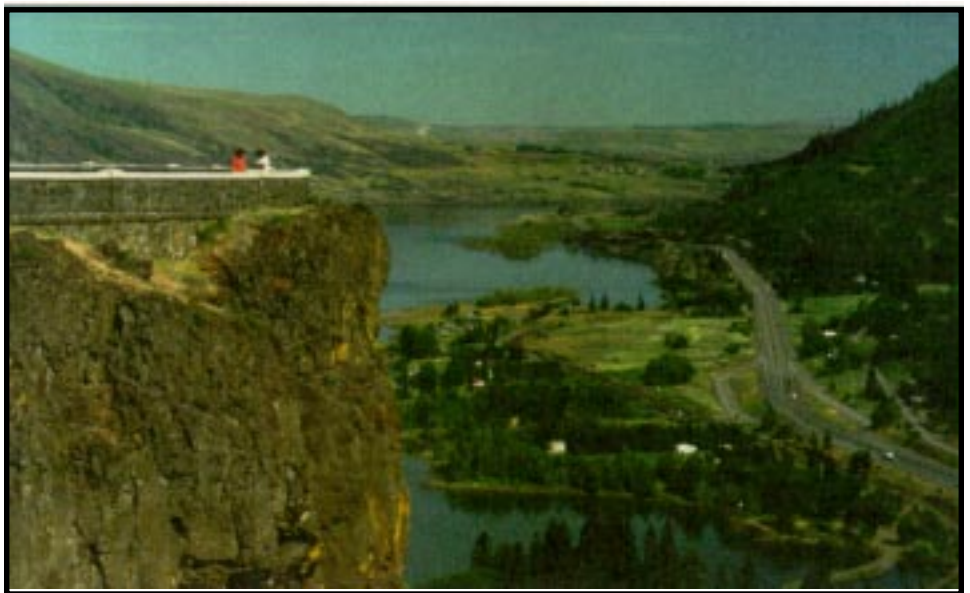


*The Columbia River Gorge.*

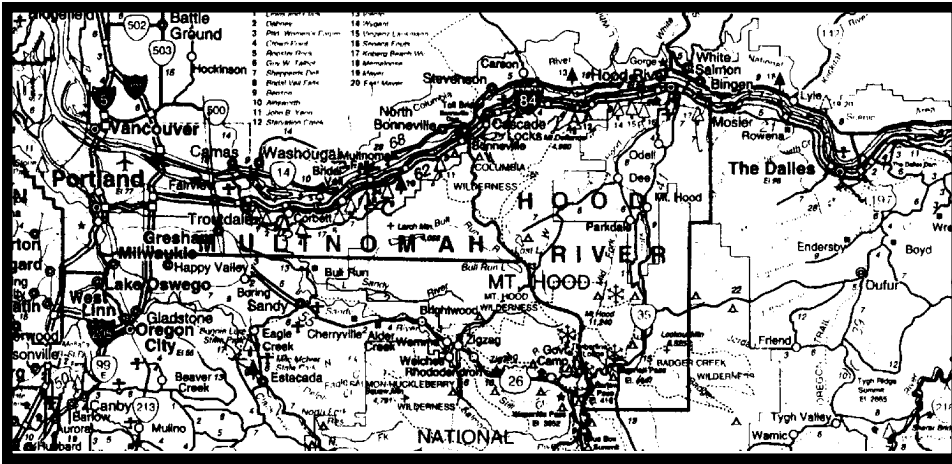


## **HISTORIC COLUMBIA RIVER HIGHWAY**

**Multnomah, Hood River, and Wasco Counties, OR**

### **BACKGROUND/PURPOSE**

When the 121-km-long (75-mile) Columbia River Highway between Troutdale and The Danes was officially completed on June 27, 1922, it was hailed as one of the engineering marvels of its age. The first paved highway in the Northwestern United States, the Columbia River Highway was conceived, designed, and constructed as both a scenic attraction and as a means of facilitating economic development along the Columbia River corridor between the Pacific Ocean and the areas to the east of the Cascade Mountains. It was heralded as one of the greatest engineering feats of its day, not only for its technological accomplishments but also for its sensitivity to one of the most dramatic and diverse landscapes on the North American Continent.

Multnomah, Hood River,  
and Wasco Counties, OR.

