WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

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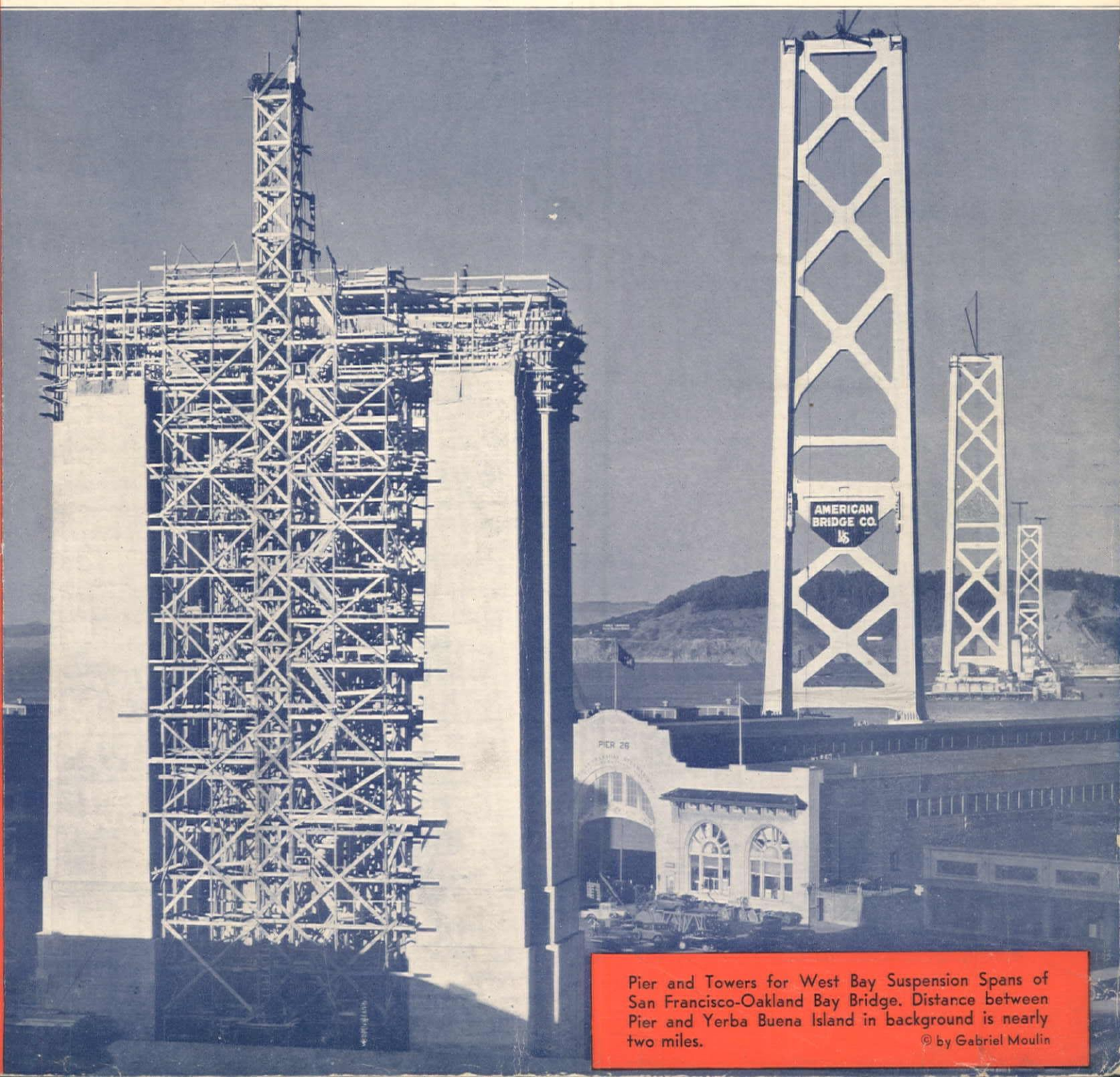


Pier and Towers for West Bay Suspension Spans of San Francisco-Oakland Bay Bridge. Distance between Pier and Yerba Buena Island in background is nearly two miles.

© by Gabriel Moulin

PROGRESS

Change, in the Building Industry as elsewhere, brings with it the demand for new products.

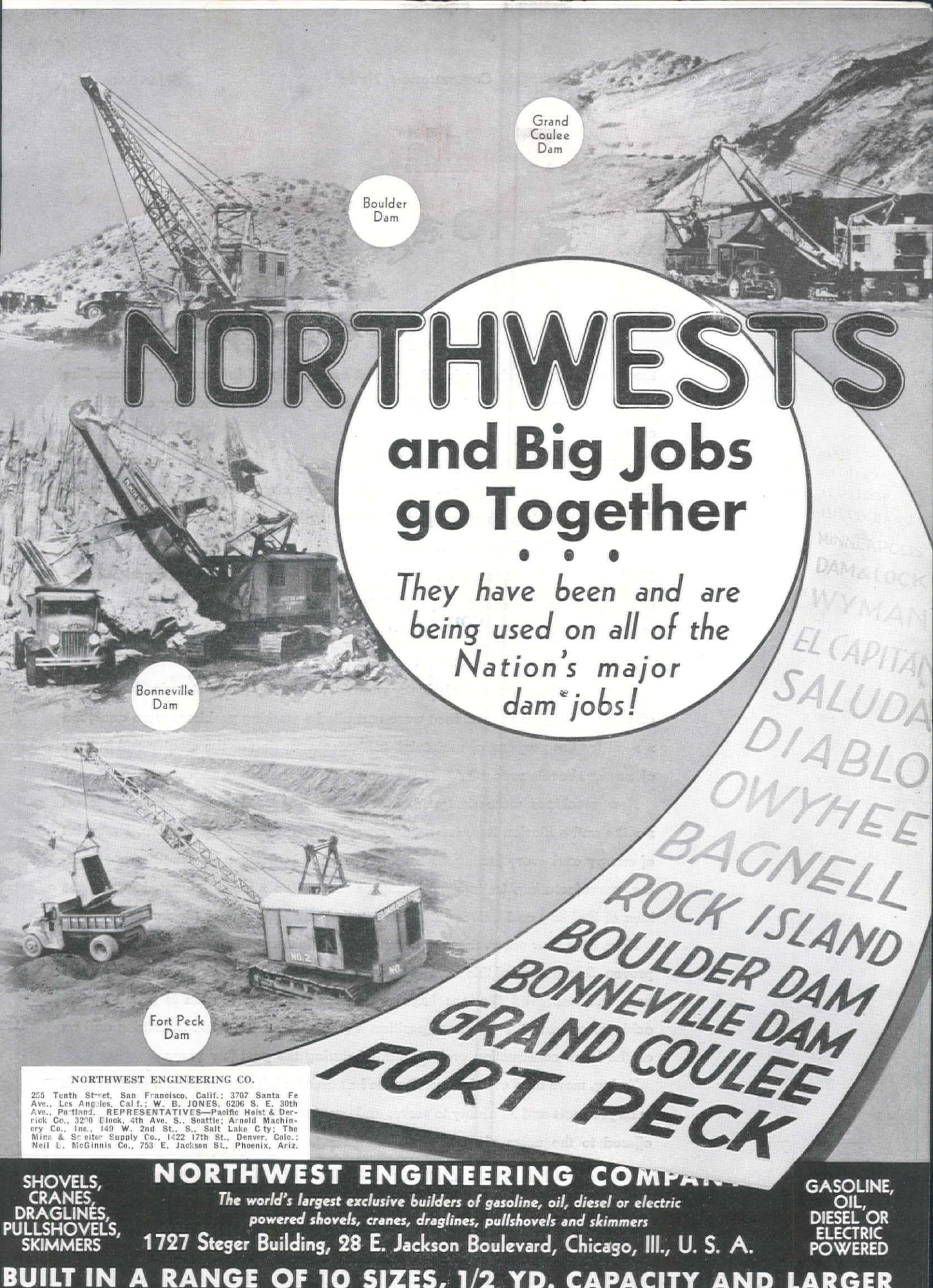
Pacific Portland Cement Company, ever alert to changing needs, has kept abreast. **24 HOUR** Cement that hardens overnight, **TAN PLASTIC** that seals out dampness and now **SEA-WATER** Cement that resists salt water—all typify this progress.

And yet, in producing these products there has been no compromise with **CERTAINTY,** the very essence of sound construction. For each one bears the name of **GOLDEN GATE,** guarantying **TRUE PORTLAND CEMENT**— with all that the name implies to assure unquestioned performance.

Whatever the modern need, you'll find a cement that fits the purpose under the old reliable name of **"GOLDEN GATE".** Ask your Building Materials Dealer.

PACIFIC PORTLAND CEMENT COMPANY
SAN FRANCISCO

When writing to PACIFIC PORTLAND CEMENT CO., *please mention Western Construction News.*



NORTHWEST ENGINEERING CO.

255 Tenth Street, San Francisco, Calif.; 3707 Santa Fe Ave., Los Angeles, Calif.; W. B. JONES, 6206 S. E. 30th Ave., Portland. REPRESENTATIVES—Pacific Hoist & Derrick Co., 3200 Block, 4th Ave. S., Seattle; Arnold Machinery Co., Inc., 149 W. 2nd St., S., Salt Lake City; The Mine & Smelter Supply Co., 1422 17th St., Denver, Colo.; Neil B. McGinnis Co., 753 E. Jackson St., Phoenix, Ariz.

SHOVELS, CRANES, DRAGLINES, PULLSHOVELS, SKIMMERS

NORTHWEST ENGINEERING COMPANY

The world's largest exclusive builders of gasoline, oil, diesel or electric powered shovels, cranes, draglines, pullshovels and skimmers

1727 Steger Building, 28 E. Jackson Boulevard, Chicago, Ill., U. S. A.

GASOLINE, OIL, DIESEL OR ELECTRIC POWERED

BUILT IN A RANGE OF 10 SIZES, 1/2 YD. CAPACITY AND LARGER

Marion's Faith in the Future

FOUR YEARS AGO

the Power Shovel Industry faced the most serious period in nearly fifty years. The situation was universal in its effect » » not a single business, industry or individual escaped.

To most industries this suggested retrenchment » » the curtailing of activities » the retarding of engineering development » the severing of long established associations » the complete abandonment of accepted plans and policies.

Marion faced this period courageously, for it meant the dawn of a new era. Marion realized that to survive and maintain its leadership would require extraordinary vision, the exercise of rare judgment, the building of better and more efficient machines, and the application of sounder business principles than ever before.

Thus, Marion charted its course.

The needs of the excavator industry were surveyed and fully determined » users of all sizes and types of machines were consulted » working problems were analyzed » » all for the purpose of maintaining Marion's position as the creator and builder of power shovels recognized as the standard for the entire industry.

New machines were designed, others were improved, some were abandoned » » the entire Marion line was made complete and thoroughly modern. Every bit of energy and every facility within the Marion organization » » whether engineering, manufacturing, testing, marketing or servicing » » were dedicated to the one idea of building and introducing the new and complete line of Marion excavators.

Now, after four years, the soundness and far-sightedness of this policy have been proven. Acceptance of this new line has been most generous. In every locality these new and improved Marions have appeared. Naturally, Marion is proud of this achievement and the dominant position it enjoys in all the basic industries and on all the large construction projects started during the past few years.

Today, more than ever before, Marion has greater faith in the future, greater faith in its products and its ability to serve, and greater faith in the opportunities that are offered to the users of excavating equipment.

THE MARION STEAM SHOVEL COMPANY

MARION, OHIO, U. S. A.

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

G. E. BJORK, Acting Editor

Maintaining Our Western Roads

ONE type of construction activity that has not hit the slump is highway maintenance. During the past period of reconstruction, there has been perhaps a tendency to overlook this work in the glitter of the projects running into millions of dollars that are being put under construction in every corner of our Western region.

The equipment manufacturer has an advantage in talking to the maintenance man, in that the same face is present year after year in more or less the same locality and office. Maintenance work is administered either from the executive State office or the various district or county offices. In the very nature of the work and the permanency of location, these men become a definite part of the community and are easily contacted. Another point is that maintenance men look to machinery manufacturers for improvements in equipment and materials, in contract in many instances, to the contractor who requests specialized machinery for his work.

The magnitude of this market can be visualized in the $20,000,000 which will be spent on maintenance of Western roads during 1935. This market, undoubtedly, will increase during the coming years since the trend in nearly every Western state is to include all highways in the State's system.

Emphasis should be placed on the value of maintaining sales in this important field. Western maintenance engineers and operators look to WESTERN CONSTRUCTION NEWS as the one publication giving them ideas on new ways and methods of carrying on their work. These are the men that manufacturers must reach; and they can be reached each month through this one publication.

Contents for January, 1935

WESTERN CONSTRUCTION NEWS

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Profit by the experience behind modern Bucyrus-Erie shovels

BUCYRUS-ERIE experience covers the building, in the United States and England, of over 15,000 excavators and cranes, and nearly 4,000 churn-type drills—far more than have been produced by any other manufacturer. These machines have been used in practically every country of the world, and under all manner of conditions have successfully met the tests of every kind of work. This tremendous volume of valuable experience is reflected in the practical convenience, the dependable performance, and the sustained high output which are characteristic of Bucyrus-Erie equipment. Because they are built to meet the most difficult conditions, to handle successfully the hardest kinds of work, they give you dependable and economical service on any job. Bucyrus-Erie Company, South Milwaukee, Wisconsin.

SAN FRANCISCO OFFICE: 989 Folsom St. Tel. GArfield 8192
CROOK COMPANY, 2900 Santa Fe Ave., Los Angeles, Tel. KImball 5137
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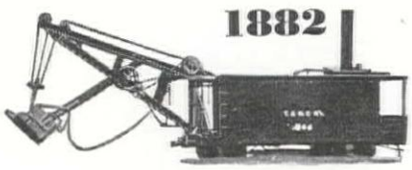
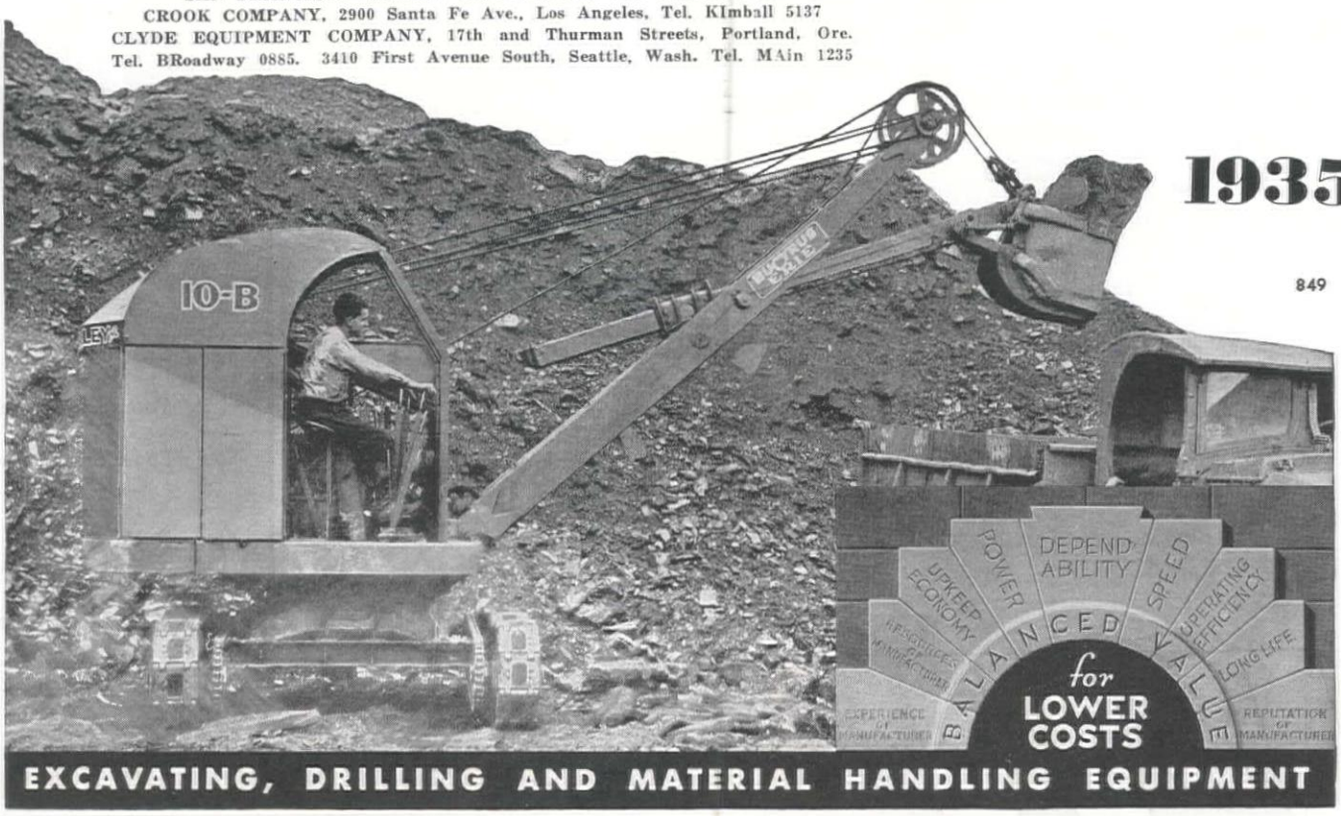


In 1882 the first shovel built by this organization laid the foundations of the reputation of Bucyrus-Erie machines for sustained, high-speed output. This first machine went to work for the Toledo and Ohio Central Railway. Its reputation for high output and few delays led to the sale of many other machines, each of which upheld the reputation.

Modern Bucyrus-Eries, judged by modern standards, are just as outstanding in their ability to consistently produce big profit-making outputs.

BUCYRUS ERIE



BALANCING 9050 LBS. *with* ONE FINGER!

P&H "Sure Feel" Power Clutch

Speeds Dirt Moving Smooths out Punishing Shocks

Admittedly, it's difficult to control 9050 pounds through the clutch with one finger—without touching the foot brake. But these P&H's can do it with a clutch so highly sensitized. The operator "feels" the loads with only 1/10 the effort required by many other types of clutches.

