemblage of species and is limited on either a physiographic province or site specific basis, depending on the individual species, population or unique assemblage.

[5] Fish passage improvements may include but are not limited to the following treatments: weirs, baffles, fish rocks, roughened channels, rock weirs, or other treatments that decrease water velocities, increase water depths, and reduce jump heights. ODFW-ODOT Liaison will work with ODOT to ensure site specific fish passage improvements are appropriate for the fish species and site conditions.

and shall ensure these funds are allocated in the most expeditious and cost effective means while maximizing native migratory fish access to blocked habitats located above high priority barriers.

5. ODOT will continue to fund at least $4.2 million annually into the ODOT Fish Passage Program. This fund may be used as the source of the $1,800,000 contribution to the ODFW fish passage fund. The remaining ODOT fish passage dollars will be used to address high priority fish passage projects administered by ODOT.

6. By February 28 of each year of the Agreement, ODOT will provide ODFW a list of culverts anticipated to be repaired each corresponding year under the terms of this Agreement. ODFW will review and approve the list based on criteria in Section II.4.a-f above, by March 31 of each year, or within 30 days of submitting the list.

7. ODOT will fund an ODFW/ODOT Liaison position to help implement this Agreement.

8. Culvert repair actions not authorized by this Agreement require specific approval by ODFW if the repair actions meet the trigger definition. This Agreement does not preclude ODOT from pursuing other options to address or comply with fish passage laws at ODOT structures.

9. ODOT is responsible for obtaining all other state and federal permits and permissions necessary for completion of activities approved by the Agreement.

10. All in-water work associated with this Agreement will occur during the appropriate ODFW in-water work window, or as negotiated.

11. This Agreement in no way purports or authorizes take of a federally listed species.

12. Pursuant to OAR 635-412-0035 (1 and 10) ODOT is responsible for following all best management practices during construction/maintenance activities to protect fish, wildlife, and their habitats. These BMP's include but are not limited to, adequately dewatering and isolating worksites, performing fish salvages, and providing adequate downstream passage, bypass, and screening if necessary.

IV. POST-PROJECT OBLIGATIONS

1. Maintenance. ODOT is responsible for all maintenance required such that culverts repaired under this Agreement continue to provide the improved level of fish passage that was achieved under this Agreement.

2. Inspection and Record-Keeping. ODFW may inspect any road-stream crossing for which ODOT is responsible (ORS 509.625 and OAR 635-412-0020(3)(b)(D)). If inspection of a culvert repair site installed under this Agreement indicates that fish passage improvements are not functioning as intended, ODFW shall notify ODOT. ODOT shall work with ODFW to determine the cause and, during a work period approved by ODFW, expeditiously rectify problems as necessary (OAR 635-412-0020(3)(b)(E)).

3. Monitoring and Reporting. ODOT and ODFW will develop a detailed monitoring plan prior to project implementation that will include pre and post repair project site analyses of fish passage conditions. ODOT, or its designee, shall monitor and report all repair projects implemented under this agreement to verify that fish passage improvement(s) function as intended. Monitoring shall be completed annually after winter and spring channel

forming high flow events for a period of 3-years after completion of each culvert repair and fish passage improvement. Monitoring shall identify native migratory fish species and life stages affected at each culvert repair site and the quantity and quality of habitat above each barrier. Monitoring shall consist of a best professional judgment assessment by a qualified fisheries biologist of fish passage conditions. This may include notation of any water surface jumps, channel adjustments, streamflow velocity characteristics, channel bed stability, scour occurrence, and other relevant data to ensure the project is functioning as designed for fish passage. Pre- and post-treatment photographs of each site shall be included in the monitoring reports. If monitoring indicates that fish passage is not being provided consistent with project intent, ODOT shall consult with ODFW, determine the cause, and during a work period approved by ODFW, expeditiously rectify problems as necessary (OAR 635-412-0020(3)(b)(E)). If in the final year, post-project assessment reveals a successful project and that fish passage has not deteriorated, then the project will be removed from the post-project monitoring obligations.

4. Annual Report. By Dec 31st of each year of the Agreement, ODOT shall provide an Annual Electronic Report on all culverts repaired under this Agreement. The Annual Electronic Report shall consist of:
    A. Narrative discussion of program activities,
    B. Map of culverts repaired under program,
    C. Description and date of repair action(s) performed at each culvert under the Agreement,
    D. Description of how fish passage was improved at each culvert repaired under the Agreement,
    E. Project specific monitoring results from monitoring efforts identified in # 3 above,
    F. Estimate of fish habitat upstream of each culvert, and
    G. List of species present at each culvert.

5. Final Reports. At the conclusion of the pilot project each agency shall provide a final report.
    a. ODFW shall provide a final pilot project analysis and report on the effect(s) of the pilot project on fish passage. The report will include: site locations, native migratory fish species, quantity and quality of habitat upstream of barriers for both the:
        i. effects of the culvert repairs and the fish passage improvements made at each repair site, and
        ii. fish passage improvements implemented with the $1.8 million fish passage funds, administered by ODFW.
    b. ODOT shall provide a final project report on the effect(s) of the pilot project on maintaining the highway infrastructure. The report will include: number of culverts repaired, improvements to infrastructure condition, the cost effectiveness of repairs relative to infrastructure benefits, and an analysis of the cost savings of culvert repairs made verses the cost of culvert replacements.
    c. These reports will be used to develop a strategy to address the culvert infrastructure issue(s) on the state highway system and the needs of native migratory fish. Final reports shall be complete by June 30, 2018.

6. Coordination Meetings. Staff from ODOT and ODFW affected by this Agreement, will meet annually, or as otherwise deemed appropriate, to collaboratively review projects implemented under this Agreement and evaluate adaptive management measures, as appropriate.

V. GENERAL PROVISIONS

1. Notice. The parties' contact persons for all notices provided for under this Agreement, except as specifically provided otherwise, are as follows:

Agency	ODFW	ODFW Technical	ODOT	ODOT Technical
Name	Greg Apke	TBD	Bill Warncke	Rob Trevis
Title	Fish Passage Coordinator	ODFW/ODOT Liaison	ODOT Fish Passage Program Team Leader	ODOT Culvert Design Engineer
Address	4034 Fairview Industrial Dr SE Salem, OR 97302	4034 Fairview Industrial Dr SE Salem, OR 97302	4040 Fairview Industrial Dr SE Salem, OR 97302	4040 Fairview Industrial Dr SE MS #6 Salem, OR 97302-1142
Phone	503-947-6228	TBD	503-986-3459	(503) 986-3860
E-Mail	greg.d.apke@state.or.us	TBD	William.M.Warncke@odot.state.or.us	Robert.E.TREVIS@odot.state.or.us

Either party may change a designated contact person at any time by providing written notice to the other party.

2. Amendments. Amendments to this Agreement may be made within applicable laws at the mutual agreement and signature of the ODFW Fish Screens and Passage Program Manager and the ODOT Environmental Resources Unit Manager.

3. Term. This Agreement is entered into on the date of last signature by and between ODFW and ODOT, both representing the State of Oregon. This Agreement expires Dec 31, 2017. This Agreement shall not be extended or renewed. If subsequent culvert repair strategies are developed, issues identified during pilot implementation will be addressed.