Location site map

The history of the development, decline, and continuing rebirth of the Columbia River Highway is particularly instructive to the highway engineering community as we approach the beginning of a new century and a future of increasing reliance on the rehabilitation and restoration of existing infrastructure instead of the construction of new highways. This study also illustrates the manner in which state and local governments can preserve and enhance existing highways that possess unique scenic and historic qualities within the framework of modern design criteria. Much of the discussion of the background and history of the highway has been excerpted from the Historic Preservation League of Oregon's publication *Oregon Routes of Exploration-Discover the Historic Columbia River Highway* and *A Traveler's Guide to the Historic Columbia River Highway*.

### Creation of the Columbia River Highway

Samuel C. Lancaster was the designer of the Columbia River Highway. His romantic and deeply spiritual attitudes toward the environment and mankind's relationship to nature framed subsequent discussions of the Historic Columbia River Highway for all time. Looking back from the vantage point of 80 years after its dedication, one cannot help but marvel at how well Sam Lancaster accomplished his task. Highway building in the United States was in its infancy. The automobile had not yet become the dominant mode of transportation that it is today. The human foot, the horse and wagon, the riverboat, and the railroads were the means of popular transportation. Travel conditions before the highway was built were grim. What roads existed were crude and unstable dirt wagon trails. Pioneers trying to get to the Willamette Valley from The Dalles during the early 1800's had essentially three choices: (1) build a raft and risk the dangers of the rapids near Cascade Locks, (2) pick their way along the Columbia River Gorge, where they encountered mudflows, rockslides, canyons, and sheer rock walls, or (3) follow the Barlow Trail over the southern flank of Mt. Hood. Each of these routes was hazardous and slow.

By the late 1800's, steamboats and railroads served some locations along the Columbia Gorge, but a good road was needed for general traffic. Early roadbuilding efforts, such as the Wagon Road from the Sandy River to The Danes of the 1870's, were largely unsuccessful. Serious attention to building a road through the Columbia Gorge grew with the advent of the automobile. In 1908, Samuel C. Hill, often referred to as the "Father of the Columbia River Highway" and a Good Roads Advocate in Washington and Oregon, invited Sam Lancaster, already known for his pioneering road-building efforts in Tennessee, to the Pacific Northwest to share in Hill's vision of creating a highway through the Columbia Gorge. In 1908, Hill, Lancaster, and Major H.L. Bowlby (who was soon to become the Oregon State Highway Department's first State Highway Engineer) traveled to Europe to attend the First International Roads Conference. They traveled extensively in Germany, Italy, and Switzerland to view and study European road-building techniques and designs



*Typical overlook area along the highway.*



*One of the many waterfalls along the route.*

### **The Vision Becomes a Reality**

Upon their return from Europe, Hill and Lancaster began designing and building a prototype paved road system on the grounds of Hill's 28.3-km (7,000-acre) estate at Maryhill, WA. In February 1913, the Oregon State Legislature viewed the results of this effort and went away sufficiently impressed to create the Oregon State Highway Department and Commission the next month. Major H.L. Bowlby was subsequently appointed the first State Highway Engineer; later Sam Lancaster was named Assistant State Highway Engineer and Charles Purcell was named State Bridge Engineer.

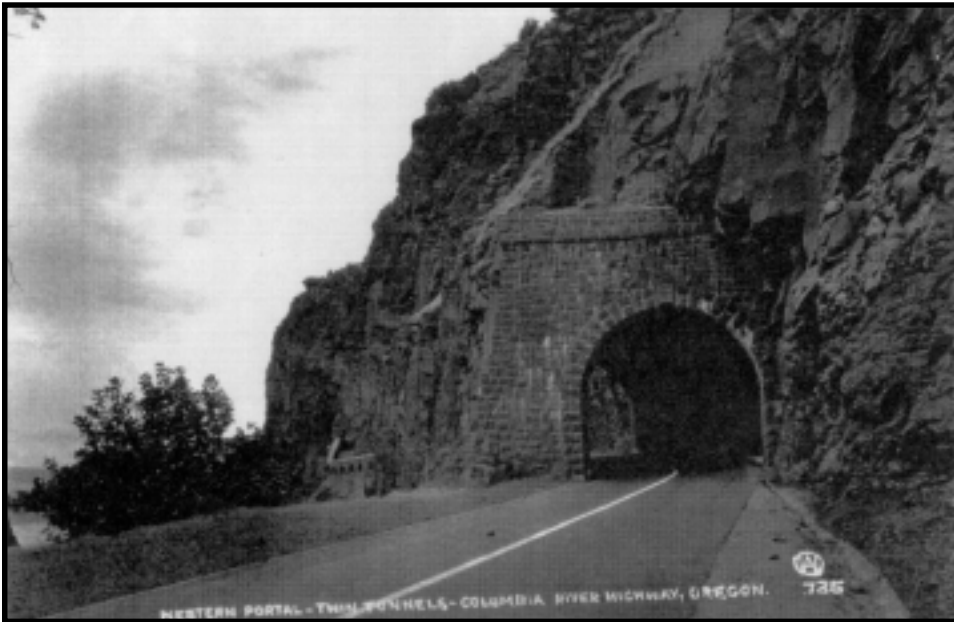
On August 27, 1913, the Multnomah County Commissioners met with Hill and the backers of the highway project at the Chanticleer Inn overlooking the western end of the Gorge. The next day, Sam Lancaster, attending as a guest of Hill's, was appointed Multnomah County Engineer for the highway. (One year later the Columbia River Highway was designated a State highway, setting the stage for future State involvement.) Lancaster went to work immediately, beginning the survey and route location from Chanticleer Point to Multnomah Falls in September 1913.