The motor does the heavy work of setting the P&H main clutches. It means faster digging . . . it prevents motor stalling . . . avoids strain and cuts repair bills by saving frames, motor and drum shafting and gearing from punishing shocks.

Watch one of these P&H's perform. You'll see what these Split Second Features mean in terms of extra yardage.

HARNISCHFEGER CORPORATION
4490 W. NATIONAL AVE. Established 1884 MILWAUKEE, WIS.

Warehouses and Service Stations

HARNISCHFEGER SALES CORPORATION, 82 Beale St., San Francisco; R. M. Taylor.
WESTERN LOGGERS MACHINERY CO., 302 S. W. Fourth Ave., Portland, Ore.

SEATTLE DALLAS LOS ANGELES SAN FRANCISCO

Auxiliary Clutch Engages Main Clutch

The motor does the heavy work in operating the P&H power clutch, relieving the operator of the tiresome manual labor that reduces his efficiency as the hours wear on. The P&H operator engages a small auxiliary clutch which in turn engages the main clutch. This requires a pull of only 4¼ pounds as contrasted with ten times the physical effort required to operate many other types of clutches.

Highly Sensitized

The balancing of heavy loads in mid-air without touching the brake, demonstrates the manner in which the operator "feels" and handles the heaviest loads with perfect ease. It enables him to run the machine at full capacity all day long without fatigue. Grade line can be held to close limits with maximum ease.

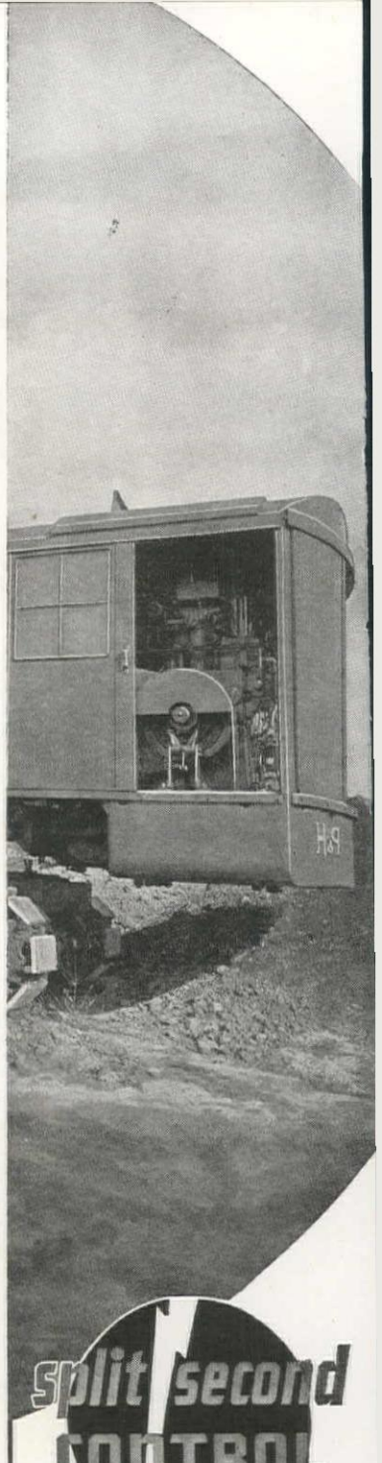
Lowers Maintenance Costs

The shock-absorbing construction of this type of clutch prevents excessive strain and so reduces the cost of maintaining the shovel in continuous service. Consider, for example, the operator who strikes a 10,000 pound rock. Immediately he feels the jolt which would be transmitted to the front end, revolving frame, engine and drum mechanism. In a split second he can release power to ward off what might otherwise develop into a very costly repair bill and service lay-up. By cushioning these jolts, P&H machines are setting unusual records for staying on the job under adverse conditions.

The Sure Feel Power Clutch has but a few moving parts. Its simple design and ready accessibility for lubrication and adjustment keep it at maximum operating efficiency with minimum care.

Also Used on Cranes

Because of its advantage in hoisting steel beams on construction jobs for quick and accurate placement, the Sure Feel Power Clutch is also used on all P&H Split Second Cranes.

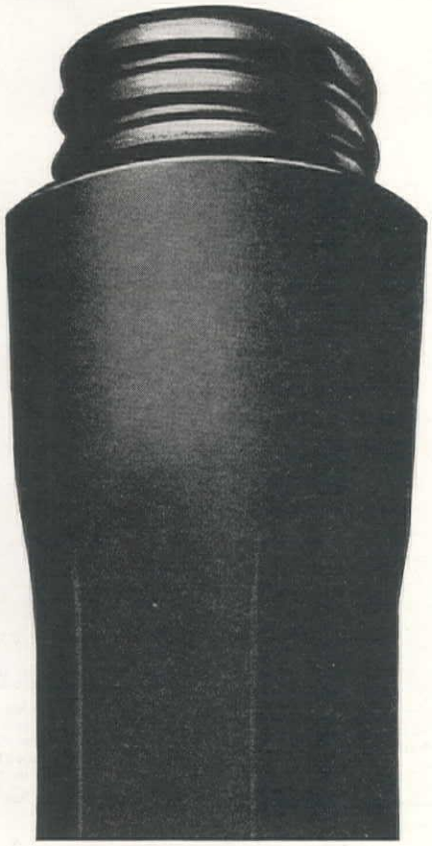


split second CONTROL

1. Sure Feel Power Clutches
2. Self Starter
3. Power Dipper Trip
4. Super Smooth Swing Clutches
5. Rapid Reversing Crowd Planetaries
6. Full Vision Cabs

P&H PERFORMANCE
SPEEDS UP YOUR PROFIT PACE

Economize YOUR ROCK DRILLING *with* TIMKEN BITS



MODERNIZATION is the keynote of industrial progress. The power shovel of 20 years ago wouldn't have a chance alongside the efficient machines of today. But some contractors who wouldn't tolerate for a moment obsolete equipment of other types are still using re-forged steels to do their rock drilling. If you are one of them take a few minutes time out to consider the following advantages of Timken Bits.

Timken Bits drill faster and farther because they are made of Timken fine-grained electric furnace steel scientifically heat-treated. They eliminate re-forging costs because they are removable. They reduce steel investment because the steel serves only as a holder for the bit and fewer steels are needed.

Many contractors, in company with mine and quarry operators, have proved these Timken Bit advantages to their own satisfaction. It will pay you to try Timken Bits on your next job.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

When writing to TIMKEN ROLLER BEARING CO., *please mention Western Construction News.*

The Colonial Construction Co., of Spokane, Washington, uses "Caterpillar" Diesel power in the construction of a new scenic highway in Rainier National Park.

On a fuel cost of less than a dollar a day, Amador County does road maintenance work with this "Caterpillar" Diesel Tractor near Jackson, California.

"THE 'CATERPILLAR' DIESEL TRACTOR HAS CUT OUR FUEL COSTS 70%"

—SAYS A COUNTY SUPERVISOR WHOSE ROAD WORK WAS FORMERLY DONE WITH A GASOLINE TRACTOR. OTHER OWNERS, EVERYWHERE, REPORT SIMILAR SAVINGS

"It costs only half as much to fill the fuel tank, and a tankful lasts twice as long"—"Fuel for our tractor costs less than food for the driver"—"Our big 'Caterpillar' Diesel costs less for fuel than three smaller gasoline tractors" . . . these are terms in which owners express their delight over the economy of the "Caterpillar" Diesel. For their economy—plus rugged power, sure traction and faithful performance—"Caterpillar" Diesel Tractors have won a foremost place on today's earth-moving, contracting, road-building jobs. They can reduce your power costs. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

AMERICA GOES DIESEL

When writing to CATERPILLAR TRACTOR CO., *please mention Western Construction News*

Remember! when buying a Shovel, Dragline or Crane~

(1) Lima Type 601, 1½ yard shovel working on a highway job in Arizona.

(2) Lima draglines everywhere are making new records for high yardages and low operating costs.

(3) Lima Type 302 Crane handling timbers on a bridge job in Ohio.

that LIMAS are built in 3/4 YARD CAPACITY and LARGER

SHOVELS
CRANES
DRAGLINES
HOES

THE OHIO POWER SHOVEL CO.

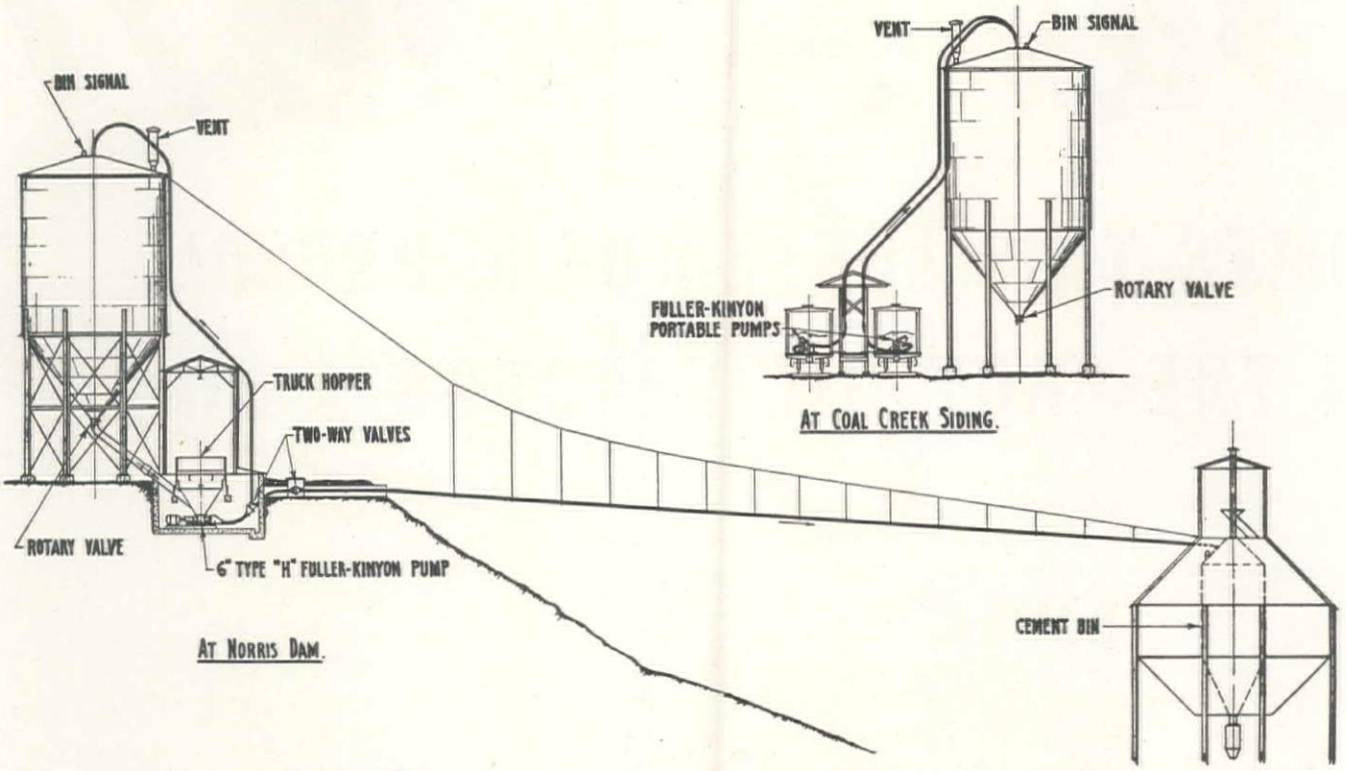
DIVISION LIMA LOCOMOTIVE WORKS, INCORPORATED

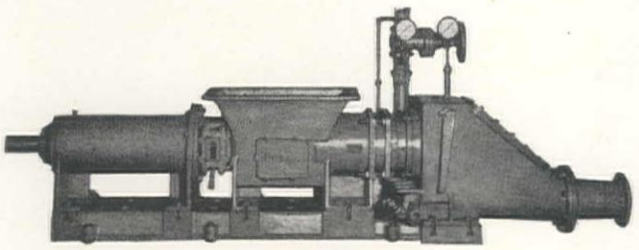
LIMA, OHIO, U. S. A.

DISTRICT OFFICES: Smith-Booth-Usher Co., 2001 Santa Fe Ave., Los Angeles. A. L. Young Machinery Co., 26-28 Fremont St., San Francisco, Calif. H. J. Armstrong Co., 2244 First Avenue S., Seattle, Wash. Western Steel & Equipment Corp., 338 First Ave. S. W., Portland, Oregon. General Machinery Co., East 3500 Block Riverside Ave., Spokane, Wash. C. H. Jones Company, 134 Pierpont Ave., Salt Lake City, Utah.

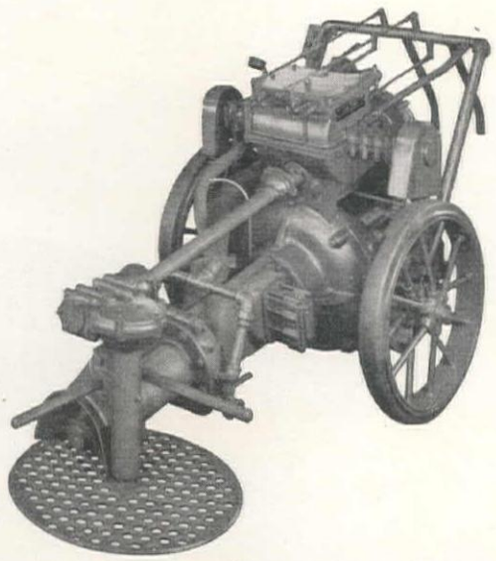
3-4 YARD TO 2 YARD SHOVELS
1-2 YARD TO 3 YARD DRAGLINES

HANDLING THE CEMENT FOR NORRIS DAM





The new Type "H" Fuller-Kinyon Pump is the most economical conveyor for transporting cement from hopper-bottom cars, truck hoppers and storage bins. It will convey cement far beyond the practical limits of mechanical systems. It is reliable and the accessibility of its parts avoids delaying the mixers. It is directly driven by gas engines or electric motors.



The improved portable Fuller-Kinyon Pump is the only conveyor capable of unloading box-cars and barges, and conveying cement to the mixers from the floors of storage sheds. These features, together with the layout flexibility of the pipe-line system make it possible to meet the conditions of future jobs.

Advantage has again been taken of the unique features of Fuller-Kinyon Pumps to design the cement handling plants at Norris Dam for economy, speed and reliability. At the unloading station, two portable Fuller-Kinyon Pump unload box-cars and deliver the cement to a truck-loading bin. The present arrangement provides for the unloading of four cars without transfer and when the demand for concrete increases, the platform and pipe-lines will be lengthened to accommodate more cars.

At the Dam, dump trucks discharge into a hopper over two stationary pumps of the type illustrated, one of which is for stand-by service. The cement is conveyed either direct to the mixing plant or elevated to a storage bin from which it is spouted to the pump hopper for transfer to the plant.

Fuller-Kinyon Cement Pumps were selected for the World's greatest dams, bridges, buildings and other concrete structures, as well as an impressive list of modest jobs. The reasons will be apparent from our fully illustrated bulletin. Write for a copy.

Fuller Company
CATASAUQUA, PENNA. U.S.A.

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Los Angeles

742 Phelan Bldg.
GA. 6938
San Francisco

Out of the No

COMES THIS LETTER OF APPROVAL ON THE "AC" OIL TRACTOR . . .

CHARLES SKEETERS — EVERETT SKEETERS

SKEETERS BROTHERS
TALENT, OREGON

November 19, 1934

Mr. A. E. Mills,
Allis-Chalmers Mfg. Company,
Portland, Oregon.

Dear Sir:

In the spring of this year we purchased an Allis-Chalmers tractor from the Brewer Tractor and Equipment Company of Medford. We wish to report that outside of a few breakages and minor repairs, we have found that this tractor does the work that we expected it to do.

This tractor was used to log pine and fir in the Wagner Creek district. Our method is ground skidding to a landing, where we use a loader to load our trucks. We believe that this tractor has anything beat for logging in the woods that we have ever seen. During the season it worked on some of the worst ground we believe that has ever been tractor logged. We were unable to use another tractor on some of the ground that we used this "LO" on.

The average fuel cost was around $1.96 per day, fuel costing 7-1/2 cents delivered to the job. We experienced no difficulty in starting or with crankcase dilution in the motor. The average amount of logs put to the landing for the season was 40,000. On many landings we worked from nothing to one-half a mile.

This is one of the greatest hill-climbing tractors we have ever seen and we would especially recommend it for rough and hilly logging.

In the morning it took us about five minutes from the t we started the motor until we would be logging. We believe this is a very good record in that one has men idle until th tractor gets into operation.

We would be pleased to demonstrate and recommend this tor to any logger or contractor that would like a word fro

Sincerely yours,

SKEETERS BROTHERS

70% SLOPES

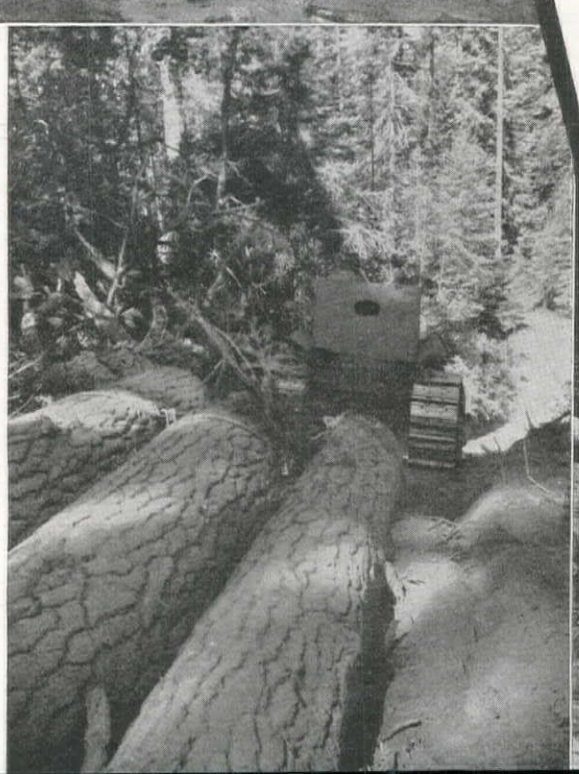
Up and down 60 and 70 per cent slopes—this work demands an engine that is "always there". A second's delay may mean the operator's life.

