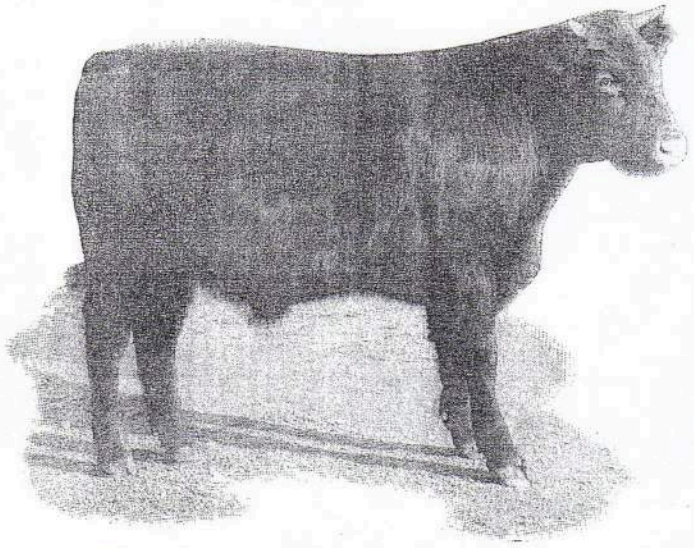
Dine at the



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PHILIP L. JACKSON
President
Rose Festival Association

PROGRAM

of the

Rose Festival

PORTLAND OREGON

June 11-12-13-14 1931

E. F. DOYLE
President
Peninsula Bridge Committee

THURSDAY, JUNE 11

10:45 a. m.—**Coronation of Queen.** Laurelhurst Park.

1 p. m.—**Grand Opening of Rose Show.** Masonic Temple.

2 p. m.—**Children's Exhibition.** Civic Stadium.

9 p. m.—**Illuminated River Display.** Willamette River.

FRIDAY, JUNE 12

9:30 a. m.—**Aviation Exhibit and Open House.** Airport.

10 a. m.—**Rose Show.** Exhibits to 11 p. m. Masonic Temple.

3 p. m.—**Grand Floral Parade.** Thru Downtown Streets.

8 p. m.—**Mardi Gras Night.** Open Air Fiesta.

SATURDAY, JUNE 13

2 p. m.—Dedication of St. Johns Suspension Bridge

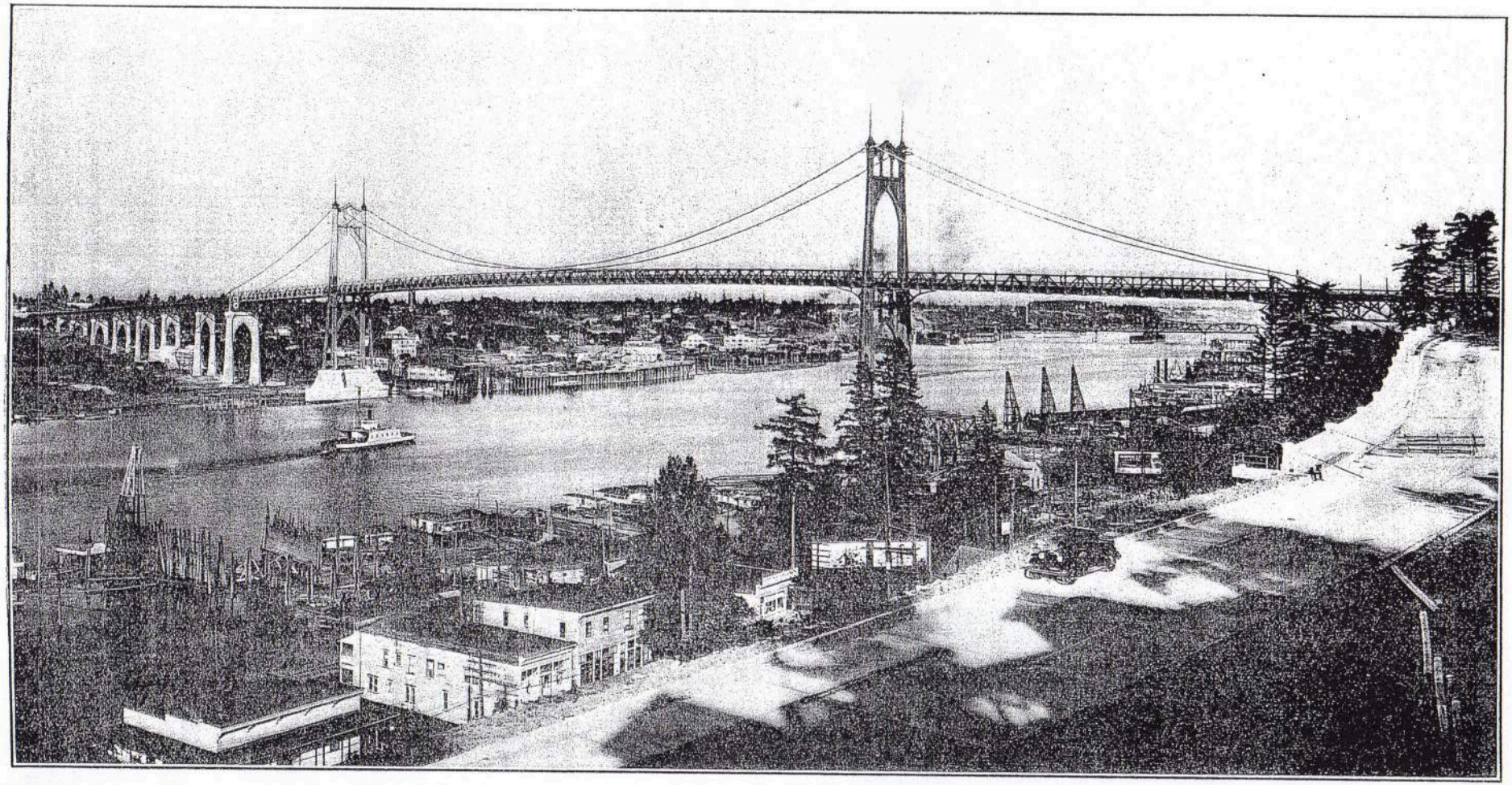
(Ceremonies will be held in the St. Johns Civic Center.)

Music by the Roosevelt High School Band.
Greeting by E. F. Doyle, president of Committee.
Address by Major General Charles H. Martin, representing the Rose Festival Assn.
Address by Stanhope S. Pier, Acting Mayor of Portland.
Address by Dr. D. B. Steinman (Of Robinson & Steinman, Designers and Supervisors of Construction of St. Johns Bridge.)
Address by Representative of the Bridge Contractors.
Address by Fred W. German, Chairman of Board of County Commissioners.
Opening of the Bridge by the Queen of Rosaria (Rachel Florence Atkinson.)
Continuation of Dedication Parade across the Bridge.

Rose Show—Final showing of Roses, all day. Masonic Temple.

Marine Day—Races, Yacht Harbor Dedication, Open House on Ships.

Sunday, June 14—**Hospitality Day.** Visitors will be taken to scenic places, Columbia Highway, Mt. Hood Loop, mountains or beaches.



ST. JOHNS SUSPENSION BRIDGE

Spanning the Willamette River at Portland, Oregon. Date of Dedication: June 13, 1931

MAIN CHARACTERISTICS OF THE ST. JOHNS SUSPENSION BRIDGE, PORTLAND, OREGON

Compiled by R. Boblow, Resident Engineer for
Robinson & Steinman, Consulting Engineers

1.	Total length of bridge, exclusive of roads, up to west abutment	3,833.6	feet
2.	Length of Suspension Bridge: Main span 1,207 feet		
	2 side spans, each 430 feet 3 inches		
	Total	2,067.5	feet
3.	Length of east approach	1,511.1	feet
4.	Length of west approach, exclusive of roads	255.0	feet
5.	Length of west approach roads: North arm 2,215 feet		
	South arm 2,950 feet		
	Total	5,165.0	feet
6.	Clearance of bridge above mean low water: At center of main span	205.0	feet
	For 440 foot center channel	203.6	feet
	At harbor lines	194.0	feet
7.	Width of roadway between curbs	40.0	feet
8.	Width of sidewalks	2 of 5	feet
9.	Height of roadway at center of main span above mean low water	213.3	feet
10	Height of roadway at main towers above mean low water	202.7	feet
11.	Height of top of concrete river piers above mean low water	60.0	feet
12.	Height of main steel towers above concrete piers, to points of support of main cables	289.0	feet
13.	Height of spires on tower tops	50.0	feet
14.	Height of beacon lights on tops of spires above mean low water	401.0	feet
15.	Height of beacon lights above roadway at main towers	198.0	feet
16.	Number of main cables	2	
17.	Diameter of main cables	16¾	inches
18.	Each cable is composed of 91-1½ inch diameter twisted strands		
19.	Length of cable between end fastenings	2,720	feet
20.	Maximum tension in one cable	4,250	tons
21	Breaking strength of cable	12,750	tons
22.	Maximum load on one tower from both cables	6,700	tons
23.	Maximum load on one main pier	7,950	tons
24.	Depth of base of east main pier below mean low water	50.0	feet
25.	Depth of base of west main pier below mean low water	25.0	feet
26.	Weight of east anchorage	29,000	tons
27.	Depth of tunnels for west anchorage	80.0	feet
28.	Maximum pull of cables on each anchorage	8,500	tons
29.	The highest concrete pier is the viaduct pier at the east end of the suspension bridge and is known as No. 10		
30.	Height of pier 10 above the ground	150.0	feet
31.	Cubic yards of concrete in Pier 10	3,934	
32.	Weight of reinforcing steel in Pier 10	100	tons
33	Total weight of Pier 10	7,968	tons
34.	Weight of one main steel tower	1,250	tons
35.	Total weight of structural steel, railings and miscellaneous castings for entire bridge	7,630	tons
36.	Total weight of cables, suspenders and cable bands	1,410	tons
37.	Total number of cubic yards of concrete for all contracts	70,000	

CONSTRUCTION CHRONOLOGY

Work begun	September 3, 1929
Pouring for main river piers completed	April 8, 1930
Main tower erection completed	September 1, 1930
Cable and suspender rope erection completed	January 2, 1931
Suspended steel erection completed, floor stringers and side span trusses riveted	March 24, 1931
Pouring of roadway slab completed	April 18, 1931
Pouring of sidewalk slab completed	April 29, 1931
Paving of west approach road completed	May 15, 1931
Bridge dedicated and opened to traffic	June 13, 1931
Total period of construction	21½ months

DR. HOLTON D. ROBINSON

DR. D. B. STEINMAN

ROBINSON & STEINMAN

CONSULTING ENGINEERS

NEW YORK

DESIGNERS AND SUPERVISORS OF CONSTRUCTION

ST. JOHNS SUSPENSION BRIDGE

PORTLAND, OREGON

THE ST. JOHNS SUSPENSION BRIDGE

THE STORY OF ITS CONSTRUCTION

By R. BOBLOW

Resident Engineer for Robinson & Steinman, Consulting Engineers

Location and General Description

The St. Johns Bridge, crossing the Willamette River in the City of Portland, Oregon, about seven miles northwest of the city center, connects the two sections of the city known as St. Johns on the east and Linnton on the west, thus forming the most northerly link between the upper and lower Columbia River Highways. The center line of the bridge is a continuation of the center line of Philadelphia Street in St. Johns. The main river crossing is accomplished by means of a suspension bridge having a main span of 1207 feet and two side spans, each 430 feet three inches in length. The approach to the main bridge on the east starts at Syracuse Street and ascends on a three and one half percent grade for a distance of 1511 feet to junction with the suspension bridge. It includes, in order, a concrete U abutment 227 feet long, three 108 foot, four 144 foot, and two 180 foot steel deck truss spans. On the west side the approach descends from the main bridge on a three and one half per cent grade for a distance of 293 feet leading into the side of a hill, from which point a road was constructed having two arms—one leading north and the other south, both descending on five per cent grades to junction with Linnton Road. The bridge roadway is 40 feet wide accommodating four lanes of traffic. In addition there are two five foot sidewalks. The length of the bridge between the intersection with Syracuse Street on the east and the junction with the new highway on the west is 3872 feet. The two arms of the side hill highway total one mile in length.

Navigation requirements of the Port of Portland specified a clearance of 205 feet at the center of the main span and a clearance of 203.6 feet for a channel width of 440 feet centered between the main piers. The clearance at the harbor lines, 1102 feet apart, is 194 feet.

R. BOBLOW

In the design of the bridge, architectural treatment received special attention. The use of the pointed Gothic arch prevails as the fundamental architectural motif—not only in the tall viaduct piers but also in the steel batter-leg towers, the combination producing a most pleasing harmonious impression.

Contracts

The bridge was built by Multnomah County and financed by a bond issue of $4,250,000. For the purpose of bidding the work was divided into seven contracts. On August 22, 1929, six of the contracts were awarded to the respective lowest bidders as follows:

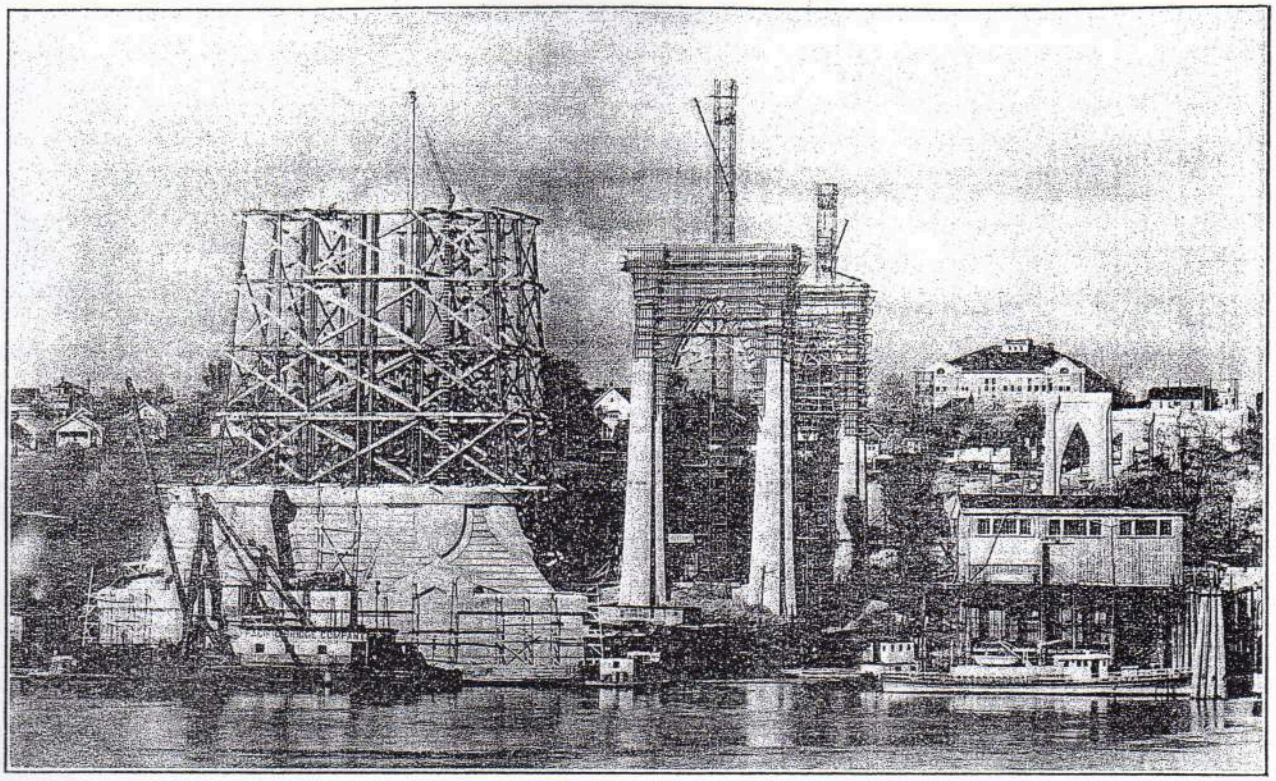
1. Substructure: East abutment and Piers 1 to 15, Gilpin Construction Company, Portland, Oregon..... $1,026,897.00
2. Superstructure steel for suspension bridge: Fabrication and erection, Wallace Bridge & Structural Steel Company, Seattle, Washington..... 986,445.80
3. Main cables: Furnishing and erection, John A. Roebling's Sons Company, Trenton, N. J..... 472,200.00
4. Viaduct steel: Fabrication and erection, U. S. Steel Products Company, San Francisco, Calif..... 290,000.00
5. Concrete deck for bridge, Lindstrom & Feigenson, Portland, Ore. 146,060.00
6. Electrical Work, National Electric Company, Portland, Ore..... 33,000.00

On September 6, 1929 the seventh contract was awarded to the lowest bidder as follows:

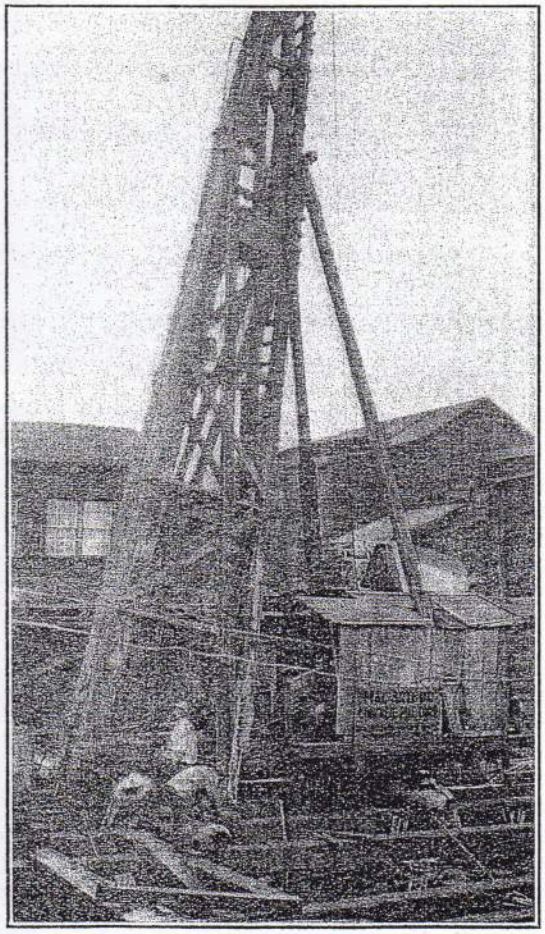
7. Construction of the west approach roads, viaduct steel being Piers 14 and 16 and the west abutment, La Pointe Construction. Company, Portland, Oregon..... 267,603.40

The bids total $3,222,206.20.