4. Termination. This Agreement may be terminated at any time through mutual agreement by the parties or by either party after a 30-day written notice. If terminated, culverts previously maintained consistent with this Agreement will not be subject to additional fish passage requirements beyond maintenance as described in IV(1), until an additional trigger event may occur.

10/10/14	10-10-14
XXXXXXXXXXXXXXXXX Date	XXXXXXXXXXXXXXXXX Date
Highway Division Administrator, Oregon Department of Transportation	Chair, Oregon Fish and Wildlife Commission

Appendix A

ODOT culvert repair actions* allowed under the Programmatic Agreement that currently trigger fish passage laws

Strip line
Spot and localized repairs
Spray on coating
Cured in place technology
Spiral wound
Pave invert
Add or extend end treatments
Replace interior sections of culvert**
Replace road pavement and sub base above culverts

*The intent of the culvert repairs allowed under the programmatic agreement is to provide (up to) an additional 10 to 25 years of culvert life. The actual life of the culvert and repair will depend on site specific conditions. These repairs are considered short-term fixes, not in effect a culvert replacement that provides a new design life.

** This technique is intended to replace 1 to 3 segments of a concrete section pipe that have broken or failed prematurely. It is not intended to replace the majority of the pipe.

New culvert repair technology that meets the intent of this agreement may be added to this list upon review and approval by the ODFW and ODOT contacts identified in section V.

Slip-line culvert repairs are specifically excluded from this Programmatic Agreement.

Appendix 2: Project Initiation Forms for 2016 and 2017 Culvert Repairs

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#
Key/Maint. # IN2683/012
Submittal Date

Project Name: OR51: Oakpoint Creek - Culvert Repair
Anticipated ESA Coverage: Blue Book
Anticipated Construction Start: Summer 2016

Route - Road ID: HWY 193
Mile Point: 2.92
Other Road / Path Name: Independence Highway
Latitude (e.g. 45.4591° N): 44.8975 N
Longitude (e.g. -123.8442° W): 123.1729 W

Watershed: 17090007 - Middle Willamette
6th Field HUC: 170900070202 - Lower Rickreall Creek
ODFW In-Water Work Window: June 1 to October 15

Culvert Shape: Circular
Culvert Material Type: Steel
Culvert Rise (in): 168
Culvert Span (in): 168
Culvert Length (ft): 144
Estimated ACW (ft): 17

Ht. Cover Outlet (ft): 0
Drop to Outlet Pool (ft): 0
Outlet Pool Depth (ft): 0.667

☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The Oakpoint Creek culvert is a 14' round pipe. The pipe is severely corroded with some minor crushing. It is anticipated that the repairs will be completed in two phases. ODOT will replace three-12' x 6' bottom sections of the pipe of the outlet end for Phase 1. In addition, ODOT will place fish rock through the entire length of the pipe during Phase 2. Approximately 12' of the outlet section will be repaired in the 1st phase; it is expected that the work will be performed by the use of backhoe. Work will be conducted in the dry, a temporary pipe will be used for low flow; screening will be placed on the temporary pipe to avoid fish kills.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☒ Replace Interior Sections of Culvert
- ☐ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☒ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Michael Morales	michael.a.morales@odot.state.or.us
Qualified Fish Biologist	Bill Warncke	William.m.warncke@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Dave Stewart	Dave.stewart@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Jeff Shambaugh	jeff.shambaugh@odot.state.or.us
Engineer of Record	Chris Carman	Christopher.W.CARMAN@odot.state.or.us
Other:		
Form Prepared By	Michael Morales	R-2 Environmental Project Manager

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

		William Warncke — Digitally signed by William Warncke DN: cn=William Warncke, o=ODOT - GeoEnvironmental Section, ou=ODOT - GeoEnvironmental Section, email=william.m.warncke@odot.state.or.us, c=US Date: 2016.06.06 11:08:38 -07'00'	Art Martin — Digitally signed by Art Martin DN: cn=Art Martin, o=Oregon Department of Fish and Wildlife, ou=Fish Passage ODOT Liaision, email=art.c.martin@state.or.us, c=US Date: 2016.06.08 15:45:48 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

Oregon Department of Transportation

DFI#

Key/Maint. # IN2683/012

Submittal Date

Project Name: OR126; Potter Creek - Culvert Repair

Anticipated ESA Coverage: Blue Book

Anticipated Construction Start: Summer 2016

Route - Road ID: OR 126B - Mckenzie - 15

Mile Point: 15.13

Other Road / Path Name: Mckenzie Highway

Latitude (e.g. 45.4591° N): 44.0775 N

Longitude (e.g. -123.8442° W): -122.7637 W

Watershed: 17090004 - McKenzie

6th Field HUC: 170900040105 - Deer Creek

ODFW In-Water Work Window: June 1 to October 15

Culvert Shape: Arch

Culvert Material Type: Steel

Culvert Rise (in): 84

Culvert Span (in): 120

Culvert Length (ft): 55

Estimated ACW (ft): 17

Ht. Cover Outlet (ft): 5

Drop to Outlet Pool (ft): 0

Outlet Pool Depth (ft): 3

☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The OR126 Potter Creek culvert is a 120" by 84" arch pipe, approximately 55' in length. ODOT proposes to pave the invert and outlet and place fish rock throughout the length of the culvert; paving will consist of 4-inches of concrete. ODOT intends to incorporate fish rock through the entire length of the culvert.; concrete will be pored, and rocks will be incorporated; the wire mesh will be cut around the rocks to hold them in place. ODOT intends to complete this work in the dry by placing a "Temporary Pipe" in the culvert for low flow. The pipe will be screened to ensure that there is no fish kill associated with the activities.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☒ Replace Interior Sections of Culvert
- ☐ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☒ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Michael Morales	michael.a.morales@odot.state.or.us
Qualified Fish Biologist	Bill Warncke	William.m.warncke@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Dave Stewart	Dave.stewart@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Jeff Shambaugh	jeff.shambaugh@odot.state.or.us
Engineer of Record	Chris Carman	Christopher.W.Carman@odot.state.or.us
Other:		
Form Prepared By	Michael Morales	michael.a.morales@odot.state.or.us

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

		William Warncke Digitally signed by William Warncke DN: cn=William Warncke, o=ODOT - GeoEnvironmental Section, ou=ODOT - GeoEnvironmental Section, email=william.m.warncke@odot.state.or.us, c=US Date: 2016.06.06 11:04:21 -07'00'	Art Martin Digitally signed by Art Martin DN: cn=Art Martin, o=Oregon Department of Fish and Wildlife, ou=Fish Passage ODOT Liaision, email=art.c.martin@state.or.us, c=US Date: 2016.06.08 15:42:11 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

Oregon Department of Transportation

DFI#

Key/Maint. #

Submittal Date

Project Name: I-5: M.P. 122.53 Culvert Repair

Anticipated ESA Coverage: Blue Book

Anticipated Construction Start: July 1, 2016

Route - Road ID: I-5 - Pacific - 1

Mile Point: 122.53

Other Road / Path Name:

Latitude (e.g. 45.4591° N): 43.1925

Longitude (e.g. -123.8442° W): -123.3636

Watershed: 17100302 - South Umpqua

6th Field HUC: 171003021305 - Lower South Umpqua River

ODFW In-Water Work Window: July 1 to September 15

Culvert Shape: Circular

Culvert Material Type: CMP

Culvert Rise (in): 60

Culvert Span (in): 60

Culvert Length (ft): 250

Estimated ACW (ft): 6

Ht. Cover Outlet (ft):

Drop to Outlet Pool (ft):

Outlet Pool Depth (ft):

Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The inlet portion (approx 250 feet) of this 60-inch diameter round Corrugated Metal Pipe (CMP) is owned by ODOT. At that point, the culvert continues to flow to the southeast under land owned by Douglas County. Thus, ODOT only controls the westernmost 250 feet of this culvert (i.e. the inlet side). ODOT plans to have a contractor pave the bottom of the culvert in order to prolong its life. In addition, the contractor will place baffles throughout the bottom of this section. The baffles will be 12 inches in height and will be placed 18 feet apart. This will improve fish passage to the upstream drainage, which carries an unnamed tributary of the South Umpqua River.

Proposed Repair Techniques - Check all that apply

- [ ] Replace Road Pavement and Sub Base Above Culvert
- [ ] Strip Line
- [ ] Spiral Wound
- [x] Pave Invert
- [ ] Spot and Localized Repairs
- [ ] Spray On Coating
- [ ] Cured In Place Technology
- [ ] Add or Extend End Treatments
- [ ] Replace Interior Sections of Culvert
- [ ] Other:

Proposed Fish Passage Improvements - Check all that apply

- [x] Culvert Baffles
- [ ] Culvert Weirs
- [ ] Roughened Channel
- [ ] Channel Weirs
- [ ] Shadow Rocks
- [ ] Other:
- [ ] Migration Hazards
- [ ] Simulated Bottom

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Dave Stewart	Dave.stewart@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Darrin Neavoll	darrin.l.neavoll@odot.state.or.us
Engineer of Record	Wade Holaday	wade.holaday@odot.state.or.us
Other:		
Form Prepared By		

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Julie Worsley	Wade R. Holaday, PE	William Madara Warncke Jr.	dave stewart
Digitally signed by Julie Worsley DN: cn=Julie Worsley, o=ODOT, ou=3620, email=julie.a.worsley@odot.state.or.us, c=US Date: 2015.07.07 09:25:21 -07'00'	Digitally signed by Wade R. Holaday, PE DN: cn=Wade R. Holaday, PE, o=ODOT, ou=3630, email=wade.holaday@odot.state.or.us, c=US Date: 2015.09.02 09:51:06 -07'00'	Digitally signed by William Madara Warncke Jr. DN: cn=William Madara Warncke Jr., o=ODOT, ou=Geo_Environmental, email=william.m.warncke@odot.state.or.us, c=US Date: 2015.09.02 16:13:38 -07'00'	Digitally signed by dave stewart DN: cn=dave stewart, o=Oregon Dept of Fish and Wildlife, ou=ODFW, email=dave.stewart@state.or.us, c=US Date: 2015.09.04 09:43:39 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#

Key/Maint. #

Submittal Date Feb 22, 2016

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5: Blackwell Creek Culvert Repair	Blue Book	Summer 2015

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	40.23		42.4232 N	123.0299 W

Watershed	6th Field HUC	ODFW In-Water Work Window		
Middle Rogue	171003080204 - Rogue River-Galls Creek	June 15	to	September 15

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	108	108	130	6

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)
4	0	0

Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The Blackwell Creek culvert under I-5 at MP 40.23 is a 9' diameter multiplate culvert that is deteriorating due to rust damage at the invert of the culvert. This project proposes to repair the culvert invert by paving the invert with cast-in-place concrete to cover the damaged portions of the culvert. There is no drop at the outlet of the culvert, but fish passage can be improved by installing weirs in the culvert that will create low velocity resting areas for fish during high flows and will increase water depth within the culvert during low streamflow conditions. Concrete weirs will be constructed during the installation of the concrete floor. Weir height and spacing have not yet been determined, but the weirs will provide jumps with a maximum height of 6 inches when completed.

This work would be conducted during the ODFW instream work period, which is June 15-September 15. Blackwell Creek is an intermittent tributary of the Rogue River and will likely be dry at this culvert during the summer, so temporary water management may not be needed. However, if water is present in the stream during the repair of this culvert, a temporary water management system will be used to de-water the culvert while it is repaired.

Proposed Repair Techniques - Check all that apply

	Replace Road Pavement and Sub Base Above Culvert		
	Strip Line	Spot and Localized Repairs	Add or Extend End Treatments
	Spiral Wound	Spray On Coating	Replace Interior Sections of Culvert
X	Pave Invert	Cured In Place Technology	Other:

Proposed Fish Passage Improvements - Check all that apply

	Culvert Baffles	Roughened Channel	Shadow Rocks	Migration Hazards	Simulated Bottom
X	Culvert Weirs	Channel Weirs	Other:		

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Jerry Vogt	jerry.vogt@odot.state.or.us
Qualified Fish Biologist	Doug Sharp	doug.sharp@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Dave Stewart	Dave.stewart@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Bryan Mast	Bryan.K.MAST@odot.state.or.us
Engineer of Record		
Other:		
Form Prepared By	Jerry Vogt	jerry.vogt@odot.state.or.us

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Doug Sharp Digitally signed by Doug Sharp DN: cn=Doug Sharp, o=ODOT, ou=Environmental, email=doug.sharp@odot.state.or.us, c=US Date: 2016.02.19 12:04:47 -08'00'	DeLanie L. Cutsforth, PE Digitally signed by DeLanie L. Cutsforth, PE DN: cn=DeLanie L. Cutsforth, PE, o=ODOT, ou=3630 Hydraulics, email=delanie.cutsforth@odot.state.or.us, c=US Date: 2016.02.19 10:58:40 -08'00'	William Warncke Digitally signed by William Warncke DN: cn=William Warncke, o=ODOT - GeoEnvironmental Section, ou=ODOT - GeoEnvironmental Section, email=william.m.warncke@odot.state.or.us, c=US Date: 2016.02.23 16:33:26 -08'00'	Art Martin Digitally signed by Art Martin DN: cn=Art Martin, o=Oregon Department of Fish and Wildlife, ou=Fish Passage ODOT Liaision, email=art.c.martin@state.or.us, c=US Date: 2016.02.24 12:53:57 -08'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#

Key/Maint. #

Submittal Date

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5: Wilson Creek Culvert Repair	Blue Book	July 1, 2016

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	150.85		43.340982 N	123.162035 W

Watershed	6th Field HUC	ODFW In-Water Work Window		
17100303 - Umpqua	171003030303 - Yoncalla Creek	July 1	to	September 15

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	Steel	84	84	270	10

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)
25		

Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The I-5: Wilson Creek culvert, located on Interstate 5 at M.P. 150.85, is a 7 foot diameter, 270 ft long multi-plate culvert. The bottom is corroding and rusting through. This project will pave the entire length of the bottom of the culvert in order to prolong its life expectancy.