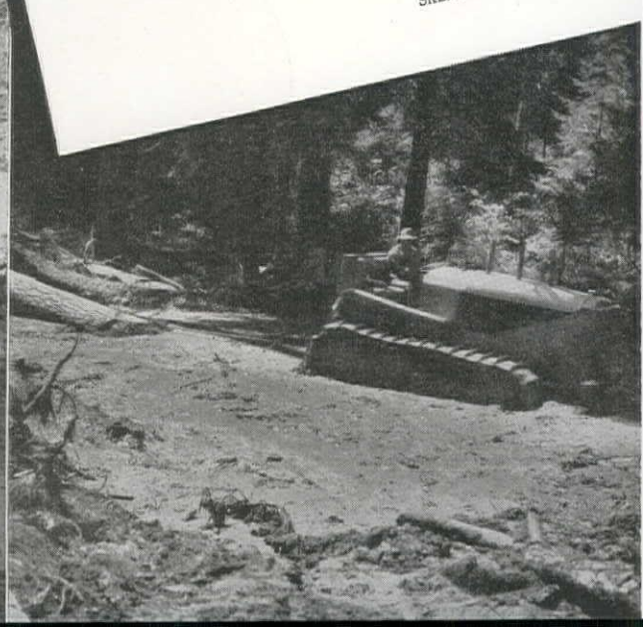
GROUND SKIDDING

On overloads that pull a tractor down to the last pound . . . the A-C Oil engine's ability to hang on gets those big loads over the hump.

RADIATOR DEEP

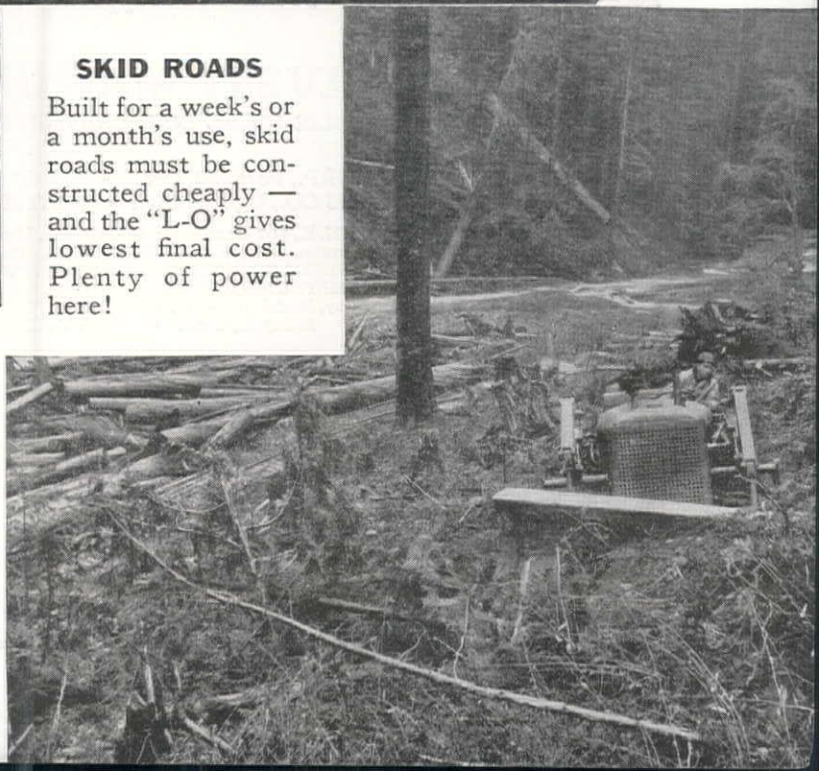
If the "L-O" weighed any more it would be out of sight in this mud hole. Why carry dead weight up hill or in mud?





SKID ROADS

Built for a week's or a month's use, skid roads must be constructed cheaply — and the "L-O" gives lowest final cost. Plenty of power here!



Logging service is without question the toughest of all tractor jobs. It takes that extra something which A-C tractors have to stand the punishment of working on rocky slopes, over trees, in continual dust, on big overloads. A-C's will give dependable performance on YOUR job, too.

ALLIS-CHALMERS

TRACTOR DIVISION—MILWAUKEE, U. S. A.

2533 Peralta Street, Oakland, Calif. S. 151 Madison, Spokane, Wash.
208 S. E. Belmont, Portland, Ore. 602 First Avenue, Pocatello, Idaho
Billings, Mont.

• RAMSAY COUNTY, MINN., SAVES MONEY WITH TONCAN IRON CORRUGATED PIPE . . .

An old wooden bridge in Ramsay County, Minn., had reached the end of its usefulness. It was a question when the road was improved of building a new bridge or installing a corrugated pipe to provide drainage. Estimates quickly proved that a 70′ by 84″ Toncan Iron Corrugated Pipe, including the necessary fill material, could be installed at approximately one half the cost of a bridge that would span the ravine. Naturally, the corrugated pipe was chosen.

The same thing is taking place on roads the country over. Corrugated pipe everywhere is demonstrating its outstanding advantages of lower first cost and freedom from maintenance.

Toncan Iron Corrugated Pipe particularly is proving its ability to last longer. It is made of an alloy of refined iron, copper and molybdenum—an alloy possessing the maximum corrosion-resistance of any ferrous metal in its price class.

A copy of the Toncan Iron Corrugated Pipe Handbook will bring you a wealth of useful information. Write today for a copy.

TONCAN CULVERT MANUFACTURERS' ASSOCIATION

REPUBLIC STEEL CORPORATION BUILDING • YOUNGSTOWN, OHIO

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Gentlemen: Please send me the Toncan Iron Corrugated Pipe Handbook.

Name .....

Address .....

I am ☐ Engineer ☐ Contractor ☐ Road Official

When writing to the above advertisers please mention Western Construction News.

"My Grader's never laid up"

Everybody knows that the upkeep expense of a power grader varies. This item in road maintenance is reduced to the minimum when your equipment is powered with a Case engine. Records of state highway departments, counties, towns and cities show substantial savings due to fewer repairs and delays. Many an operator has told us that his grader has never been laid up.

We say this: There are more trouble-free maintenance miles in a Case-powered grader than in any other. That's because the big, husky valve-in-head Case power unit is built as durable and fool-proof as long experience and modern engineering permit, with oversize bearings... full pressure lubrication, oil-bath air cleaner, 100% sealed to resist sand and dust. Heavy construction throughout makes it well suited for hard road maintenance.

During 1934, three times as many chose CASE POWER in road graders as in 1933. The low upkeep experienced by users had much to do with this decision. Case power is also available as engine units on skids or as complete tractors.

SPECIFY CASE POWER

Model "CI"
FOR GRADER PATROLS WITH 6 to 10 ft. BLADES.

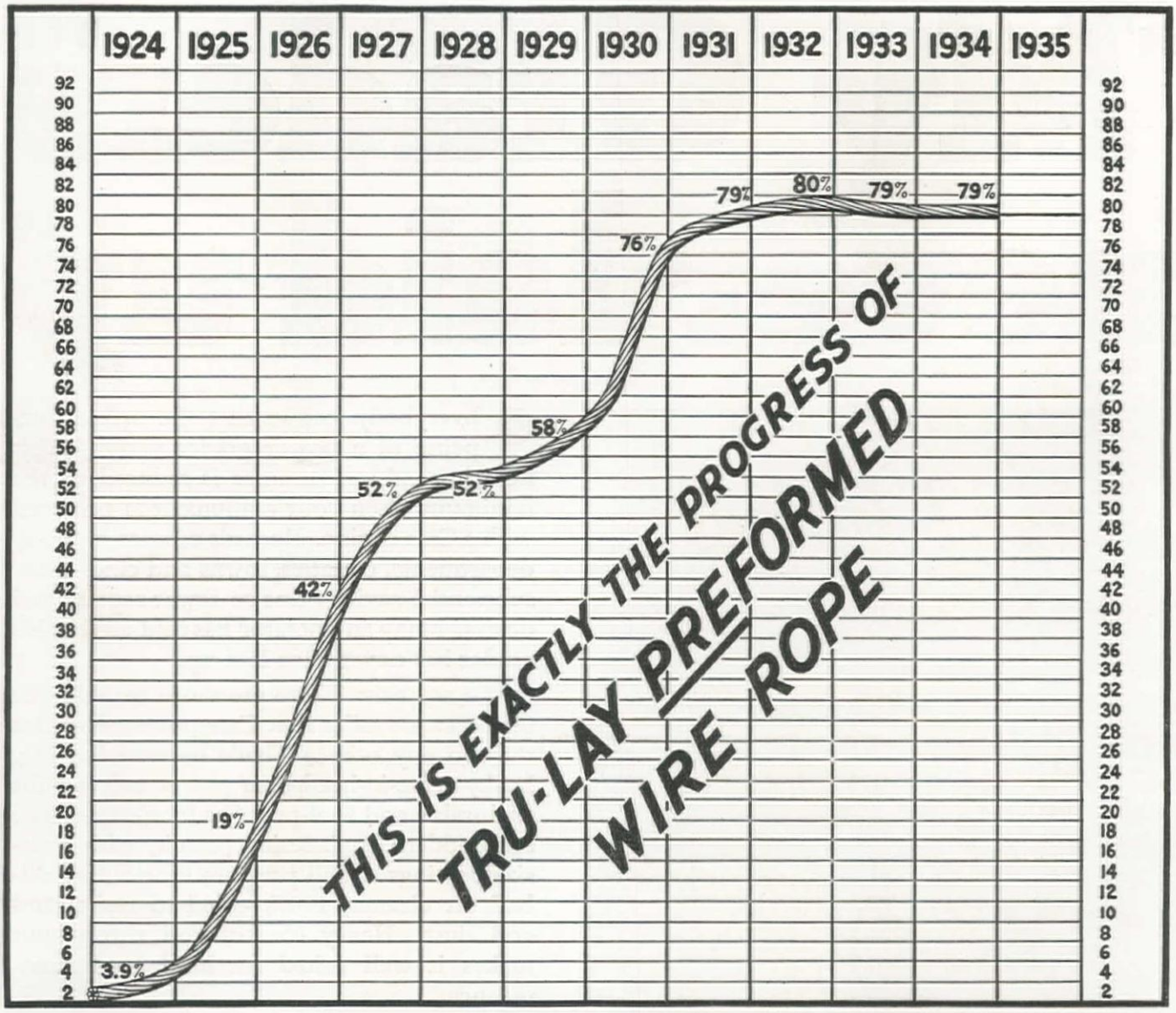
Model "LI"
FOR LARGER GRADERS WITH 10 to 16 ft. BLADES.

CASE

The Modern **POWER** *for Road Maintenance*

J. I. CASE COMPANY, Oakland, Los Angeles, Salt Lake City, Portland, Spokane, Billings

When writing to J. I. CASE COMPANY, *please mention Western Construction News*



TRU-LAY Preformed Wire Rope was introduced by the American Cable Company, Inc., in 1924. For many years we had made a high grade non-preformed rope and we still make it under brand name of "Crescent." In fact, non-preformed was the only type made and sold by any manufacturer from the production of the first wire rope in 1846 to the year 1924 when the American Cable Company perfected and introduced Tru-Lay Preformed.

During 1924, the first introductory year of Preformed Wire Rope, "Tru-Lay" accounted for 3.9 per cent of American Cable Company's entire sales volume.

Once in actual service, "Tru-Lay" proved itself so far superior to the non-preformed type of wire rope that by 1925 it commanded 19 per cent of the American Cable Company's volume. In 1926, Tru-Lay jumped to 42% of the total; then in 1927 to 52%; 1928—52%; 1929—58%; 1930—76%; 1931—79%. Since then it has been hovering around that high percentage.

Gentlemen, those figures prove that "Tru-Lay Preformed" gives longer service.

We will gladly send you either literature or a representative, without obligation

AMERICAN CABLE COMPANY, Inc.

San Francisco: 425 Second St. • Tacoma: 2312 East "E" St.
Los Angeles: 841 Petroleum Securities Bldg. • Wilkes-Barre, Pa.

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2724 First Avenue So., Seattle, Wash.

NATIONAL EQUIPMENT CO.
Salt Lake City, Utah

NRA CODE

ACCO

TRU·LAY *Preformed Wire Rope**

*** PREFORMING IS A PATENTED MANUFACTURING PROCESS APPLICABLE TO ANY TYPE, GRADE, CONSTRUCTION AND LAY OF WIRE ROPE**

"Paying for dead horses"

never builds a good highway system!

ROADS that need constant, costly maintenance and reconstruction, keep the taxpayer always "paying for dead horses." Year after year his taxes are paid, yet there's not enough money for new highways, widening, grade separations and other permanent improvements.

What a difference when each year's program includes new concrete highways! How they stand out in the midst of inferior roads! If there's anything calculated to create and keep up public interest in good roads, it's this *contrast* of fine, enduring concrete with makeshift surfacing. Concrete is the standard by which all roads are judged.

As you get more concrete and less inferior roads, annual maintenance costs are cut, releasing more and more funds for *new* roads, arterial streets, bridges and grade separations.

All the needed data including proved formulae, sketches and details necessary in the design of concrete pavements as engineering structures are yours for the asking. Write nearest office.

First cost of concrete is less than that of any other pavement of equal load-carrying capacity.

Only for concrete are basic engineering data fully worked out to enable you to design pavements at minimum cost to carry any anticipated load.

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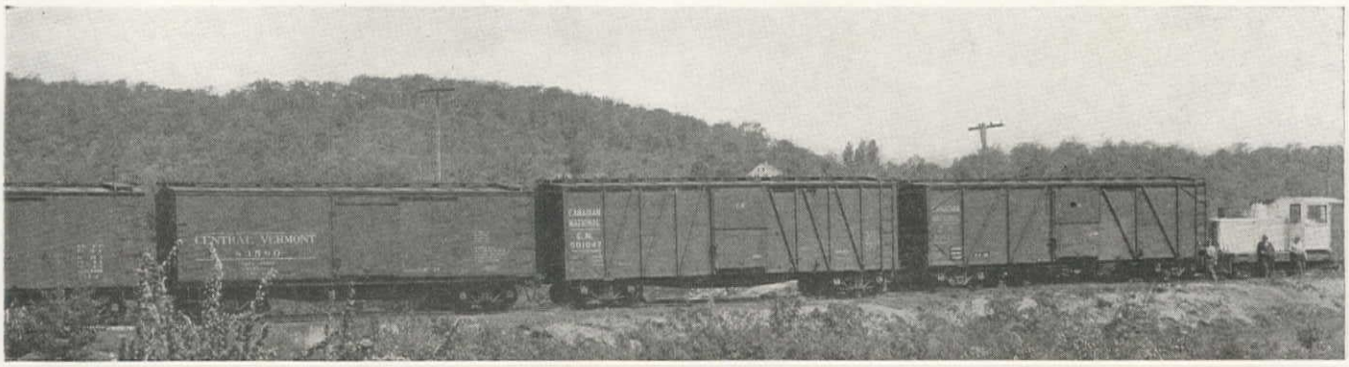


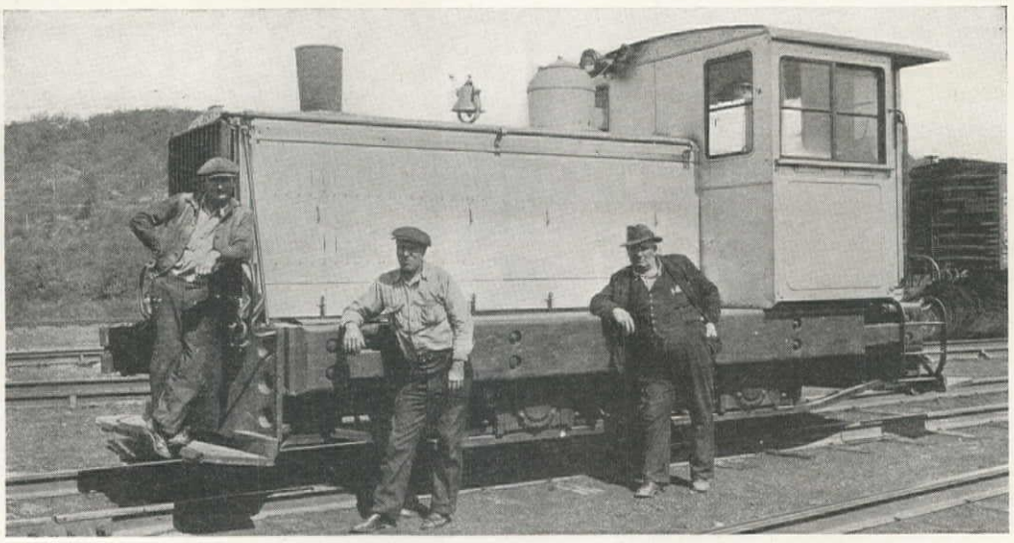
Wickwire Spencer Steel Company Purchases 25 TON PLYMOUTH

Wickwire Spencer Steel Company's 25 Ton Plymouth Locomotive is kept busy switching cars . . . handling incoming freight consisting of rods, coal and lumber . . . and outgoing freight consisting of wire and wire rope.

Coal cars containing from 100,000 to 160,000 lbs. are spotted on a trestle at the end of a 600 ft. 3.3% grade . . . lumber cars are spotted the same way . . . and other cars carrying a net load of from 80,000 to 120,000 lbs. of freight are carried up a 4% grade.

Approximately 100,000 TONS of material are handled each year, most of which is hauled 1900 ft.—the full length of the yard.

Where there's a switching problem to be done, you can count upon a Plymouth Locomotive to do it most economically. Cost of operation figures from hundreds of plants substantiate this statement. Free bulletins upon request.



