

**WORK FINISHED ON SOUTH JETTY AT COLUMBIA'S MOUTH;  
PLAN FOR CHANNEL IMPROVEMENT INCLUDES NORTH JETTY**

**GOVERNMENT SPENDS  
MILLIONS IN MAKING  
NAVIGATION SAFER**

After Years of Study Engineers Have Learned Habits of Currents Near Bar.

SAILING over the Columbia's bar, in ocean greyhound, freighter or coaster, few persons, as they pass by the south jetty, pause and give thought to the millions in money spent, the problems met and solved and the years of struggle of man against nature's angry elements, in the building of that slender thread of rock, which makes the channel safe and passage deep.

From Fort Stevens, across the shallows of Clatsop Spit and into the ocean itself, extending a distance of seven miles, the jetty stands a bulwark against the northbound shifting sands, and narrowing of the mouth of the great stream compels it to hurl the tremendous forces of its currents against the hampering sands and scour the channel clean. The work of building the jetty, which extended intermittently over a period of 28 years, was only completed this year at a total cost of approximately \$10,000,000.

And not content with the showing made, Uncle Sam nalled another slogan to the mast—"A Forty Foot Channel Over the Bar!"—and in 1911 began preparations for the construction of a jetty on the north side of Columbia's mouth, which, when completed, will, it is anticipated, bring the channel's depth to at least 35 feet. Dredges will complete the job, and the 250,000 square miles of productive empire drained by the Columbia will be in position to build up one of the most magnificent fresh water harbors of four continents.

Already the jetty has left the shores of Cape Disappointment and plunged 800 feet outward through the treacherous surf of danger Peacock spit. And close behind are following the "rocking" crews who, with their old little steam trawlers, haul the rock that goes into the sea and builds the jetty walls.

In the spring, the trestle will be extended several thousand feet more in its long stretch to five miles. Slowly, surely, it will best its way across the bar shallows and when completed will cut off the fan shaped opening of the river to the north and confine Columbia's currents between it and the jetty two miles to southward. With such a narrow opening the river cannot do other than scour out the fine sands and send them into deep water, where the littoral northbound current will carry them out of the way.

**River's Habits Determined.**  
Factors governing the depth of water, such as currents, their direction, wave action, sand movement, etc., are now well understood by the engineers. Numerous surveys extending over a period of a century have established the river's habits fairly well, particularly since 1885, when work on the first unit of the south jetty was started. Briefly stated, the entrance of the river with its uncontrolled shoals and spits underwent many important changes. At certain times only one channel existed across the bar, but more frequently two, one to north, the other to south. Since 1885 one channel has obtained. In that year the bar channel was probably the shallowest in its history. A bare 20 feet in depth was shown. This was largely due to the "spill" of the river over Clatsop spit, which naturally reduced the scouring force of the current.

As the jetty was extended onto the spit a marked improvement was noted by when the first unit of four and one quarter miles was completed in 1895. The channel was one half a mile wide and 31 feet deep, at low water—the widest and deepest channel ever known to exist.

Clatsop spit had gained greatly in elevation and area. As a submerged spit it extended three miles seaward from the end of the jetty. Its presence trained the currents and directed largely their scouring energy. But later the spit caused a deterioration of the channel. Detached and beyond jetty control, influenced by the ocean's northward current and the force of constant waves, it gradually edged toward the north, forcing the bar channel correspondingly in the same direction with constantly increasing depth, until the channel had decreased to 23 feet in 1901. Beyond the jetty, the spit had virtually disappeared. Then with the arrival of the same conditions facing them as in 1885, government engineers began to work out the problem a second time. In 1903 a board reported and recommended jetty construction to accomplish a channel 40 feet in depth. This called for an extension of the south jetty for approximately two and a half miles, the building of a north jetty and, if necessary, permanent construction was to be supplemented by dredging.

The recommendations were approved and backed by liberal appropriations. Work has been going on since. Practically a million dollars a year has been spent since then and this year the last bit of rock was placed on the jetty—it was finished. This, combined with dredging, has made a 28 foot channel, safe and deep enough for a dreadnaught, at low water. The tremendous total of 5,783,000 tons of rock has been quarried out of the hills above Vancouver, transported in scows to the mouth of the river, carried by train far out on the jetty, and dumped into the ocean.

