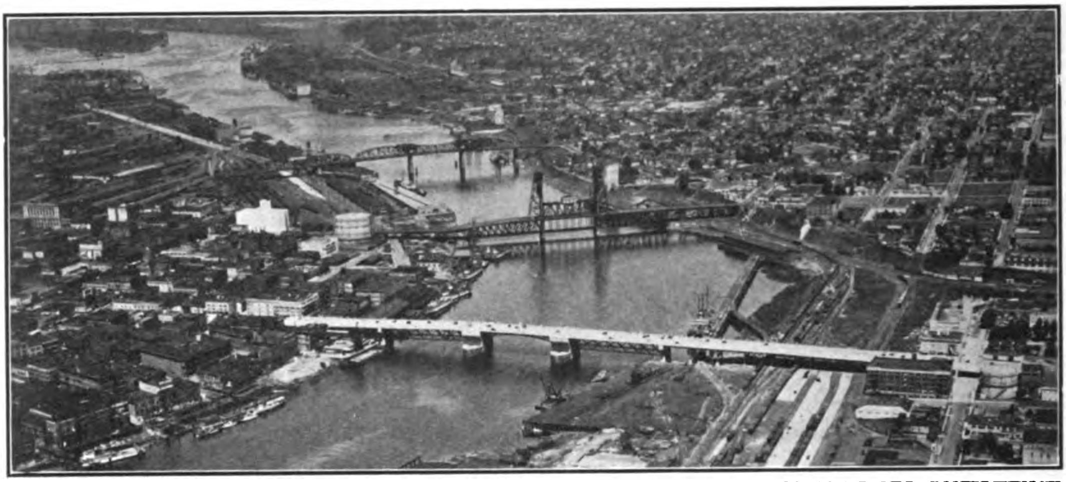


PORTLAND, OREGON, LOOKING NORTH DOWN THE WILLAMETTE RIVER TOWARDS ITS CONFLUENCE WITH THE COLUMBIA RIVER. BUSINESS DISTRICT AT THE LEFT

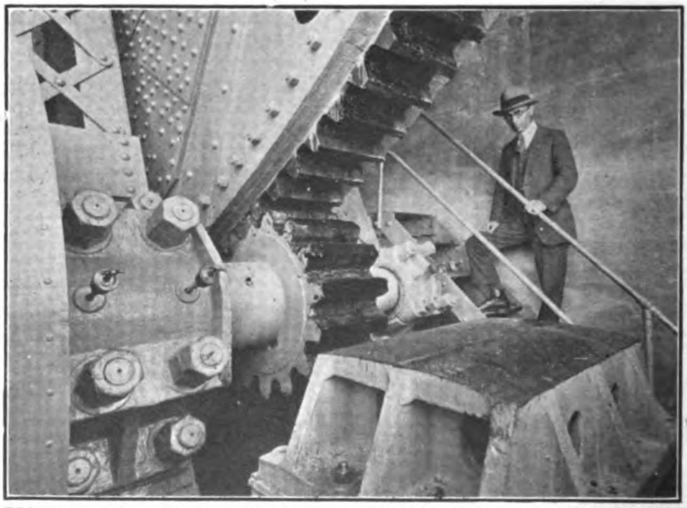
In the foreground is seen the Burnside Bridge, beyond which is the railway bridge and still further back the Broadway Bridge

The New Burnside Bridge at Portland, Oregon

Combined Steel and Concrete Structure an Important Traffic Link for the City

THE construction of the new Burnside Bridge across the Willamette River at Portland, Ore., completed in June, 1926, was of necessity. Old travelers of the Oregon Trail were balked by many streams, among them the Willamette River in Oregon near its confluence with the Columbia. Transportation could not stop, so a ferry became a link in the historic road. As time passed and transport grew heavier, the ferries were no longer adequate and a bridge was built. Other bridges followed. Still the traffic grew, until even these bridges were inadequate. New bridges have come to replace the old. These are wide enough and constructed to carry the thousands of motor vehicles and the electric railways which have taken the place of the ox-cart that first traveled the Oregon trail. The Burnside Bridge, which extends from Union Avenue and Burnside Street on the east side to Third and Burnside Streets on the west side, is one of the latest and most modern.