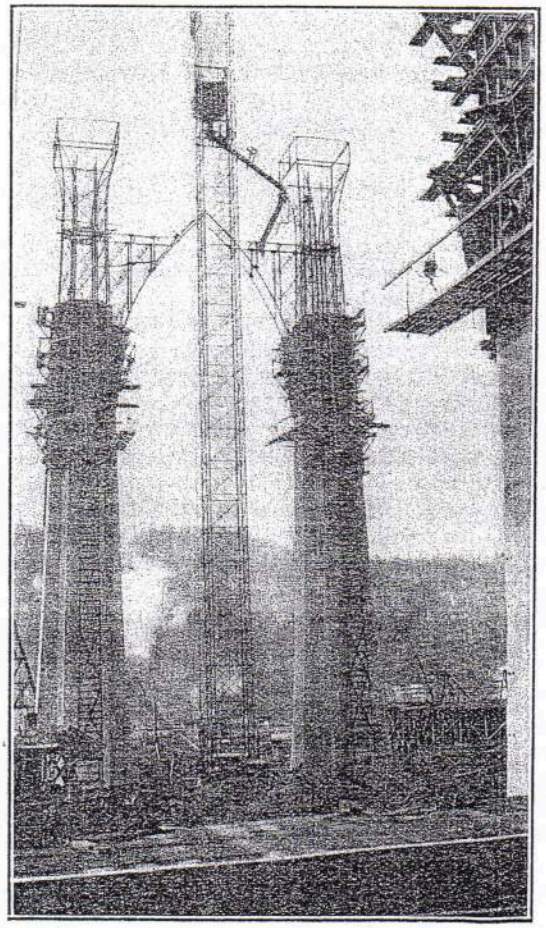
Work was begun on September 3, 1929.



GENERAL VIEW OF FOUNDATION CONSTRUCTION. WOODEN FALSEWORK TOWER FOR ERECTION OF MAIN STEEL TOWER BEING ERECTED FOR EAST MAIN PIER. WORK BY GILPIN CONSTRUCTION CO., PACIFIC BRIDGE CO., J. H. POMEROY CO.



MAC ARTHUR CONCRETE PEDESTAL PILES BEING CAST IN PLACE AT EAST ANCHORAGE



METHOD OF CONSTRUCTION FOR VIADUCT PIERS. NO. 10 IS SHOWN.

Foundations: Land Piers and Anchorages

One of the architectural features of the design lies in the use of tall reinforced concrete piers to carry the approach spans. These piers vary in height from 22 feet to 150 feet above the ground. The two shafts of each pier rise from a heavily reinforced concrete footing, tapering towards the top, the inside faces converging to meet in the point of a gothic arch. The main reinforcing for these shafts consists of a structural steel frame set in four inches from the face of the concrete and well braced so as to form a rigid support for the outside forms.

The Gilpin Construction Company of Portland, Oregon, undertook the construction of these piers with a full realization of their significance in the architectural scheme of the bridge, and aware of the importance of trueness of outline and evenness of surface finish in the final effect.

The excavation for the land piers amounted to about 15,400 cubic yards, almost entirely of clay except for about 700 cubic yards of rock excavation for Piers 13, 14 and 15 on the west approach. The work was done by an Erie Crane with a ¾ yard clam shell, except at the east anchorage and Pier No. 13 where a Marion Shovel with a ¾ yard bucket was used. On the east side of the river Piers 1 to 7 inclusive rest upon clay foundations; the east anchorage, which also supports Pier No. 8, rests upon MacArthur concrete pedestal piles; Piers 9 and 10 rest upon timber piles; and the west viaduct Piers Nos. 13, 14 and 15 and the west abutment known as Pier No. 16 rest upon rock foundations. There was no rock at all encountered on the east side of the river at footing elevations, while on the west side all piers rest on rock.

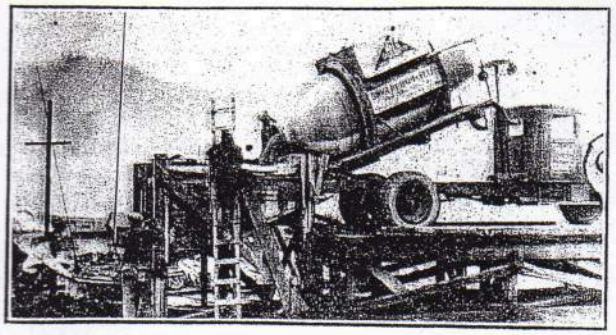
The wood piles under Pier 9, totalling 210 in number, and those under Pier 10, 390 in number were driven by means of a Vulcan No. 2 steam hammer having a 3750 pound ram and a 27 inch stroke. The piles were driven to sustain a load of 30 tons, the required penetration being figured according to the Engineering News formula. They were spaced three feet on centers and averaged about 40 feet in length under Pier 9, and about fifty feet in length under Pier 10. Pile cutoff was at elevation plus 8 at Pier 9 and at elevation minus 2 at Pier 10. The pier base on top of the piles was a heavily reinforced concrete cap 30 by 64 feet in plan and 9 feet in depth for Pier 9, and a similar one 40 by 90 feet in plan and 11 feet in depth for Pier 10.

MacArthur Piles. The driving of the MacArthur piles at the east anchorage was sublet by the Gilpin Construction Company to the MacArthur Concrete Pile Corporation. These piles were of the standard MacArthur Compressed Concrete Pedestal type, except that reinforcing was used, and were cast in place as follows: A solid steel core was placed in a steel cylindrical casing 16 inches in diameter and ½ inch thick and the assembled unit was driven by means of a Vulcan No. 1 steam pile hammer having a 5000 pound ram and a 32 inch stroke, to such a resistance that 5 blows of the hammer caused a penetration of one inch. The core was then removed and a charge of concrete was dropped to the bottom of the casing. The casing was then pulled up about three feet and the weight of the core and steam hammer, aggregating 14,000 pounds, was allowed to bear on the concrete at the bottom of the hole. This concrete was thus compressed into the soil to form a bulb or pedestal which gives the pile its name. The core was then withdrawn and a reinforcing steel cage consisting of 6-¾ inch diameter rods set within a ¼ inch steel spiral having a 6 inch pitch was placed within the casing. The casing was then filled with concrete of a 1:6 dry mix and the weight of the core and hammer was again allowed to bear on the concrete while the casing was slowly withdrawn. The concrete was thus compressed and forced to fill compactly the cylindrical hole in the ground left by the withdrawal of the casing. There were 516 piles of this type cast in place, on a spacing of 4 feet 3 inches. One hundred and ninety-two of them were driven on a batter of 1 to 4. This was accomplished by sloping the leads. The piles averaged 30 feet in length. The entire operation was performed successfully during a period of seven weeks, and this in spite of unfavorable weather conditions, since for nearly half the time the temperature was below freezing.

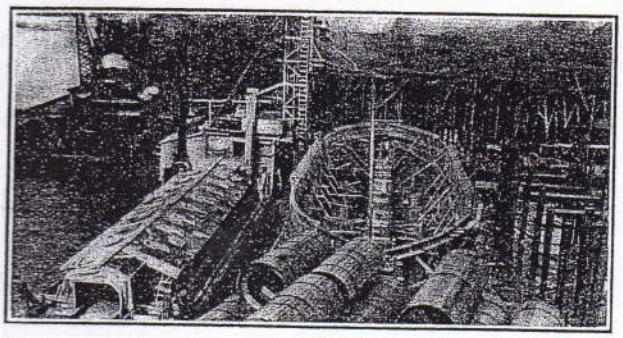
The structural steel frame within the viaduct pier served two purposes: firstly, it proved a rigid support for the forms and was thus the greatest factor in the attainment of perfection of shape and line of the tall, slender, tapering pier shafts; seccondly, the main shaft angles served as part of the necessary reinforcing steel, the balance being made up of one and one quarter inch square rods. Because of their function as reinforcing steel, the main shaft angles (4x4x⅜ and 6x6x½ in size) were rolled to intermediate grade reinforcing steel specifications. The bracing angles are 2x2x3-16. Every three feet the main angles are braced in a horizontal plane by means of ¾ inch diameter rods fitted with turnbuckles. The frames were fabricated by Poole & McGonigle in Portland. They were made to permit erection in twenty foot vertical sections and were delivered to the site entirely dismantled. Erection was by means of a light wooden gin pole. All connections were bolted. There are 337 tons of structural steel reinforcing and 909 tons of rod reinforcing in the viaduct piers.

The basis of the concreting system employed by the Contractor for the construction of the high piers, was the use of steel concreting towers. The Archer Tubular tower was used at Piers 7, 8 9 and 10; the Insley Mast tower was used at Piers 6 and 13. At Pier 10 the Archer Tubular tower was built up to a height of 210 feet; at Pier 13 an Insley Mast tower attained a height of 180 feet. The forms were built in panels on the ground and hoisted to position by means of a Chicago boom attached to the steel concreting tower. The same means was also used to place the reinforcing bars that were required in addition to the structural frames. For the concreting of Piers 2, 3, 4 and 5 an Erie Crane with a one yard bucket was used. A timber extension of the boom had to be used at Piers 3, 4 and 5. For the pouring of the west abutment, Piers 14 and 15 and the west anchorage tunnels use was made of an electrically operated stiff leg derrick erected on the side of the hill, and a wooden concreting tower.

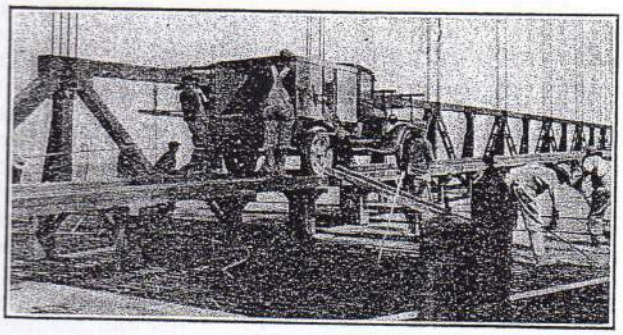
Following the pouring of the base of a viaduct



TRANSIT MIX TRUCK DISCHARGING CONCRETE INTO HOPPER, TO BE USED FOR VIADUCT PIERS.



CONCRETING OF EAST MAIN PIER



POURING OF DECK SLAB ON SUSPENSION BRIDGE

pier, the structural reinforcing frame was erected to a height of 20 feet, the additional reinforcing rods were placed, the wood forms were erected and that section of the pier was poured. Then followed the erection of another 20 foot height of reinforcing and repetition of the previous process. All piers were thus poured in 20 foot vertical lifts. The surface finish of the piers was obtained by grinding off the form marks, rubbing a cement wash into the surface with a carborundum stone and then removing excess material using the edge of a trowel.

Transit Mix Concrete. One of the outstanding features of the viaduct pier construction was the use of transit mix concrete manufactured and delivered by Swigert, Hart and Yett Incorporated of Portland, Oregon. The sand and gravel were proportioned by weight by means of a Howe platform scale of the double beam and Weightograph type which enabled the operator to weigh the exact proportions of the different sizes of aggregates for each batch uniformly. The water was measured by volume in a specially constructed tank calibrated to insure accuracy within ¼ gallon in 100 gallons of water. The dry batch of cement, sand and gravel was then discharged into the drum of the transit mix truck which has a capacity of three cubic yards of concrete. The required amount of water was discharged into a saddle type water tank located above the mixing drum. Before any mixing water was added the drum was revolved 45 revolutions with the dry materials in order to insure thorough mixing of the batch. During transit or at a point at close proximity to the point of discharge, the water was added to the dry batch and the drum rotated for 60 revolutions at the rate of 12 revolutions per minute.

For the bases of the viaduct piers the specified mix was a 1:6 having a strength of 2800 pounds per square inch at 28 days. The amount of water used averaged slightly under 6½ gallons per sack of cement. Above the ground line the concrete was mixed to 1:5 proportion containing 6.77 sacks of cement per yard and about 5½ gallons of water per sack. The specified strength for this mix was 3200 pounds per square inch at 28 days. No trouble was encountered in meeting the strength requirements.

The amount of concrete required for the viaduct piers varied from 200 yards for Pier No. 2 to 3950 yards for Pier No. 10. The rate of pouring with the use of the transit mix system averaged about 50 yards per hour and the maximum pour was 422½ yards at Pier 10, made in 9 hours.

On the whole the use of transit mix concrete showed very favorable characteristics on this work, chief among which were ease of control, uniformity of product and adaptability to any particular pouring condition. About 16,000 cubic yards were required for the viaduct piers.

Anchorages. The anchorages are vital elements in suspension bridge stability since they resist the pull of the main cables which in this bridge amounts to 8500 tons at each anchorage. On the east side of the river the anchorage is a massive concrete structure 115 feet by 91 feet in plan, containing 12,500 cubic yards of concrete. In this mass of concrete are embedded the anchorage bars and girders to which the cables are attached. The anchorage is not a solid concrete structure but contains chambers in its interior some of which are left permanently open to permit inspection of the ends of the cables and others are filled with sand so as to obtain weight more economically than by using concrete. The total effective weight of the east anchorage including the weight of Pier No. 8 which rests upon the rear portion of it, and the re-actions of the viaduct spans, is close to 29,000 tons. For this structure the concrete was poured by use of an Archer Tubular tower. The anchorage steel was furnished by the Wallace Bridge & Structural Steel Company of Seattle, Washington, and was placed by the Gilpin Construction Company by means of an Erie Crane.

On the west side of the river the cables are anchored to steel which is embedded in concrete filling a wedge shaped tunnel entering 80 feet into the dense basaltic rock of the hill. The con-

struction of these tunnels required 2000 cubic yards of rock excavation. Transit mix concrete was also used for the east and west anchorage, about 14,300 cubic yards being required.

Foundations: River Piers

The construction of the main river piers, No. 11 on the east side and No. 12 on the west side was sublet by the Gilpin Construction Company to the Pacific Bridge Company of Portland, Oregon. The east main pier, No. 11, rests upon 1068 wood piles, the base of the pier being 50 feet below mean low water. Instead of excavating for this pier through the cofferdam, the Pacific Bridge dredged the bed of the river to the required depth sloping off the sides of the excavation as required for stability. The advantages of this method lay in the ease of excavation and favorable condition for the use of their pile driver.

The pile driving rig was set on a barge 100x32 feet in dimension. The 11B2 McKiernan-Terry pile hammer with a ram weighing 3265 pounds having a stroke of 20 inches in a bore of 12⅜ inches was set between 90 foot telescope leads. The telescopic feature of these leads enabled the hammer to follow the pile under water until it reached refusal. The hammer was operated by a 24x24 Ingersoll-Rand air compressor operating under 150 pounds of pressure and striking 120 blows per minute. The piles were driven through sand and varied in length between 20 and 47 feet. The pile cutoff was made under water by means of a 4 inch circular cut-off saw on a 2 inch 80 foot vertical shaft driven by a 100 horse power motor. Following the cutting off of the piles the crib was floated into position and pouring of the seal was begun. The seal was poured by means of a tremie to elevation minus 30 or a depth of concrete of 20 feet. Pouring of the seal was completed on February 8, 1930 and the cofferdam was pumped out March 3rd, the date of pumping being ascertained by the strength of concrete cylinders suspended under water on top of the seal at the time when pouring of the seal was completed. Concreting was resumed in the dry on March 6, and the last pour for this pier was made on March 21st. This pier contains 16,900 cubic yards of concrete and about 110 tons of reinforcing steel.

The west river pier, No. 12, rests upon a rock foundation at elevation minus 25. For this pier the seal was poured to minus 13, or a concrete depth of 12 feet. Pouring of the seal was completed on February 20, 1930 and the cofferdam was pumped out on March 12th. Concreting was resumed on March 19th and completed on April 8, 1930. This pier contains 9,127 cubic yards of concrete and about 60 tons of reinforcing steel.

An interesting feature in the design of these piers is the placing within the body of each pier of forty three 75 inch diameter wooden cylinders with the purpose of filling up space and saving concrete. Thirty seven of these cylinders extend up to elevation 28 and the balance extend to elevation 52.

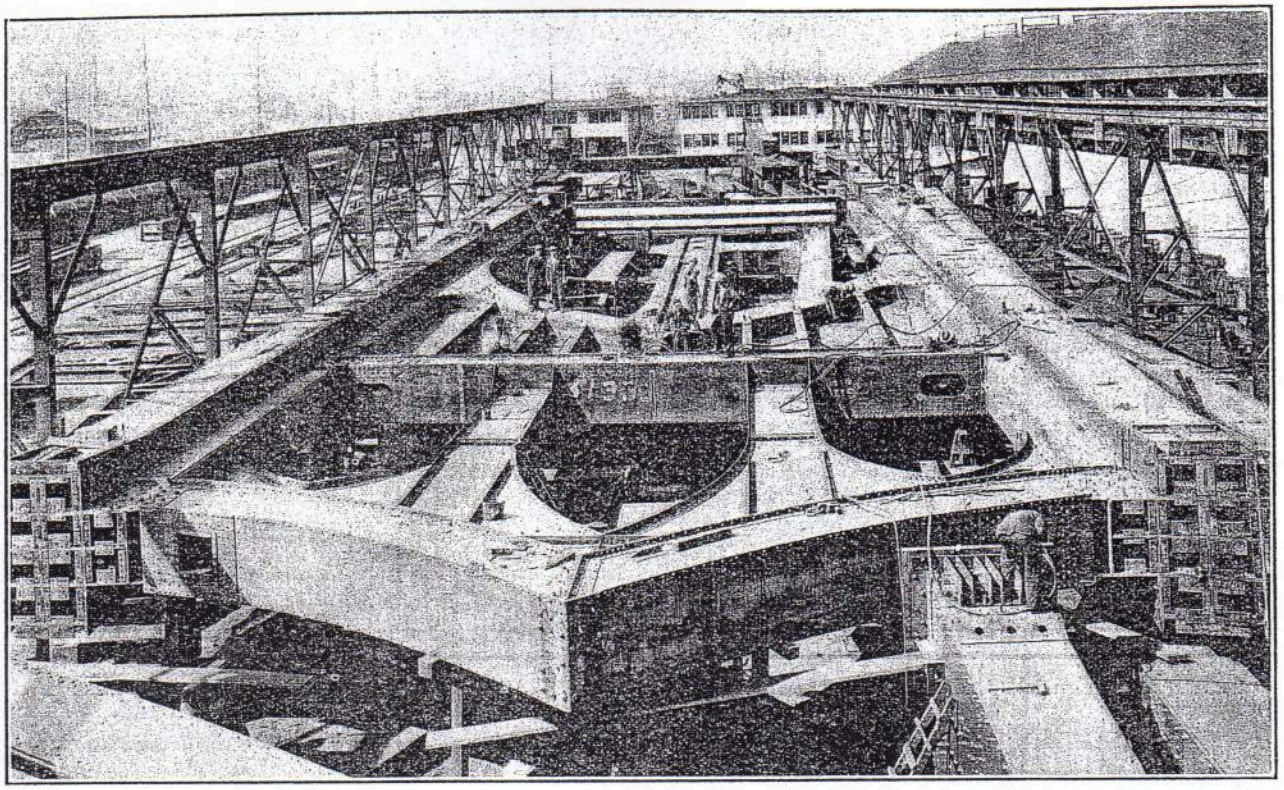
The 26,000 cubic yards of concrete required for the main piers were mixed in a complete mixing plant installed on a barge. This barge was 141x42 feet in plan, had a gravel bin with a capacity of 400 yards, a sand bin with a capacity of 250 yards and the cement was furnished in bulk on two barges, one holding four cars and the other holding five cars. The sand and gravel were fed to two one yard Ransome Mixers by 20 inch endless conveyors, belt and elevator. This plant had a capacity of 350 to 400 cubic yards of concrete per 8 hour shift. For the pouring of the seals four tremies were used made up of a 10 inch pipe 80 feet long.