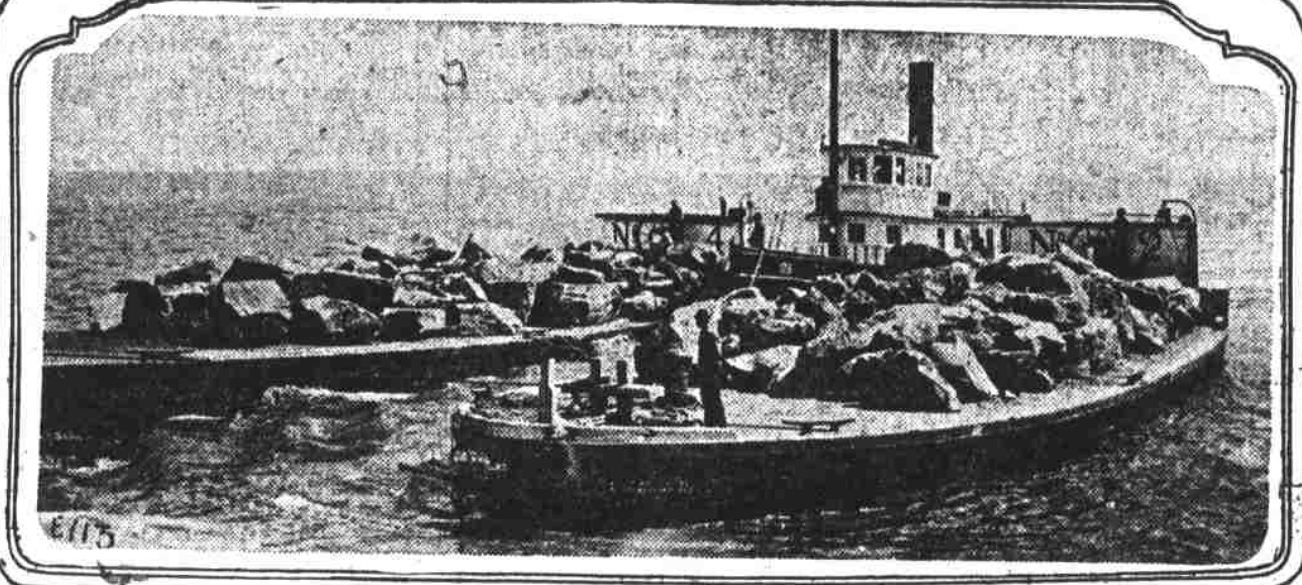
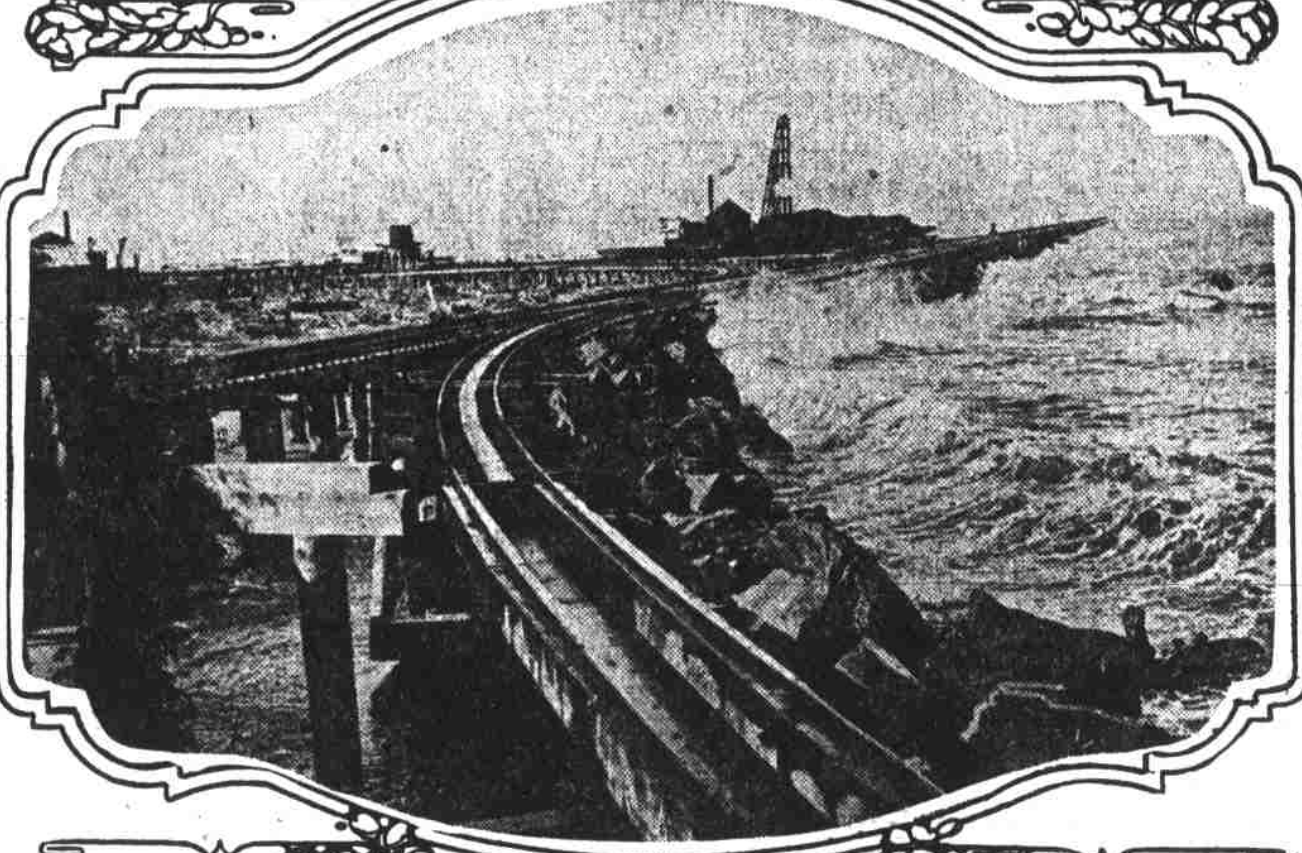
**Hundreds of Men Employed.**  
During the last year 300 men have been kept busy repairing and extending the artificial reef into the Pacific. On the other side of the river, an additional force of 200 men have been busy putting in trestles, building plants and shops and houses. A dredging channel in Baker's bay for rock scows, erecting docks, and carrying on the multitudinous tasks connected with the last and most important part of the work.