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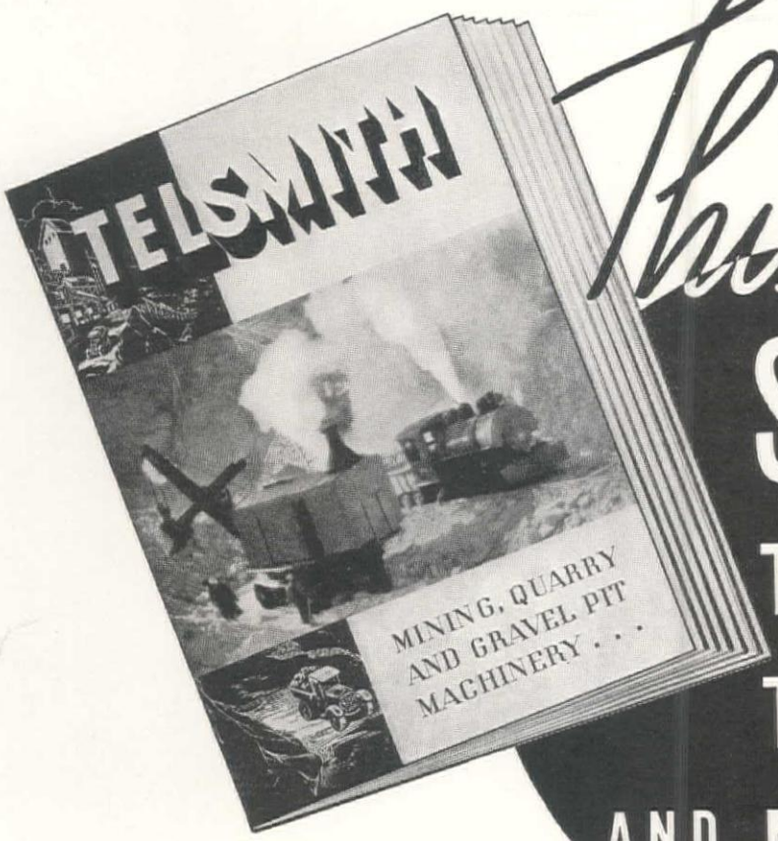

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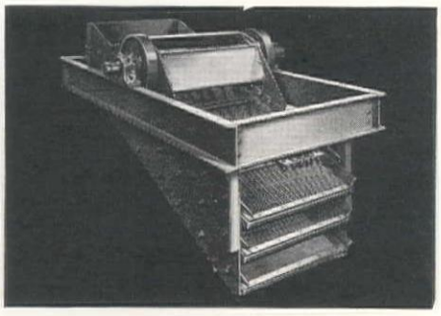
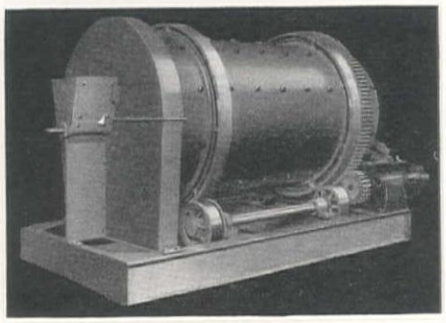


THE NEW TELSMITH PULSATOR



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Authoritatively written, it describes and illustrates the most modern equipment now available. Every machine is designed and built to give you faster production and lower up-keep . . . to enable you to meet today's conditions and operate at a profit.

You'll want to know about Telsmith's latest engineering developments —the New Telsmith Pulsator and the New Telsmith Super Scrubber . . . latest improvements and new sizes of Telsmith crushers, plate feeders, gravity tanks, log washers, etc.

And this book contains the first table ever published by any manufacturer for figuring the capacities of vibrating screens of any size, and with any number of decks—of Telsmith or any other make of vibrator operating on the eccentric principle.

On every type of equipment . . . from crushers to bin gates . . . you'll find the book a dependable guide that will save you time, trouble and money. Sent without cost or obligation. Write for Bulletin E-30.

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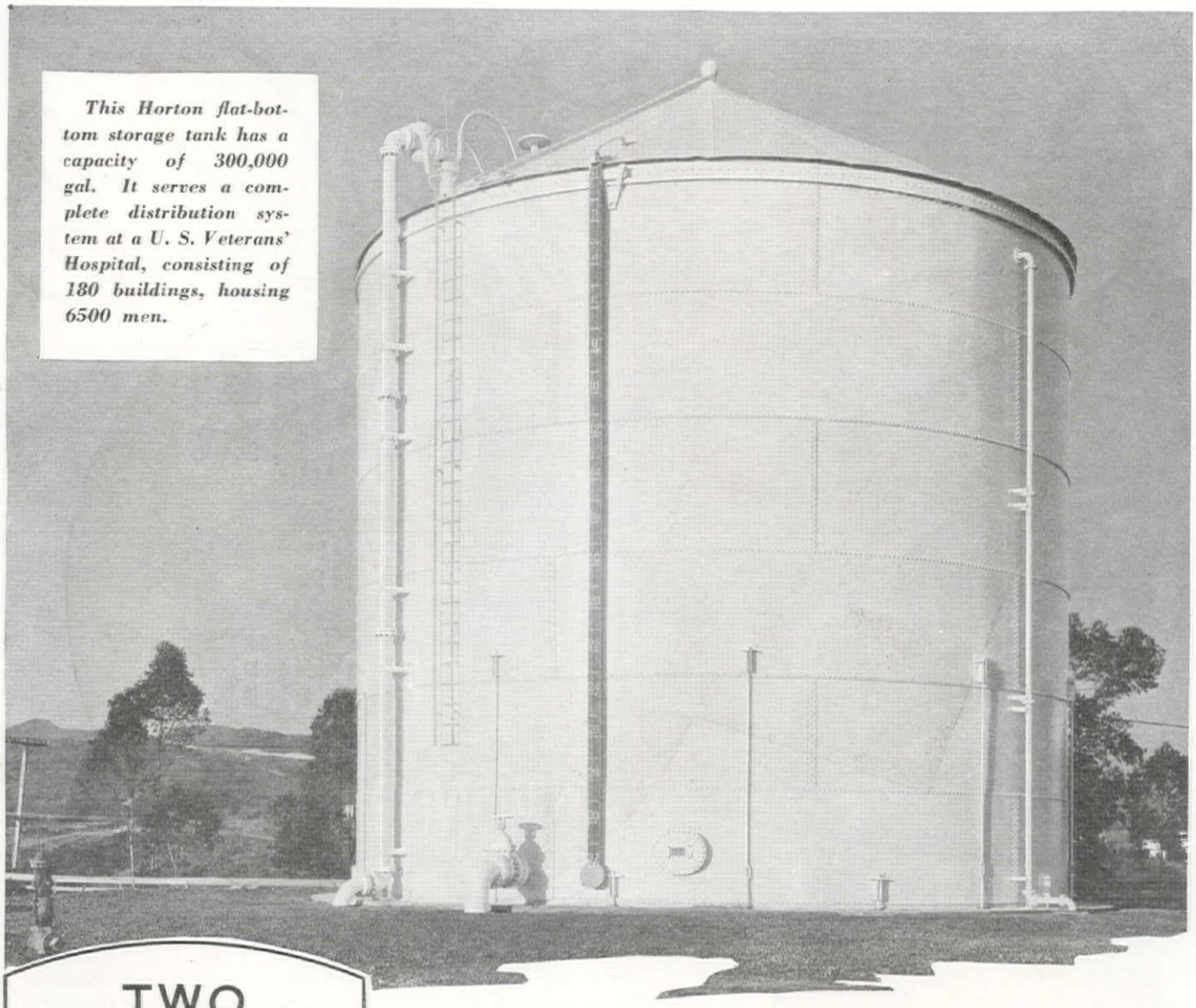


This Horton flat-bottom storage tank has a capacity of 300,000 gal. It serves a complete distribution system at a U. S. Veterans' Hospital, consisting of 180 buildings, housing 6500 men.

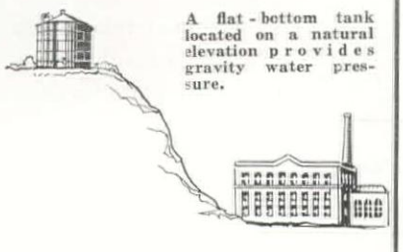
Unique Water Supply for Veterans Hospital

No pumps are needed in the new water system at the U. S. Veterans Hospital at W. Los Angeles, California. The flat bottom storage tank which supplies the water is filled from the adjacent Los Angeles aqueduct, carrying a pressure of 180-lb. at this point.

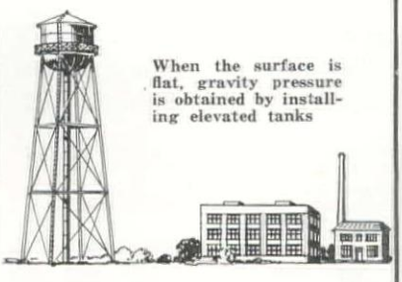
The water flows to buildings for fire protection, general service, sprinkling and irrigation is by gravity because the tank is located on a hill approximately 150 ft. above the average level of the ground.

Our nearest office will gladly give you full information for estimating on any type of water supply to meet your conditions—municipal, industrial or institutional.

TWO Types of GRAVITY WATER SUPPLY



A flat-bottom tank located on a natural elevation provides gravity water pressure.



When the surface is flat, gravity pressure is obtained by installing elevated tanks

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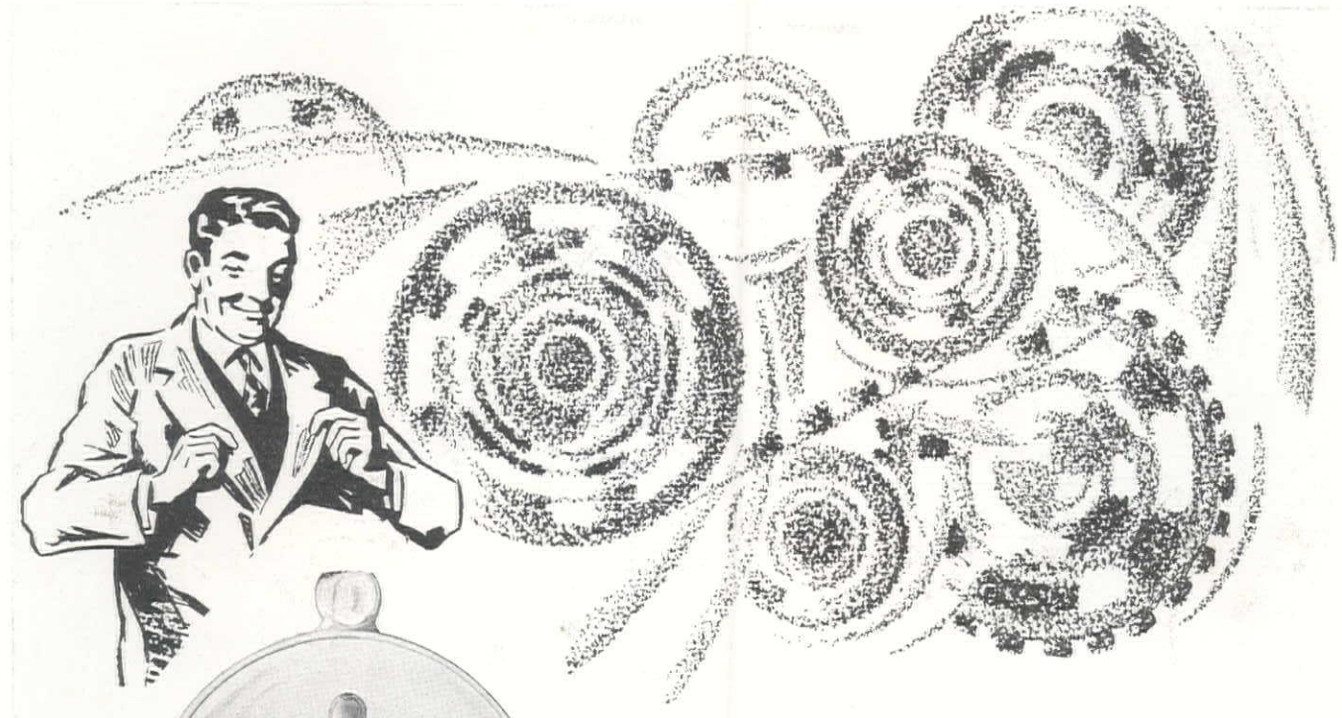

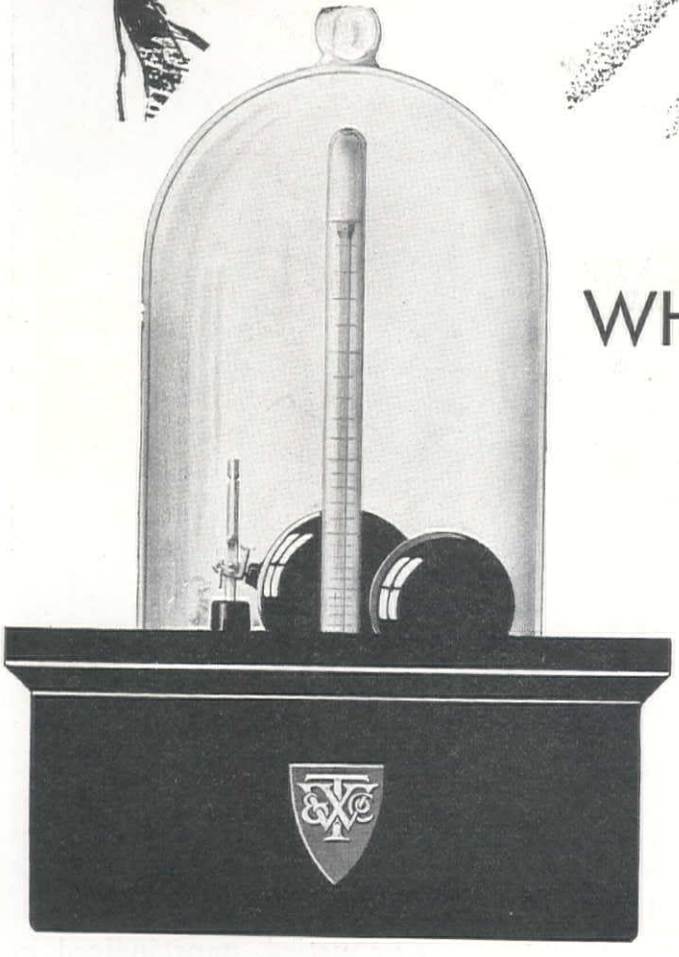

"The Only Safe Water is a Sterilized Water"

"WATCH THE WHEELS GO 'ROUND"

Watching the wheels go 'round used to be a fascinating boyhood pastime. For most of us it's now an obligation and any sign that the wheels are not turning steadily means "get busy."

It's easy to "watch the wheels go 'round" in W&T Vacuum Chlorinators because the working parts are under the glass bell jar, always in plain sight. Don't play "hide and seek" with trouble—know what's happening by installing W&T Visible Control Vacuum Chlorinators on your plant.

Technical Publication No. 38—a copy free—tells all about them.

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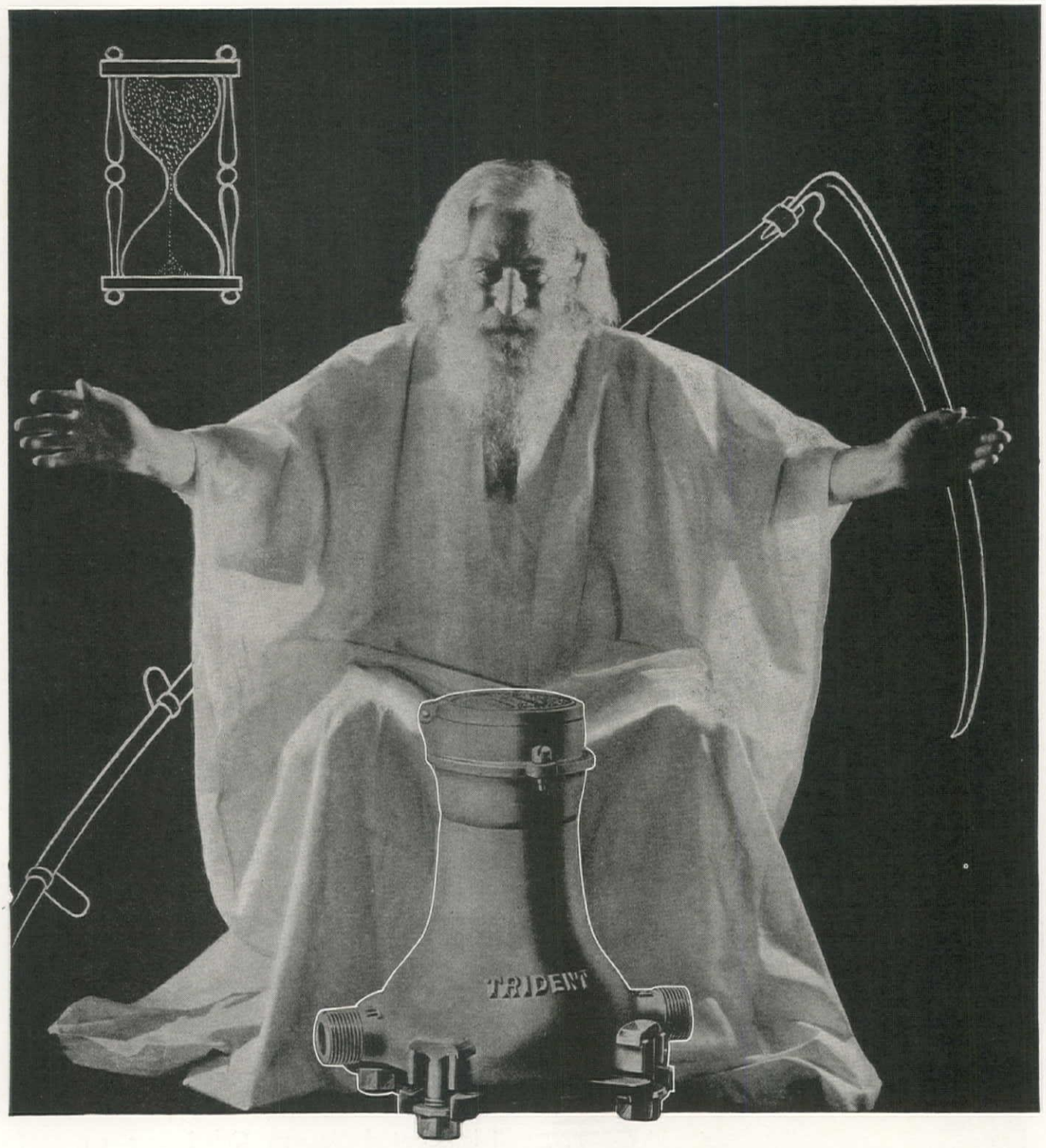


Time . . . the supreme tester. Time . . . the supreme judge . . . unhurried, unprejudiced in collecting the evidence . . . just in his conclusions . . . devastating in his final verdict where man-created objects cannot resist his never-ceasing, ever-changing, searching tests.