*Typical curvilinear alignment*

From the very beginning, this was to be both a scenic and a modern highway. The challenging requirements set by Lancaster were to locate the road in such a way that it would be at least 7.3 m (24 ft) wide, have grades no steeper than 5 percent, and have curve radii no less than 30.5 m (100 ft). At the same time, the roadway was to be located so as to provide maximum scenic opportunities, yet do as little damage to the natural environment as possible. Amazingly, Lancaster was able to achieve all these goals, even over the first segment of the highway, which required accomplishing an elevation change of nearly 183 m (600 ft) in a distance of less than 1.6 km (1 mile).

The construction of the highway incorporated a number of features then found only in Europe such as miles of dry masonry walls (built by Italian stone masons) and rock rubble guard walls with arched openings. At Mitchell Point, John Elliott, the location engineer who worked with Lancaster on the eastern segment of the highway, exceeded the achievements of the legendary Axenstrasse around Lake Lucerne, Switzerland. Elliott directed the construction of a tunnel bored through solid rock into which were cut five openings instead of the three on the Axenstrasse, to allow travelers to view the magnificent scenery. An original design element was the construction of stone observation areas with benches for weary travelers. Extensive use was made of the then new construction material reinforced concrete for bridges and viaducts, over the length of the highway. Many of these structures are still in use today.



*Early days of the Columbia River Highway.*

The highway, although only partially paved, was officially opened on July 6, 1915, between Portland and Hood River. Paving began in June 1915, making the Columbia River Highway the first major paved road in the Northwest. On June 7, 1916, the highway was officially dedicated with ceremonies at Crown Point and Multnomah Falls. At 5:00 p.m. that day, President Woodrow Wilson touched a button in the White House that “electronically unfurled the flag of freedom to the breezes” at Crown Point.

Construction continued eastward from Hood River along the alignment established by John Elliot in 1915 to The Dalles. This final section of the highway included two tunnels bored through the bluffs near Mosier. Finally, on June 27, 1922, Simon Benson, who was an ardent supporter and benefactor of the project, ceremoniously spread pavement mixture on the final segment at Rowena Point near The Dalles. After almost 9 years of work on the Columbia River Gorge Highway, the final segment linking Astoria to The Dalles was complete. From The Dalles to Troutdale, workers had built an amazing 119 km (73.8 miles) of roadway, including 3 tunnels, 18 bridges (some of world-class quality for their time), 7 viaducts, and 2 footbridges.

### **Early Economic Benefits of the Highway**

The Columbia River Highway proved to be much more than just an engineering marvel and a scenic attraction. It stimulated tremendous economic growth in every community it touched. Restaurants served up salmon and chicken dinners to hungry travelers. Automobile dealers and service stations sprang up to fix tires and replenish fuel. Before long, motor parks, auto camps, and the grand Columbia Gorge Hotel in Hood River made it possible for travelers to experience a variety of overnight accommodations. Retail stores flourished in the towns along the route, and summer homes appeared on the forested slopes above the river and the highway.

## **Decline and Disuse**

Within a decade after its completion, technological advances in transportation began to make the Columbia River Highway obsolete. Trucks and cars became larger and faster, making travel on the narrow, winding roadbed increasingly difficult and dangerous. By 1931, plans were underway to make another road, but this one would be straighter and closer to river level. Public enthusiasm for this replacement highway was tempered by a lack of funds and, aside from a new tunnel constructed through Tooth Rock near Bonneville Dam in 1935, little more was done. Nevertheless, interest in the new highway remained high, and a portion of it was constructed from Troutdale to Dodson in the summer of 1949.