The Burnside Bridge is of great importance to the city of Portland, which is literally cut in two by the Willamette River. On the east side are most of the residential districts. On the west side are the business and industrial sections. The bridge consists of two steel deck trusses with a central Strauss trunnion bascule span over the channel, with a concrete encased steel viaduct on the east side over the railroad yards. Reinforced concrete approaches and earth embankments connect with present street



MAIN RAMP AND PINION AND LIVE-LOAD SHOE OF THE BURNSIDE BRIDGE BASCULE grades. The entire structure carries an unsurfaced reinforced concrete pavement. The use of concrete on the bascule span is, it is believed, the first departure from former methods. This material was used because of the minimum wear, thereby eliminating trouble and repair expense, and because the factor of safety to motor travel is high.

The total length of the bridge is 2,307 feet between abutment walls. Its total length, including approaches, is 2,925 feet. The river span includes two truss spans of 266 feet, 5¼ inches, and one double leaf bascule span measuring 252 feet between trunnions.

The width of the river channel is 213 feet between the bascule piers. The maximum vertical clearance of the bascule span is 70.37 feet above city datum, or 67.27 feet above government datum, which is considered identical with "low water." The bases of the main bridge piers are 68 x 78 feet, while the main shafts of these piers are 55 x 65 feet. The roadway rises to a maximum elevation of 77.65 feet above city datum with a maximum grade of 3.84 per cent on the west approach.

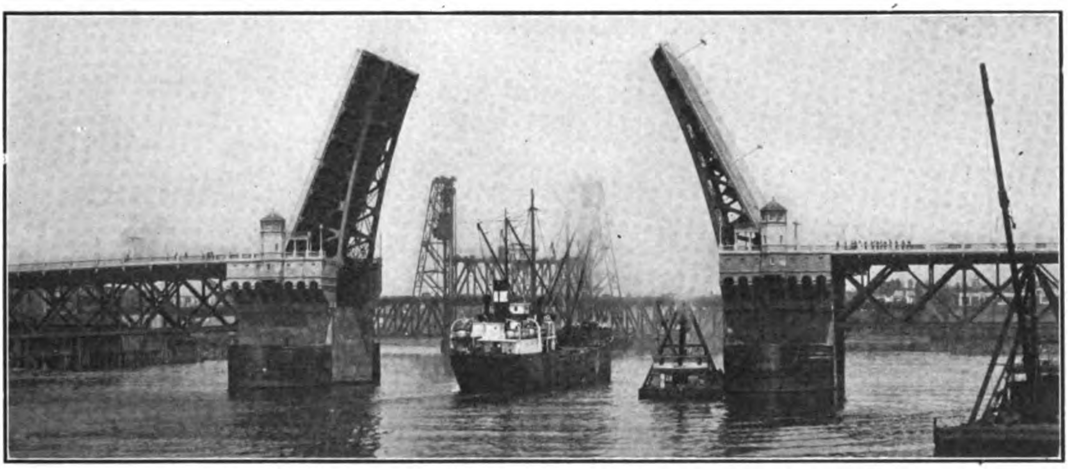
On the approaches west of Front Street and east of East Second Street, the roadway is 90 feet wide between curbs, and the sidewalks have about 8 feet clear width. This accommodates two street-car tracks and in addition thereto six lines of traffic.

Through a bottle-neck arrangement the width of the roadway for the river spans and part of the approaches is narrowed to 68 feet, giving space for two street-car tracks and four lanes of traffic. The sidewalks are about 7 feet wide.

At Front Street staircases lead to the bridge and also to loading platforms. At Second Street all four street corners and two loading platforms are connected by a subway. A similar subway connects the southeast and northeast corners at the intersection of Burnside and Third Streets.

The bascule span is not one of the longest in existence, but it is unusually wide and heavy. Each bascule leaf weighs about 930 tons and is balanced by a counterweight which weighs approximately 1,700 tons. The total weight of 2,630 tons is supported on two trunnion pins, each of which carries 1,315 tons. The whole leaf revolves around the two trunnion pins when the bridge is being either opened or closed.

In the closed position the bascule leaves are locked one against the other so as to prevent any relative movement when, for instance, a street car passes from one leaf to the other.