What equipment in the water works field, during the past 30 or 40 years, has NOT been rendered obsolete and its value destroyed by Time . . . except Trident and Lambert Water Meters!

Let us tell you about Trident and Lambert INTERCHANGEABILITY . . . what it means, in keeping the same Water Meters you buy NOW profitably efficient, continuously new and modern for long years to come.

Neptune Meter Co. (Thomson Meter Corp.) 50 W. 50th St., N. Y. C. . . . Neptune National Meters Ltd., Toronto, Canada

PIONEERS IN METER PROGRESS—YESTERDAY—TODAY—TOMORROW

Water Prolongs

The Life of This Tank

There's one important difference between a Federal Wood Tank and that of any other construction . . . that difference is economy. *Economy* . . . Not alone in first cost but in maintenance costs over a long period of years.

In the first place, here is a type of storage tank that defies all of the elements. Nature gave this material its resistant qualities to withstand water, heat, cold, and time itself. A life of 30 to 40 years is not exceptional for Federal Wood tanks, and during that time, maintenance costs practically nothing.

Whereas metal tanks require painting—both outside and inside—at least once a year, a Federal tank needs painting only as often as its appearance needs improving. Think this over. Interpret it in terms of continuous service as well as cost. There are never service interruptions—for there is no draining and refilling—

Freezing weather is no obstacle to a Federal Tank. The cellular construction of the wood seals it against cold. Two inches of wood is equal to 20 inches of steel in insullation against cold. Likewise, in hot weather, the water is kept cool, fresh, and pallatable for drinking purposes. Then, after summing up all of the advantages just mentioned, consider the low first cost . . . the ease of installation, and the portability in case of location change.

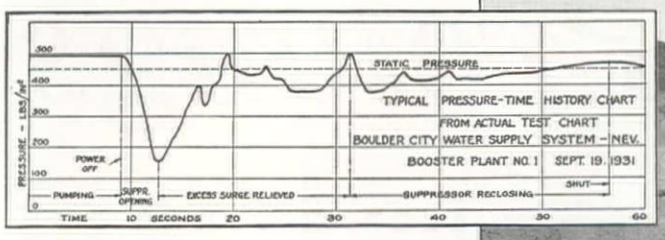
No matter what your liquid storage problem may be, consult with our engineering department. Expert counsel and advice are at your command whenever the occasion arises. Simply send your inquiry to: FEDERAL PIPE & TANK COMPANY, 5332 24th Avenue, N. W., Seattle, Washington. P. O. Box 5055, Ballard Station, Seattle, Washington.

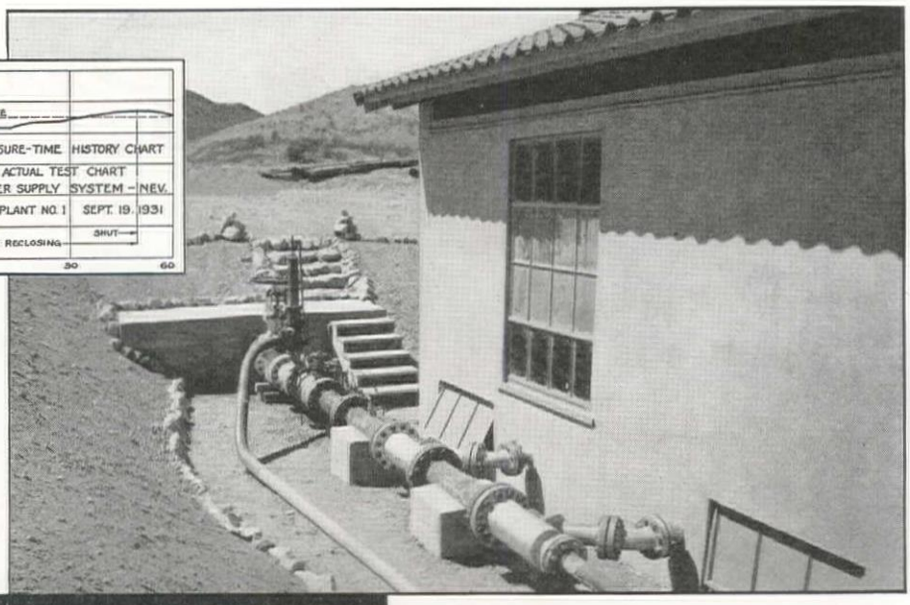
7 Reasons Why Federal Tanks are Most Economical to buy

1. **More durable—Have a life of 30 to 40 years.**
2. **Most practical regardless of service requirement because of lowest first cost.**
3. **Superior in low upkeep cost — Requires no painting.**
4. **Easy to transport—easy to handle—without costly labor.**
5. **Insulation against heat and cold is unequaled—removes freezing hazard.**
6. **Keeps water supplies fresh and cool in all weather.**
7. **Not affected by corrosion—for all purposes for which tanks are used.**

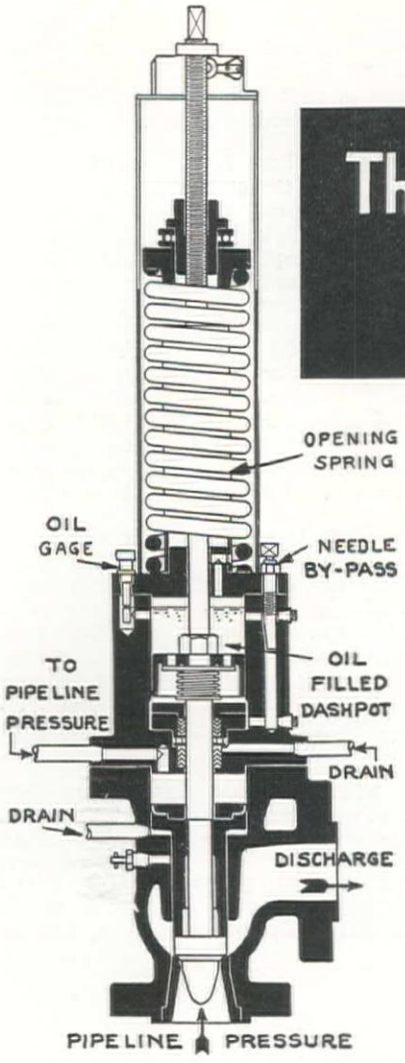
F. P. & T. CO.

FEDERAL CREOSOTED DOUGLAS FIR TANKS





The Chart Tells The Story



POWER interruption occurs. Three pumping units, delivering a total of 1350 g.p.m. against 1130 ft. head, cease to operate. The main line check valve must function immediately to prevent dangerous reverse rotation. Such an emergency, as in the case of Boulder City, precipitates a potential water hammer sufficient to break the discharge line were it not for a Pelton surge suppressor installed to relieve the excess pressure.

The suppressor opens immediately by action of a compressed spring as the line pressure drops, remaining open to relieve the returning surges, actually limiting line pressure to that of initial pumping pressure. When the water column has come to rest, the line pressure automatically recloses the surge suppressor, restoring normal conditions.

Such performance typifies that of other Pelton pressure control units for water works systems, including altitude valves, check valves, pressure regulators, automatic gate valves, air valves, flap valves and throttle valves. All are described in our new bulletin No. 29. Copies mailed on request.

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

120 Broadway, New York — 2929 Nineteenth Street, San Francisco — Paschall Station, Philadelphia

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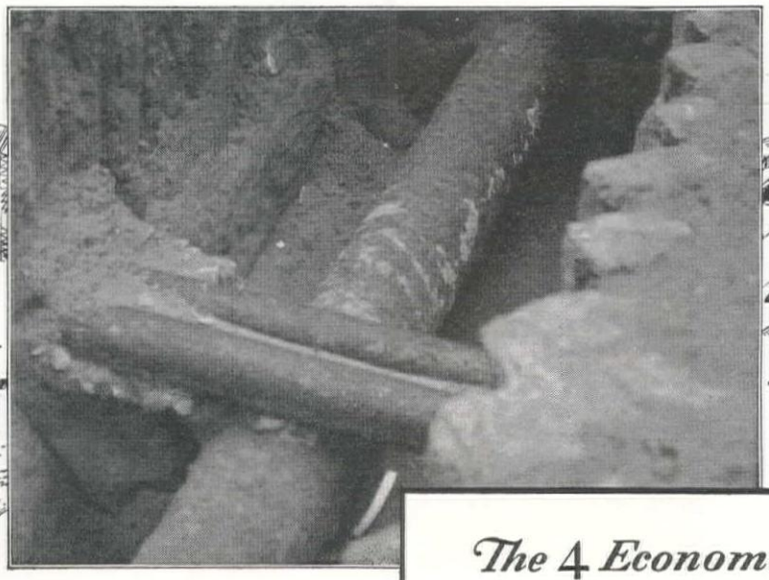
New 75 Years Ago "Good as new" Today

San Francisco laid this cast iron pipe in the days of the Pony Express.



THIS unretouched photograph shows at the bottom of the trench an 8-inch cast iron water main installed in San Francisco in 1859 and still in service. When this old pipe was uncovered in January 1932 for the inspection of Mayor Rossi and other city officials, it had been in continuous service for 73 years and was in excellent condition. It is a section of the *first* cast iron water main laid in San Francisco.

In older cities of Europe and the United States, cast iron mains still in use, after serving 100 to 200 years and longer, were recently uncovered and inspected. All were in satisfactory condition for further service. Thus, evidence accumulates to prove that the useful life of cast iron pipe is *more than a century.*

The reason for the long life and low maintenance cost of cast iron pipe is its effective resistance to rust. Cast iron is the one ferrous metal for water and gas mains, and for sewer construction, that will not disintegrate from rust. This characteristic makes cast iron pipe the most practicable for underground mains since rust will not destroy it.

The 4 Economies of Cast Iron Pipe

1. Official records of cast iron pipe laid 100 to 200 years ago and still in service, prove that it is *cheapest in the end.*

2. Official reports on file in the office of a prominent technical publication, prove that cast iron pipe is *cheapest to maintain.*

3. Long-lived pipe obviously causes less street-opening for replacements and repairs. Therefore, cast iron pipe *saves money on street-openings.*

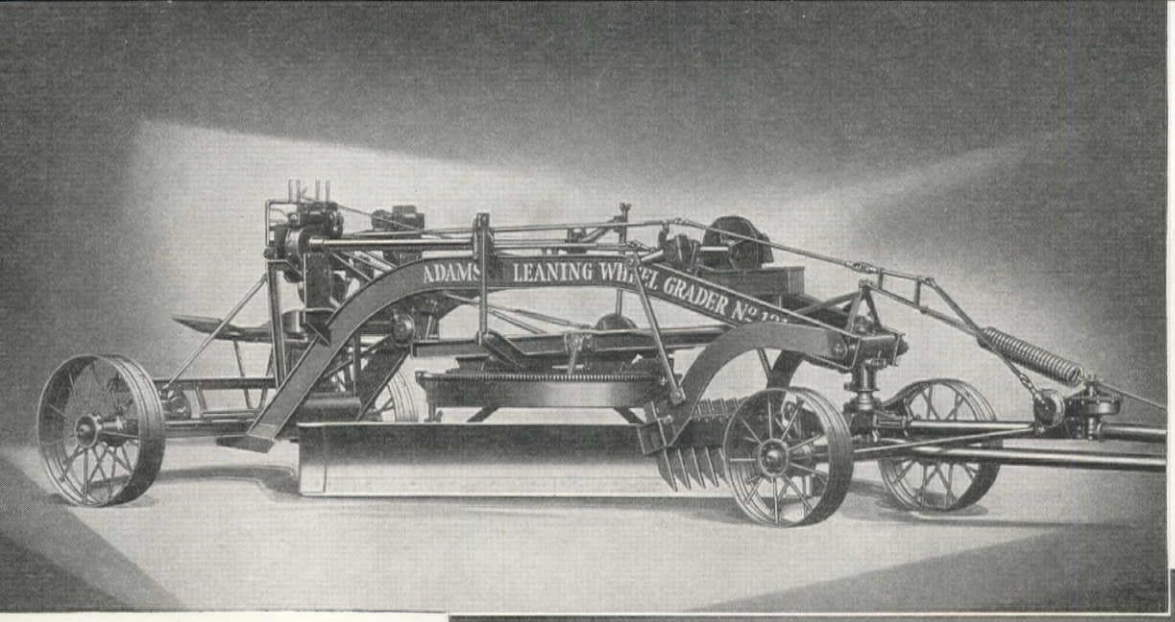
4. When replaced by larger pipe, or a main is abandoned or rerouted, cast iron pipe *pays a final dividend in salvage value.*

For further information, address The Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, 309 Peoples Gas Building, Chicago, Ill.

Methods of evaluating bids now in use by engineers rate the useful life of cast iron pipe at 100 years

CAST IRON PIPE

Look for this TRADEMARK REG. *trade-mark*

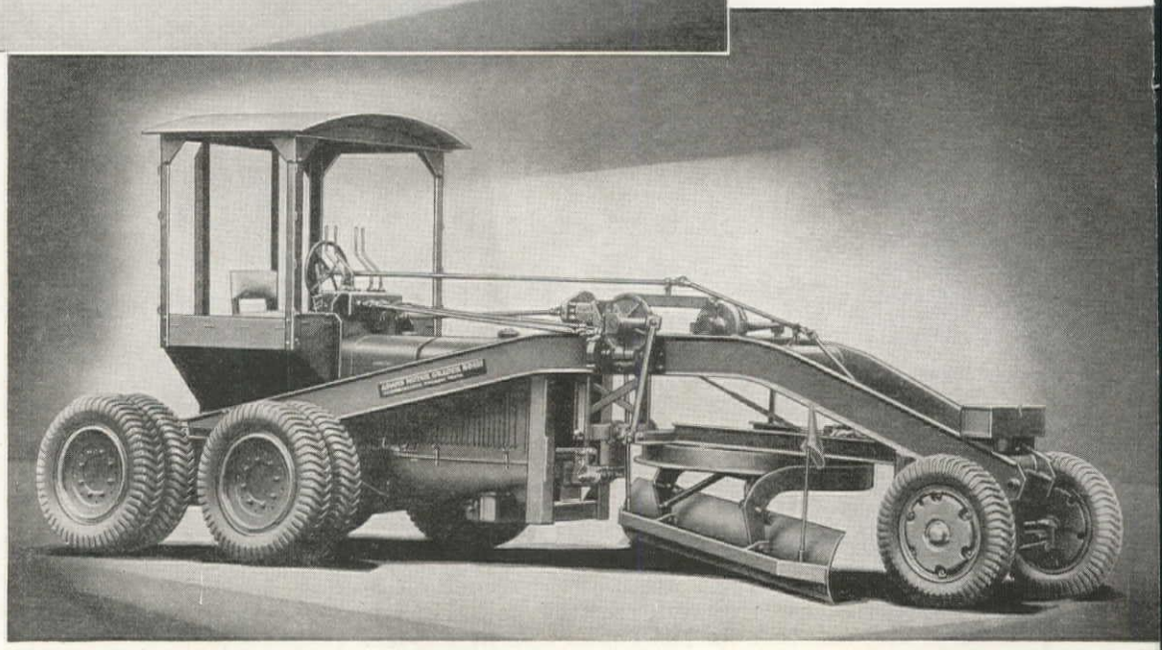


ADAMS
Leaning Wheel Graders

● Furnished in 7, 8, 9, 10, 12 and 14 foot blade lengths for any size of tractor, with or without scarifier and with hand or power-operated controls on larger models. All are adjustable for high bank cutting.

ADAMS
Motor Graders

● Have the power, traction and stamina to "go through" whether the job is surface maintenance, ditching, scarifying or "oil mixing." Furnished with dual-tired, two-wheel drive or Adams Tandem Drive with four or eight drive wheels. Available with 10, 12, 14 or 16 foot blades, with or without scarifier and with hand or power-operated controls.



Modernize in 1935...

● The use of obsolete, worn-out road machinery is false economy—always. In the hands of a contractor it is a handicap in competing with modernly equipped firms. In the hands of highway officials it means needless waste of taxpayers' money . . . Modernize in 1935 with Adams up-to-date road machinery and get your money's worth.

Each type of Adams machine shown here stands "ace-high" in its class—each will produce the maximum results possible per dollar of investment and operating cost—and each is of all-welded, machine-finished construction to give you a long life of dependable service.

Adams Road Machinery is sold and serviced in every state of these United States—wherever you are or wherever you go there is an Adams representative nearby to serve you. Write today to any of the offices listed below and let us send you complete descriptive literature on machines in which you may be interested; we shall give you also the name of your local Adams representative. Before buying *any* road machine see what Adams offers.