How long it will take to complete the north jetty, no one knows; probably from five to seven years, says the engineers. How much it will cost, no one knows, the figures ranging anywhere from \$4,000,000 to \$7,000,000.

**By Way of Comparison.**  
Building permits for the first 10 months of 1913:

Portland	\$11,763,846
Seattle	8,383,590
Tacoma	2,296,506

A new bayonet lies along the barrel of a rifle normally, but is thrown into position for service by pressing a button on the stock of the weapon.



Scenes along the South Jetty at the mouth of the Columbia. Top—Hauling rock to sea. Center—Section of the jetty completed. Bottom—Towing barges laden with rock for use on the jetty.

**CONSTRUCTIVE WORK MARKS GOOD ROADS PROGRAM IN OREGON FOR PRESENT YEAR**

Popular Demand for Cooperative Endeavor and Improved Legislation Are Followed by Prompt Action in Intelligent Highway Plans.

**I**N OREGON the good roads orator is being succeeded by the trained mind and the practical hand. System, science and scrutiny are beginning to exclude haphazard, waste and graft.

On the statute books laws are now written. They permit counties to pledge their credit for permanent roads. They permit employing of city, county and state prisoners in road making. They create and authorize support of a state road department. They permit a degree of state aid in road building.

The county bonding act is already being exercised. Four counties have voted on bond issues. But one has rejected its bonding proposition.

People approve or reject the definite proposal. They think most easily in terms of concrete objects. It is not strange that the bonds so far voted have been special purpose bonds. Multnomah county voted \$1,250,000 in bonds to meet Clarke county, Washington, in the construction of an interstate bridge. Under the definition of a law passed by the last legislature, this state's portion of an interstate bridge is a highway for which the county interested may vote bonds under the county bonding act.

disapproved method in any other Oregon county. "The sum total spent in Clatsop county on roads and bridges during the last eight years is \$767,153.22. This money has been distributed according to the valuation among 22 road districts, and it has been expended by 22 road supervisors in 22 different ways; each man building his own road according to his own individual idea of how a road should be built.

"Do you wonder that the roads of Clatsop county or any other county in the state of Oregon which are built by this kind of a system are not better?" "During the past eight years the people of Clatsop county have gone down into their pockets and dug up \$767,153.32 and I believe that I am safe in making the assertion that half of this amount has been absolutely wasted, thrown away, destroyed. Yet there are among us people willing to commend this system."