Superstructure: Approaches

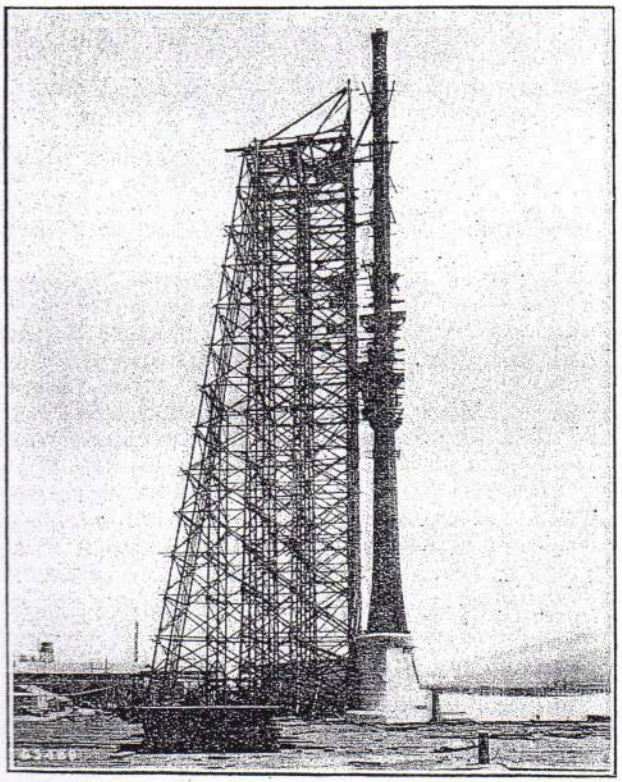
The erection of the approach steel between Piers 1 and 10 on the east side of the river and between Piers 13 and 14 on the west side will be treated at this time so that the description of the various erection operations for the suspension bridge may be treated in their connected sequence later on. The contract let to the U. S. Steel Products Company, and later assigned to the Columbia Steel Company, both subsidiaries of the U. S. Steel Corporation, required the fabrication and erection of 1943 tons of structural steel embodied in 3-108 foot spans, 4-144 foot spans and 3-180 foot spans. The fabrication of the 4-144 foot spans, totaling 740 tons in weight was sublet to Poole and McGonigle of Portland, Oregon. The balance of the steel amounting to 1203 tons was fabricated in the Elmira, New York plant of the American Bridge Company. The erection of all the steel was done by the American Bridge Company. Erection was begun on July 1, 1930, on the span between Piers 1 and 2. For the 3-108 foot spans which lead up to Pier No. 4 a single bent of falsework was used near the center of each span. Erection was by means of a Jinniwink deck traveller equipped with a 50 foot boom and operating on the roadway stringers. The falsework was shifted from span to span as required. For the purpose of erection of the balance of the spans, namely, the 144 foot and the 180 foot spans, a timber tower bent was used supporting the steel at the two center panel points. A cableway consisting of two parts of 1 inch rope was used to shift the falsework from span to span as the work progressed and also aided in the erection of some of the steel members for the longer spans. One end of the cableway was anchored to the bottom strut of the tower on Pier No. 11 and the other end was tied to the steel of the 108 foot span between Piers 1 and 2. The vertical supports for the cableway were at Pier No. 10 where a wood bent was erected on top of the pier and at a wooden "A" frame on the Jinniwink traveller. The trolley on the cableway was moved by means of a line to a spool on the traveller engine. The load line for the falls suspended from the trolley was operated by a gasoline engine on the ground which was moved along with the progress of the work.

The Jinniwink traveller was equipped with a 60 horse power, heavy duty motor. Its capacity was 10½ tons straight ahead with the 50 foot boom flat and 7½ tons sidewise with the boom flat.

Erection on the east side of the river was completed on November 17, 1930. Then the equipment was moved to the west side where the 180 foot span between Piers 13 and 14 was erected by means of the traveller without the use of a cableway, 2 tower bents of falsework being used to support the steel.



MAIN STEEL TOWER ASSEMBLED IN THE YARD OF THE WALLACE BRIDGE & STRUCTURAL STEEL COMPANY



MAIN TOWER ERECTED BY MEANS OF DERRICK ON TOP OF 300 FOOT FALSEWORK TOWER.

In the erection of the trusses the truss members were assembled in units approximating two panels in length and lifted into position by the traveller. This naturally follows because of the use of only a single tower bent of falsework for each span. Erection of the 180 foot span on the west side was completed on December 30, 1930. The entire plant worked very smoothly and efficiently during the entire contract.

Superstructure: Suspension Bridge

Main tower fabrication. The Wallace Bridge & Structural Steel Company of Seattle, Washington, was awarded the contract for the fabrication and erection of all the suspension bridge structural steel superstructure. They fabricated the main towers in their Seattle shop. Their height is 284.5 feet between the milled surface of the base plates resting on the pier and the milled plates on top on which the cable saddles rest. The vertical legs are spread 52 feet apart corresponding to the spacing of the main cables and the distance between batter legs is 88 feet 7⅝ inches. The legs are of cellular construction and are divided into 9 vertical sections.

The tower sections were milled to bear against each other, the splice material and rivets being proportioned for only 50% of the developed strength of the member. To stiffen the sections, horizontal diaphragms were spaced about every 10 feet along the length of the members. One inch diameter rivets were used, all connection holes being sub-punched and reamed to size with parts

assembled. To insure accuracy of fit and dimensions the Wallace Bridge & Structural Steel Company assembled the entire tower in the yard of its plant.

Tower erection: The J. H. Pomeroy Company, under sub-contract with the Wallace Bridge & Structural Steel Company, erected all the steel falling within the main contract of the latter company. For the erection of the main towers, the erector built on the shore side of each of the main piers, a timber falsework tower reaching to elevation 300. On top of the falsework tower he erected a stiff leg derrick with an 80 foot timber boom and was thus in a position to erect the entire height of steel tower without having to change the position of his derrick. This was a departure from the more usual creeper traveller method of tower erection.

The timber falsework tower rested upon 56 wood piles approximately 100 feet long at Pier 11 and 50 feet long at Pier 12, and reaching to elevation 30 which is the height of the shelf of the main pier. The wooden bents making up the tower were framed on the ground in 40 foot depths and lifted into position by a guy derrick acting as a creeper. The main posts were 12x14 inch timbers; diagonals 4x12 and girts 8x10. Connections were bolted and spiked and steel straps were used for the splicing of the vertical posts. Each tower contained 252,000 board feet of timber exclusive of piling. The mast of the derrick on top of the tower was supported directly on a double bent bearing on the shelf of the main pier at elevation 30. The upward kicks of the backlegs of the derrick were taken by two counterweights of 36 tons each in the form of sand boxes suspended from 2½ inch diameter rods.

For tower No. 11 driving of the falsework was begun on March 4, 1930 and the first section of tower steel was set May 23, 1930. For tower No. 12 driving of the falsework piles was started April 14, 1930 and the first section of tower steel was set June 20, 1930. The erection of tower No. 11 was completed on August 13, 1930 with cable saddles in place and all connections riveted. The corresponding date for tower No. 12 was August 27, 1930. Thus No. 11 was erected and riveted in 11 weeks and No. 12 in nine weeks.

With the use of a derrick on top of the high falsework tower steel erection was free and easy due to the large amount of drift available permitting handy manipulation of the sections. The greatest amount of steel set during one day (two shifts) was 146 tons for tower No. 11 and 155 tons for tower No. 12. The heaviest piece in the tower was a bottom section weighing 34 tons.

Previously, during June and July, the cable bent towers on top of Piers 10 and 13 had been erected by means of wooden "A" frames on top of the piers and guyed to the pier tops. With the main towers, cable bent towers, and anchorage steel all in place everything was in readiness for the beginning of one of the most interesting features of the job, namely, cable erection.

Cables

There are two main cables supporting the suspended spans, one directly above each of the two stiffening trusses. Each of these cables is composed of 91-1½ inch diameter galvanized 51 wire bridge strands. The John A. Roebling's Sons Company of Trenton, New Jersey, manufactured and erected the cables.

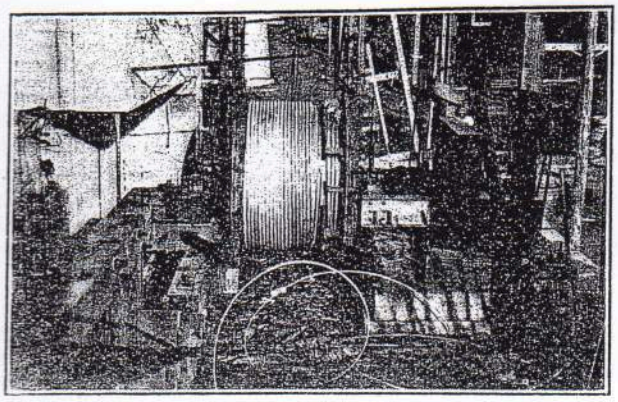
Each strand was specified to have a minimum ultimate strength of 135 tons and a minimum yield point of not less than 200,000 pounds. The modulus of elasticity was to be not less than 24,000,000 pounds per square inch up to 50% of the ultimate specified strength. All of the above requirements were more than satisfied. In fact tests showed the average modulus to be 25,000,000 pounds per square inch.

Each strand was manufactured in a length of about 2750 feet and then prestressed to a tension of 150,000 pounds and held at this tension for ½ hour. The tension was then reduced to correspond to the average full dead load stress that the strand was to carry in the completed structure, which was 70,000 pounds per strand; it was then measured while under this tension to calculated length which varied with the position of the strand in the cable, and then cut and socketed. The strand was then reeled on a wooden reel and shipped to the site. The completed strand weighed close to 6½ tons.

In the erection of the cables the Contractor did not use the usual footbridge but elected to adopt an overhead system of tramway lines and track ropes. The general plant layout consisted essentially of an upper 1 inch diameter tramway line and lower ¾ inch diameter tramway line, each of the above a continuous rope serving both cables and passing through tightening frames on the east anchorage; and two 1 inch diameter track rope strands per cable. The track ropes were stationary and were used to support and act as guides for the steel cages stationed at the quarter points of the main span and the mid-point of each side span. The motive power for operating the tramway lines was placed at the west anchorage. The reel containing the strand was placed on a reel stand at the east anchorage. The socket of the strand was attached to the lower tramway rope and the strand was then pulled across the river over the tops of the cable bents and main towers, through guides suspended from the upper tramway rope, to its anchorage on the west side of the river where the socket was slipped into place between castings attached to the structural steel anchorage embedded in the concrete. The steel cages in which the men were stationed to perform the necessary adjusting operations could be moved along the track ropes by means of the upper tramway rope.

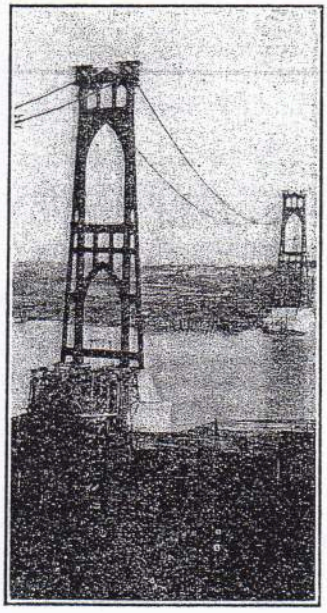
The first strand was pulled across the river on October 15, 1930. Stringing was completed on November 25, 1930 .

The 91 cable strands as erected formed a regular hexagon with a long diameter of 16½ inches (11-1½ strands). The next operation was the placing of the cable bands around the cable at points spaced thirty-eight feet six inches apart horizontally. At each cable band were slung 2-1⅝ inch suspender ropes thus forming four parts of line from which the suspended steel was to be hung. The suspender rope was specified to be 1⅝ inches in diameter of 6x19 construction with

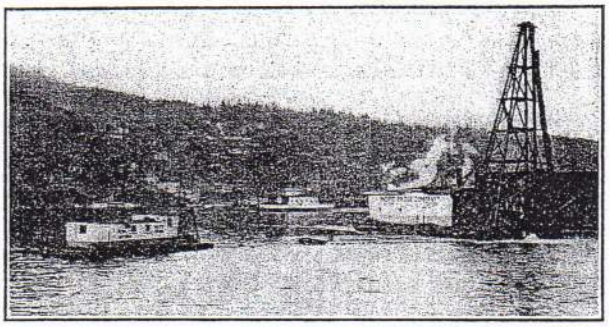


REEL WITH ONE 2720-FOOT MAIN CABLE STRAND, IN REEL-STAND ON EAST ANCHORAGE, IN POSITION FOR STRAND BEING PULLED ACROSS RIVER; ROEBLING'S CONTRACT.

WRAPPING OF THE MAIN CABLE.



GENERAL VIEW OF CABLE ERECTION SHOWING LOCATION OF STEEL CAGES.



PILES BEING DRIVEN FOR EAST MAIN PIER

7x7 independent wire rope center, having an ultimate strength of not less than 212,000 pounds and a modulus of elasticity of 14,000,000 per square inch after pre-stressing. The pre-stressing operation consisted of applying a tension of 100,000 pounds for a period of ½ hour. They were cut to length under a tension of 35,000 pounds, then socketed and shipped to the site ready for erection. On January 2, 1931 erection of the suspender ropes was completed.

Superstructure: Suspended Steel

Fabrication. The fabrication and the erection of the suspended structural steel of the suspension bridge was part of the contract of the Wallace Bridge Structural Steel Company. They fabricated the stiffening trusses, the floor beams and the lateral system in their Seattle shop. All the splice connections for the trusses had the holes subpunched and reamed with parts assembled. The side span trusses, 430 feet in length were assembled for their entire length before connections were reamed. The main span trusses, 1207 feet between towers were assembled in three units and the cambers checked before connections were drilled. The fabrication of the floor stringers was sublet to the Willamette Iron & Steel Works of Portland, Oregon.

Erection. The erection of all the suspended steel was sublet by the Wallace Bridge & Structural Steel Company to the J. H. Pomeroy Company of Portland, Oregon. The stiffening trusses were shipped to the site entirely dismantled. For the purpose of erection the truss members were riveted into double panel units. This assembly was made at the bridge site for the side span trusses, the sections being assembled directly beneath the points where they belonged in the main structure. For the main span trusses the assembly was made on the Albina Dock and when ready for erection the assembled sections were brought out to the site on barges.

The steel was hoisted by means of sets of falls

suspended directly from the cables. The falls were suspended from wire rope slings which were wrapped around the cable, wooden segmental collars being placed between the cables and the slings to protect the cables from abrasion. Steel was raised at 8 points, 4 in the main span and two in each of the side spans. The power was provided by means of six steam winches, three on each side of the river. The load lines were guided along the cable and down the towers to the drums. In order to keep the tower deflection within prescribed limits the sections were lifted alternately in the main span and the side spans. The first sections erected were in the center of the main span on January 12, 1931. After erection of three truss sections in the main span center erection was begun at each of the cable bents, working towards the towers; while in the main span erection was continued from the center towards the towers. Erection was kept symmetrical about the center of the main span and erection progress on both side spans was also kept even. On the first pass the truss sections and floor beams were erected; on the second pass going in the reverse direction stringers and laterals were placed. All steel was in place on February 23, 1931. In the shifting of tackle from panel point to panel point, use was made by the Contractor of the upper traction rope used during cable erection. The method proved to be very efficient. An assembled truss section weighed about 10 tons. The floor beams, weighing 7 tons each, were picked at both ends. After all the steel was in place the floor system was riveted. The side span trusses were also riveted but the main span truss connections could not be riveted, until after the completion of the pouring of the concrete roadway and sidewalks, this additional weight being required to bring the trusses to their proper camber and close the splices.

Concrete Slab

The contract for the pouring of the reinforced concrete roadway deck and sidewalks was awarded to Lindstrom & Feigenson of Portland, Oregon.

The roadway is 40 feet wide between curbs, and is divided into four ten-foot traffic lanes by Erickson metallic disc markers, 6 inches in diameter and set into the concrete on a spacing of 6 feet. The curbs are ten inches in height and each sidewalk is five feet in width. The slab thicknesses are seven inches for the roadway and four inches for the sidewalks. The concrete is a 1:5 mix, containing 6.8 sacks of cement per cubic yard and 4.95 gallons of water per sack of cement, meeting the specifications requirement of a minimum 28 day strength of 3200 pounds per square inch. For the roadway slab, the reinforcing consists of ½ inch diameter bars spaced three inches on centers at the bottom of the slab and on 6 inch centers at the top, every other bottom bar being turned up at the floor stringers which are spaced four feet four inches apart. The sidewalk reinforcement consists of ½ inch diameter rods, two inches on centers.

Transit mix concrete was used. The trucks dumped into a hopper on the east abutment for the paving of the east approach, and into a hopper at the west bridgehead for the paving of the west 180 foot span. From the hopper the concrete was dischargd into a two-ton Ford truck having a special body of about one yard capacity divided longitudinally into two hoppers designed to permit chuting from both sides stimultaneously. This truck ran along wooden guides set on an elevated wooden runway along the center line of bridge.

Pouring was begun on the east appraoch on January 29, 1931 at Pier 6 and carried on to Pier 1 which was reached on February 2nd. On February 10th pouring was resumed at Pier 10 working towards Pier 6. On March 3rd the 180 foot span between Piers 13 and 14 on the west side of the river was poured.

The main span was poured in panels of 38.5 foot lengths, the pours being distributed along the span according to a schedule planned to prevent excessive tower and truss deflection. This condition necessitated the passing of the truck over panels of concrete poured the previous day, a requirement which was met by the interposing of a piece of ship lap between the slab and the runway supports. The 2067 feet of suspended span roadway, exclusive of sidewalks, was poured in eight working days, being completed on April 18, 1931. Pouring of the sidewalks was completed on the 29th of April.

The reinforcing steel was furnished by the Mercer Steel Company of Portland. Swigert, Hart and Yett delivered about 4100 cubic yards of transit mix concrete for this contract.