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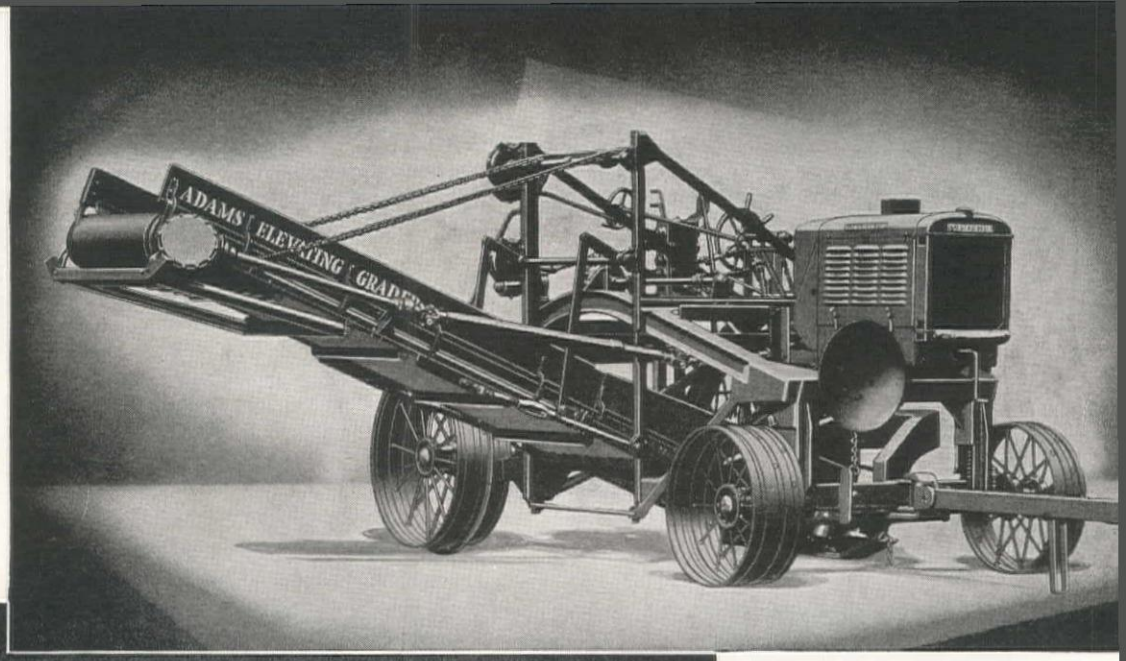
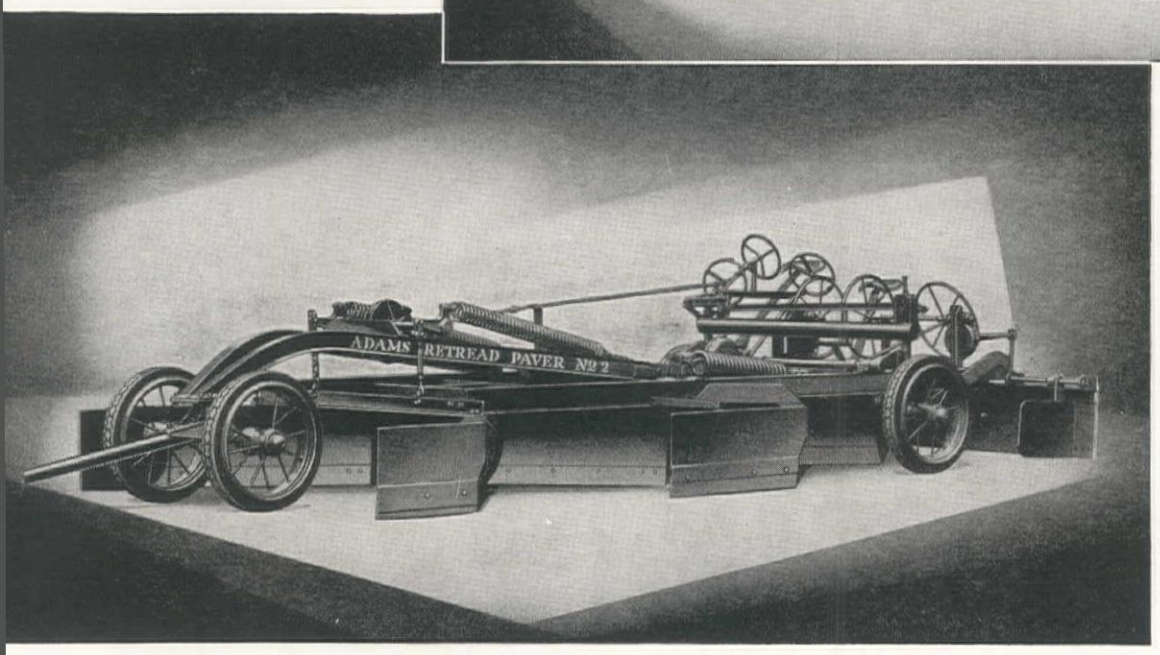
● Have several exclusive features which make them unequalled for capacity and stability. Furnished with 19, 22 or 25 foot carriers; 42 inch or 48 inch belts and with hand or power operated controls.





ADAMS Retread Paver

● The outstanding, moderately-priced machine for "road mix" jobs. Thoroughly mixes tar, asphalt or road oils with stone, gravel or other aggregate and spreads it to specifications ready for rolling. Mixes quicker and cheaper, and finishes much better than is possible with single-blade machines. Also ideal for mixing and spreading on calcium chloride stabilization work.

RIGHT: Adams "Multiple Blade" Maintainer

Has 40 feet of blades which work the road surface *four times* in one trip. Unequalled as "chatter bump" remover on gravel and stone roads. Also used for light retread.

BELOW: Adams Terracer

Not a road machine but one in which federal and county officials will be interested for terracing to prevent soil erosion as advocated by the U. S. Soil Erosion Service. Write for special descriptive folder.

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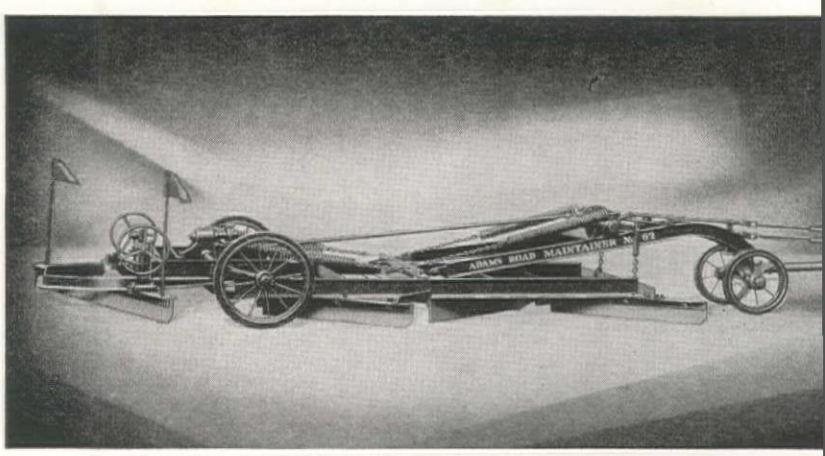
The Adams Line also includes Rotary Scrapers, Fresno and Drag Scrapers, Plows and Drag and Grader Blades for all makes of machines.



ROAD
ADAMS
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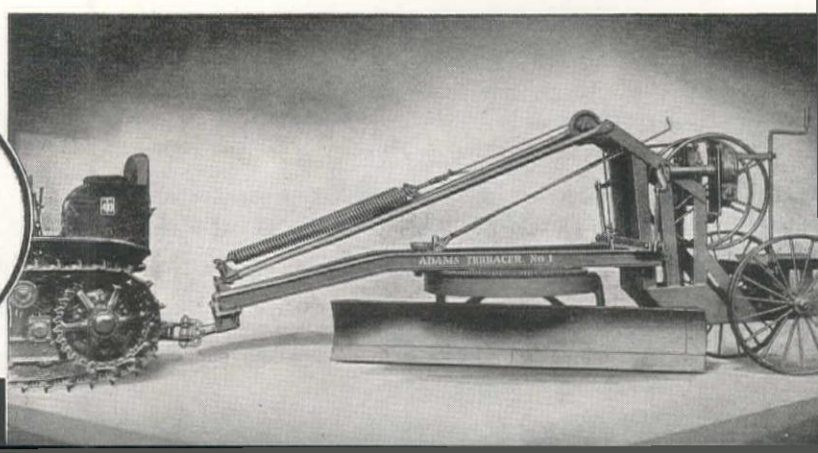


WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

January, 1935 Vol. 10, No. 1

G. E. BJORK, Acting Editor
H. W. PYERITZ, News Editor
R. P. BRYAN, News Editor

Stop Raids On Gas Tax Money

This is the time of year when state legislatures convene, and we suppose it will mean a lot of tampering with gas tax funds. This plainless, pay-as-you-go means of financing the construction and maintenance of state highways has produced sums of money which are tempting to even the sturdiest lawmakers; and at one time or another every state legislature makes an attempt to divert to other purposes the money which by law has been collected for the specific business of building and maintaining good roads.

Many such attempts will be made this year, and under the guise of objectives both noble and holy; so we think it may be well to point out certain facts in the matter, on the chance that some of our readers may wish to contact some of the members of their state legislatures.

A lot of men and organizations are working and planning constructively for the further relief of unemployment that are not yet settled back into the routine of economic stability. Careful studies made by the U. S. Bureau of Public Roads quite clearly show that no form of unemployment relief has been as effective as highway construction and maintenance. It provides a wide spread in payroll distribution, both urban and rural; and at the same time it gets something done that benefits the whole country in a permanent way.

Earl Lee Kelly, California Director of Public Works, recently said, "I want to impress upon the minds of our legislators and citizens that every available road dollar is needed and can be put to work at once. There is no such thing as an idle highway surplus lying around awaiting necessary projects to which it can legally be applied; and there never can be for the next ten years at least. There are always more projects demanding attention than there are funds to pay for them."

"For example, when the current biennial budget was being prepared, projects totalling more than $90,000,000 were urged upon the Highway Commission by civic and official delegates from all parts of the State; and the available funds for construction projects amounted to only $34,000,000."

The inadequacy of funds for urgent highway improvements is a vital problem in every one of the eleven western states. It is a problem, too, with which the people themselves are intimately acquainted, because we are a motoring nation. Time and time lawmakers and politicians have been warned by the people in many states that the gas tax should be used for roads, and for no other purpose. Moreover, the Federal government has in no uncertain way expressed its own opinion of gas tax diversion, through the Hayden-Cartwright act. This act definitely stipulates that funds from the Federal treasury for Federal aid shall be curtailed to those states that permit gas tax diversion, other than an amount obligated prior to passage of the Act.

By the provision of this Federal law, future gas tax diversion will decrease road funds in the eleven western states in the sum of approximately $8,000,000 yearly. Surely the loss of such an amount of money will work a real hardship on every community in the west, and cause further unemployment and distress. Honest legislatures, especially if they sense the public mind, will make certain that gas tax funds are not diverted to other purposes, or loaned to other state divisions under any guise. The one certain way to accomplish this is by enacting laws which secure gas tax money to its original purposes.

In Step With National Planning

The planning of public works, so definitely stimulated by the program for recovery, has developed a new angle in the concept that in this nation we are a community of states. We now discover that a disasterous drought in the upper Mississippi valley quite definitely reduces the market there for California oranges and the apples of Washington and Oregon. We also learn that a water shortage in California has its effect on the business of the shoe manufacturer of Saint Louis and the machine tool maker of Cincinnati. The problem of the development of adequate water supply, irrigation, flood control, and electric power is no longer a matter of concern to the west alone; it is a matter of national concern, requiring sound planning on a national basis.

Step by step, since its establishment in 1902, the U. S. Bureau of Reclamation has shaped its policies to this broad national idea. Even such widely separated projects as Grand Coulee and Boulder dam are closely related in the broad program of development of water, land, and power. Under the present national administration the plans of the War department, Forestry Service, Indian Service, Bureau of Reclamation, and other agencies are being coordinated in an orderly and comprehensive plan. Such coordination will prevent the useless spending of millions of dollars; and will produce the greatest good for the greatest number of people.

The planning and administration of these great developments is no fool's play; and in the west we are fortunate in having Federal men of broad training and experience to direct a program of reclamation and irrigation estimated to cost $225,000,000, of which sum $108,000,000 was allotted in 1934. These great projects will finally be financed in the west, because by Federal law reclamation projects are required to be self liquidating; but the gain is to the nation, both now and in future generations.

Building a Much Happier Nation—We Call It

During 1934 major construction contracts actually awarded in the eleven western states reached an all-time high of $300,000,000. Corresponding figures for 1933 were $240,000,000, and for 1932, $146,000,000. In these figures for 1934 are not included such force-account projects as Boquet canyon dam and pipe line, the Mono tunnel for the Los Angeles water department, or other similar developments by public and private utilities. To these totals should also be added the expenditures for relief administered by SERA and other agencies in this region, amounting to the impressive sum of $170,000,000.

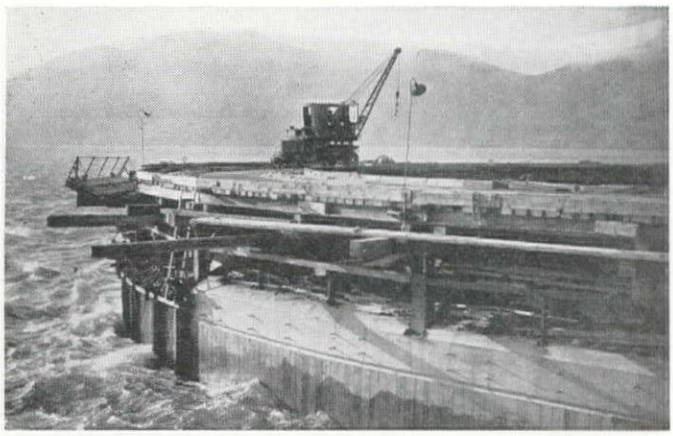
We hear much talk about priming the recovery pump, with much discussion on both sides of the question; but we definitely know, and every westerner will acknowledge the fact, that in the great construction program of 1934 was found the key to unemployment relief, and the means of a general quickening of business.

But in the long view of the program are to be found benefits which in their magnitude bedwarf all the advantages, needed as they were, which immediately resulted. The development of much-needed systems of water supply and sewage treatment will provide facilities for the creation of greater and more permanent national wealth. The building and improving of highways and bridges will quicken the transportation of the products of the west, and speed the recovery of western industry for the nation's benefit. Hydro-electric projects, flood control programs, and irrigation systems will provide westerners and the nation with new and better tools for the production of greater wealth and better living. The present generation will clearly feel that advantage of these improvements; and to coming generations their value will be multiplied ten fold.

The program should be continued, not only in point of immediate advantages, but in the broader view of planning now for a greater, happier, more productive nation. A number of worthy projects, both large and small, are pending with PWA; and many others can be submitted on short notice. Continuing the construction program under PWA will provide maximum unemployment relief, stimulate work by contractors and manufacturers, and allow states, municipalities, and improvement districts to proceed with work which otherwise could not be attempted.

A public works program for 1935, equal to or larger than that of 1934, will serve a three-fold purpose of further stimulating private capital to function properly, developing and constructing much needed public improvements, and increasing employment of idle hands.

Tidal Currents of Hazard in Fender Construction



Fender Wall Completed to Height of 15 ft. Above Water. Construction Trestle and Portion of Concrete Forms Are Still in Place.

In construction of the San Francisco pier and fender many obstacles, peculiar to this specific job, were encountered and a solution effected. Located as it is in Golden Gate, the bottle-necked opening to San Francisco bay, rough waters with unfavorable tide conditions, and frequent storms created an ever-present menace to the satisfactory completion of the work and necessitated adjustment of the method employed in construction of the fender to conditions as they developed.

Now that the fender is completed to a point where it has been pumped out for use as a caisson in construction of the pier, a tribute to the engineering and construction skill of the chief engineer and his staff and the contractors, is due, especially from those skeptics who said, 'It can't de done."— Editor's Note.

Difficulties that have arisen in construction of the San Francisco pier and fender and the methods by which they have finally been overcome is of great interest to the engineering and construction industry, and it is the purpose of this article to set forth the physical difficulties encountered in the work, and their effect in determining the method of construction finally employed.

The Site—The original pier site was on a serpentine ledge 1,100 ft. off shore from the sea wall, surrounding Ft. Point in water varying in depth from elev. —48 to —96 ft. This site is exposed to severe tidal currents having velocities of about 6 knots on the ebb and 5 knots on the flood. The Coast and Geodetic Survey shows a maximum tidal range of 10.3 ft. through the years at Ft. Point varying from elev. +7.9 to —2.4 ft. Should this 10.3 ft. range occur in one day it would result in a velocity on the ebb of 6.5 knots, and a pressure against a vertical plane surface at right angles of 162 lb. per sq. ft., according to Weisbach's formula. Actually such an extreme runout did not occur during the period of construction, and a maximum pressure of 130 lb. per sq. ft. was used in designing the contractor's important structures such as the guide tower and fender frame.

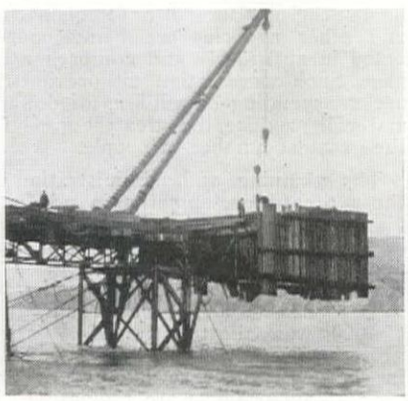
But severe as these tidal currents are, they are far overshadowed in their effect on the work by the pressures and impacts due to storm waves, which are a possibility at any time of the year and are more prevalent during December, January and February. Fortunately the working season from March 1 to October 1, 1934, was comparatively free of these storms, and the contractor was able to get the fender in a safe condition by the time the first storm occurred on the morning of October 9. The probable effect of these storm waves cannot be ignored even for an instant. On the two occasions when the contractor's work was in its most vulnerable condition, storms occurred which made necessary radical changes of the method of construction for future work. The first was on October 31, 1933, when the guide tower with three sections of the original fender unit fastened to it was twisted off at the ground and the second was on October 9, 1934, when the floating caisson was removed from within the fender and abandoned, for fear of destroying the fender structure already in place.

Water at the pier site is never still, and this fact had a profound effect on the methods used for the work. It may be possible to make assumptions regarding pressure of storm waves when tidal currents alone are considered. These assumptions fail if stresses set up in falsework structures due to being battered by floating objects are added to the wave effect. This was foreseen by the contractor from the start, and no operations were conducted with floating equipment except excavation at the pier site which was made by the dredge 'Ajax'. At times the boom point of the 'Ajax' pitched up and down 12 ft. in the heavy ground swells occurring at the pier site.