For fish passage improvement, ODOT will place poured concrete weirs (with alternating low-flow notches) throughout the culvert. These baffles will be 12 inches high and will be spaced at 18 foot intervals. This will help back up water and catch substrate, which will improve fish passage at this location. In addition, there are a few pieces of large wood and boulders that are causing a fish passage impediment just upstream from the culvert. Those pieces of wood and boulders will be moved around a little in order to eliminate this existing impediment.

Proposed Repair Techniques - Check all that apply

	Replace Road Pavement and Sub Base Above Culvert		
	Strip Line	Spot and Localized Repairs	Add or Extend End Treatments
	Spiral Wound	Spray On Coating	Replace Interior Sections of Culvert
X	Pave Invert	Cured In Place Technology	Other:

Proposed Fish Passage Improvements - Check all that apply

	Culvert Baffles	Roughened Channel	Shadow Rocks	Migration Hazards	Simulated Bottom
X	Culvert Weirs	Channel Weirs	Other:		

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Dave Stewart	Dave.stewart@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Darrin Neavoll	darrin.l.neavoll@odot.state.or.us
Engineer of Record	Wade Holaday	wade.holaday@odot.state.or.us
Other:		
Form Prepared By		

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Julie Worsley	Wade R. Holaday, PE	William Warncke	Art Martin
Digitally signed by Julie Worsley DN: cn=Julie Worsley, o=ODOT, ou=3620, email=julie.a.worsley@odot.state.or.us, c=US Date: 2015.09.09 08:25:49 -07'00'	Digitally signed by Wade R. Holaday, PE DN: cn=Wade R. Holaday, PE, o=ODOT, ou=3630, email=wade.holaday@odot.state.or.us, c=US Date: 2015.10.06 15:53:43 -07'00'	Digitally signed by William Warncke DN: cn=William Warncke, o=ODOT - GeoEnvironmental Section, ou=ODOT - GeoEnvironmental Section, email=william.m.warncke@odot.state.or.us, c=US Date: 2015.11.09 14:56:13 -08'00'	Digitally signed by Art Martin DN: cn=Art Martin, o=Oregon Department of Fish and Wildlife, ou=Fish Passage ODOT Liaision, email=art.c.martin@state.or.us, c=US Date: 2016.02.22 10:51:09 -08'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#

Key/Maint. #

Submittal Date Sep 2, 2015

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5: Vandine Creek Culvert Repair	Blue Book	July 1, 2016

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	110.31		43.0371	-123.3323

Watershed	6th Field HUC	ODFW In-Water Work Window		
17100302 - South Umpqua	171003021002 - Willis Creek	July 1	to	September 15

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	Steel	96	96	327	13

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)
30	6	0

Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The I-5: Vandine Creek Culvert, located on Interstate 5 at M.P. 110.31 is an 8 foot diameter, 327 ft long multiplate culvert. The bottom (invert) of the culvert is rusting through. The repair plan is to pave the bottom of the culvert in order to prolong its life expectancy. Replacing the existing culvert with a bridge (or series of bridges) at this location would cost up to $20 million.

For a fish passage improvement, ODOT will place baffles throughout the culvert. These baffles will be 12 inches high and will be spaced at 18 foot intervals. This will help back up water and catch substrate, which will improve fish passage at this location.

Proposed Repair Techniques - Check all that apply

	Replace Road Pavement and Sub Base Above Culvert		
	Strip Line	Spot and Localized Repairs	Add or Extend End Treatments
	Spiral Wound	Spray On Coating	Replace Interior Sections of Culvert
X	Pave Invert	Cured In Place Technology	Other:

Proposed Fish Passage Improvements - Check all that apply

X	Culvert Baffles	Roughened Channel	Shadow Rocks	Migration Hazards	Simulated Bottom
	Culvert Weirs	Channel Weirs	Other:		

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Dave Stewart	Dave.stewart@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Darrin Neavoll	darrin.l.neavoll@odot.state.or.us
Engineer of Record	Wade Holaday	wade.holaday@odot.state.or.us
Other:		
Form Prepared By		

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Julie Worsley Digitally signed by Julie Worsley DN: cn=Julie Worsley, o=ODOT, ou=3620, email=julie.a.worsley@odot.state.or.us, c=US Date: 2015.07.07 09:23:07 -07'00'	Wade R. Holaday, PE Digitally signed by Wade R. Holaday, PE DN: cn=Wade R. Holaday, PE, o=ODOT, ou=3630, email=wade.holaday@odot.state.or.us, c=US Date: 2015.08.31 11:01:39 -07'00'	William Madara Warncke Jr. Digitally signed by William Madara Warncke Jr. DN: cn=William Madara Warncke Jr., o=ODOT, ou=Geo_Environmental, email=william.m.warncke@odot.state.or.us, c=US Date: 2015.09.02 14:35:44 -07'00'	dave stewart Digitally signed by dave stewart DN: cn=dave stewart, o=Oregon Dept of Fish and Wildlife, ou=ODFW, email=dave.stewart@state.or.us, c=US Date: 2015.09.04 09:44:53 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI# OPO28
Key/Maint. # N/A
Submittal Date May 25, 2017

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5 MP 276.58 (Senecal Creek) Culvert Repair	Blue Book	6/26/2017

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	276.58		45.20774212	-122.8275462

Watershed	6th Field HUC	ODFW In-Water Work Window		
17090009 - Molalla-Pudding	170900090501 - Table Rock Fork of Molalla River	June 1	to	September 30

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	144	144	370	13

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)
28	0	2.5

☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The Senecal Creek culvert under I-5 at MP 276.58 is failing. A culvert repair was approved under the CRPA in 2016, but the culvert was found to be too structurally degraded for the proposed fix, which was an invert pave. This initiation form represents an update to the previous approval, which is attached. The changes to the previous proposal include a modifying the proposed fix to a centrifugally cast reinforced concrete liner and minor modifications to the fish rock size and placement.

During construction, downstream fish passage will not be feasible to provide due to the nature of the repair and the length of the culvert (370 ft). The centrifugally cast reinforced concrete liner will be sprayed-on using a machine that rolls through the culvert. In order to ensure that the downstream channel will not be dewatered, a small pipe will be attached to the top of the culvert and water will be pumped through it to bypass the isolation area. The reinforced concrete will be sprayed over the the small pipe, which will become a permanent feature. Downstream passage will be blocked for approximately two weeks using this approach.