Cable Wrapping

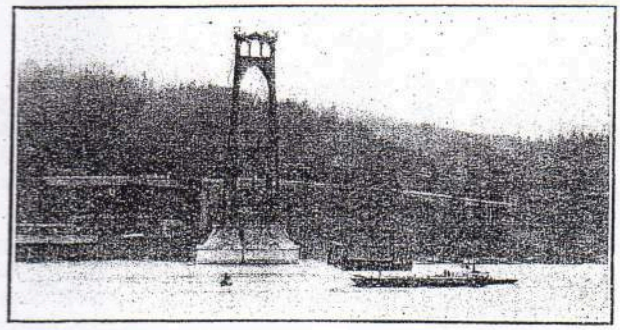
As previously stated, the shape of the cable after the erection of the 91 strands, was hexagonal. Following the erection of the suspended steel, two coats of paint were applied to the outside of the cables. Then the flat surfaces of the cables were covered with segmental strips of Port Orford cedar about six feet in length, transforming the hexagonal cable cross section into a circular one The Port Orford cedar strips had been treated by immersion for a period of twenty minutes in linseed oil at a temperature of 200 degrees Fahrenheit.

The wrapping consists of a continuous serving of No. 9 soft, annealed double galvanized steel wire and was done by two motor driven machines one operating on each cable. The end of each cable band was counter-bored, to receive the end of the wire, the groove being then caulked tightly with lead wool.

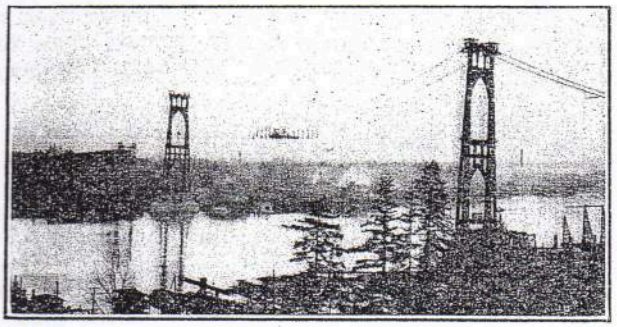
Following the wrapping, three coats of paint were applied to the outside of cable. The diameter of the completed cable is 16¾ inches.

Lighting

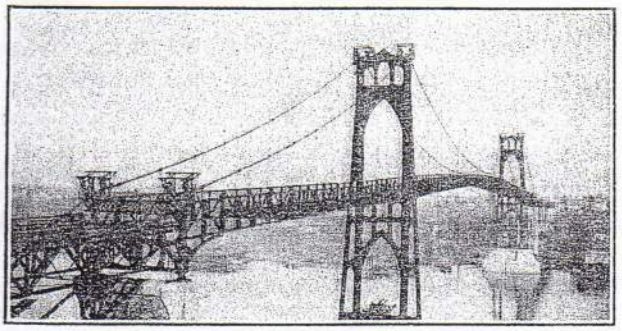
Roadway lighting. For the roadway lighting of the bridge, ornamental lighting standards are used, manufactured by the Union Metal Manufacturing Company of Canton, Ohio. The lights are spaced on about 80 foot centers, the system being



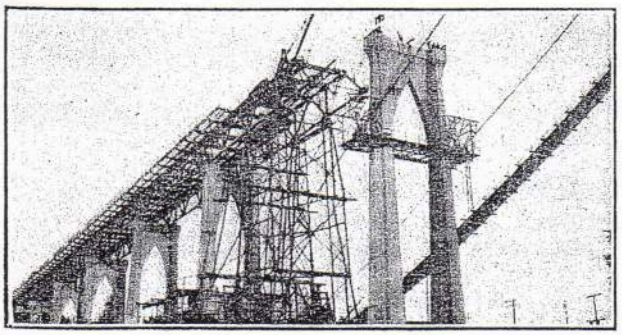
THE FIRST UNIT OF THE SUSPENDED STRUCTURE BEING HOISTED FROM A BARGE, AT THE CENTER OF THE MAIN SPAN.



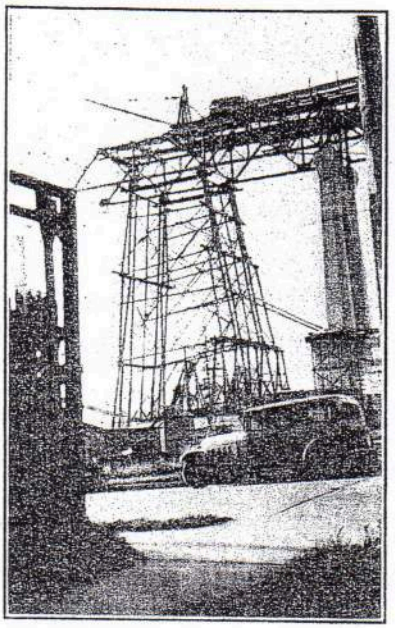
EARLY STAGE OF SUSPENDED STEEL ERECTION



SUSPENDED STEEL ERECTION PRACTICALLY COMPLETED.



ERECTION OF VIADUCT STEEL BY AMERICAN BRIDGE COMPANY



VIADUCT STEEL BEING ERECTED OVER EAST ANCHORAGE

divided into two separate circuits so that only half the lights may be used when desired. Outside current is delivered to a transformer room in the east abutment, as well as to another transformer vault in the west anchorage. The turning on and off of the lights is controlled by a Sauter time switch and self winding clock with astronomic dial. One of the lighting circuits is controlled at the transformer room in the east abutment, and the other circuit is similarly controlled in the transformer room in the west anchorage.

Navigation lighting. Navigation lights were placed in accordance with Department of Commerce regulations. Red lights directly beneath the trusses mark the boundaries of the channel while a green light marks the center of the channel. There are a double set of navigation lights on separate circuits, controlled by Sauter time switches and clocks.

Aviation lights. At the top of each main leg of each main tower, a 50 foot spire was erected, supporting an airport code lantern containing 2-200 watt PS30 lamps and equipped with a motor flasher. This was done to meet the requirements of the Bureau of Lighthouses, Department of Commerce.

The National Electric Company of Portland, Oregon, installed the complete lighting systems for roadway, navigation and aviation.

West Approach Roads

The contract for the west approach roads, let to the La Pointe Construction Company of Portland, Oregon, included not only the grading and paving of the roads but also the construction of the west abutment, the two 36 foot spans between Piers 14 and 16 and the construction of a concrete encased steel girder bridge crossing Mills Street, and consisting of 1-90 foot and 4-30 foot spans.

Taylor Brothers did the grading of the road under sub-contract with the La Pointe Construc-

tion Company. The excavation totalled 92,000 cubic yards of material of which 56,000 cubic yards were solid rock. For this work the Contractor used two steam shovels: a Bucyrus 30 with a one yard bucket and a Marion 21 with a ¾ yard bucket.

The Gilpin Construction Company under subcontract with the LaPointe Construction Company built the west abutment, Mills Street Bridge and the steel spans between Piers 14 and 16. The steel for the Mills Street Bridge and the two viaduct spans was fabricated by Poole & McGonigle of Portland.

The road was paved with concrete for a 30 foot width. The paving was done by the La Pointe Construction Company using a Rex mixer of one yard capacity. 1:5 concrete mix was used requiring 6.8 sacks to the yard. The paving was laid in 3-10 foot strips, about 1000 feet per day being the maximum rate reached. The slab was reinforced with wire mesh furnished by the Truscon Steel Company and weighing about 50 pounds per hundred square feet.

Miscellaneous

Railing. The railing consists of 1 inch square vertical bars set between top and bottom pipes spread two feet 10½ inches apart, the top pipe being a 3½ inch extra strong black pipe and the bottom pipe a 3 inch black standard pipe. For the approaches the railing was divided into nine foot panels and attached to castings on 4½ inch extra strong black vertical pipes fastened to the floor fascia girders; on the suspension bridge the panels were fabricated in 19 foot lengths and fastened directly to the trusses by means of castings. The railing sections were welded to the castings at one end of the panel for the viaduct spans, while on the suspension bridge tapered dowel pins were used. All pipe is copper bearing and furnished by the National Tube Company. The Portland Wire & Iron Works fabricated all the railing between Piers 1 and 14, and also erected the suspension bridge railing, under sub-contracts with the Columbia Steel Company and the Wallace Bridge & Structural Steel Co. The Consolidated Railway Equipment Company of Portland fabricated and erected the railing between Piers 14 and 16.

Tower Spires. The tower spires are of structural steel covered with copper sheathing. The steel frame was fabricated by the Wallace Bridge & Structural Steel Company in Seattle and the copper sheathing was applied by the Grand Sheet Metal Works of Portland. They were erected in place by the J. H. Pomeroy Company of Portland, being fastened to the ribs of the main cable saddles. The top of the spire is 400 feet above the mean low water stage of the Willamette River.

Paint. All steel was given three coats of paint known under the trade name of Bar-Ox and manufactured by the Truscon Laboratories of Detroit, Michigan. The shop coat was red, the first field coat, brown and the final coat a light green, harmonizing effectively with the landscape.

Cable Saddles. The four main cable saddle castings for the main towers were fabricated by the Columbia Steel Company at their Pittsburg, California plant. Their total finished weights amounted to 106,760 pounds. The cable bent main cable saddles, weighing 26,812 pounds were fabricated by the Electric Steel Foundry Company of Portland, Oregon.

Surface hardener. In order to harden the wearing surfaces of the concrete roadway slab and sidewalks, a chemical surface hardener was applied after the concrete had set. This hardener, known as Agatez and manufactured by the Truscon Laboratories of Detroit, Michigan, comes in the form of a white powder, which is dissolved in water and applied with a broom to the slab surface. Two coats were applied at a one day interval.

Inspection The Robert W. Hunt Company performed the mill, shop and field inspection for all structural steel and cables in the bridge; also the mill inspection for the reinforcing steel.

The Northwest Testing Laboratories supervised the mixing and placing of all concrete.

Cement. Sun, Oregon and Beaver cements were used on the work. Beaver was used for the bases of the viaduct piers, and throughout both main piers; Oregon was used for the paving of the west approach roads and Sun for the balance of the work.

Personnel. The St. Johns Bridge was designed and its construction supervised by Robinson & Steinman, Consulting Engineers of New York City.

At the time of letting the contracts, the Board of County Commissioners of Multnomah County was made up of Grant Phegley, Chairman, Clay S. Morse and Fred W. German. At the completion of the work the Board consists of Fred W. German, Chairman, Grant Phegley and Frank L. Shull.

MAIN CONTRACTORS

Gilpin Construction Company, Portland, Oregon—Foundations.

Wallace Bridge & Structural Steel Company, Seattle, Washington—Suspension bridge superstructure.

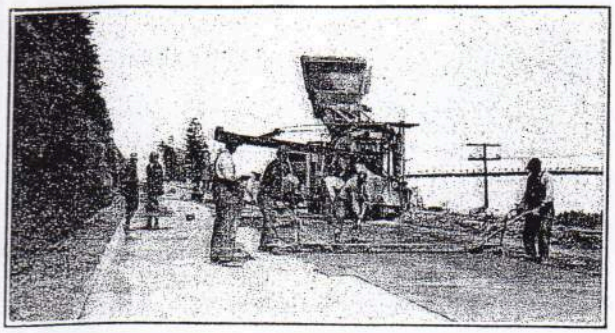
John A Roebling's Sons Company, Trenton, New Jersey—Cables.

La Pointe Construction Company, Portland, Oregon—West Approach Roads.

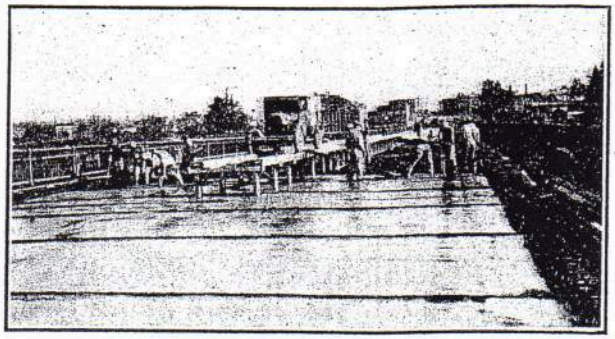
Columbia Steel Company, Portland, Oregon—Approach superstructure.

Lindstrom & Feigenson, Portland, Oregon—Roadway slab and sidewalks.

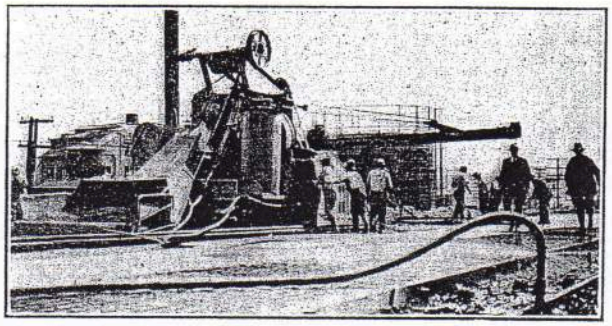
National Electric Company, Portland, Oregon—Electrical work.



PAVING OF THE WEST APPROACH ROAD BY LaPOINTE CONSTRUCTION COMPANY



LINDSTROM & FEIGENSON POURING DECK SLAB ON EAST APPROACH



PAVING OF WEST APPROACH ROAD

SUB-CONTRACTORS

Pacific Bridge Company, Portland, Oregon—River Piers.
J. H. Pomeroy Company Inc., Portland, Oregon—Erection of suspension bridge structural steel.
Taylor Brothers, Portland, Oregon—Grading of west approach roads.
American Bridge Company, New York City—Erection of viaduct superstructure.

Swigert, Hart and Yett Inc., Portland, Oregon—Transit mix concrete.
Poole and McGonigle, Portland, Oregon—Fabrication of portion of viaduct steel.
Willamette Iron and Steel Works, Portland, Oregon—Fabrication of floor stringers for suspended spans.
Electric Steel Foundry Company, Portland, Oregon—Cable bands and other castings.
Portland Wire and Iron Works, Portland, Oregon—Handrailing fabrication and erection.
Grand Sheet Metal Works, Portland, Oregon—Copper sheathing of spires.
McArthur Concrete Pile Company, San Francisco, California—Concrete pedestal piles, east anchorage.
Bethlehem Steel Company, Steelton, Pennsylvania—Fabrication of anchorage steel.
Western Foundry Company, Portland, Oregon—Cast Iron Ornaments.
Columbia Steel Company, Pittsburg, California—Main tower cable saddles
Pacific Coast Steel Company—Reinforcing steel for piers.
Mercer Steel Company, Portland, Oregon—Reinforcing steel for roadway slab.
A. & F. Brown Company, Elizabethport, New Jersey—Cable wrapping machines.
Oregon Brass Works, Portland, Oregon—Brass tablets, zinc fillers for cable bands.
Truscon Steel Company, Youngstown, Ohio—Wire mesh reinforcing, parting strips and reinforcing steel for highway paving.
Truscon Laboratories, Detroit, Michigan—Bar Ox Paint, Agatex floor hardener.
J. Rebman, Portland, Oregon—Grading and paving east bridgehead intersection, Sun, Beaver and Oregon brands of cement used.
Consolidated Railway Equipment Company, Portland, Oregon—Handrailing fabrication.
K. E. Erickson Company, Portland, Oregon—Traffic markers.
A. G. Rushlight Company, Portland, Oregon—Drainage pipes.
A. Young & Son Iron Works, Portland, Oregon—Welding of handrailing.
Union Metal Manufacturing Company, Canton, Ohio—Lighting fixtures.
General Electric Company—Electrical equipment.
Westinghouse Electric Company—Electrical equipment.
Gamewell Corporation—Aviation beacons and flashers.
Tennent Steel Corporation, Portland, Oregon—Handrailing castings.
Pure Iron Culvert & Manufacturing Company, Portland, Oregon—Armco pipe.
H. Hays Mirkil, Philadelphia, Pennsylvania—Bolts and cable shrouds.

Roebling as Father of Suspension Bridges

By J. N. HICKS

Resident Engineer for John A. Roebling's Sons Company of Trenton, N. J.

Stretching across the Hudson River between Fort Lee, New Jersey and Fort Washington Point, better known as 178th Street, New York City, is a suspension bridge in the course of construction. This structure, commonly known as the Hudson River Bridge, will be completed the latter part of this year and will be the largest single span suspension bridge in the world. On the top of the New Jersey tower, 635 feet above the water, there blazes a sign: "ROEBLING CABLES." Likewise over the entire evolution of the suspension bridge shines the name of "Roebling."

There were suspension bridges, it is true, before those built by the Roeblings, and some of these structures date back into the Eighteenth Century. It was not until steel wire cable was devised, however, that the modern suspension bridge became a possibility, nor did it become an actuality until the Roeblings had built the Brooklyn Bridge.

Early in the fifties of the Nineteenth Century, when the Niagara Bridge was more or less the talk of the two continents and communication underseas by cable had helped to emphasize the possibilities of wire, John A. Roebling, protagonist of the wire cable theory advanced a proposal to connect New York and Long Island by a suspension bridge. The people of Brooklyn, however, were not ready to change their custom of crossing the East river by ferry, and it was not until the vicious winter of 1866 and '67 that they finally realized the great inconveniences of the East river ferries. In the month of May, 1867, the initial charter for the Brooklyn Bridge was granted and Mr. Roebling was appointed engineer. Three months afterward he submitted his report and estimates which were examined and approved by the Commission of Engineers in the United States War Department. He immediately started preparations for this huge and now historically famous task.

While fixing the location for the Brooklyn tower, John A. Roebling met with an accident that a little over two weeks later caused his death. But his work had been well done, and his son and associate, Colonel Washington A. Roebling, took up without delay the execution of the plan he had helped to create. The Colonel put all his force of mind and character into carrying out his father's great project and even spent many long hours, month after month, down in the foundation caissons with his "sand hogs." Unfortunately, however, while working in the depths of the caisson, he was stricken one day with that terrible affliction known as the "bends." His limbs were partially paralyzed, his body in constant pain, and his voice gone, but despite all this, he kept the work going. Unable to sustain a conversation he wrote his instructions in detail and watched the progress of the work from a window in his home in Brooklyn Heights through a field glass. It was 1876 before the first wire was strung across the span and not until seven years later that the bridge, finally completed, was opened to traffic.