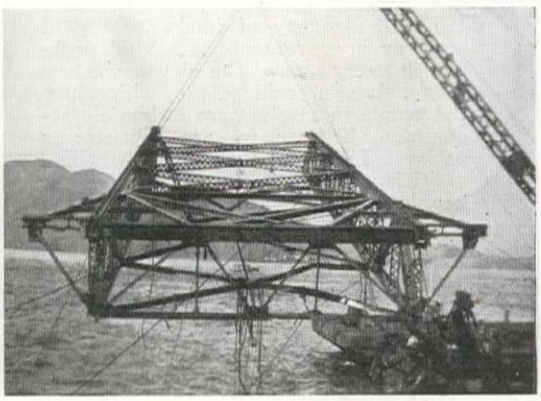
Mention should be made here of diving difficulties in connection with this work. More and more important operations as time went on were intrusted to the divers. Diving could only be done on slack tides, and there were two such periods of about 2 hrs. each at the beginning and end of the half tide runout. Under very favorable conditions 6-hr. diving time could be had in twenty-four. At lowest water the flood tide would start coming in from

Base Form Being Lowered With Whirley Derrick, June, 1934.

Lowering Base Form of AS Unit From End of Construction Trestle, April, 1934.



Removing Battered Guide Tower From Pier Excavation Following Accident of October 31, 1933. Note Bent Condition on Steel Members.



Golden Gate Create and Pier

Radical changes at vulnerable periods necessitated in erection methods during construction of Golden Gate Bridge south pier and fender

By FRED W. CROCKER

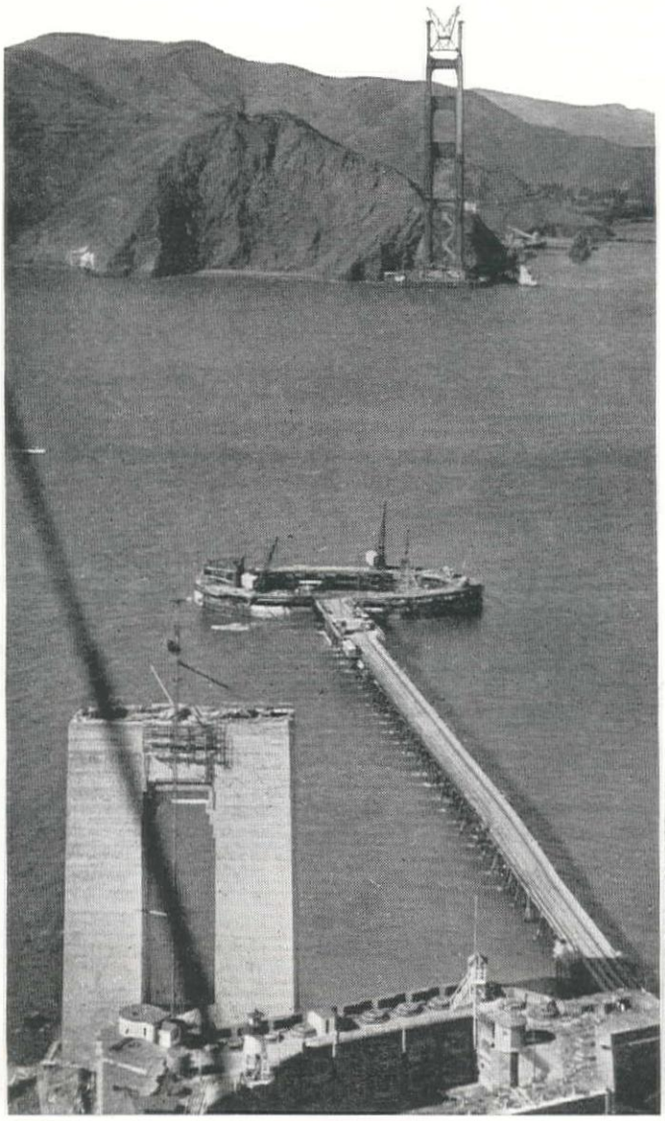
the south while the ebb tide was still running giving a rip tide effect at the pier site. At such times there was no slack water and conditions at highest water showed a short slack water period but insufficient for any accomplishment by the diver. When divers went down on the tides air hose and telephone lines were carried several feet away in the direction of the current, and they were whipped around in the surging water until there was danger of rupture. From elev. —18 ft. up it was difficult to do diving at any time, as divers would be tossed about by the surging water and in constant danger from injury from being hurled against the structure. Operations within this range were so conducted that nothing was required of divers except stopping leaks inside of forms in comparatively quiet water.

Original Plan—As originally planned the concrete fender consists of a wall 27½ ft. thick having pointed circular ends and extending completely around the pier (see June, 1933, issue, page 263, Western Construction News, for complete description). The fender, with a length on the axis of about 300 ft. and total width width of 155 ft. was to be built in twenty-two 33-ft. long units of tremie concrete to elev. —18 ft. This provided a solid base on which derricks could operate and track girders and track would be installed as a part of the steel frame for No. 1 unit. A Whirley derrick was to be pulled out onto this track and used to erect the steel frame for No. 2 unit which was provided with guide castings to slide down guide rails (see drawing) previously installed on the frame of No. 1 unit. In this way the entire fender could be completed to elev. —18 ft. Wooden cofferdams made tight before they were lowered into the water were to be provided in the steel frames above elev. —18 ft. It was the intention to pump out these wooden cofferdams and complete portions of the fender above elev. —18 ft. in the dry.

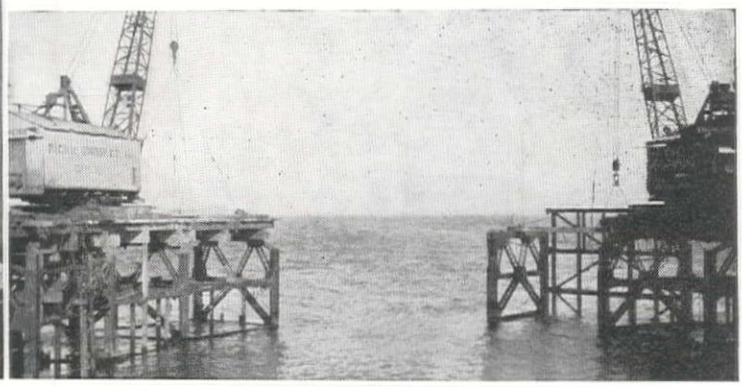
Regarding the system of notation, each of the 22 main divisions of the fender as shown in plan is known as a unit, the different types being A, B, C, D, E, and F. Thus 2 C L N is the second C unit on the left north half. Each unit is divided into 6 vertical sections about 20 ft. in height, weighing in general about 20 tons. These are numbered from the top down, the base being section No. 6.

Originally the contractor was to build the fender on natural rock at the site before excavating, then construct the caisson inside of the fender at the site and make the entire excavation inside the cutting edge. This would have meant lowering the caisson on sand jacks as excavation proceeded from the highest rock level, elev —48 ft. to the lowest at elev. —100 ft.

In view of the short time allowed for construction, the objection arose as to the possibility of long, dangerous and aggravating delays in settling this caisson, the largest in the world, through 52 ft. of rock, all of which would require blasting from under the cutting edge. To obviate this, it was proposed by Moran and Proctor, consulting engineers for Pacific Bridge Co. that excavation be made in the open, the height of fender be extended, and the base of the fender be founded on the slope of the open excavation for the pier. This course was finally adopted, and embodied in the revised plan for building the fender.



View of Golden Gate Showing San Francisco Pylon (in foreground), Construction Trestle, and Fender, and Nearly Completed Tower on Marin Shore.



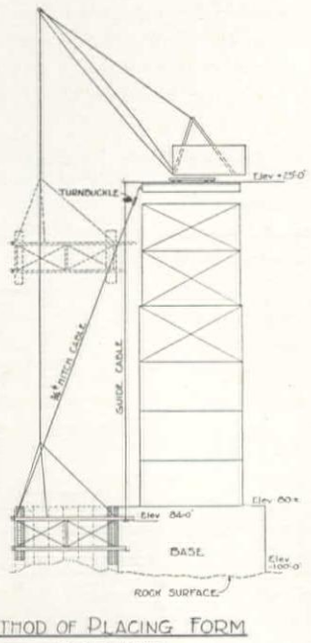
Replacing Bents at East End of Fender Following Removal of Caisson. Side Frame Being Lowered on Right Leg.

As a substitute for the full pneumatic caisson method a 35-ft. deep blanket of tremie concrete was deposited on the foundation rock upon which the caisson was to be placed. Eight inspection wells were embedded in this concrete base. These wells consist of large diameter pipes having belled bottoms which rest on the foundation material. However, new difficulties resulted from the increased height of the fender, as revealed by the accident on October 31, 1933, later described. The fender as finally built was carried to the full depth of pier for its total width of 27½ ft. and had an enlarged footing 10 ft. wide on the inside and what the slopes would permit on the outside.

The Guide Tower—Assuming that the method of erecting the fender in sections as originally planned would be successful the contractor was faced with the question of how the original unit would be erected in proper position and held during concreting. The method devised was by means of a steel guide tower 8 by 30 ft. in plan and 100 ft. high with suitable guide rails for the first unit to slide down. The tower, weighing 50 tons, was brought to the site fully assembled on a barge. It was up-ended by the dredge 'Ajax' and a timber A-frame which had previously been installed at the end of the trestle. The four legs were lowered into four 26-in. diam. steel tubes with cast steel points which had been previously driven in proper position at the site after which the legs were concreted therein. The top of the guide tower was braced against the end of the trestle and held in position by 6 cable guys to pipe anchors driven into blasted holes in the rock. Jaw castings on the first fender unit engaged vertical rails on the front of the guide tower permitting it to slide down into position. Wooden blocking under the jaw castings of the fender units facilitated accuracy to adjustment in alignment and position.

The first installation of the guide tower was made late in October, 1933. The four tubes were driven in the slope of the pier excavation at about elev. —75 ft. Difficulty was encountered in blasting holes in rock 100 ft. below water accurately enough to permit the legs of the 8 by 30 ft. tower entering into the tubes. It is believed that in this first installation the necessary field alterations did not materially weaken the tower where it emerged from the ground, which is its point of greatest bending moment. In an effort to cut down stretch of guy cables under load, 2-in. wire center guy cables were used and made as short as safety of pipe anchors would permit. Unfortunately after three sections of the first fender unit (about 75 ft. in height) had been installed on the guide tower and riveted together, a severe storm arose and the steel had to be lowered to the ground in an effort to save it, hoping that storm waves would pass completely over it. As a storm abates, a series of huge, well developed rollers follow in the storms' wake and it is these rollers that embody the most destructive force and in this case were responsible for wrecking the tower. The top of the guide tower proved to be inadequately fastened to the end of the trestle and these huge, well formed waves striking the 100-ft. high structure caused the guy cables to stretch and a harmonic motion was set up in the top of the tower. The top of the tower moved 6 in. back and forth and dangerous stresses were set up where it emerged from the ground. A wrenching action was set up in the rock at the base of the tower by this harmonic motion and on October 31, 1933, the tower and three fender sections it supported slid down into the excavation of the pier, carrying away also the last bent of the trestle. Moving the wreckage it was found a large block of the rock surrounding the tower legs had had been wrenched off and slid into the pier excavation along with the three fender sections.

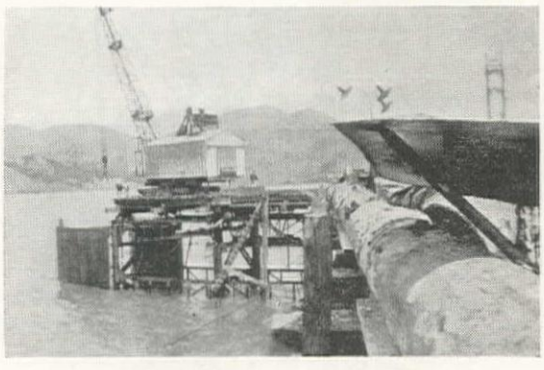
Development of New Plan—The first plan contemplating building the fender in vertical units from elev. —100 ft. to elev. —18 ft. with a wooden cofferdam on top provided that the original unit after concreting would have to develop stability against wave and current action not only for itself but also for the adjoining unit. Stability studies indicated that the resultants for the assumed conditions would be slightly outside the middle third. Since the slight margin of safety might prove insufficient because (1) the wave force might exceed its assumed value, (2) vibratory motion might be set up in a group of completed units. and (3) the steep slopes of the pier excavation, which underlay a part of the fender base, might not be entirely free of loose rock, it was decided that for the safety of operations while constructing the fender, an enlarged base would be necessary for each unit, providing greater lateral stability. The excavation was enlarged so that the entire fender rested on a level base at about elev. —100 ft. The completed sections of the fender were lowered and concreted one section at a time instead of one unit so that a complete concrete ring was constructed up to elev. —38 or —41 ft. all around, before any of the structure emerged from the water from elev. —38 or —41 ft. up to elev. +23 ft. This horizontal instead of vertical method of construction permitted storm waves to pass over the top of the completed concrete and exposed a minimum of obstruction to waves and currents until the fender ring was completed. Columns of the fender frame above that point were anchored to the column sections embedded in the base through 3½ in. pins placed by divers. These developed an uplift capacity of about 350,000 lb. per column, and this was considered ample to provide for any waves action.



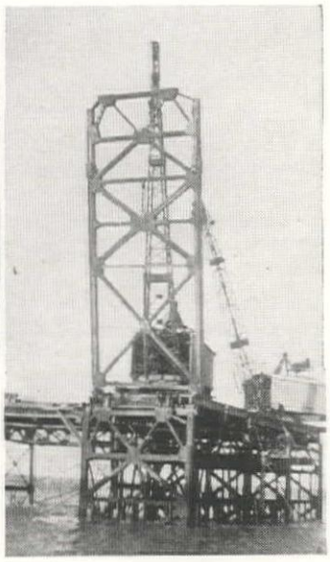
METHOD OF PLACING FORM OTHER UNITS

(On left) Method of Placing Concrete Form Adjacent to a Completed Concrete Base Section.

Whirley Derrick Lowering Unit 2CLS, May, 1934. Note Guide Beams Projecting Above Water.



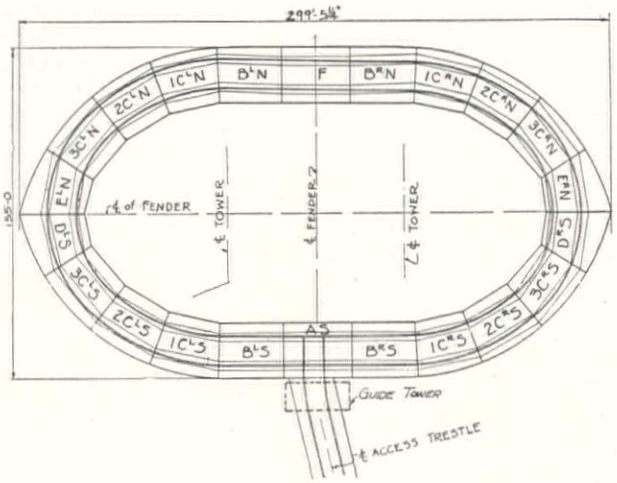
The original intent was to make the bottom sections of steel to fit the rock slopes as excavated. It was found impossible for the contractor to furnish measurements three weeks in advance to facilitate shop fabrication so the method of constructing the base section to elev. —80 ft. was changed A rectangular shaped cage of 18-in. I-beam wales about 45 ft. wide and one unit (33-ft.) long assembled at the site was lowered on tight cables or tricing lines engaged in plates projecting from the adjacent base unit. Wooden panels 5 ft. wide suitably weighted with concrete blocks were lowered on tight cables to the wale frame. Divers then clamped these panels to the frame and stopped minor openings between and under the forms that might leak con-



(Upper) Lowering Bottom Section Of AS Unit On Guide Tower, October 25, 1933. Note Jaw Castings And Wooden Blocking To Facilitate Aligning. Three Such Sections Were On Guide Tower At The Time Of Accident One Week Later.

(Right) End Frame Bent ICRS In Position For Lowering. Width Of Bent Is Approximate Thickness Of Fender Wall.

(Below) Plan Of Fender Showing System Of Notation And Relative Position Of Access Trestle And Guide Tower.

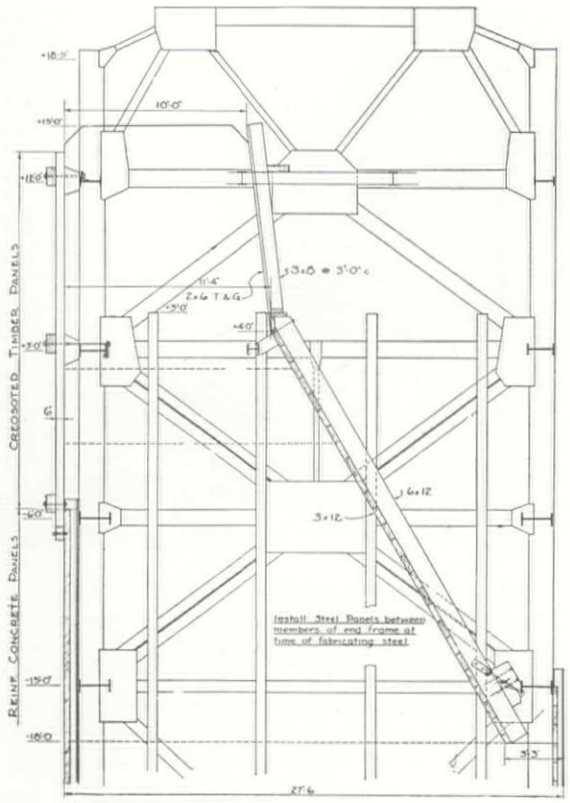


crete. These wooden forms and wale frames were removed after the concrete had set and were used over and over. This method proved successful in providing the adaptability to changing conditions so necessary in work of this kind. It relieved the shop of all but standard work and changed their operations to a strictly production basis of getting out standard units planned months in advance.