The attached drawings are those approved in 2016 with modifications shown in red.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☒ Spray On Coating
- ☐ Replace Interior Sections of Culvert
- ☐ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☒ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
Qualified Fish Biologist	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
NMFS Representative		
ODFW Liaison	Art Martin	art.c.martin@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	ODOT	
Engineer of Record	Chris Carman	christopher.w.carman@odot.state.or.us
Other:		
Form Prepared By	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Daniel Ohrn Digitally signed by Daniel Ohrn DN: cn=Daniel Ohrn, o=Oregon Department of Transportation, ou=Region 2 Environmental Unit, email=daniel.k.ohrn@odot.state.or.us, c=US Date: 2017.05.26 15:03:18 -07'00'	CARMAN Christopher W Digitally signed by CARMAN Christopher W DN: o=Oregon Department of Transportation, email=Christopher.W.CARMAN@odot.state.or.us, cn=CARMAN Christopher W Date: 2017.05.26 15:00:15 -07'00'		Art Martin Digitally signed by Art Martin Date: 2017.05.30 10:18:32 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI# OPO29
Key/Maint. # N/A
Submittal Date May 25, 2017

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5 MP 277.98 (Senecal Creek Tributary) Culvert Repair	Blue Book	6/19/2017

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	277.98		45.22601419	-122.8145513

Watershed	6th Field HUC	ODFW In-Water Work Window		
17090007 - Middle Willamette	170900090401 - Senecal Creek	June 1	to	September 30

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	72	72	350	7

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)	
34	0	1	☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The Senecal Creek Tributary culvert under I-5 at MP 277.98 is failing. A culvert repair was approved under the CRPA in 2016, but the culvert was found to be too structurally degraded for the proposed fix, which was an invert pave. This initiation form represents an update to the previous approval, which is attached. The changes to the previous proposal include a modifying the proposed fix to a centrifugally cast reinforced concrete liner and minor modifications to the fish rock size and placement.

During construction, downstream fish passage will not be feasible to provide due to the nature of the repair and the length of the culvert (370 ft). The centrifugally cast reinforced concrete liner will be sprayed-on using a machine that rolls through the culvert. In order to ensure that the downstream channel will not be dewatered, a small pipe will be attached to the top of the culvert and water will be pumped through it to bypass the isolation area. the reinforced concrete will be sprayed over the the small pipe, which will become a permanent feature. Downstream passage will be blocked for approximately two weeks using this approach.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☒ Spray On Coating
- ☐ Replace Interior Sections of Culvert
- ☐ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☒ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
Qualified Fish Biologist	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
NMFS Representative		
ODFW Liaison	Art Martin	art.c.martin@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	ODOT	
Engineer of Record	Chris Carman	christopher.w.carman@odot.state.or.us
Other:		
Form Prepared By	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Daniel Ohrn — Digitally signed by Daniel Ohrn DN: cn=Daniel Ohrn, ou=Oregon Department of Transportation, ou=Region 2 Environmental Unit, email=daniel.kohrn@odot.state.or.us, c=US Date: 2017.05.26 14:53:08 -07'00'	CARMAN Christopher W — Digitally signed by CARMAN Christopher W DN: o=Oregon Department of Transportation, email=ChristopherW.CARMAN@odot.state.or.us, cn=CARMAN Christopher W Date: 2017.05.26 15:07:08 -07'00'		Art Martin — Digitally signed by Art Martin Date: 2017.05.30 10:23:10 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI# 31,010
Key/Maint. # M17009
Submittal Date May 25, 2017

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
OR99W at MP 19.22 (Cedar Creek) Culvert Replacement	SLOPES V Transportation	7/17/2017

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
OR 99W - Pacific Highway West - 1W (91)	19.22		45.3226529453° N	-122.8941016973° W

Watershed	6th Field HUC	ODFW In-Water Work Window		
17090010 - Tualatin	170900100501 - Rock Creek-Lower Tualatin River	July 15	to	September 30

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	48	48	202	15

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)	
7.9	0	2.5	☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The Cedar Creek culvert under OR99W at MP 19.22 is failing and requires maintenance. The proposed fix is a cured-in-place pipe (CIPP) liner. The pipe is a barrier to NMF due to high water velocities. The proposed fish passage improvement is to construct a boulder weir downstream of the culvert. This will backwater the majority of the culvert. Interior weirs will be placed in the remainder of the culvert in order to to provide passage for the portion of the culvert not backwatered by the downstream boulder weir.

During construction, downstream fish passage will not be feasible to provide due to the nature of the repair. The CIPP process involves inserting a bag into the culvert and inflating it in order to provide pressure against the liner. Two periods without downstream passage of 4-5 hrs in length are expected. Water will be pumped around the work area and discharged immediately downstream of the work area in order to ensure that the downstream channel is not dewatered.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☐ Replace Interior Sections of Culvert
- ☐ Pave Invert
- ☒ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☐ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☒ Culvert Weirs
- ☒ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
Qualified Fish Biologist	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
ODFW Liaison	Art Martin	art.c.martin@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	ODOT	
Engineer of Record	Chris Carman	christopher.w.carman@odot.state.or.us
Other:		
Form Prepared By	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Daniel Ohrn	CARMAN Christopher W		Art Martin
Digitally signed by Daniel Ohrn DN: cn=Daniel Ohrn, o=Oregon Department of Transportation, ou=Region 2 Environmental Unit, email=daniel.k.ohrn@odot.state.or.us, c=US Date: 2017.05.26 14:51:55 -07'00'	Digitally signed by CARMAN Christopher W DN: o=Oregon Department of Transportation, email=Christopher.W.CARMAN@odot.state.or.us, cn=CARMAN Christopher W Date: 2017.05.26 15:05:29 -07'00'		Digitally signed by Art Martin Date: 2017.05.30 10:41:50 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI# 36,700
Key/Maint. # M17007
Submittal Date May 25, 2017

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5 at MP 227.47 (Lake Creek Trib) Culvert Repair	No Effect	7/3/2017

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	227.47		44.54677482	-123.0615127

Watershed	6th Field HUC	ODFW In-Water Work Window	
17090003 - Upper Willamette	170900030403 - Calapooia River	June 1	to October 15

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	36	36	245	10

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)	
5.5	0	0.5	☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

A set of four culverts that convey a tributary of tLake Creek under I-5 at MP 227.47 are failing and require maintenance. The majority of the length of each of the culverts are made of concrete, but the last 50' on both ends are CMPs. The concrete sections of these pipes are functioning well, but the CMP sections are rusted out. The proposed fix is to remove and replace the 50' CMP sections via an open trench. The proposed fish passage improvement is to construct a boulder weir immediately downstream of one of the four culverts in order to backwater it. Hydraulic analysis shows that one weir will be sufficient to backwater the length of the single culvert and will not create a jump height greater than 6".