The promotion of the definite items of road building spoken of have been engineered to a considerable extent each by a separate organization. For instance, the Columbia Highway association has been back of the campaign to forward units of the great trunk road's building from Wasco county to the sea. With Multnomah and Clatsop counties taking the lead, with Columbia and Hood River counties following close, the prospect of a great, hard surface, general utility, magnificent scenic highway that shall not only lead to the ocean but for the first time connect eastern and western Oregon by water grade highway, is exceedingly good.

The vote for the interstate bridge over the Columbia river and for road bonds in Jackson county were both triumphs to be partially credited to the Oregon division of the Pacific Highway association. When the work of this organization is finished it is believed that in Oregon there will be, both east and west of the mountains and along the coast, splendid trunk highway, giving the tourist opportunity to view the scenic wonders of this state yet having also an immense value in state development.

**PORTLAND'S STREET  
CAR MILEAGE MORE  
THAN TWO HUNDRED**

Between 95 and 100 Million Fares Registered on City Lines Present Year.

**P**ORTLAND'S streets are traversed by more than 200 miles of car lines. These include the city and suburban lines of the P. R. L. & P. company and the lines of the United Railways and the Oregon Electric. The former company operates over 200 miles of tracks, which include the lines to Estacada and Cazadero, Oregon City, Vancouver, St. Johns and the Mount Hood line.

Twenty-six years ago there were 15 miles of car lines in the city. The Portland Railway, Light & Power company, organized seven years ago, represents a consolidation of several companies, which in turn represent consolidation of earlier lines, so that as a matter of fact 52 constituent companies form the present company.

Portland has eight miles of street car track for every 10,000 of population; Seattle has about the same, while Los Angeles has nearly 11 miles, Denver 9 1/2 miles, San Francisco, Oakland, Berkeley and Alameda together 8 miles, Kansas City 7 1/2 miles, Baltimore 7 miles, New Orleans 6 miles and Cleveland 4 1/2 miles.

It is possible for the passenger in Portland to ride 18 1/2 miles for a single fare; in Los Angeles 18 miles, in Cincinnati 17 miles and in Detroit, St. Louis, Kansas City and Cleveland, 15 miles. The average length of a single trip in Portland is 4.3 miles; and the average number of passengers per trip, 32.2. There are at present 3200 employees on the company's monthly payroll, which approximates \$200,000.

For the seven years ending December 31, 1912, the company has spent \$4,436,835 on its street railway lines, exclusive of interurban lines. Today there are 425 cars in service on the city lines alone. In addition to this there are a considerable number of cars on hand for exclusive interurban service and for special rush occasions, the total number of available cars being 638.

The three days on which the largest number of fares have ever been collected in Portland are: June 10, 1911, during the Rose Festival, when 372,285 fares were collected; June 15, 1912, also during the Rose Festival, when 382,799 fares were collected, and July 11, 1912, during the Elk's Carnival, when 370,499 fares were registered.

The following table shows the growth of the passenger business in Portland:

1907	60,115,222	1910	88,310,850
1908	65,196,914	1911	91,600,393
1909	77,019,800	1912	93,208,938

For the first 10 months of 1913 the record shows the total number of fares to be 78,460,522. Inasmuch as November and December are heavy months, December particularly, being the month when Christmas shopping is being done, the year will probably show a record of work throughout the year which has been at some time between 96,000,000 and 97,000,000 fares. Over 20 per cent of these fares are represented by transfers.

**THREE OCEAN-GOING  
VESSELS ARE BUILT**

St. Helens, Dec. 30.—The close of the year finds St. Helens with added 35 per cent to her population. She has enjoyed a splendid growth during the last year industrially, and in building and business.

The shipyards have turned out three ocean going vessels during the year, the Merced, Multnomah and the Cello, which were added to the McCormick fleet which is carrying millions of feet of lumber monthly from the St. Helens mills to the California markets. The block or paving cutters have been at work throughout the year and have turned out a product bringing large revenues to this place. The Belgian blocks made here are not surpassed in this state as to quantity or quality.

St. Helens has established a creosoting plant during the year which employs a goodly number of men and is among the largest plants of its kind. The quarries have been in operation a good part of the year furnishing thousands of yards of crushed rock and forming an important industry. The fishing season has been about normal employing about 150 men with a catch of about \$30,000. St. Helens has put in more than three miles of sewer during the last year and is still extending the system. Permanent street improvement in all directions has been extensively made during the year. St. Helens' principal industries are fishing, lumbering, quarrying, creosoting and ship building, and an aggregate monthly payroll of more than \$100,000. The population is slightly in excess of 2000.

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