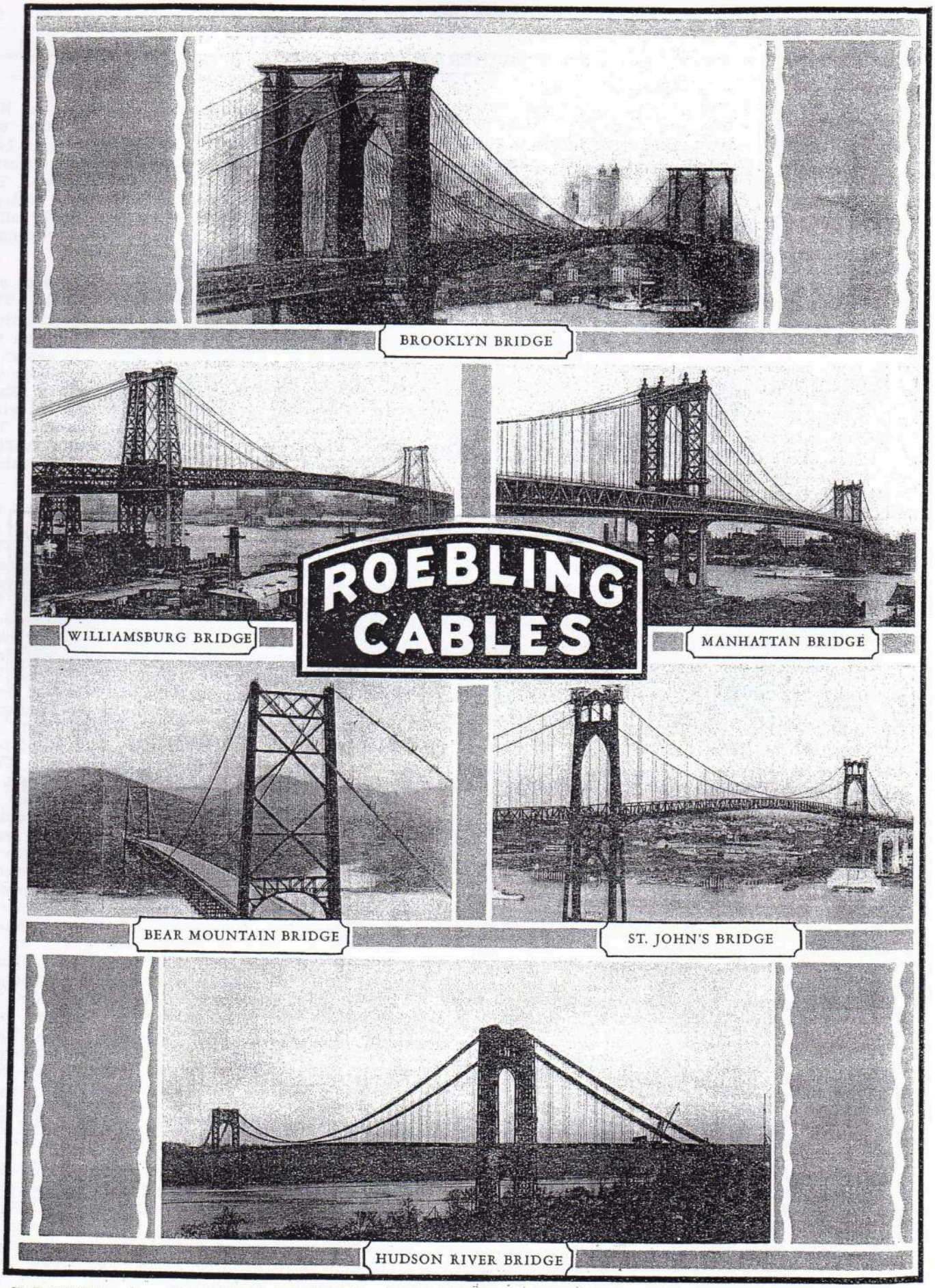
In designing the Brooklyn Bridge, the Roeblings worked out theories, principles, and practices which were to be used for the first time. It was truly a super span but many people expected the bridge to fall. The fact that the bridge still stands and is carrying traffic and loads which could not have been envisioned by a man, even as great as Mr. Roebling, is proof enough that the theories, practices and principles used in this structure were correct and without fault.

Fundamentally these same theories and principles are used in the design of suspension bridges of today, and now, no one questions the safety of suspension bridges.

The St. Johns Bridge is designed on theories and principles which were derived from those used by Mr. Roebling and which have been shown to be correct. Although the St. Johns Bridge is not the longest suspension bridge in the world, it can truthfully be said that it is the most beautiful structure of its kind and the first long span suspension bridge west of the Mississippi River.

Compared to the Brooklyn Bridge, in regard to size, the St. Johns Bridge is not as impressive in some respects, but in others it overshadows the dimensions of the Brooklyn Bridge. The distance between centers of towers on the Brooklyn Bridge is 1595½ feet, as against 1207 feet for the St. Johns Bridge. The total length of suspended span on the Brooklyn Bridge, which includes the main span and both side spans, is 3455½ feet. The corresponding length on the St. Johns Bridge is 2067 feet. At the center of the main span, the St. Johns Bridge has a clearance of 205 feet above the water. The Brooklyn Bridge has a clearance of only 135 feet. above the water. The towers of the Brooklyn Bridge, which are built of stone masonry, rise 275 feet above the water, whereas the towers of the St. Johns Bridge stand majestically to a height of 400 feet including the spires.

The roadway of the Brooklyn Bridge is supported by four parallel wire cables, each cable being 15½ inches in diameter. There are nineteen strands of 282 wires making a total of 5358 wires per cable. Each cable is approximately 3580 feet



JOHN A. ROEBLING'S SONS COMPANY *of* CALIFORNIA

long, from anchorage to anchorage, and weighs 925 tons. If all the wire in these cables were stretched out in one piece, it would cover a distance of 14,530 miles or very nearly three-fifths of the distance around the world at the equator.

On the St. Johns Bridge there are two cables supporting the roadway, each cable being 16½ inches in diameter, 2720 feet in length, and 590 tons in weight. These cables are composed of ninety-one strands making a total of 4641 wires in each cable. If the wires in these cables were stretched in a straight line, they would reach out to a distance of 4780 miles.

The cables on the Brooklyn Bridge have a total strength of 45,000 tons, whereas the two St. Johns Bridge cables will aggregate a strength of 25,000 tons.

Thirteen years were required to bring to realization and completion the Brooklyn Bridge, but half of this time was required for laying the foundations and building the towers. The remaining half was consumed in the task of stringing the cables and suspending the floor system from them. In contrast to this, less than two years were required to completely erect the St. Johns Bridge, and this time was divided approximately the same as the time for the Brooklyn Bridge; namely, about half for the completion of the foundations and towers and the remaining half for the cables and super-structure. It is true that a part of the eleven years time difference, in the two structures, is due to the difference in the sizes of the two bridges, but this part is very small. Practically all of the saving in time is the result of very great improvements in methods and equipment used in the erection of the modern structure.

One of the great innovations on the Brooklyn Bridge was the introduction of galvanized steel wire for the cables. Prior to this time cables were fabricated from bright wire and for protection against the elements, oil, grease, or paint was applied. In this bridge, however, the cables were fabricated from galvanized wire, thus bringing into use for the first time, zinc as a protective coating for suspension bridge cable wire. This wire was manufactured, completely, in the Roebling plants located at Trenton, New Jersey. These plants, greatly enlarged and improved of course, still remain in the same location and are still manufacturing wire for bridge cables and steel rope for elevators, tramways, and innumerable other uses. These plants were in existence before the Brooklyn Bridge was built and have continued to be in existence constantly engaging in research work to improve the quality of their products.

On page 18 is a group of photographs showing a few of the more important structures in which the John A. Roebling's Sons Company has played a most vital part.

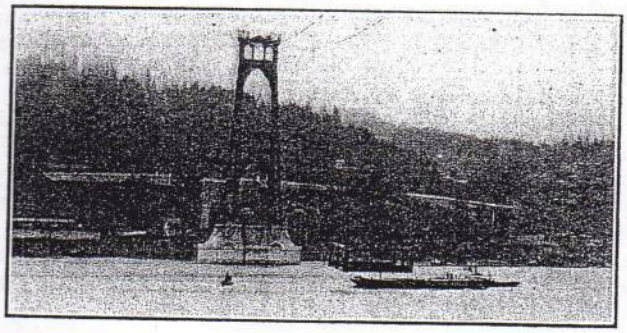
The Williamsburg Bridge, completed in 1903, has a main span of 1600 feet between towers and is supported from four cables 18¾ inches in diameter. Each cable consists of 37 strands and each strand is composed of 208 wires making a total of 7696 wires in each cable. The length of these cables between center lines of anchorage pins is 2985 feet and the four cables contain a total wire length of 17,432 miles. The ultimate strength of each cable is approximately 22,300 tons.

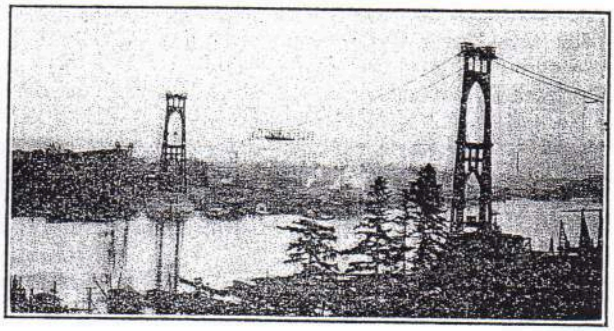
The Manhattan Bridge, the largest of the New York City Suspension bridges now in use, was completed in 1909 and has a main span of 1470 feet. The four cables are 20¾ inches in diameter and each cable is composed of 9472 wires. The cables are 3224 feet in length, making a continuous wire length for the four cables, of 23,170 miles. The ultimate strength of each cable is approximately 28,300 tons.

The Bear Mountain Bridge was dedicated and opened to the public on November 26, 1924. This bridge spans the Hudson River from Anthony's Nose on the east bank to Bear Mountain on the west bank. The distance from center to center of towers is 1632 feet and the roadway is supported by two cables having diameters of 18 inches. Each cable is made up of 37 strands containing 196 wires making a total of 7252 wires in each cable. The length of the cables between anchorages is 2640 feet giving a total weight of wire in both cables of 1914 tons.

The Hudson River Bridge, as mentioned before, spans the Hudson River between Fort Lee, New Jersey and 178th Street, New York City. This structure is still in the course of construction and will probably be completed in the very latter part of 1931. This bridge, when completed, will be the "span supreme" having a distance between centers of towers of 3500 feet. This distance is very nearly twice the length of any exisiting span, and four 36 inch diameter cables are required to support the roadway and traffic. Thre are 61 strands in each cable, each strand containing 434 wires making a total of 105,896 wires. The total length of the cables from anchorage to anchorage, is 5,212 feet representing a total weight of 28,500 tons. This weight of wire is greater than the total weight of wire in the seven largest suspension bridges in the world today. The total strength of the cables, is 350,000 tons. If all the wire in this bridge were strung together, it would reach for a distance of 107,000 miles, or in other words, four times around the earth at the equator. The two towers supporting these cables rise to a height of 635 feet above the water, and the Washington Monument at Washington, D. C. could be placed within each leg of each tower without protruding therefrom. Another picture of the tremendous size of this structure may be visualized from the following: On the New Jersey side of the river, the hard trap rock of the Palisades has been tunneled out to a depth of 250 feet in order to provide an anchorage against the terrific pull of the cables, while on the New York side an almost solid block of concrete masonry 290 feet by 200 feet and 130 feet (10 inches) high has been placed on solid rock to resist this same pull.

John A. Roebling, himself, made possible the modern suspension bridge, and he has left with us today a business known as the John A. Roebling's Sons Company which maintains a group of specialists, who are responsible for many bridges other than those described above and which bear the signature "ROEBLING CABLES." This organization is guided by the same principles and theories as those established by the founder, and is carrying on the great work started by the "Father of Suspension Bridges."





ALL FABRICATED STEEL FOR THE MAIN SPANS AND THE TOWERS OF THE ST. JOHNS BRIDGE
FABRICATED BY

Wallace Bridge & Structural Steel Co.

of

Seattle, Wash., and Portland, Ore.

and

ERECTED BY

J. H. Pomeroy & Co., Inc.

of

Seattle, Wash., and Portland, Ore.

Development of the Bridge Project

Between the inception and completion of the St. Johns Bridge project seven years intervened.

While the community had been bridge minded for years, the movement that finally attained the cherished objective took form with the organization of the Peninsula Bridge Committee in 1924. It included representatives from each Peninsula community.

Out of the preliminary negotiations with the Board of County Commissioners, consisting of Amadee M. Smith, chairman, Grant Phegley and Ervin A. Taft, emerged a survey to determine the most feasible sites for a Peninsula bridge.

Two measures appeared on the ballot of the 1926 general election—one to span the river from the foot of Fremont street at its intersection with Interstate avenue and the other to be located at St. Johns. Both measures were defeated; even so, sentiment began to crystallize in favor of one bridge, to cost about $5,000,000 and to be built at St. Johns.

In the eighteen months intervening before the next regular election, a wonderful work of organization, under St. Johns leadership, embracing many community and other civic clubs and contacting every part of the city was built up. Victory was attained when a bond issue of $4,250,000 for the construction of a bridge at St. Johns was authorized by the voters at the Primary election in the Spring of 1928.

On November 13, 1928, the Board of Commissioners announced the appointment of Robinson & Steinman, New York engineers, to design and construct the bridge.

Borings for suitable rock or hard sand foundations for the main piers were then made at Fessenden, Baltimore, Philadelphia and Tyler streets and at opposite points on the west side of the river. These tests were completed in January 1929.

Meanwhile Amadee M. Smith had retired from the Board, upon the completion of his term, thus concluding an official service of highest credit to himself and of immense value to the County of Multnomah. To his wise counsel and direction in the development of the bridge project much of its success was due.

The new Board, at the beginning of 1930, consisted of Grant Phegley, Clay S. Morse and Fred German and under their direction various preliminary plans were shaped in the ensuing months. First, the height of the bridge was fixed at 205 feet above low water. This clearance was approved by both the Dock and Port Commissions and

finally by the U. S. War Department. Then at the end of March, 1929, Philadelphia street was selected as the site by the unanimous vote of the Board. Next a four-lane bridge was decided upon by the Board and a suspension type of structure approved by it.

Robinson & Steinman had plans for the bridge complete on July 1. Contracts were let by the Board of County Commissioners on August 22, 1929, in each case to the lowest bidder. On September 1, the first building activity became manifest.

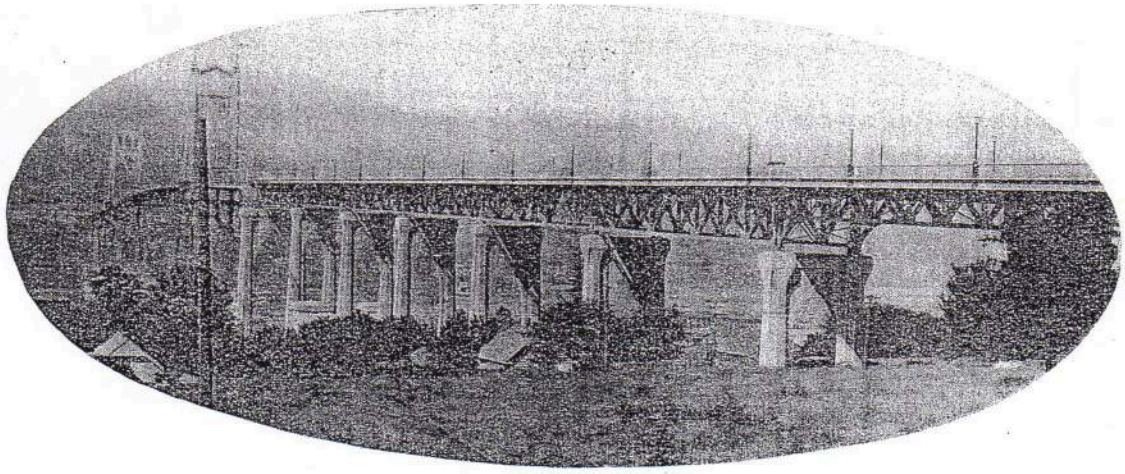
How the bridge was built is splendidly described by R. Boblow, resident engineer for Robinson & Steinman, in preceding pages. The enthusiasm and pageantry of the dedication parade and ceremonies as a Rose Festival event gives expression to the fact that more and more the St. Johns Suspension Bridge will be appreciated as an architectural marvel in addition to its vast utility, and will also stand forth as the pride of Portland, symbolizing the Rose City's power of achievement and its proclamation of advantages in terms of beauty.

The present board of County Commissioners, who had the satisfaction of seeing the great structure brought to completion during their tenure, is comprised of Fred German, chairman, Grant Phegley and Frank L. Shull.

In the list of the Bridge Dedication committee will be found the names of loyal and efficient workers in the great cause; to which must be added the name of Harry W. Ormandy, for two terms president of both the Community Club and the St. Johns Business Men's Association. With other leaders, Mr. Ormandy stood firmly at the helm and navigated skillfully at times when the project was in danger of foundering.

E. R. LA POINTE
President of the La Pointe Construction Company

PRODUCERS OF STEEL FOR EVERY PURPOSE



EAST APPROACH—ST. JOHNS BRIDGE
SUPERSTRUCTURE
AMERICAN BRIDGE COMPANY

New Span Brings Economic Changes

By ROBERT H. STRONG

The completion of the St. Johns Bridge closes one of the most interesting chapters in municipal development ever undertaken in Portland. The history of the effort of the people on the Peninsula to get this bridge dates back many years. Contributing much to its success was the vote of southeastern Portland, expressing their gratitude for the support which the Peninsula gave the Ross Island Bridge.

It is probable that a large per cent of the voters who supported the bond issue believed that the bridge was desired by those interested in shortening the distance and promoting easy access to the business section of the city from the St. Johns territory.

Immediately the bonds were voted, many were astonished to find that this was not the case. St. Johns people overwhelmingly desired a northerly site, which was nearly a mile longer than a southerly site would have been, and a northerly site they got.

This bridge therefore serves a different purpose than any other existing bridge in that its purpose is not primarily to furnish direct connection with the city center, but rather to connect and consolidate two outlying districts.

Now the bridge is finished. It is a great bridge. How generally and by whom will it be used? What effect will it have on the city's development? Will it justify its great cost?

From the center of St. Johns to the city center is a shorter mileage on the Broadway bridge than by way of the new structure. Regardless of this fact, much of the traffic will use the new bridge because distance is no longer measured in miles but in hours and minutes.

The new route will permit fast running time, because the bridge itself with the approaches is over a mile in length without any crossings, and the roads on the west side are wide and straight, with relatively light traffic load. The two new streets, Yeon Avenue and Front Street, through the Guilds Lake area, furnish good distribution outlets. It is probable, therefore, that most of the traffic generated west of the S. P. & S. Railroad cut across the "Peninsula" will follow the new route. This is about 6000 cars a day. The Linnton Ferry traffic will furnish about 1000 more. To these, add an unknown number that will use the bridge as a by-pass from the entire east side to the lower Columbia River Highway. Besides all of these, the Swift industrial area may furnish some and there will be that unaccountable traffic that every new route develops from unpredictable sources. Making generous allowance for all known and unknown reasons, the traffic flow will probab-

ly be very small as compared with, let us say, the Broadway Bridge, which averages 40,000 automobiles daily.