Downstream passage during construction will not be required because the stream will either be completely dry or so hot and oxygen deficient that NMF will not be present.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spiral Wound
- ☐ Pave Invert
- ☐ Spot and Localized Repairs
- ☐ Spray On Coating
- ☐ Cured In Place Technology
- ☒ Add or Extend End Treatments
- ☒ Replace Interior Sections of Culvert
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Culvert Weirs
- ☐ Roughened Channel
- ☒ Channel Weirs
- ☐ Shadow Rocks
- ☐ Other:
- ☐ Migration Hazards
- ☐ Simulated Bottom

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
Qualified Fish Biologist	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
NMFS Representative		
ODFW Liaison	Art Martin	art.c.martin@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	ODOT	
Engineer of Record	Chris Carman	christopher.w.carman@odot.state.or.us
Other:		
Form Prepared By	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Daniel Ohrn Digitally signed by Daniel Ohrn DN: cn=Daniel Ohrn, o=Oregon Department of Transportation, ou=Region 2 Environmental Unit, email=daniel.k.ohrn@odot.state.or.us, c=US Date: 2017.05.26 14:51:07 -07'00'	CARMAN Christopher W Digitally signed by CARMAN Christopher W DN: o=Oregon Department of Transportation, email=ChristopherW.CARMAN@odot.state.or.us, cn=CARMAN Christopher W Date: 2017.05.26 15:09:17 -07'00'		Art Martin Digitally signed by Art Martin Date: 2017.05.30 08:11:26 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI# 036567-036570
Key/Maint. # M17013
Submittal Date May 25, 2017

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
I-5 MP 223.32 (Calapooia Trib) Cullvert Repair	No Effect	7/3/2017

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
I-5 - Pacific - 1	223.3		44.48667091	-123.0612861

Watershed	6th Field HUC	ODFW In-Water Work Window	
17090003 - Upper Willamette	170900030308 - Lower Calapooia River	June 1	to October 15

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	48	48	348	10

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)	
8	0	0.75	☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

A set of four culverts that convey a tributary of the Calapooia river under I-5 at MP 223.32 are failing and require maintenance. The majority of the length of each of the culverts are made of concrete, but the last 50' on both ends are CMPs. The concrete sections of these pipes are functioning well, but the CMP sections are rusted out. The proposed fix is to remove and replace the 50' CMP sections via an open trench. The proposed fish passage improvement is to install steel corner baffles in one of the four culverts. Hydraulic analysis confirmed that the downstream-most weir will be partially backwatered by the natural grade downstream and will not present a barrier to NMF. The 50' inlet section of the pipe containing weirs will be placed on a flat slope, which will lower the inlet of this culvert compared with the other three, thereby creating a low-flow channel. The weirs will be placed throughout the culvert (including the concrete section that does not require maintenance) with the exception of the 50' flat section near the inlet; the purpose of omitting weirs in the first 50' of culvert is to attract flow to that culvert, enabling it to function as a low flow channel.

Downstream passage during construction will not be required because the stream will either be completely dry or so hot and oxygen deficient that NMF will not be present.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☒ Replace Interior Sections of Culvert
- ☐ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☒ Culvert Baffles
- ☐ Roughened Channel
- ☐ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
Qualified Fish Biologist	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us
NMFS Representative		
ODFW Liaison	Art Martin	art.c.martin@state.or.us
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	ODOT	
Engineer of Record	Chris Carman	christopher.w.carman@odot.state.or.us
Other:		
Form Prepared By	Daniel Ohrn	daniel.k.ohrn@odot.state.or.us

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Daniel Ohrn	CARMAN Christopher W		Art Martin
Digitally signed by Daniel Ohrn DN: cn=Daniel Ohrn, o=Oregon Department of Transportation, ou=Region 2 Environmental Unit, email=daniel.k.ohrn@odot.state.or.us, c=US Date: 2017.05.26 14:50:13 -07'00'	Digitally signed by CARMAN Christopher W DN: o=Oregon Department of Transportation, email=Christopher.W.CARMAN@odot.state.or.us, cn=CARMAN Christopher W Date: 2017.05.26 15:11:31 -07'00'		Digitally signed by Art Martin Date: 2017.05.30 08:40:04 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#
Key/Maint. #
Submittal Date

Project Name: I-5: M.P. 165.90 Culvert Repair
Anticipated ESA Coverage: Blue Book
Anticipated Construction Start: July 1, 2017

Route - Road ID: I-5 - Pacific - 1
Mile Point: 165.90
Other Road / Path Name:
Latitude (e.g. 45.4591° N): 43.7481
Longitude (e.g. -123.8442° W): -123.1775

Watershed: 17100303 - Umpqua
6th Field HUC: 171003030304 - Upper Pass Creek
ODFW In-Water Work Window: July 1 to September 15

Culvert Shape: Circular
Culvert Material Type: CMP
Culvert Rise (in): 144
Culvert Span (in): 144
Culvert Length (ft): 254
Estimated ACW (ft): 8

Ht. Cover Outlet (ft): 25
Drop to Outlet Pool (ft): 0
Outlet Pool Depth (ft): 2
☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The 12' culvert on I-5 at MP 165.90 is in critical condition and in need of repair. The culvert carries Pass Creek under four lanes of I-5. The proposed repair would pave the invert of the culvert. Fish passage improvement will be achieved by installing formed concrete fish rocks inside the pipe.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☐ Replace Interior Sections of Culvert
- ☒ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☐ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☒ Other: Formed concrete fish rocks

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
~~ODFW Liaison~~	~~Dave Stewart~~	~~Dave.stewart@state.or.us~~
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor	Darrin Neavoll	darrin.l.neavoll@odot.state.or.us
Engineer of Record	Wade Holaday	wade.holaday@odot.state.or.us
Other:	Art Martin	art.c.martin@state.or.us
Form Prepared By		

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

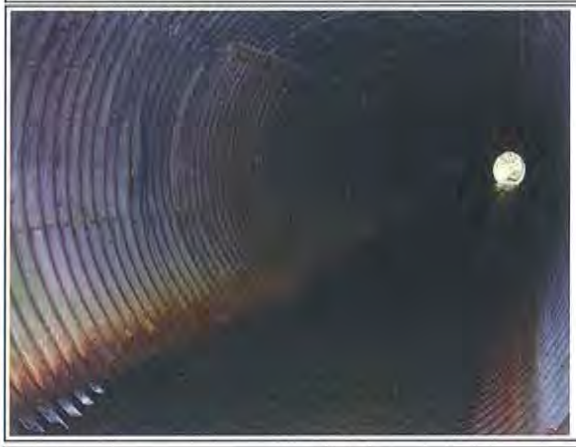


Photo 3: Outlet end (H) -

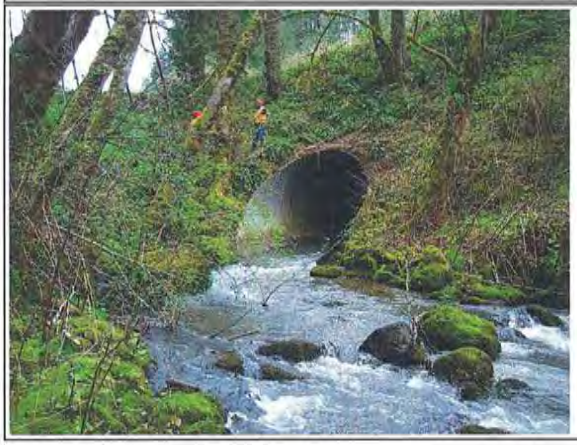


Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

			Art Martin Digitally signed by Art Martin Date: 2017.05.30 11:10:53 -07'00'
Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#
Key/Maint. #
Submittal Date

Project Name: I-5: MP 126.40 Culvert Repair
Anticipated ESA Coverage: Blue Book
Anticipated Construction Start: July 2017

Route - Road ID: I-5 - Pacific - 1
Mile Point: 126.40
Other Road / Path Name:
Latitude (e.g. 45.4591° N): 43.2457
Longitude (e.g. -123.8442° W): -123.3602

Watershed: 17100302 - South Umpqua
6th Field HUC: 171003021305 - Lower South Umpqua River
ODFW In-Water Work Window: July 1 to September 15

Culvert Shape: Circular
Culvert Material Type: CMP
Culvert Rise (in): 60
Culvert Span (in): 60
Culvert Length (ft): 308
Estimated ACW (ft): 7

Ht. Cover Outlet (ft): 10
Drop to Outlet Pool (ft): 0
Outlet Pool Depth (ft):
☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The culvert under I-5 at MP 126.40 is in critical condition and in need of repair. The culvert crosses under four lanes of I-5 as well as the northbound off-ramp and southbound on-ramp at Interchange 126. The un-named tributary joins Sweetbriar Creek just downstream from I-5. The stream has been highly modified and flows through an urban/residential area of Roseburg through various structures before joining Newton Creek and eventually the South Umpqua River.