By 1954, the new “water-level” freeway (originally designated as U.S. Route 30 but now I-84) finally reached The Dalles, but not without significant damage to the original Columbia River Highway. Nearly 4.2 km (26 miles) of the old road between Dodson and Hood River had been either destroyed or abandoned. In 1966, the world-famous Mitchell Tunnel was dynamited to allow for the completion of the adjacent section of I-84. Many of the original bridges, stone guardrails, and observatories fell into disrepair. Towns and businesses bypassed by the freeway suffered declines as new economic opportunities were created at the freeway interchanges.

The only segments of the original route that remained usable were the sections from Mosier to The Dalles and from Dodson to Troutdale. The Historic Columbia River Highway began to deteriorate badly.

## **Renewal and Rebirth**

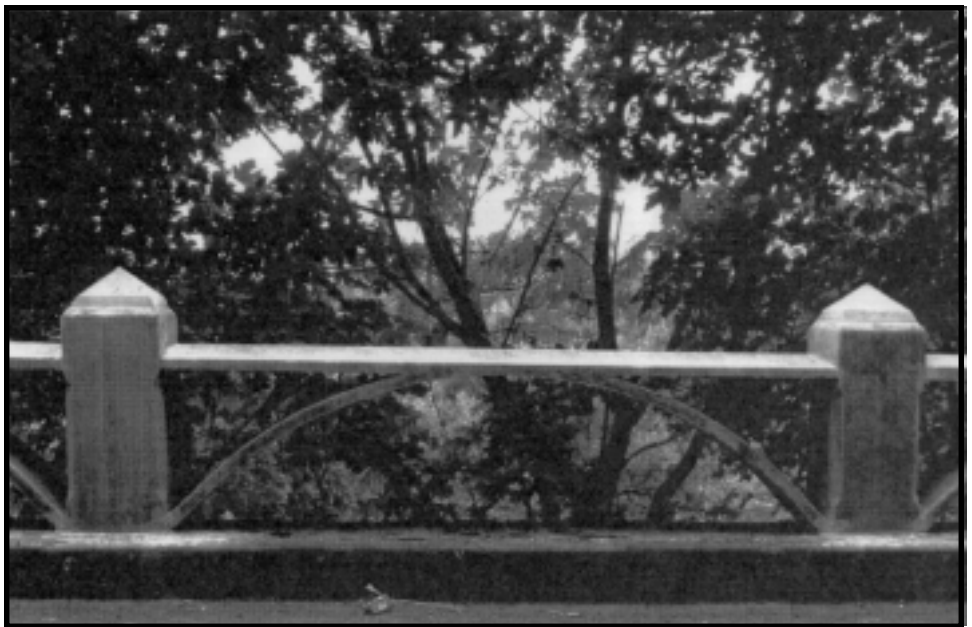
Fortunately, the 1980’s marked the reversal of this trend. Heightened environmental awareness led to the creation of the Friends of the Gorge, which spearheaded the successful effort to create the Columbia River Gorge National Scenic Area. The preservation and interpretation of the historic highway is specifically mandated in the Federal enabling legislation, which also created the Bistate Columbia River Gorge Commission.

A parallel historic preservation movement led to a survey and inventory of the historic highway by the National Park Service. In 1983, the Oregon DOT successfully nominated the surviving sections of the Historic Columbia River Highway to the National Register of Historic Places. The Historic Preservation League of Oregon led the successful effort to create the Historic Columbia River Highway Advisory Committee to monitor changes, alterations, and improvements to the highway.

*Early days of the Columbia River Highway.*



*After restoration.*

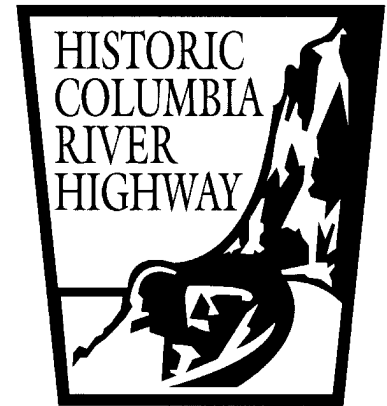


Signs of the rebirth of the great road are everywhere. The Oregon DOT is doing an excellent job of rebuilding stone guardrails and concrete caps, recasting and installing delicate concrete arches along the viaducts, and signing the highway with an appropriate logo. The Highway Division of the Oregon DOT is also in the process of developing a long-term master plan for the restoration and reuse of the highway. The Friends of Vista House, in cooperation with the Oregon State Parks and Recreation Department, have restored the Vista House as an interpretive center. Today, millions of visitors each year drive, hike, and bicycle along portions of the highway.