The immediate traffic can scarcely be sufficient to justify an expenditure of $4,000,000. It must therefore be considered mainly a constructive enterprise that must look into the future for large results.

It is a rash man who thinks he can foresee the full results of this bridge and we have no desire to try to play the prophet.

A great improvement such as this, brings into play new economic changes, new lines of development, new forces that are not foreseen. For example: already there has developed a pronounced inquiry from workers in the plants in the district about the American Can Company and Montgomery Ward on the west side for homes in the St. Johns area, seeming to indicate that about the first beneficial effects will be to the owners of residential property even before the stimulus to the industries in this region and conversely, should developments follow along this line, then the industries about the American Can and in the Guilds Lake area will benefit because good housing conditions are a vital factor in industry, and this particular district has already suffered from lack of them.

So industry and land owners would do well to watch closely the effect of this bridge. There are going to be some surprising by-products.

And here are congratulations to St. Johns and Linnton on the completion of their bridge. They fought hard and long for it and may they get their reward.

IN MEMORIAM

To the memory of the late Joseph B. Fletcher, who worked heroically for realization of the community aspirations for the St. Johns bridge and gave unstintingly of his time and talents, his coworkers in the cause hereby pay affectionate tribute.

C. P. SWIGERT
President of the Pacific Bridge Company

THE INDUSTRIAL BACKGROUND

Spanning the lower harbor, the St. Johns bridge performs the valuable function of connecting the two leading industrial sections of Portland.

On the east side of the Willamette lie the three main Peninsula industrial districts—St. Johns, Kenton and North Portland, whose mills and factories employ thousands of people. Some of these industries are nationally known.

The same may be said of the long industrial strip on the west side of the river, comprising the Linnton, Willbridge and Guilds's Lake districts.

The plants on either side of the river are favored with shipping facilities that put them into touch with every part of the country by rail and wih every part of the world by water.

The Peninsula is served by three trans-continental railways—the Union Pacific system, the Great Northern and Northern Pacific—and by one local railway, the Spokane, Portland & Seattle. Their trains from either the north or the east pass 'hrough two Peninsula corridors, following routes that intersect near the northeasterly boundary of the city, which is referred to as the northeast gateway.

The industrial districts are well provided with tracks and sidings. The tracks in a physical sense possess the elements of a belt line and eventually, it seems, will be operated as such.

According to the Day & Zimmerman survey study of rail and water facilities of Portland, sponsored by the Portland Commission of Public Docks, conditions are ripe for the construction of a new receiving and construction yard in North Portland. This is advocated on the grounds that it would enable a superior handling of freight traffic between this point and industries in various sections of the city.

As for the west side industrial area, Linnton, Willbridge and Guild's Lake are served by the Astoria Division of the Spokane, Portland & Seattle Railway and the United Railway.

Industrial sites meeting every demand are available.

Linnton and Kenton have splendid tracts that would no doubt appeal to various types of industries.

The Guild's Lake tract contains 900 acres of undeveloped land, with almost three miles of undeveloped waterfront. It is convenient to the retail and wholesale and business sections, warehouses, freight stations and waterfront terminals concentrated on the west side of the river. The property values indicated by the 1929 assessment range roughly from $3,000 to $5,000 per acre. This district is recommended by the Day & Zimmerman survey for immediate large scale industrial development.

St. Johns has very desirable waterfront tracts and others of higher elevation. A portion of such industrial property adjoins Municipal Terminal No. 4, where sites may be leased from the Commission of Public Docks at very reasonable rates Industries locating there would have the additional advantage of the use of the valuable Terminal No. 4 facilities.

North of St. Johns and extending eastward is the vast Columbia Slough area, which may be made available for industries, large and small. The development of this area, comprising about 6,000 acres is being urged as a municipal enterprise, involving considerable reclamation. Its development is bound to come with the growth of Portland and the exhaustion of the supply of adequate tracts elsewhere.

St. Johns, itself, has been termed the industrial center of Portland because of the wonderful industrial and residential advantages it both possesses and offers. Here and on the Peninsula as a whole, the residential sections are well up from the river and level as a floor.

The climate is ideal. The soil is exceptionally adapted to the raising of fruit, vegetables and flowers, in which most householders take delight; also they find it profitable.

St. Johns, Portsmouth, University Park, Kenton, Arbor Lodge, Ockley Green and the upper Peninsula communities are all attractive residentially. There a large per cent of the workers in the mills reside, and many own their homes.

Good building lots can be had at surprisingly low prices. Rents are likewise reasonable. Moreover, it is possible for people employed in the various industrial plants to live close to their work.

The Community Background

Few suburban communities could be more progressive and better organized or offer more inviting home advantages than those comprising the Peninsula group, and Linnton.

A panoramic view would show sightly homes, modern school plants, libraries and churches nestled in a setting of perpetual verdure and seasonal bloom. Three large beautiful parks are popular recreational centers for the entire city.

Miles of streets paved in recent years and numerous new, modern business blocks bespeak continud economic progress.

While within easy riding distance, by street car or auto, from the downtown section of Portland, each of these districts has a definite entity and a strong community consciousness.

Stimulating progress and cultural as well as material upbuilding, are strong, flourishing organizations in each community. They also provide exceptional social opportunities.

The sense of identity and common interest thus fostered has borne fruit in large and varied public improvements. And between the communities themselves there are strong ties of loyalty that continually bring benefit to them all.

The resultant of the influences engendered by many whole-hearted activities are friendship and civic pride, so evident among the people of the the Peninsula and of Linnton.

It will be interesting, in ensuing pages, to note some distinctive features of the Peninsula, as a whole, also to view each community in the bridge area on both sides of the river in detail.

Our Bridge

Dyed in the stain of setting suns, or gay with the brilliant dawning,
Or bleak with the chill of a winter's day, its iron strength falters never.
Though years may pass with measured tread, and stars above grow weary,
And the hands that fashioned it are still, our bridge must stay forever.
And each us must build a bridge to span life's threat'ning waters,
That will withstand the weight of scorn, the scathing winds of sorrow.
He whose bridge is gallant dreams and bitter tasks well done,
Will leave behind that memory; his deeds will live tomorrow.

—Anna Louise Rice.

PENINSULA KIWANIS CLUB WILL BE HOSTS

The Peninsula Kiwanis Club gracefully accepted the privilege of providing hospitality for special guests at the Bridge Dedication, as well as for visiting Kiwanians, with a luncheon served at the James John School in St. Johns.

ST. JOHNS HAS A $2,000,000 INDUSTRIAL PAY ROLL

St. Johns has 32 industries, employing about 2,000 people and representing an annual payroll of $2,000,000..

Included in the list of industries are such major plants as the Oregon-Washington Plywood company (formerly the Portland Manufacturing company); the Western Cooperage, which is the largest plant of its kind in the world; the Portland Woolen Mills, the largest plant of its kind west of Cleveland; the Portland Spruce Mills, the Coast Basket & Veneer plant, the Western Wool Warehouse, the Hood River Canning company and the Purdy Brush Co., which has come rapidly into prominence.

Following is a complete list of the industries:

Advance Manufacturing Co.
Coast Basket and Veneer Co.
Cross Arm Factory.
Columbia Machine Works.
Consolidated Railway Equipment Co. branch.
Forrester Fertilizer Plant.
Hood River Canning Co.
Loomis Printing Co.
Municipal Terminal No. 4.
Oregon-Washington Plywood Co.
Peninsula Iron Works.
Portland Woolen Mills.
Port of Portland Dry Dock.
Purdy Brush Co.
Portland Chain Co.
Peninsula Pattern Works.
Puritan Oar Co.
Richmond Furniture Manufacturing Co.
St. Johns Ice & Coal Co.
Shaver Transportation Co.
Stady Lumber Co.
Star Sand Co.
St. Johns Manufacturing Co.
St. Johns Planing Mills.
Skookum Manufacturing Co.
St. Johns Review.
Swigert, Hart & Yett branch.
Terminal Flour Mill.
Volume Heating and Engineering Co.
Western Cooperage Co.
Western Wool Warehouse Co.
Y. W. G. Co.

JULIUS L. MEIER
GOVERNOR OF OREGON

The St. Johns Industrial District

Municipal Terminal No. 4

At the present extreme northern limit of the St. Johns waterfront stands Municipal Terminal No. 4. It is a seven million dollar property of the Portland Commission of Public Docks and is one of the great factors which distinguish Portland as a world port.

It is conspicuous for its extensive piers and docks, where commerce carriers from every quarter of the globe load and unload; two gigantic grain elevators having a combined capacity of approximately 2,000,000 bushels; its big storage plants and tanks, and administration and other buildings.

This great Terminal accommodates full cargoes of all traffics, and the handling of all bulk commodities.

It has a shed area of 586,360 square feet and an open area of 211,140 square feet..

Its trackage has a working capacity of 425 cars and accommodates 800 cars.

Piers No. 1 and 2 are each 1500 feet long and have transit sheds 180x1500 feet and 166x715 feet respectively. Pier No. 5 is 900 feet in length. Immense berthing spaces are provided.

ST. JOHNS rates high industrially—an exceptional compliment to its marked residential advantages.

First magnitude industries stand forth along its Willamette waterfront, to say nothing of groups of smaller plants there and elsewhere.

The industrial dollars emanating from St. Johns contribute materially to the city's support, passing through many trade channels of circulation and creating prosperity along the way.

Adjoining Pier No. 5 are bunkers and cold storage plant, whose concrete bins have a combined capacity of 10,000 tons, being utilized for coal, concentrates, ores, phosphate rock and other bulk commodities.

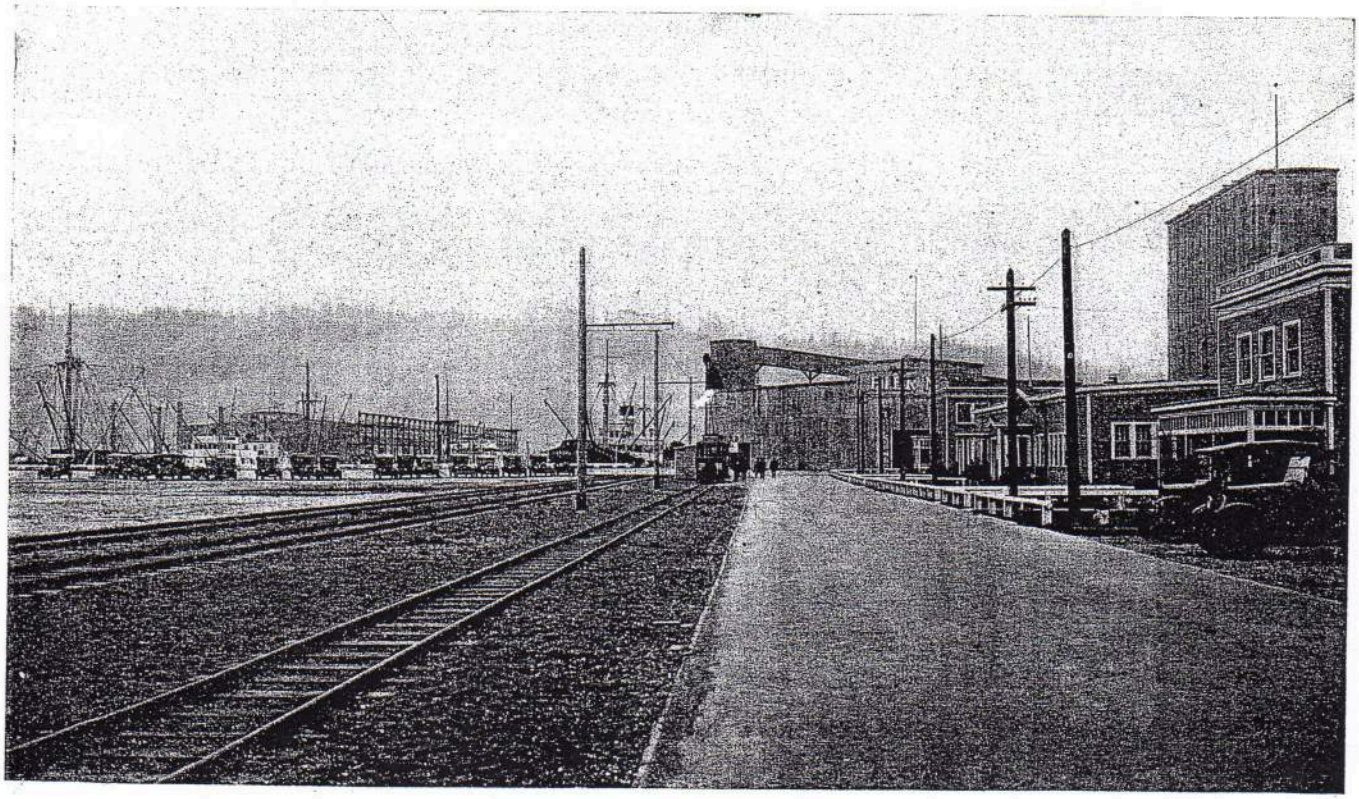
A bulk oil and storage plant, with 14 steel tanks having a storage capacity of 1,486,800 gallongs, is utilized for bulk vegetable oils and molasses.

A cold storage plant of hollow tile construction and standard insulation adjoins Pier No. 1. It has capacity for 105,000 boxes of apples.

A fruit warehouse connects Pier No. 1 and the cold storage plant. It is of hollow tile construction and has capacity for 250,000 boxes of apples.

Through the two gigantic grain elevators enormous shipments of wheat from Eastern Oregon, Idaho, Washington and Montana flow into the holds of vessels which convey it to domestic and foreign destinations.

A subsidiary group of buildings border the main approach to the terminal. These



ENTRANCE TO TERMINAL NO. 4

are the administration building, the cafeteria and welfare building.

Standard track scales have been installed in the Terminal switching yards. Here, for a nominal charge, cars may be weighed heavy and light. The operation of these scales is under the Trans-continental Freight Bureau.

Federal and State Bureaus are represented at the Terminal by various agencies.

Private agencies include a railroad office, a marine radio service station, a telegraph station, a fumigation plant and large flour mills.

The Farmers' National Grain Corporation leased from the Commission of Public Docks a site adjacent to the new grain elevator annex, in April, for the construction of three huge frame warehouses, to be utilized for the storage of old crop wheat.

INDUSTRIAL SITES AVAILABLE

But a small portion of the 211-acre tract comprising the Terminal site is occupied by present structures or reserved for future construction. The balance has been designated by the Commission of Public Docks as an "Industrial Area," open to expansion and development by private enterprise. The sites having every advantage of direct rail and water transportation are ideally located for industries depending upon water movement for the import of their raw material or export of their manufactured products. Long time leases are offered on exceedingly advantageous terms. Prospective industries seeking Portland as a location for factory, branch or warehouse are invited to communicate with the Commission of Public Docks.

NEW GRAIN STORAGE ELEVATOR ANNEX CONSTRUCTED IN 1930

Practically doubling the storage capacity of Terminal No. 4 to accommodate, mainly, the immense grain shipments through the Columbia River gateway from Eastern Washington and Oregon, Idaho and Montana, is the new Storage Elevator Annex of 950,000 bushels capacity, built during the summer of 1930.

It stands close to the old grain elevator of 1,000,000 bushels capacity and has similar equipment for transferring grain into the holds of vessels at the docks.

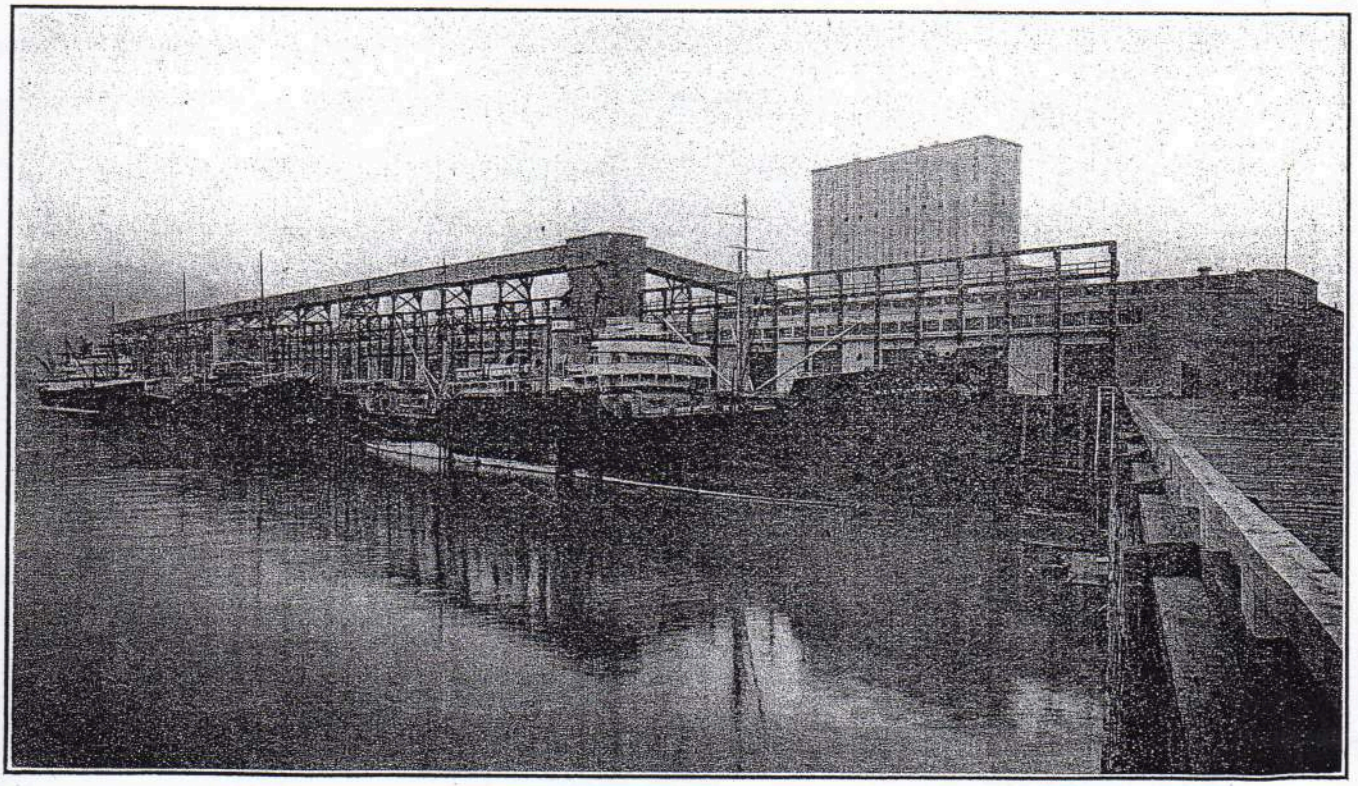
It is 114 feet in height and occupies a ground space of 135 feet, 7½ inches by 120 feet, 7½ inches.

It has 72 circular tanks, each having a depth of 78 feet and 56 inter-spaces. The thickness of the outer and inner walls ranges from 7 to 8½ inches.