The proposed repair consists of paving the invert of the culvert. Fish passage improvement will be achieved by embedding formed concrete simulated fish rocks into the paved invert.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☐ Replace Interior Sections of Culvert
- ☒ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☐ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☐ Culvert Weirs
- ☐ Channel Weirs
- ☒ Other: Simulated fish rocks from formed concrete.

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
~~ODFW Liaison~~	~~Dave Stewart~~	~~Dave.stewart@state.or.us~~
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor		
Engineer of Record		
Other: ODFW Liaison	Art Martin	art.c.martin@state.or.us
Form Prepared By		

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

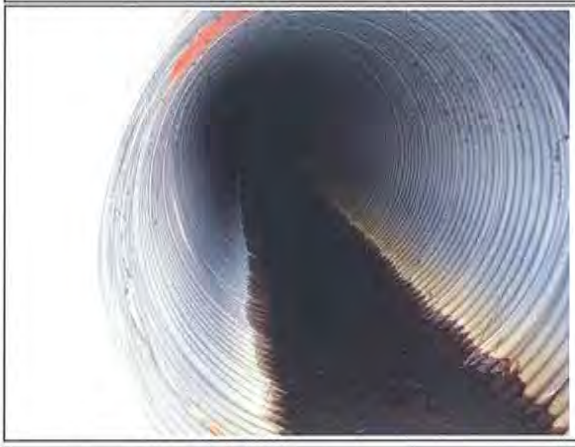


Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison
			Art Martin Digitally signed by Art Martin Date: 2017.05.30 11:04:38 -07'00'

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#
Key/Maint. #
Submittal Date: May 1, 2017

Project Name	Anticipated ESA Coverage	Anticipated Construction Start
OR38 MP 6.42 Culvert Repair	Blue Book	Summer 2017

Route - Road ID	Mile Point	Other Road / Path Name	Latitude (e.g. 45.4591° N)	Longitude (e.g. -123.8442° W)
OR 38 - Umpqua - 45	6.43		43.6911	-123.9864

Watershed	6th Field HUC	ODFW In-Water Work Window		
17100303 - Umpqua	171003030801 - Dean Creek	July 1	to	September 15

Culvert Shape:	Culvert Material Type:	Culvert Rise (in)	Culvert Span (in)	Culvert Length (ft)	Estimated ACW (ft)
Circular	CMP	72	72	55	6.75

Ht. Cover Outlet (ft)	Drop to Outlet Pool (ft)	Outlet Pool Depth (ft)	
3	0	0	☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The culvert carrying an un-named tributary to the Umpqua River under OR 38 at MP 6.42 is in poor condition and in need of repair. The proposed repair will pave the invert of the culvert and replaced a 20' section of culvert. Notched weirs will be added inside the culvert to facilitate and improve fish passage. The culvert is low gradient with no perch at the outlet. The weirs will increase water depth and accommodate fish passage over a wider variation of flows.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☒ Replace Interior Sections of Culvert
- ☒ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☐ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☒ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
~~ODFW Liaison~~	~~Dave Stewart~~	~~Dave.stewart@state.or.us~~
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor		
Engineer of Record		
Other: ODFW Liaison	Art Martin	art.c.martin@state.or.us
Form Prepared By	Julie Worsley	

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project Initiation & Tracking

DFI#

Key/Maint. #

Submittal Date May 1, 2017

Project Name: OR38 MP 6.92 Culvert Repair

Anticipated ESA Coverage: Blue Book

Anticipated Construction Start: Summer 2017

Route - Road ID: OR 38 - Umpqua - 45

Mile Point: 6.92

Other Road / Path Name:

Latitude (e.g. 45.4591° N): 43.6906

Longitude (e.g. -123.8442° W): -123.9770

Watershed: 17100303 - Umpqua

6th Field HUC: 171003030801 - Dean Creek

ODFW In-Water Work Window: July 1 to September 15

Culvert Shape: Circular

Culvert Material Type: CMP

Culvert Rise (in): 72

Culvert Span (in): 72

Culvert Length (ft): 60

Estimated ACW (ft): 7

Ht. Cover Outlet (ft): 8.3

Drop to Outlet Pool (ft): 1

Outlet Pool Depth (ft): 2

☐ Slope may be an issue for fish passage repairs

Brief Project Description & Repair Plan

The culvert carrying an un-named tributary to the Umpqua River under OR38 at MP 6.92 is in poor condition and in need of repair. The repair will consist of paving the culvert inlet. Notched weirs will be added inside the culvert to improve fish passage. The culvert is low gradient and tidally backwatered by the Umpqua River. The outlet ranges between being tidally backwatered to being perched up to one foot, depending on tide and flow conditions in the Umpqua. The weirs will increase water depth inside the culvert and accommodate fish passage over a wider variation of flows.

Proposed Repair Techniques - Check all that apply

- ☐ Replace Road Pavement and Sub Base Above Culvert
- ☐ Strip Line
- ☐ Spot and Localized Repairs
- ☐ Add or Extend End Treatments
- ☐ Spiral Wound
- ☐ Spray On Coating
- ☐ Replace Interior Sections of Culvert
- ☒ Pave Invert
- ☐ Cured In Place Technology
- ☐ Other:

Proposed Fish Passage Improvements - Check all that apply

- ☐ Culvert Baffles
- ☐ Roughened Channel
- ☐ Shadow Rocks
- ☐ Migration Hazards
- ☐ Simulated Bottom
- ☒ Culvert Weirs
- ☐ Channel Weirs
- ☐ Other:

Stakeholder Contact Information*

Stakeholder	Name	Email
Region Environmental Unit Contact	Sam Dunnavant	sam.k.dunnavant@odot.state.or.us
Qualified Fish Biologist	Julie Worsley	julie.a.worsley@odot.state.or.us
NMFS Representative	Tom Loynes	Tom.loynes@noaa.gov
~~ODFW Liaison~~	~~Dave Stewart~~	~~Dave.stewart@state.or.us~~
GE Section	NRU-Trans	NRU-Trans@odot.state.or.us
Project Sponsor		
Engineer of Record		
Other: ODFW Liaisaon	Art Martin	art.c.martin@state.or.us
Form Prepared By	Julie Worsley	