## ENVIRONMENTAL AND DESIGN ISSUES AND CONSTRAINTS

Perhaps the single most distinguishing feature of the ongoing efforts to rehabilitate the Historic Columbia River Highway is that the designs are intended to replicate the original configuration of the facility as it existed at the time of its completion in 1922. This is analogous to the historic preservation process applied to buildings to return them to their original conditions. Current Oregon DOT plans call for the restoration of as much as possible of the entire 119 km (74 miles) from Troutdale to The Dalles as either a scenic highway or a hiker/biker trail.

The location of the highway in a National Scenic Area prevents the construction of any projects that would have an adverse impact on the defined historic resource, which in this instance is the highway itself.



## ACTIONS TAKEN TO RESOLVE ISSUES

### Crash-Tested Historic Guardrails

One of the more impressive ongoing restoration projects involves the replacement of existing steel guardrails installed over the past several decades with a “new” crash-tested two-beam timber guardrail backed by wood and steel that closely replicates the original 1915-vintage guardrail design, of which no sections remain today. The “new” guardrail has been crash tested at 80 kph (50 mph) and approved for use by the FHWA nationwide. Interestingly, evidence in the archives of the Oregon DOT indicates that the original 1915 guardrail design was adopted by the U.S. Bureau of Public Roads and several States in the 1920’s and 1930’s as the “standard” guardrail for use in similar rural environments.

Oregon DOT staff noted that, if current AASHTO guidelines were to be fully adhered to, the historically accurate replacement guardrail would need to be installed at many more locations than where it previously existed and it is currently being reinstalled.

### Hiker/Biker Multiuse Design Elements

In places where it would not be economically feasible to recreate the historic road in its original location, a representative hiker/biker trail is planned for construction. In such areas as the now-closed Mosier Tunnels, which are too narrow to accommodate two travel lanes wide enough for modern vehicles, the rubble-filled tunnels will be rehabilitated to their original conditions and will provide access limited to bicycles and pedestrians. Wherever possible, the “new” sections of facility needed to accommodate the current “missing links” in the original 1920’s vintage alignment will utilize the same historical design criteria of maximum 5 percent grades and 30.5-m-minimum (100-ft) radius curves, although a slightly narrower pavement width may have to be provided in certain locations. The new hiker/biker trails are being designed in accordance with current ADA provisions in order to allow use of these facilities by individuals with disabilities.

Newly installed steel-backed wooden guardrail.

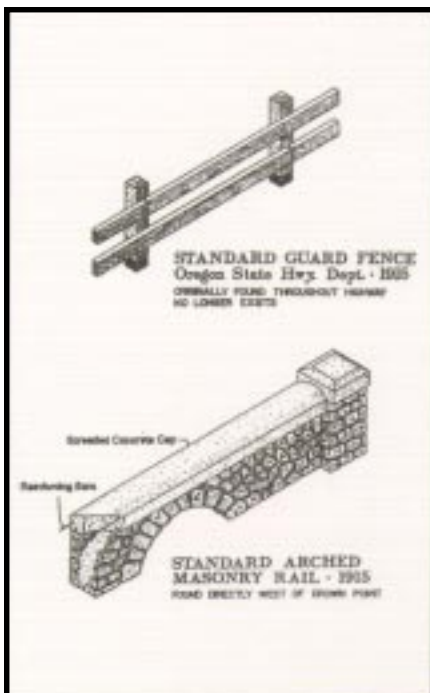


### Aesthetic Considerations of Enhancement Projects

Throughout the design of the current enhancement/rehabilitation projects, Oregon DOT staff members have been particularly cognizant of the need to consider the aesthetic qualities of the Columbia River Gorge. An example of this concern is the manner in which the remediation of a continuing rock fall area was addressed as part of the rehabilitation project encompassing Tanners Creek to Eagle Creek. Because it was not possible to use Oregon DOT's standard steelcolumn-supported, metal rock-fall fencing, the decision was made to shift the roadway alignment slightly to provide a greater separation between the rock face and the edge of the travelway. The resulting lateral separation space is able to accommodate falling rocks.

Moreover, because virtually the entire length of the Historic Columbia River Highway is on the National Register of Historic Places and the highway is located in a designated National Scenic Area, no roadway widenings are permitted. The result is that the "new" roadways are identical in cross section to the existing highway.