In all, 11,383 yards of concrete were poured —the largest amount ever handled by a trans-mix operation, that of the Hart, Swigert & Yett company.

The expedition of its construction by the contracting firm, Albertson & Cornell, has never been duplicated. Under the supervision of their engineer, C. L. Fargo, the pouring of the concrete started July 28, and elevator was completed and receiving grain on September 2.

The construction cost was $267,970.68. With the equipment, the total cost was $430,000.



PIER NO. 1, TERMINAL NO. 4, WITH MILLION BUSHEL GRAIN ELEVATOR IN REAR

Portland Commission of Public Docks

A presentation of Terminal No. 4 would be incomplete without a reference to the Portland Commission of Public Docks.

The Commission was created a separate department of the City by amendment of the City Charter under date of November 8, 1910, and has labored most effectively for the upbuilding of Portland as a post.

At the present time it is composed as follows:

John H. Burgard.....Chairman
A. H. Averill.....Vice Chairman
Ira F. Powers.....Member
S. W. Lawrence.....Member
J. H. Banfield.....Member

Philip H. Carroll is Executive Secretary; A. D. Merrill, Engineer; and Wm. McKinlay, Superintendent of Operations.

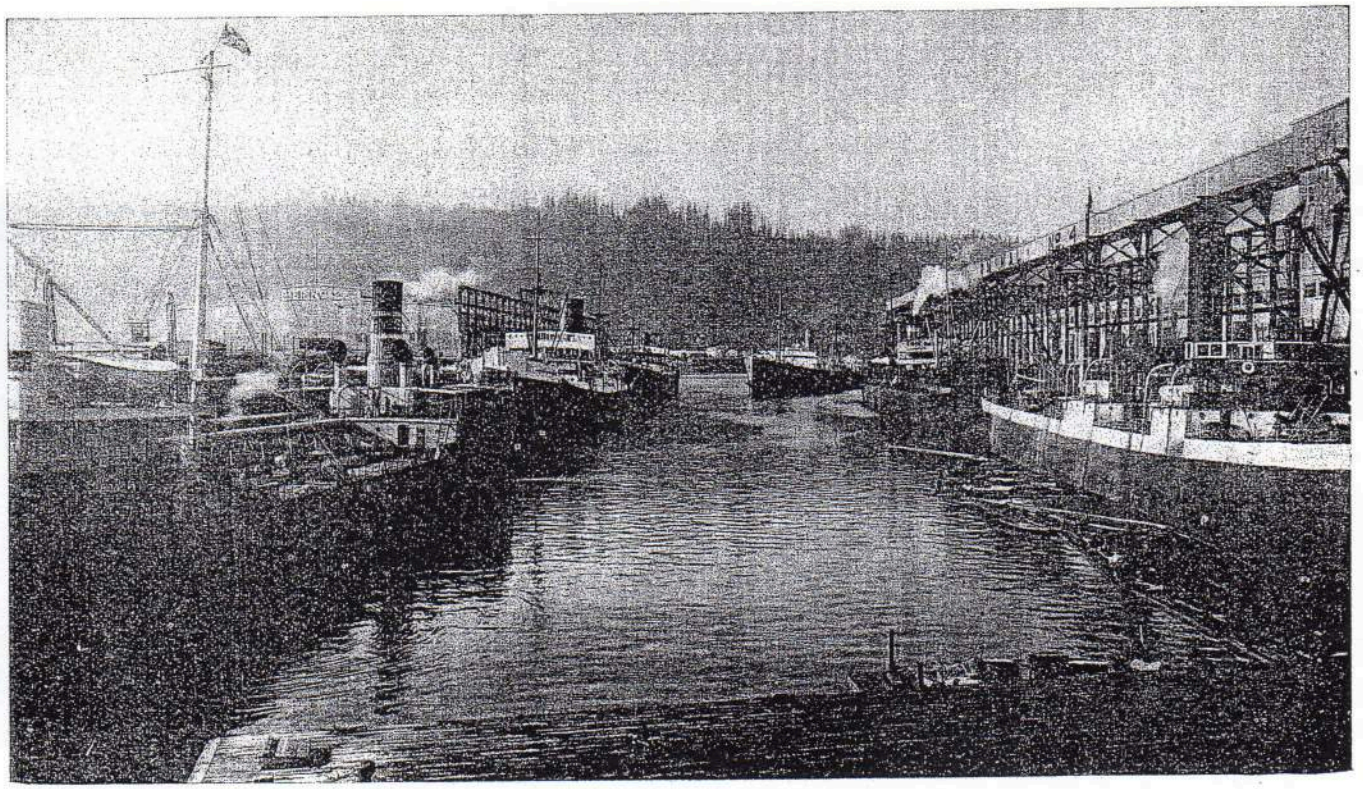
The Commission has constructed, owns and operates the muncipal wharves, warehouses, grain elevators, coal and oil bunkers, cold storage plant, bulk oil and molasses handling and storage plant, and the other facilities which comprise Municipal Terminals 1, 2 and 4.

Wharfage and other terminal charges assessed by the Commission for the use of its facilities and service are established by ordinance and set forth in a published tariff.

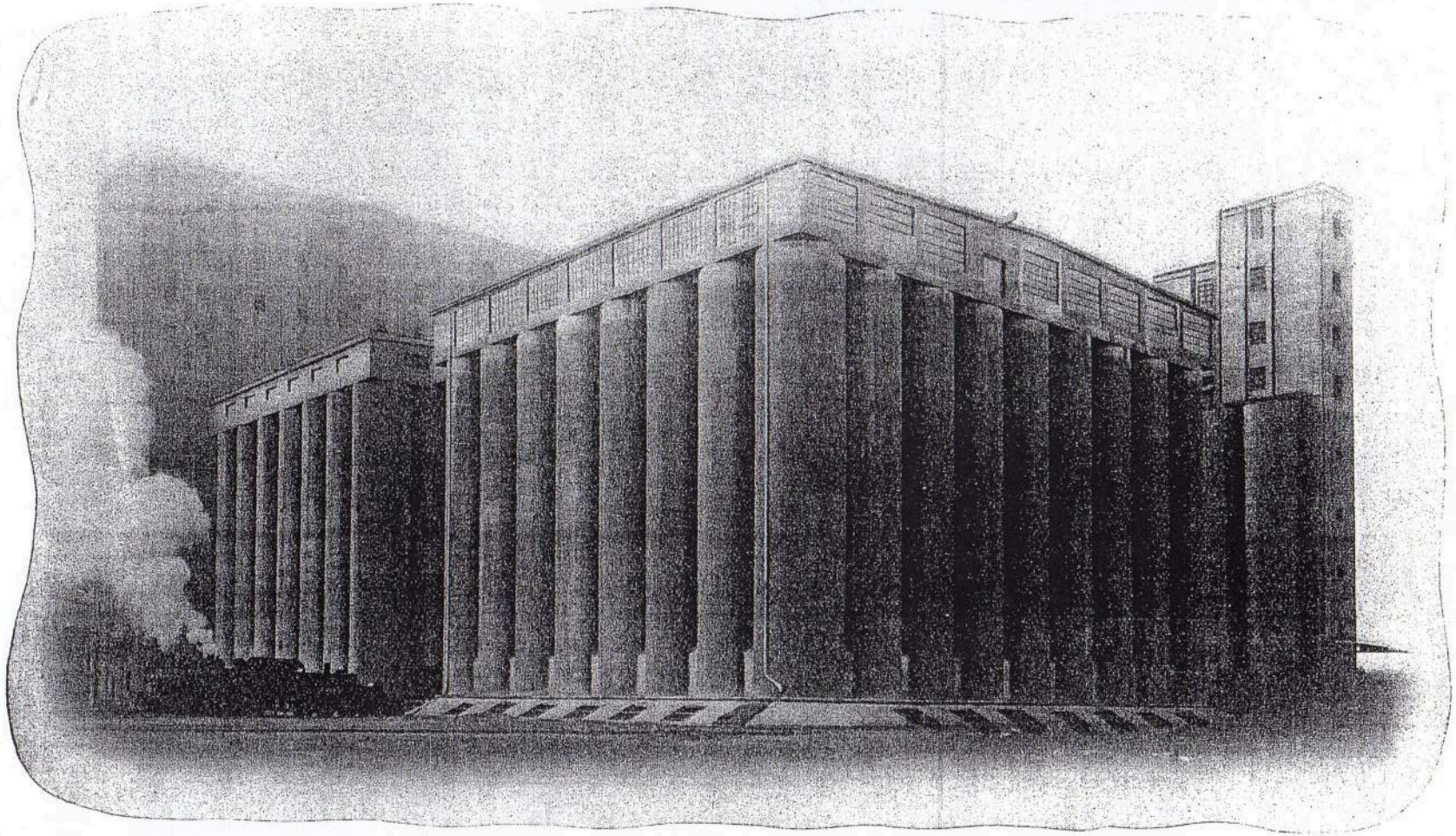
These charges are in the main on a parity with those assessed at other ports of the Pacific Northwest and are generally adopted by the private dock operators of this port.

The properties of the Commission of Public Docks consist of Municipal Terminal No. 1, foot of 17th street; Municipal Terminal No. 2, foot of East Washington street; Municipal Terminal No. 3 site, foot of Philadelphia street; Municipal Terminal No. 4, foot of Burgard avenue; Municipal Boat Landing and Main Office, foot of Stark street; Pubic Levee, foot of Jefferson street; and the Woodward Avenue Boat Landing.

JOHN H. BURGARD
Chairman
COMMISSION OF PUBLIC DOCKS



SLIP NO. 1 AT TERMINAL NO. 4



New Storage Elevator Annex at Terminal No. 4

COMPLETED EARLY IN 1930. HAS A CAPACITY OF 950,000 BUSHELS. COST, INCLUDING EQUIPMENT, $430,000.

The Portland Woolen Mills Supreme in the West

St. Johns has the distinction of having for a leading industry the largest woolen mills west of Cleveland, Ohio.

For such are the Portland Woolen Mills. Their products go regularly to the market centers of the east and middle west, as well as to the island possessions.

It has also filled large orders for the federal government, and now has on hand an immense contract from the Navy Department.

In fact, so well known are the Portland Woolen Mills that what is said concerning this big pioneer industry naturally takes the form of acknowledgment and tribute.

While equipped with the most modern machinery throughout the extensive plant, the firm has increased its output rather than made any undue reduction in the number of employees.

Its economic value both to the community and the city cannot be overestimated.

Many visitors to Portland are welcomed at its plant, making a tour through the various departments and marvelling at the efficiency and scale of production.

Mindful of the interests of its employees, the management has provided a large, handsome recreation building. It has a large dining hall, rest rooms for the women, a billiard room and other recreation facilities, and a library as well as many other conveniences and a fine auditorium.

Accounting for the success and economic value of the Portland Woolen Mills, two men in its organization stand to the fore—Mr. W. P. Olds and Mr. Charles H. Carter. They exemplify the ideals in industry, which have the highest regard for the human element and invest an institution with personality.

A high grade wall board is being produced in the old Portland Manufacturing company plant. It is made from three-ply fir plywood and is adaptable to many different purposes. By many users it is considered much superior to composition wall board material.

Three St. Johns young men are inseparable from airplane activities in Portland. These are the Smith brothers—Lieutenant Basil, Professor D. E. and Barrett. At present they are participating in the manufacture of popular priced planes, at E. Sixth and Hancock streets, Portland.

Thursday, April 9, J. F. Gillmore rounded out twenty-five years in the real estate business in St. Johns.

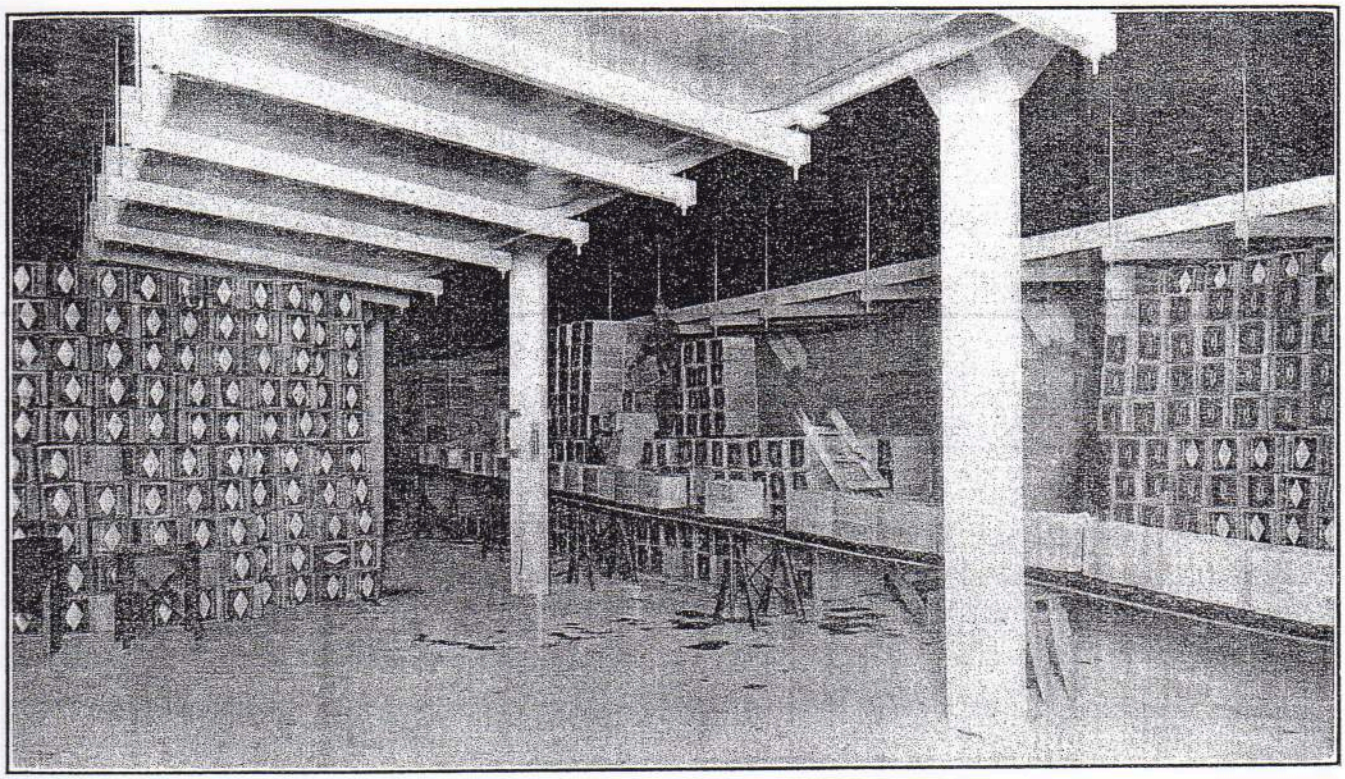
CONSOLIDATED RAILWAY EQUIPMENT CO. MAKES BLEACHER SEATS, TOO

In addition to putting impaired donkey engines and logging trucks back into proper form, the branch of the Consolidated Railway Equipment company at St. Johns is manufacturing seats.

These range all the way from park benches to bleacher sets, each accommodating 120 people. While the iron parts are made at the main plant in the Albina industrial district, the slats are inserted and finishing done in the local establishment.

An order for 125 seats for city parks was recently filled; and folding tables were supplied to two leading amusement resorts—Jantzen Beach and Lotus Isle.

The St. Johns plant also built the bleachers used at the "Walkathon" at Lotus Isle, viewed by thousands of spectators—all of course comfortably seated. Ten bleacher sets, accommodating 1200 persons, were constructed for Camp Lewis.



IN THE COLD STORAGE PLANT AT TERMINAL No. 4

The Shaver Transportation Company

A splendid industrial acquisition welcomed by St. Johns in 1927 was the Shaver Transportation Company, which transferred its quarters and fleet of tug boats from the upper to the lower harbor.

From the early eighties this company made history in Portland, and it is famed in the annals of Willamette and Columbia River navigation.

It was established in 1880 by Geo. W. Shaver, and was incorporated in 1893.

With Mr. Shaver, four sons, each a captain, became associated. These were James, Lincoln, George and Delmer Shaver. Later two grandsons—Captains H. T. Shaver and L. R. Shaver—entered the company.

The Shaver Transportation Company engaged in the freight and passenger business until 1905, when it devoted itself exclusively to log towing and ship moving.

It now has six steam tugs and twelve Diesel tugs operating on the Willamette and Columbia Rivers.

The officers are: Delmer Shaver, president; Milton Smith, vice president; George M. Shaver, secretary and treasurer; H. T. Shaver, manager; and L. R. Shaver, assistant manager.

The service and prestige of the company have grown with the Port, and the Shavers have splendid family traditions to cherish.

BUSY ALL THE YEAR 'ROUND SAYS RICHMOND FURNITURE CO.

One of the junior industries of St. Johns, whose operations never seem to lag, is the Richmond Furniture company. Located near the foot of Richmond street, it emits a hum of enterprise that paraphrases the statement of its manager and owner, A. C. Vaillancourt: "We are busy the whole year 'round."

Here high-grade furniture is manufactured, in both hard and soft woods—bedroom and dining room sets and special pieces, principally.

This industry has been under way four years, showing increased strength each year. Its chief foreign markets are Oakland, Los Angeles, Boise and the state of Montana.

Y.W. G. MANUFACTURING CO. IS NEW, BUT COMING FAST

The youngest member of the St. Johns industrial family is the Y. W. G. Manufacturing company.

But in its recently constructed plant at the foot of Midway avenue, it is up and doing and coming fast in the production and sales of its woodworking products.

Widely in vogue are the sewing cabinets, Ball-foot chests, ironing boards, lamps, sewing cabinets, smoking stands, magazine and music racks and screen doors which are among its specialties.

And with the manufacture of toys and novelties it has had equal success. These include "wiggly" pigs, dogs, rabbits and bears. doll beds, juvenile furniture and a new paddle-shuttlecock game, which bids fair to becoming very popular.

Its chief customers are novelty firms, hardware stores and department stores.

It is constantly enlarging its field; shipments, for example, of smoking set stands being made to Nevada and California.

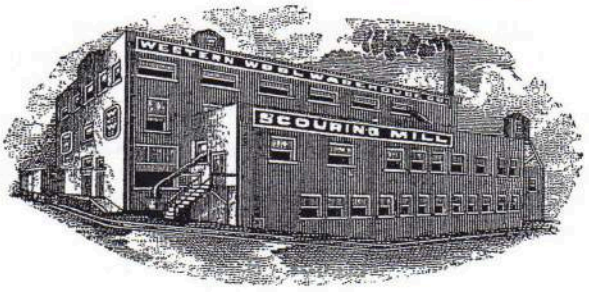
There are two partners in this enterprising firm—H. York and P. Webster.