Oregon Department of Transportation

ODOT-ODFW Culvert Repair Pilot Project
Initiation & Tracking

Photo 1: Inlet end (C) -

Photo 2: Inlet end, looking inside (G) -

Photo 3: Outlet end (H) -

Photo 4: Outlet, looking inside (L) -

Photo 5: Inlet, Upstream (F) -

Photo 6: Outlet, Down Stream (K) -

Approvals

Qualified Fish Biologist	Engineer of Record	ODOT Fish Passage Program	ODFW Liaison

Appendix 3 Photos of 2016 and 2017 Culvert Repairs During and After Construction

Photos of Blackwell Creek Culvert (I-5 MP 40.23) Post-construction (10/26/16)

Outlet

Inlet

Looking downstream toward outlet

Looking upstream toward inlet

From outlet looking upstream toward inlet

Close-up of weir

Photos of Fairgrounds Creek Culvert (I–5 MP 122.53) Post-construction

Inlet of culvert upstream of I-5 (9/20/16)

Close-up of inlet of culvert upstream of I-5 (9/20/16)

Inside culvert showing invert paving and roughness features (9/20/16)

Inlet of culvert with flow (10/26/16)

Roughness features creating turbulence, increased water depth, and longer flow path during low flow (10/26/16)

Roughness features creating turbulence, increased water depth, and longer flow path during low flow (10/26/16)

Photos of Oakpoint Creek Culvert (OR 51 MP 2.92) During and After Construction

Rusted invert during construction, after the work area is isolated and culvert invert was cleaned out (10/4/16)

Work area isolation. The stream was not running but there were isolated pools in the channel (10/4/16)

Rebar cage and fish rocks in place prior to invert paving (10/7/16)

During invert paving - rocks are covered in plastic to keep the concrete off the natural rock surface (10/7/16)

Post-construction bracing and invert paving (10/20/16)

Post construction fish rocks (10/20/16)

Photos of Potter Creek Culvert (OR 126 MP 15.13) During and After Construction

During construction dewatering and cleaning out the culvert (9/20/16)

Rusted invert and voids under the culvert (9/20/16)

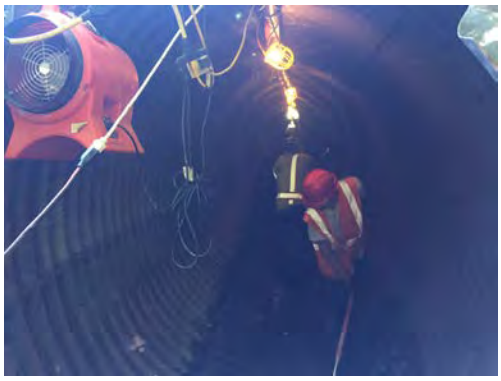
Grouting the invert to fill voids under the invert and reinforce the floor so that the fish rocks and invert paving can be installed (9/21/16)

Post-construction looking upstream at the outlet (9/29/16)

Post-construction - Invert paving and fish rocks installed (9/29/16)

Post-construction - Invert paving and fish rocks installed (9/29/16)

Photos of Vandine Creek Culvert (I-5 MP 110.31) During and After Construction



Contractor personnel cleaning stream material out the culvert to prepare for invert paving (8/5/16)

Contractor staging at the inlet of culvert (8/5/16)

Invert paving with sloped weirs prior to the return of flow (9/20/16)

Outlet post-construction (9/20/16)

The slump in the middle of the pipe resulted in a less backwater at this weir location (near inlet) than anticipated (10/26/16)

Typical sloped weir configuration with low flow (10/26/16)

Photos of Wilson Creek Culvert (I – 5 MP 150.85) Post-construction

Walking into culvert inlet right post-construction (9/20/16)

Sloped weirs prior to re-watering of culvert (9/20/16)

Culvert inlet post-construction (10/26/16)

Sloped weir looking upstream toward culvert inlet (10/26/16)

Sloped weir looking upstream toward culvert inlet (10/26/16)

Culvert outlet – backwatered (10/26/16)

Senecal Creek I5 MP 276.58 Construction and Post Construction Photos

In-water work area isolation at culvert inlet - 2017

Access road at outlet - 2017. Water is piped around work area in pipe on right of photo

Looking toward culvert outlet and access road - 2017.

2018 construction – placing fish rocks

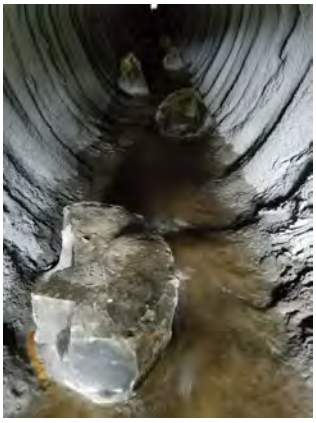
Tributary of Senecal Creek I5 MP 277.98 – Construction and post-construction photos

Inlet

Inside culvert showing fish rocks and centrifugally cast concrete

Looking downstream at outlet of culvert

Outlet of culvert is backwatered



Fish rocks inside culvert

Outlet of culvert during construction showing work area isolation

Photos of OR 99W MP 19.22 Cedar Creek after construction.

Looking downstream from culvert at boulder weir

Looking upstream at boulder weir below culvert outlet to back water up into culvert

Baffle inside culvert showing resting habitat and deeper water

Baffle inside culvert during lower flow – steel corner baffles are bolted to culvert

Inside culvert showing centrifugally cast concrete liner and corner baffles

Downstream weir at winter base flow – February 2018

Tributary of Newton Creek I5 MP 226.4 – Post-construction photos

Culvert outlet before repair

Aerial showing culvert location

Culvert outlet after repair

Inside culvert showing centrifugally cast concrete liner and simulated fish rocks

Culvert outlet

Tributary of Lake Creek I5 MP 227.47 – Construction and post-construction photos.

New culvert outlets in construction

New downstream weir to back water into culverts

Looking downstream from outlets

Culvert outlets with weir

Looking upstream at inlet side of culvert

Tributary of Calapooia I5 MP 233.3 – Post construction photos

Internal culvert baffles

New culvert inlets

Culvert inlet

Culvert outlets

Culvert outlets

I5 MP 169.5 Pass Creek

Culvert inlet

Inside culvert showing invert paving and simulated fish rocks – some debris on double rock installation

Looking downstream toward culvert outlet showing weir

Culvert outlet at winter base flow. There is a steep section at the end of the culvert treatment - 2017

Looking upstream at culvert outlet - fall 2017

New downstream weir to back water up into culvert. Installed summer 2018

Tributary of Umpqua River OR 38 MP 6.92 – Post-construction photos

Culvert outlet

Culvert outlet showing invert paving and weirs

Culvert outlet looking downstream showing weir

Inlet of culvert flow returning to creek

Inside Culvert showing flow returning to creek

Tributary of Umpqua River OR 38 MP 6.42 – Post-construction photos

Culvert outlet looking downstream toward boulder weir

Inside culvert showing some accumulation of substrate near inlet

Looking downstream at outlet of culvert

Inside of culvert showing centrifugally cast concrete liner

Downstream rock weir to back water up to culvert outlet