



# RISING TO THE CHALLENGE

A vital retaining wall project transforms into something bigger

BY KATE SHIRLEY

Approximately 15 miles east of the Pacific Ocean near the community of Mapleton, Oregon, lies Sweet Creek Road, a vital transportation link between State Route 126 and forest land that serves as a popular hunting and fishing destination. First constructed in 1896, the road was susceptible to the effects of heavy rainfall and storms, and in the early 1970s was supported with a retaining wall. However in early 2011, the road finally gave in to gravity and nature, and collapsed into the Suislaw River.

The 1,120-foot-long section of road between Milepost 1.90 and 2.20 had been a constant maintenance challenge for Lane County Public Works due to settling pavement, sunken grades and a deteriorating retaining wall, which was almost 40 years old. The maintenance issues were compounded by a roadway only 22-feet wide and bordered on either side by a sheer rock bluff and the steep banks of the river. By January 2011, one lane of the roadway had sunk so severely that a huge crack rendered the westbound lane impassable. As the road provided the only all-season access route to this area that includes 30,000 acres of National Forest System lands as well as 68 rural residences, it was necessary to keep traffic flowing while a long-term solution was identified. Lane County reduced the road to a single lane and installed traffic signals to manage the flow and keep the roadway open despite the considerable damage.

The Sweet Creek Road Retaining Wall Replacement Project was designed to replace the failing retaining walls and reconstruct both lanes of this vital connector for two-way commercial, residential and life-support traffic. Lane County secured a grant from the Federal Highway Administration through the Western Federal Lands Highway Division (WFLHD) to construct two tieback retaining walls connected with a 243-foot long pre-stressed concrete bridge. WFLHD committed to fund \$5.8 million, with Lane County contributing the remaining portion from their Road Fund.

### Major Modifications

The problems associated with this section of Sweet Creek Road can be traced back to its original construction, which was achieved by dynamiting a rock face next to the river, then building the road on top of the rubble. Issues with this initial design—and the road's close proximity to a bend in the Siuslaw River—had made it susceptible to major weather damage and deterioration over time. It had required extensive maintenance for years, and in 2006, the Lane County Public Works Department underwent a study on the safety of the retaining wall. The study included a

recommended design and construction plan that would support the road. The engineers at Lane County worked closely with the contractor to create the initial plan, which proposed replacing the deepest sections of the retaining wall with additional concrete spans to support the road. West Coast Contractors, Inc. from Coos Bay, Oregon was awarded the contract with a competitive bid of \$4.7 million in June 2012.

The construction was already going to be tricky, given the narrow, heavily-utilized roadway and the unyielding terrain. Compounding these issues were unforeseen complications that came to light soon after construction began on the retaining wall. During preliminary drilling for the new retaining wall soldier piles, it was discovered that the depth of bedrock was considerably deeper than initial engineering estimates had projected. Further excavation of the retaining wall revealed that the rock material, which was identified as bedrock during subsurface geotechnical explorations, was actually large boulders stacked on top of the bedrock. As a result, the pile embedment would be insufficient to support the original design. The project design and construction teams

consulted and determined that, due to this highly unusual differing site condition, it was no longer practical nor cost effective to continue construction of the original tieback retaining walls.

The original design called for a simple retaining wall to support the road, but given the new findings, the plans were revised to build a bridge over the unstable section of land. The initial design called for a single, 243-foot three-span bridge with two tieback retaining walls. This design was later expanded to four additional spans, which resulted in combining two bridges into a single 1,130-foot bridge. All but 40 feet of the original 909 feet of tieback retaining wall would be eliminated.

Although this modification substantially altered the scope of the project, the construction time was not adversely affected. The contractor implemented state-of-the-art construction techniques and employed a subcontractor for the necessary drilling into the rock foundation so pilings could be set to support the bridge structure. Accelerated construction techniques were employed, as well as nightly road closures during the week. Due to the busy weekend



During excavation, construction teams discovered large boulders instead of the expected bedrock.

usage of Sweet Creek Road to access popular recreation areas, road closures were restricted to Monday through Thursday. Additionally, the contractor was required to open the road for five minutes each hour to permit traffic to pass through the work zone.

## Paving Complexity

The final paving for the project was an exercise in advanced geometry. Since there was no constant plane throughout the entirety of the bridge, it involved consideration of the curvilinear alignment of the roadway, as well as a vertical and horizontal staggered alignment of the concrete slabs.

The first step in the paving process was to pre-level each bent to fill low spots and to accommodate the anticipated deflection of each concrete slab. In addition, the vertical displacement of each concrete slab required pre-leveling prior to placement of the final wearing course. To establish each of these planes, the placement of the bridge rail was a challenging aspect and key to the final paving smoothness and drainage of the structure.

## Safety Considerations

During any complex construction project, safety is always a primary concern. And given the difficult terrain that surrounded the road, safety on Sweet Creek Road was thoroughly addressed during the design phase. Emergency services access was a major consideration, as half the roadway was out of service during daytime construction, and completely out of service during scheduled nighttime closures. As a safety precaution, Lane County coordinated with the Mapleton

and Florence Area Emergency Services to have an ambulance staged above the project during all closures. Advanced communication of the closures was also displayed on portable changeable message signs at both ends of the project.