Western Wool Warehouse Service Appreciated

Wool men in the Pacific Northwest have learned to appreciate the service rendered by the Western Wool Warehouse during the ten years of its existence.

The capacious warehouse and modern facilities ensures to each clip the attention it deserves and a large number of buyers are attracted. The company has some of the best graders and sorters on the coast.

The main activities consist in handling wool



for the wool grower, and much grading and scouring of western wools is done for local woolen mills and dealers.

This last year, storage space in the great warehouse was made available for surplus shipments of wheat.

Much to the credit of the Western Wool Warehouse is its splendid organization, in which the human equation is pronounced. To know any member of the staff is to establish a friendship.

The officers of the company are: Dr. Frank S. Post, president; Rex N. Shinn, vice president; George Celsi, secretary-treasurer; office manager, C. L. Weddell. J. S. Carroll is warehouse superintendent and field man.

The Importance of Junior Industries

By ROBERT S. MILLER

Manager of Portland Chain Manufacturing Company

The new St. Johns bridge links together two of the principle industrial districts of Portland. Linnton and Willbridge on the west side and St. Johns on the east side of the harbor can now for all practical purposes be looked upon as one industrial district.

This industrial district lying on both sides of a wonderful harbor has all the requisites that go to make an ideal location for all types of industries. It is a central distributing point for all northwest markets and has adequate rail and water connections for national and world markets. In common with the rest of the northwest, this district has an abundance of cheap electric power and an unsurpassable climate, which make for more comfortable working conditions and consequently efficiency the year round.

All of these advantages are important to the larger industrial plants, but are especially favorable for the smaller factories. In taking stock of our industrial assets we are apt to think only of the larger industrial plants and overlook the small ones. The large industrial plants are very important, but we should not overlook the small ones. These smaller industries in the aggregate make up a large part of our payrolls and our consumption of raw and finished materials. They are, therefore, very desirable in the industrial community and at the same time the community has much to offer them to make it a desirable location.

In addition to the advantages enumerated above this district has others which are very important to the small factories. Factory sites in this district are reasonable in price and taxes are comparitively low. One advantage that this district has to a greater degree than others is the proximity of a large home owning working population. This condition has become recognized in recent years and has a distinct advantage.

It is a well known fact that in Portland labor turn-over is small and labor strife almost unknown.

This district like all others has had its ill-starred small business adventures which have dropped by the way, but the large number of small industries which we now have are mostly showing a substantial growth.

These factories manufacture a wide range of wood, steel and wood products, which are distributed not only in local markets, but to all markets in the world.

A large part of the growth of this industrial community will be through the growth of these small progressive industries. This growth together with the new industries which are certain to be attracted here, will make this an industrial district of continually increasing importance.

MANY HOMES ARE EQUIPPED WITH A VOLUME FURNACE

From the plant of the Volume Engineering and Heating company at Calhoun and Fessenden streets, St. Johns, many furnaces have gone forth to do telling duty in making homes comfortable and happy both in Portland and in many outside towns.

Both pipe and pipeless furnaces, large and small, are made in this plant, whose products are in high repute in Oregon and Washington, its trade field.

A. S. Scales is the owner and manager. He is a master of the furnace game, and in the Volume Furnace has a heating facility that is giving complete satisfaction to hundreds of users.

ONE OF OLDEST ARTS REPRESENTED BY PORTLAND CHAIN MANUFACTURING CO.

"Chain-making," says Robert Miller, manager of the Portland Chain Manufacturing company, "is one of the oldest arts. And there has been practically no modification in the form of chains through the ages." Mr. Miller also points out the important place chains have had in history; for example, the massive one which Israel Putman stretched across the Hudson river at West Point to stop the British ships, during the Revolutionary War.

It is interesting too, to watch the manufacture of chains in the plant, supervised by Mr. Miller, where the rods are cut and bent into connected links.

The Portland Chain Manufacturing company is another unit contributing to a totality that makes St. Johns stand out not only in the Portland, but in the Pacific Northwest industrial field. Its activities include the manufacture of chains and chain attachments. The chain sizes range from three-sixteenths of an inch to three inches. The largest single outlet is to the lumber mills and the logging industry. There is also distribution to a variety of other users, such as to the marine trade, for agricultural purposes, and to contractors. The principal market is the Pacific coast; for instance, 40 per cent of the total output for one month was shipped to California.

THE SKOOKUM COMPANY HAS BLOCKS AND FORGINGS FOR ITS SPECIALTIES

The main activity of the busy Skookum company plant near the foot of Burlington street, St. Johns, is the manufacture of logging and contractors' blocks and forgings, for which it has a well equipped machine shop, with two gas forging furnaces and two steam hammers.

Its trade field is very extensive, shipments of its products being made to the Panama Canal, Denver, Utah, Duluth and California, as well as to nearer Northwest points.

One of its high standard specialties is the Columbia hydraulic ram, ranging in size from those used for farm and household purposes to those in use for irrigation and water works, which pump volumes of water running into millions of gallons per day.

M. D. Riley is the manager of the Skookum company.

PENINSULA IRON WORKS MAKES VARIOUS KINDS OF MACHINERY

Supplying a large trade in the Pacific Northwest, the Peninsula Iron Works is famous for the sawmill and veneer plant machinery that it makes. Its specialties include the Sky-Pile-It lumber stackers and the Christy light weight power drag saw, which weighs only 105 pounds and can be easily transported about in the woods and operated by one man. Also its veneer "hog" is unsurpassed.

Great success, too has been achieved by the Peninsula Iron Works in the production of the Peninsula sawdust burner. Made in various sizes, it is adaptable to all kinds of heating plants from small dwelling house furnaces to large commercial installations, up to 50-room apartment house size.

Form bolts and machinery repairs were made in its large, well equipped machine shop for contractors while the bridge was building.

Dean H. Knowles is president of the firm, Carl Lind vice president, and Earl H. Knowles secretary and treasurer.

"ALWAYS BUSY," SAYS THE PENINSULA PATTERN WORKS

While the right-of-way was being cleared for the construction of the bridge, the Peninsula Pattern Works plant was moved bodily to one side.

Most people will make a regular event of "moving." But not so with the Peninsula Pattern Works. It continued in full operation during the whole process of being transferred out of the way for the mighty bridge structure to be.

This is characteristic of this enterprising firm. For who ever visited the Peninsula Pattern Works when it was not busy?

Yet W. M. Hippler, the popular owner and superintendent, is always willing to snatch a moment to explain any of its operations to a visitor.

Wood and metal patterns are its principal products. It also makes a specialty of hardwood work, such as yacht fittings from ligmun vitae. Yachts of multi-millionaires on the Atlantic coast carry mast-tops and other parts manufactured by the Peninsula Pattern Works.

Wood hoists and novelties of various kinds are also made and shipped to jobbers in every part of the country.

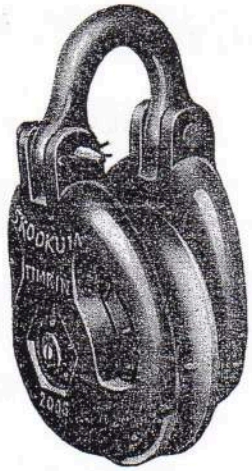
MANY VARIETIES OF WOOD-WORKING AT ST. JOHNS MANUFACTURING CO.

Variety as well as volume characterizes the busy activities at the St. Johns Manufacturing Company, which has grown steadily in every way during the nine years of its existence.

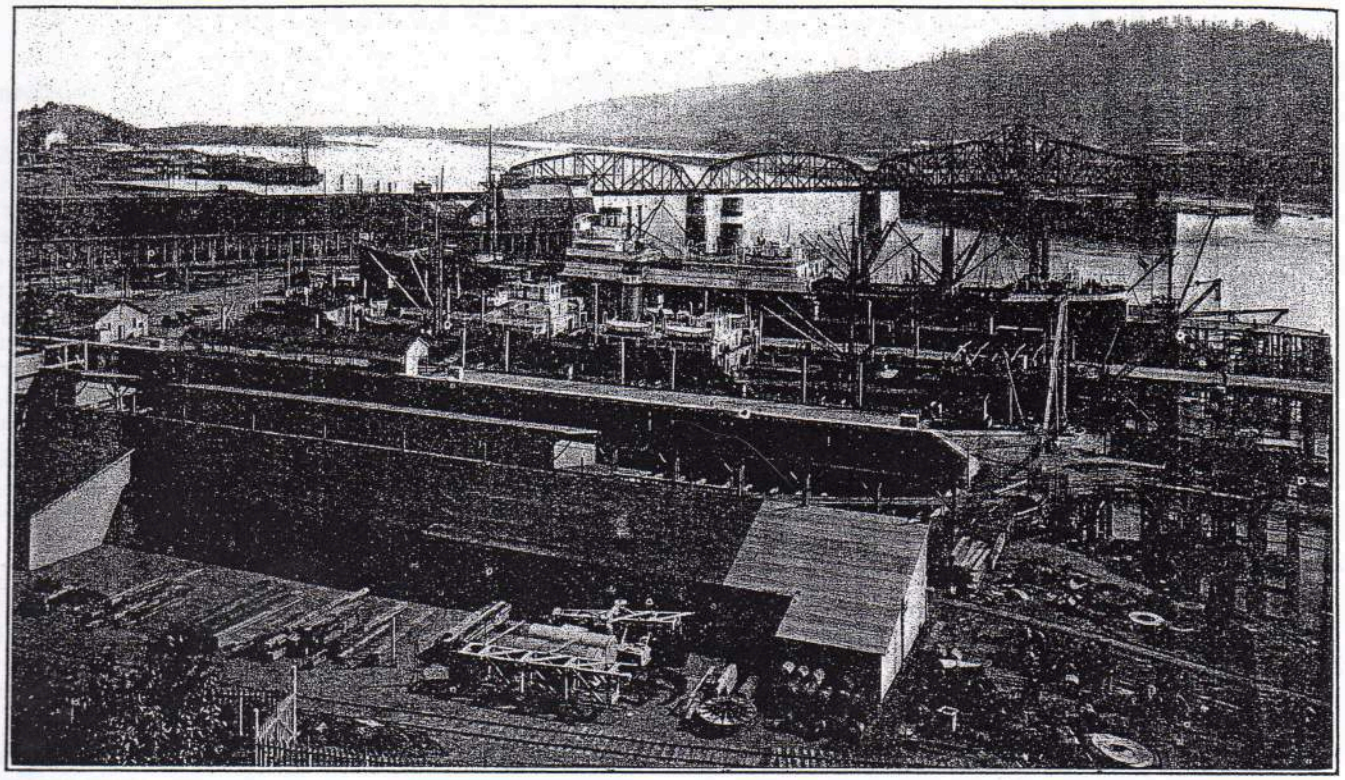
Its products include hot house flats, which are made up into planting boxes for greenhouses and flower growers in general; construction stakes which are used by contractors; cauliflower, cabbage and celery crates; general wood turning products; novelties and furniture turnings.

It supplies a large trade in Portland and also in Multnomah and Clackamas Counties generally.

In this flourishing business E. T. Bolen, E. E. Reinhart and B. R. Butt are partners.



Port of Portland Dry Docks, St. Johns



The St. Johns Community

Apart from its industrial prestige, St. Johns shines on the score of its well proportioned community structure.

Known as the metropolis of the Peninsula section of Portland, it has a population of about 10,000 and its influence extends far beyond its community boundaries.

Making up a prepossessing composite are modern stores, financial institutions, apartment houses, an elegant theatre, a public library, a branch Y. W. C. A., schools and churches.

Productive civic activities are engendered by the Community Club and the Business Men's Association.

Four Parent Teacher Association branches work in close cooperation with the schools.

Clubs distinguished for social and cultural activities include the St. Johns Study Club, the Altruistic Club, the Girl Reserves; Ye Merrie Tymers, a society of young ladies; and the Bachelor Club, which is distinguished for its benevolent work and athletic prowess which has brought football and other championships to St. Johns.

Leading religious bodies are represented by flourishing churches and their large beneficent activities.

Fraternal organizations include the Doric A. F. & A. M. and the Peninsula R. A. M. lodges; Minerva Chapter of the Order of the Eastern Star; Laurel I. O. O. F. lodge and the Laurelwood Rebekahs; Holmes Lodge of Knights of Pythias and Rose Temple of Pythian Sisters; Modern Woodman of America and Neighbors of Woodcraft; the General Compson G. A. R. Post and the H. B. Compson W. R. C.; Peninsula Post of the Veterans of Foreign Wars and its Auxiliary; Royal Neighbors; Peninsula Chapter of DeMolay and Job's Daughters.

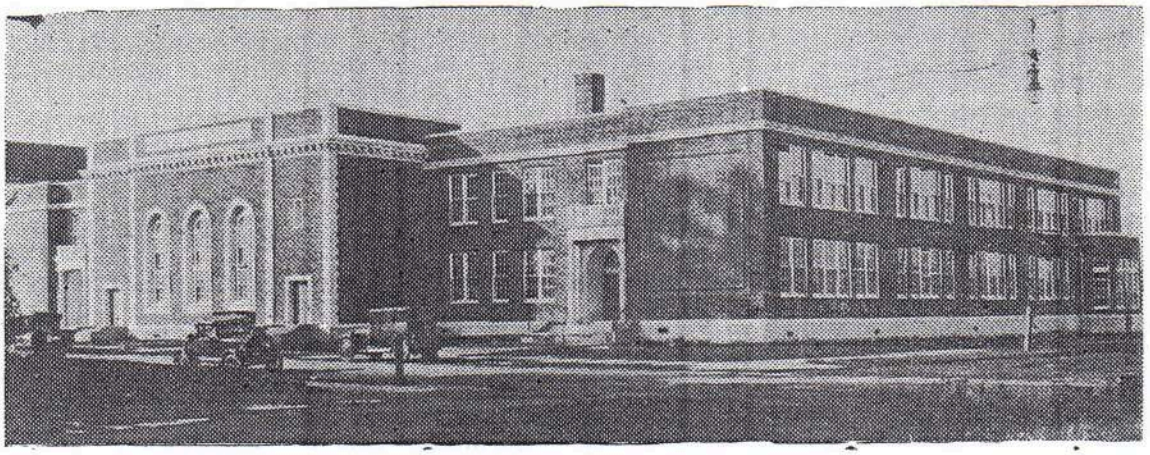
The schools, the branch Y. W. C. A., the library and minor social clubs provide entertainment, helpful recreation and cultural opportunities for children and young people.

St. Johns is the home of the Roosevelt high school. The student body is drawn from adjacent communities as well as St. Johns. A beautiful commodious auditorium, costing $150,000, was added to the Roosevelt High school plant, being completed in February, 1931.

There are three splendid grade schols—James John, George and Sitton. The James John is the

most modern of its kind. It was completed early in 1930 at a cost of $300,000.

One of the most marked characteristics of St. Johns is its genius for organization, which has brought public improvements ranging from paving projects up to the $4,000,000 suspension bridge, the presence of which places the community before the eyes of the nation.



THE NEW JAMES JOHN SCHOOL, COMPLETED IN JANUARY, 1930.

St. Johns Community Club

By T. J. Monahan, President

In January 1920, Mrs. J. M. Shaw, Mrs. Jesse Blew and Miss Ethel Bowers, librarian, Professor W. T. Fletcher, Tom Autzen, C. B. Russell, Mr. Harry Bonham, Harry Ormandy, Mrs. Harney and Mrs Stearns decided it was expedient for St. Johns citizens to organize a Community Club.

January 19, 1920, Dr. E. P. Borden visited the several churches and made an eloquent appeal for organization. The following day, January 20, about two hundred men and women sat down to a splendid dinner prepared by the Woolen Mills chef. After solos by Lieutenant Crane and Mrs. Gabriel Pullin, speeches by Professor Fletcher, Dr. Borden and others on the needs of the community and the importance of organization, H. W. Bonham, acting as chairman, called for nominations for permanent offices.

The following were nominated and elected: T. J. Monahan, president; W. H. Bonham, vice president; Ethel Bowers, secretary; Mrs. J. M. Shaw, treasurer; A. W. Markle, publicity chairman.

Thus the first Community Club in the city was launched and through the years that have passed it has stood for the best for our people and their welfare. It has fostered every enterprise of merit and held out the hand of welcome and encouragement to every worthy enterprise. It has fostered the spirit of unity among our people, as witness the campaign for the bridge, led by that indomitable leader E. F. Doyle. The club has been very fortunate in having the help of the Y. W. C. A., led by Mrs. J. M. Shaw, our library and the very efficient librarian, Miss Jeanette White, the P T. A. branches of the different schools and the Business Men's Club; and our local paper, the St. Johns Review, has done valiant work in building up a strong community spirit.

I have mentioned only a few of the many things accomplished. Last, but not least by any means, is the wonderful spirit of loyalty and unity among the citizens of the lower Peninsula, the garden spot of Oregon.

Since its organization, the Community Club has been most capably and loyally led by the following presidents: T. J. Monahan, A. E. Jones, Harry Ormandy, J. B. Fletcher and A. W. Davis.

The present officers are: T J. Monahan, president. Dr. W. J. Gilstrap, vice president. and Irvin Gromachey, secretary-treasurer.

The St. Johns Business Men's Association

By A. W. Davis, President

The St. Johns Business Men's Association was organized in 1926. Virtually all of the merchants, physicians, attorneys, and other professional men of this district are members.

H. W. Ormandy was the first president in 1926 and 1927. W. R. Evens succeeded him for the year 1928 and A. W. Davis followed in 1929, 1930 and 1931.

The Association is very active in Civic affairs and meets regularly at luncheon every Thursday noon at Dan's Restaurant. This Association is very closely allied with and operates virtually as a branch and part of the Community Club, the larger body of Civic Workers and voters having the interest of this community at heart.

The Business Men's Association is cooperating to a man in the Bridge Dedication plans. The entire membership is represented on committees having preparations for this event in hand. Both in matters which they themselves initiate and in cooperating with other bodies they give immediate attention to any task assigned them. A committee from the Business Men's Association is always welcome at the City Hall or before the Board of County Commissioners because, as one official expressed it, "they only ask for what is right and reasonable."

Coupled with our weekly meetings is our ability to keep in touch with conditions while they are fresh, and proscribe the proper emergency remedies. The St. Johns Review is our official organ, and the editor, Mr. John D. Rice, has been our secretary since the inception of the organization.

Many wonderful accomplishments have been brought about by this Civic combination. The wonderful St. Johns Bridge, High School, Grade School, the lowering and equalization of insurance rates on homes, saving this district $8,000 or $10,000 a year, and innumerable improvements of a minor nature at all times.

We believe in the idea of knowing what we want and are entitled to, and then all going after it at the polls. The organization is not political or partisan, except as to men and measures that pertain to the interest of this district. Also, up to this time we pay our debts by showing that we remember all of the kindly acts and cooperation of our public officers. New comers into this district are invited into these organizations and will be given the glad hand and a hearty welcome.