THE COMPLETED BURNSIDE BRIDGE OPEN FOR PASSAGE OF VESSEL
This picture is taken looking north toward the railroad bridge

For the operation of the bascule leaves there are four motors of 70 horsepower each. These motors act through a series of gears in a pinion which drives circular racks attached to the main trusses. The theoretical time for complete opening is nearly 70 seconds, but whereas there is under ordinary conditions an excess of power, the actual opening or closing time may be about one minute. Not only the bascule leaves, but also the center lock and the roadway gates are electrically operated.

Ordinarily the whole bascule span will be operated from the west side, although it is possible to operate each leaf from its own side. A submarine cable connects the two bascule piers, thus making it possible to transfer the current from one side of the bridge to the other. This makes it possible to operate the bridge even if the current supplied from the west side or from the east side breaks down.

The Burnside Bridge was financed by a

bond issue voted by the people of Multnomah County in 1922. It cost approximately $2,650,000, and the entire project, including approaches, $3,000,000. The main contract for constructing the bridge was let on July 21, 1924, for the sum of $2,390,173. This sum included taking down the old draw-span and removing the old piers. Additional contracts were let on November 9, 1925, for the sum of $93,976 for completing the approaches, and, on September 21, 1925, for the sum of $11,853 for the lighting system, not including certain later modifications embracing the approaches. The total appropriation for the construction of the Burnside Bridge was $3,000,000. This sum has proved sufficient and it is even expected that a substantial amount will be returned to the taxpayers.

The Burnside Bridge was constructed under the direction of the Multnomah County Commissioners, Amedee M. Smith, Erwin A. Taft, and Grant Phegley. Gustav Lindenthal, of New York, was consulting engineer; Hans H. Rode, Resident Engineer; M. E. Reed, principal Assistant Engineer; the Pacific Bridge Company, general contractor; Booth & Pomeroy, subcontractors for steel erection; Lindstrom and Feigenson, subcontractors for approaches; and the American Bridge Company, subcontractors for structural steel.

New Filtration Plant for Progressive Southern City

By R. Alton Jackson

WINSTON-SALEM has just put into operation one of the largest modern water purification plants in North Carolina. The capacity of the plant is about 16,000,000 gallons daily, and the entire cost of construction was about $600,000.

Winston-Salem's water-supply comes from Salem Creek, being impounded in a large reservoir with a capacity of about one billion gallons located two miles from the plant. During the past season the level on this lake lowered only a few inches, despite the fact that one of the worst droughts in years visited this section.

From the impounding reservoir the water is conducted to the filtration plant at the waterworks through two pipe lines each 10,000 feet long. One of these lines is 30 inches in diameter and the other 36 inches.

Chemical Building

Water from the impounding reservoir enters the mixing chambers in the new chemical building through a 36-inch Venturi meter. As the water enters the mixing chambers, alum is applied automatically by a Savage dry feed machine. Three of these machines are in the building, one used for alum, one for lime, and one held in reserve. Lime is used in the water only when the water is low in alkalinity. Alum is always used.

Just ahead of the mixing chamber is a balancing chamber in which is set a float controlling a 30-inch hydraulic valve, thus automatically admitting water to the mixing chambers as needed and preventing overflow in any part of the plant.

The mixing chambers are concrete tanks in which are set mechanical agitators, electrically operated, by which the water and chemicals are violently agitated and thoroughly mixed. By this means the minimum of alum is used and quick and positive coagulation is secured. The laboratory is on the second floor of the building, in charge of a chemist, who makes daily analyses.

Coagulation Basin

From the mixing chambers the water enters the coagulation basin through a stilling well. This basin is 150 feet square and 13 feet deep, with a capacity of about 2,180,000 gallons of water. Through the center of the basin is a concrete dividing wall which allows the basin to be used in series or parallel. The chemically treated water is passed slowly through these basins, where the floc and entrained impurities settle out. The settled water flows over a submerged weir and through a concrete flume to the filters.

Filters

The filters are constructed of concrete with 29 inches of sand and 22 inches of gravel, underlaid with cast iron pipe laterals which conduct the water to an effluent pipe, 24 inches in diameter, for each six filters. The new plant consists of eighteen filters with a combined capacity of about 16,000,000 gallons every 24 hours.