In the Tanners Creek area, the planned improvements will involve the removal and relocation of existing overhead electrical utility lines and poles and the removal of some trees to reopen some of the historic vistas of the gorge. One issue to be addressed here is determining exactly which of the trees should be removed.



## Cost Considerations of Historic Enhancement Projects

The costs of the ongoing rehabilitation and enhancement projects for the Historic Columbia River Highway are considerable. For example, the initial installation of 886 m (2,906 linear ft) of two-rail steel-backed timber guardrail had a total bid price of \$119,146 or about \$41.00 per linear ft (\$134.50 / m). If standard Oregon DOT steel guardrail had been installed, the estimated cost would have been approximately \$32,000 or about \$11.00/linear ft (\$36.09/m). The historically accurate timber guardrail costs about 3-1/2 times as much to install as traditional steel guardrail. Since the installation of the initial sections of the two-rail steelbacked timber guardrail in 1992, however, no maintenance of the guardrail has been necessary. It is anticipated that the guardrail will eventually need to be repainted about once every 5 years. The estimated cost of this activity (in 1994 dollars) is approximately \$3.20/linear ft (\$10.50/m).

Similarly, the requirement for the use of hand labor in association with the reconstruction of stone guard walls has resulted in substantially higher costs for this activity than if standard steel guardrails or concrete barrier walls had been installed. However, the Oregon DOT understands the need for an appropriate balance to be maintained between enhancement, maintenance, rehabilitation, and new construction projects and remains committed to the Historic Columbia River Highway projects.

### LESSONS LEARNED

The experience of the Oregon DOT with the design and construction of improvements to the Historic Columbia River Highway has the potential for widespread application across much of the United States. In particular, many of the generally low-volume rural highways that have been, or are proposed to be, designated as “scenic highways” date from the general era of the original Columbia River Highway and thus share similar geometric constraints. Now that regional through traffic that once used these older highways has shifted to more modern parallel freeway routes, opportunities may exist for the enhancement and rehabilitation of these older routes to a configuration similar to that at the time of their original construction.

The existence of an FHWA-approved two-rail steel-backed timber guardrail that has been crash tested to 80 kph (50 mph) provides an alternative to the use of current steel guardrail designs, especially on those routes where the timber guardrail would help to provide a more aesthetically pleasing vista. Finally, the experience of the Oregon DOT with the construction and maintenance of such “nontraditional” roadway design features as timber guardrails and stone guard walls should prove to be of use to a number of other States facing similar requests from historic preservation groups.

*Young's Creek (Shepards Dell)  
Bridge after restoration.*



*Spindle railing after restoration on  
the Young's Creek Bridge.*



## HISTORIC COLUMBIA RIVER HIGHWAY AT A GLANCE

<b>Setting:</b>	World-class designated National Scenic Area; rural highway passing through small communities.
<b>Length:</b>	Approximately 119 km (74 miles) (from Troutdale to The Dalles)
<b>Traffic Volume:</b>	Widely variable, from approximately 4,200 vehicles per day in most heavily traveled western sections (with peak summer weekend volumes of approximately 7,500 vehicles per day) to about 500 vehicles per day in the most lightly traveled eastern sections
<b>Design Speed:</b>	Not applicable; rehabilitation of existing historic roadway; estimated design speed of 56 to 73 kph (35 to 45 mph)
<b>Type of Road:</b>	Historic, scenic highway (owned and maintained by Oregon DOT); functional classification - collector
<b>Design Cost:</b>	Current enhancement/rehabilitation projects only— Not available (in-house by Oregon DOT staff)
<b>Construction Costs:</b>	Current enhancement/rehabilitation projects only— \$120,000 for initial installation of 886 m (2,906 linear ft) two-rail steel-backed timber guardrail; \$35,000 for initial rock guard wall reconstruction; other projects totaling approximately \$4.0 million are planned for the next 3 to 5 years
<b>Key Design Features:</b>	Restoration/rehabilitation of existing historic highway to original condition at time of completion in 1922; installation of two-rail steel-backed timber guardrail very similar in design to original; reconstruction of rock guard walls; reconstruction of original concrete bridges
<b>Debits:</b>	Design limits operating speeds to 48 to 65 kph (30 to 40 mph) in most areas
<b>Similar Projects:</b>	Paris-Lexington Road, KY Oyster River Bridge, Durham, NH SR 89, Emerald Bay, Lake Tahoe, CA SR 92, Lebanon Road, New Castle County, DE

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