Throughout construction, workers used safety harnesses as fall protection, and safety rails were installed and maintained. A boat was staged along the riverbank for rescue, and life preservers were on site. Rock overhanging the project from the bluffs was either removed or caged with wire fencing, and overhead power lines were supported and tethered away from potential conflict with heavy machinery. As a result of these efforts, there were no lost-time injuries during construction.

## Acquisition and Disposition

The process of acquiring private property rights for a project can be one of the trickiest project tasks in terms of meeting construction deadlines. In this case, the initial task at hand was a relatively simple one—to acquire non-contiguous segments of land along the Siuslaw River frontage from its owner, a large local timber organization. Fortunately, the needed rights were acquired without undue cost and delivered well ahead of the Notice to Proceed to the contractor.

The more daunting right of way requirement for this project was locating an area to deposit the 12,000 cubic yards of dirt and rock expected to be excavated. Commercial sites were available, but at distances between 30 and 50 miles from the job site. Transferring more than 1,500 truckloads to these sites would have substantially increased the cost of the project, as well as created additional

environmental impacts. The right of way team located and negotiated fill rights from a private owner located less than two miles from the project. The placement of this site meant overall travel for heavy truckloads was reduced from 90,000 to approximately 6,000 miles. The acquisition of this nearby site was essential to the project coming in under budget and with minimal environmental impact.

## Environmental Priorities

With the Siuslaw River on one side and 30,000 acres of forested land on the other, several permits had to be issued prior to construction. These included a Department of State Lands In-Water Work Permit and a Joint Permit, as well as a U.S. Army Corp of Engineers Joint Permit. Typically, the in-water work period runs from November 15<sup>th</sup> to February 15<sup>th</sup> of each calendar year, however, a special extension was granted specifically so this project could begin in-water work in the middle of August. Much of the initial construction work had to be done below the ordinary high water mark of the river. This gave the contractor a jump on the project prior to the start of Oregon's formidable rainy season.

Although they allowed for the work to start, the permits also placed a number of stipulations on the project—most notably, the required protection of the marbled murrelet and its habitat. The contractor submitted a migratory bird protection plan to address the measures that would be taken to avoid disturbing nesting habitats. Initially, noise restrictions for wildlife avoidance/harassment measures put limitations on construction activities conducted during spring and summer, which limited daily operation hours.



However, once the project evolved from tieback retaining walls to bridge construction, all in-water work was eliminated. As a result, the in-water and migratory bird measures ended up having no impact on the project, as the contractor was able to perform all work above the ordinary high water of the Siuslaw River.

## Community Outreach

Creating and maintaining open lines of communication with the Mapleton and Florence communities was critical to the success of the project. As a heavily used recreational corridor, Sweet Creek Road provides access to scenic waterfalls as well as popular hunting and fishing locations. The affected communities were deeply concerned about access to these parks during construction. Two town hall meetings were held in Mapleton, allowing residents to voice their concerns and ask questions. The traffic considerations and working restrictions were added to the construction plan as a result of these meetings.

As the road provides the only in-and-out access for almost 70 rural properties, continual communication to residents about traffic restrictions and updates regarding major construction operations were of prime importance. Lane County sent out mass mailings on three different occasions during the 10 month-long project, informing residents and property owners of key milestones in the project. A 24-hour toll-free hotline was also established so residents could call and obtain the latest information on closures and traffic-related restrictions.

## Maximizing Effectiveness

The new bridge is 28-feet wide with two eleven-foot travel lanes, and is actually



American Public Works Association President Larry Stevens (left) presented Lane County Public Works Director Marsha Miller and Right of Way and Construction Service Manager David Brown the APWA 2014 Public Works Project of the Year Award.

considered an elevated roadway, as it does not cross over any bodies of water. The surveying necessary to determine the locations of each pipe pile and bent required an extraordinary level of coordination between Lane County, the design consultant and the contractor. Construction of the bridge began in August 2012, and despite the accommodations, the scheduled completion date was shortened by an additional five months. The project was completed on April 30, 2013—a full eight months ahead of schedule. Given the unique and difficult construction aspects of this project, completion of the project ahead of the original schedule was unanticipated and resulted in numerous benefits to area residents and commercial interests.

The final construction cost totaled \$4.9 million, which ended up being only 5 percent over the contractor's original bid. For a project of this nature and scale and

with such dramatic design and construction characteristics, including eight change orders exceeding the original bid, this was a testament to all the hard work, cooperation, determination and dedication of myriad agencies, organization and businesses.

On August 18, 2014, Lane County Public Works was honored with the 2014 Transportation Project of the Year Award from the American Public Works Association. This recognition showcased the unique nature of the project. Originally envisioned as a retaining wall replacement, the Sweet Creek Road project was completed as a complex, 15-span bridge that maximizes effectiveness in preventing further landslides at the site, while maintaining all-season road access. It is now the longest bridge in Lane County's road system. 🌟

*Kate is the Senior Editor at Right of Way Magazine.*



Although it technically doesn't cross water, Sweet Creek Road is now the longest bridge in Lane County, Oregon.