Fender steel as fabricated into panels about 33 by 20 ft. in area, as large as could be handled over the company's material wharf near Crissy field. These panels were transported in a vertical position one-half mile to Ft. Point in counter-weighted trucks. Assembled fender sections were 20 ft. in height, 33 ft. long and 27 ft. 6 in. wide, and weighted about 20 tons each. From the assembly wharf they were transported to the outer end of the trestle on cars fitted with two sets of wheels at right angles operating on the track previously used by Whirleys. Here a right angled turn to the Whirley track on top of the fender was made by screwing down the second set of wheels on the car. The box forms and wale frames were transported to the rear of the fender Whirleys, picked up on a high boom, swung around and lowered to position after booming out. The plan to build a trestle across the fender site and attack the work at four points, as described in June, 1933, issue Western Construction News, was abandoned in favor of working on two fronts because it was not feasible to maintain a trestle in 105 ft. of water against the existing current and wave action. Whirleys pass completely around the end on curves of 55 ft. radius and the closure was made on the north center section F. Two Whirleys were found able to erect fender units as fast as steel could be fabricated, assembled and brought to them.

Progress—Following the accident which wrecked the guide tower rock at the guide tower location was excavated to a depth of elev. —95 ft. and new holes were excavated for the guide tower and new tubes driven. The guide tower after removal was lengthened 20 ft. and repaired and on March 12, 1934, was again set in place. In the writer's opinion the tower as altered to fit the tubes, which were driven less accurately than for the first installation, this time had only about half its original strength in bending. To compensate for this apparent weakness a form was lowered around the guide tower and a block of concrete was poured around it up to elevation —80 ft. embedding all the weakened parts in concrete. Care was taken to make a rigid connection from the top of the guide tower to the end of the trestle through steel members fully developed. By April 24, 1934, the base of the first and second units were concreted to elev. —33 ft. and since then progress has been rapid and consistent. On August 16, the ring was completed to elev. —38 or —41 ft. all around and on July 4 the first two units were completed above water to elev. +15 ft. On September 7 all of the fender concrete had been carried above the water to elev. +15 ft. excepting the eight easterly units, for which the steel bents and deck were to be removed to admit the caisson. Eight easterly units above elev. —41 ft. were removed on October 5 and 3 days later the caisson was towed in place inside the fender wall. The next morning a storm arose and the caisson rolled and pitched inside of the fender with sufficient force to crush the wooden floats that had been provided to keep it away from the fender steel, and break several of the mooring lines. Several of the fender frame members were badly bent, and because the surging of the caisson might endanger all the work already done, the contractor requested and received permission from the chief engineer to abandon the caisson and use the completed fender as a cofferdam. It was removed that evening. Work was then resumed on replacing the steel at the east end of the fender and all the fender concrete was in place on October 28. Concreting of the main fender units to elev. —38 or —41 ft. was done at an average of one every 5½ days, two Whirleys doing all of the work, one serving each end of the fender.

A few days delay were experienced in placing panels in the deep fender base sections at the east end. These panels varying in height to 26 ft. (between elev. —80 and —106 ft.) and were placed at a time of strong ebb cur-



TYPICAL SECTION
(FROM -18' TO +15')

Typical Section Showing Location And Method Of Fastening Forms For Upper Concrete Work.

rents. Several of these panels were wrenched from the wale frames by the ebb current even at these great depths. An improved method of fastening by the divers obviated the difficulty.

Emerging from Water—In bringing the fender wall up from elev. —38 and —41 ft., steel end frames in the form of bents were erected complete on the concrete at this level to furnish a support for inside and outside wall forms. Divers were used for pinning the columns to steel connections below.

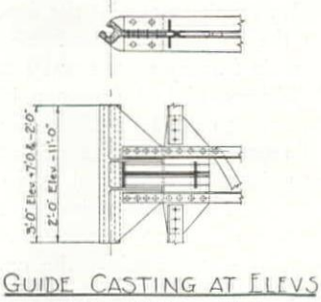
Panels of reinforced concrete were used for wall forms on the outside face of the fender wall up to elev. —6 ft. and creosoted timber panels, properly weighted with concrete blocks were used on the inside up to elev —15 ft. Side frames of 8-in. beams placed vertically at 6-ft. centers from elev. —38 to 3 ft. along the inside and outside face of the bents provided a means of sliding the form panel into place. Rails on the column faces facilitated sliding the side frames into place. Guide beams from elev. —6 ft. up on the front and from elev. —14 ft. up on the back were removable by disengaging them from slots on the steel work below. Diver work becomes particularly difficult in the region from elev. —15 ft. up to the water surface because of the surge of the water back and forth. Since it was nearly impossible within reasonable time to assemble by means of divers tight cofferdams that could be pumped out a concession was obtained whereby the upper portion of the wall could also be poured in the water. Reinforcing steel was previously lowered to place in vertical mats and secured by divers. The front form forms were sloping panels about 8 ft. wide of 6 in. by 12 in. studs and 3 in. by 12 in. sheeting. The lower end was lowered to position and clamped to the side frame wales at elev. —12 and +3 ft. It was drawn hard against the top of the concrete panels at elev. —6 ft. by cables attached to steel work in the rear and above the water. Rear forms were sloping panels about 8 ft. wide of 6-in. by 12-in. studs and 3 in. by 12 in. sheeting. The lower end was drawn up against a steel wale at the elev. —15 ft. by cables extending above the surface and was supported at the upper end by a steel truss member at elev. +3 ft. with steel brackets and hook bolts. Above elev. +4 ft. rear forms were built of 2 in. t. & g. sheeting and 3 in. by 8 in. studding. End forms were made by providing permanent 8 in. steel guide beams on the end frames up to elev. +5 ft. Between these beams concrete or steel bulkhead panels were properly keyed and lowered into place. The 16½ in. space occupied by the end forms was carried across by welding in a steel plate panel on the end frames between elev. —4 and —18 ft. Openings larger than an inch might result in loss of concrete and divers were necessary to stop these leaks.

Features of the Design—Several details of the design deserve comment. The interlocking device which facilitated sliding one fender section down on another consisted of a cast steel jaw casting designed to slide on a 104-lb. crane rail with 5/16 in. clearance all around the rail head. Large stresses are transferred through these jaws and a crane rail was chosen because of its 1-in. web providing ample strength against lateral bending. Crane rails were riveted to the column plates and were of such high carbon content it was necessary to anneal and strengthen them before they could be drilled for rivet holes.

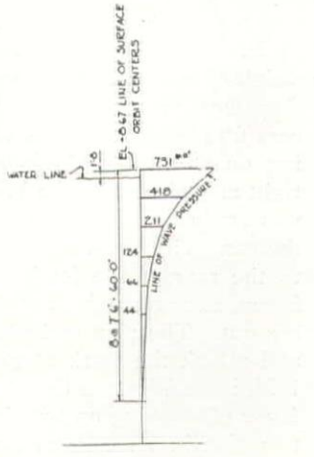
Sides and end bulkheads of the fender sections below elev. —38 and —41 ft. consisted of ⅛-in. skin plate, horizontal stiffener angles at 3 ft. centers, and 8 or 9-in. beams spaced vertically on 3 ft. centers, all welded. Such construction resists a concrete pressure of 200 lb. per sq. ft. according to experiments done a few years ago at Rensselaer Polytechnic Institute. Similar construction has become standard for steel caisson work recently done on Mississippi river.

The tricing line connections for entering the pin plate of a descending base section over the pin of another base section already in place are essentially a long cable socket with hollow pipe pins fitted loosely over. The pin is placed over the socket and the assembly inserted in the lower pin plate already in place. The upper end of the socket is of pilot shape to guide the descending pin plate over the pipe pin. When entry has been properly made the socket is detached by driving out a wedge. In connecting the columns under water a protruding extension was

(Left) Jaw Castings On Guide Tower For Guiding Fender Units Into Place Under Original Plan. .Right) Pressure Diagram Which Was Developed To Facilitate Design of Necessary Structures.



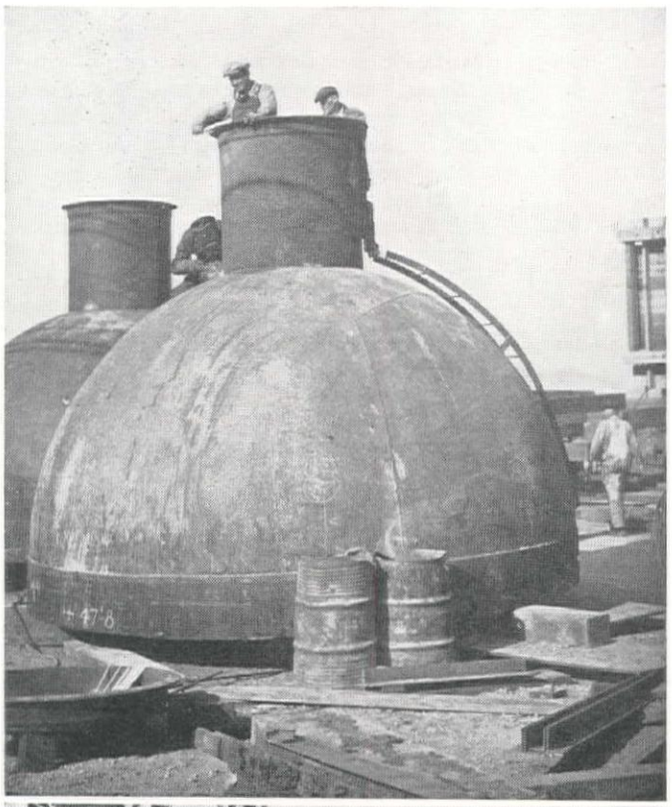
GUIDE CASTING AT ELEVS
+7'-0", -2'-0" & -11'-0"

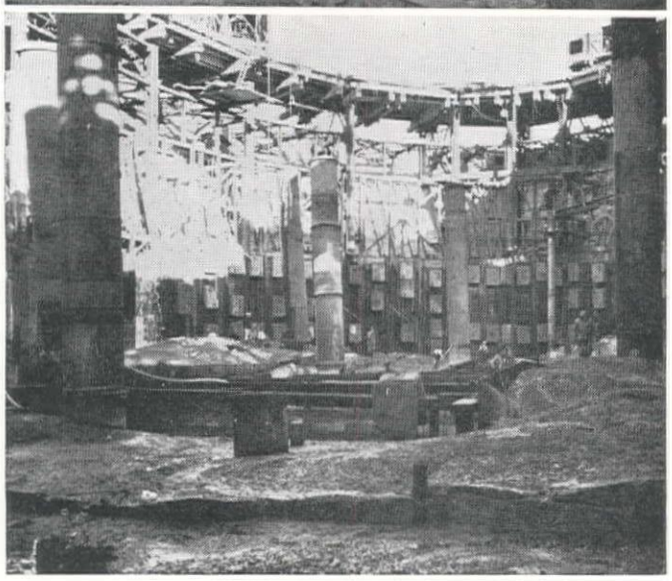


PRESSURE DIAGRAM
FIGURE 10

riveted to the open end of the column above. This extension was fitted with a pilot end and had a complete socket for guiding the pin to place. Pin holes would center automatically when the section being lowered came to rest on the one below. Pins were of S.A.E. 3,250 chrome-nickel steel and were figured for an uplift of 350,000 lb. per column.

Pipe anchors used for guying the guide tower and other structures consist of two 12-in. extra strong pipes filled with reinforced concrete equipped with cast steel points. These are driven about 15 feet into holes blasted in the rock. A cast steel clamp engages the pipe at ground level, and the 2-in. cable pulls on this clamp at such an angle that increased pull only develops more friction on the pipe. A 1½-in. turnbuckle rod ties the top of each main pipe to a lighter pipe driven about 17 ft. in the rear. These anchors were driven in 80 ft. of water, the clamps installed, and rods fitted with divers without much difficulty. They have held loads of 30 tons without a sign of distress or movement.





In making the closure on the north unit of the fender base below elev. —80 ft. surveys made of the pin plate locations by plumbing up through the water on the 3 C north units revealed an error of one foot in lining up the base forms. This was satisfactory considering the type of construction.

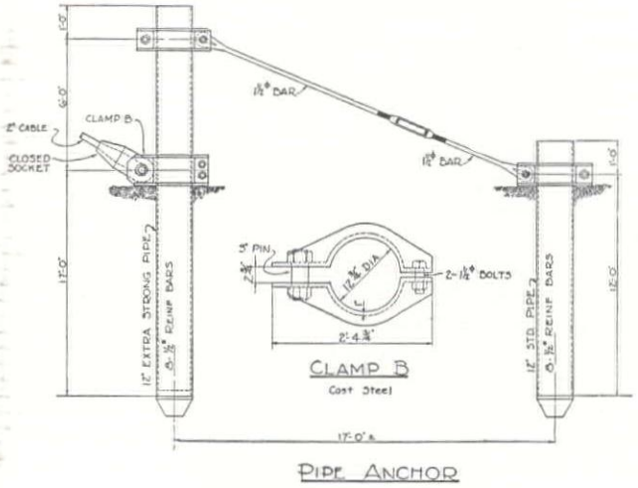
In closing the steel fender frame the final offset on F or closing section was about 1½ in. after applying a calculated correction to the third unit back and this was rectified by adjusting the upper lines of the concrete wall, so there is no perceptible lack of alignment to the eye.

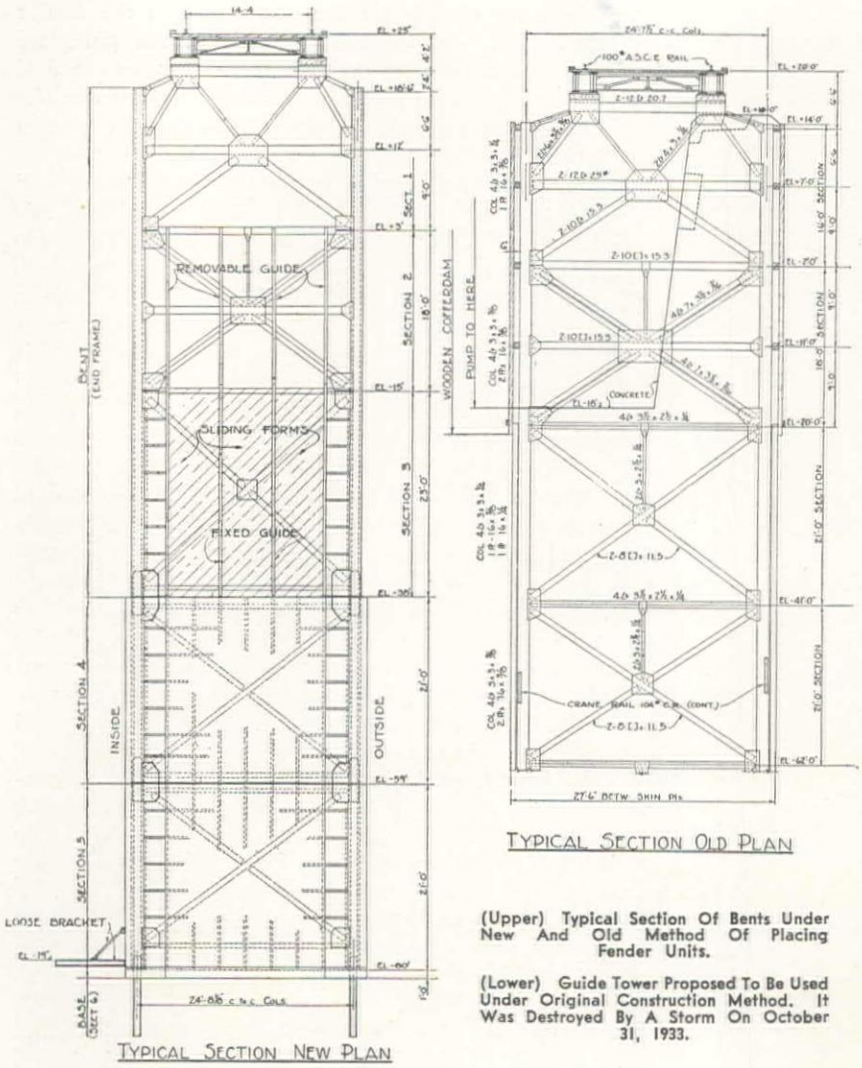
In a structure as highly fabricated as this where such huge allowances had to be made for weight of details, it appears offhand that welding would have resulted in marked economy due to reduction of details. The objections from the standpoint of the contractor are that all field connections would have had to be riveted anyway for the sake of time saving and accuracy. Some control rivets would have had to be used throughout all fabricated members to control the lengths to the nearest sixteenth inch. Welding around heavy members such as guide rails and jaw castings would have caused distortions in the adjoining members. Most important of all, welding has not proven satisfactory to the contractors in members subject to vibration, and vibration due to currents is what this structure was subjected to. Welding proved invaluable for minor connections such as skin plate to vertical beams, guide beams to wales, etc. Some concrete was lost when one of the guide beams supporting concrete panels broke its connection due to impact. The experience of the contractor is unfavorable to welding for the main frame of this structure.

Pressure of Storm Waves—To provide a rational basis of design for such a structure some assumptions must be made as to the pressure of storm waves. Of literature available on this subject, the most helpful was Gaillard's 'Wave Action on Engineering Structures', Professional Papers No. 21 of the Corps of Engineers, U. S. Army. From this data was developed the pressure curve for such waves as were liable to attack the structure.

This provides for maximum pressure of 731 lb. per sq. ft. 20 in. above normal water surface. This pressure decreases rapidly with the depth until at 20 ft. below the surface it is practically zero. Following the storm of December 13, 1933, which took out the trestle, doubts arose as to whether this wave allowance was adequate, and if it should not have been more like 3.5 tons per sq. ft., which

(Upper Left) The Belled Bottom Of Inspection Well. Note Relative Size Of Tube. (Lower Left) Interior of Fender After Being Pumped Dry On December 2, 1934. Note Floor Of Tremie Concrete At Elev. —35 And Inspection Wells Which Extend To Foundation Bed Rock. (Below) Typical Arrangement Of Pipe Anchors For Guying Guide Towers And Other Structures.





(Upper) Typical Section Of Bents Under New And Old Method Of Placing Fender Units.

(Lower) Guide Tower Proposed To Be Used Under Original Construction Method. It Was Destroyed By A Storm On October 31, 1933.

picking up of a 3-ton track girder and battering it around in the surf until bent almost beyond recognition, and the gigantic breakers which destroyed the trestle in December, 1933, all came on the flooding tide.

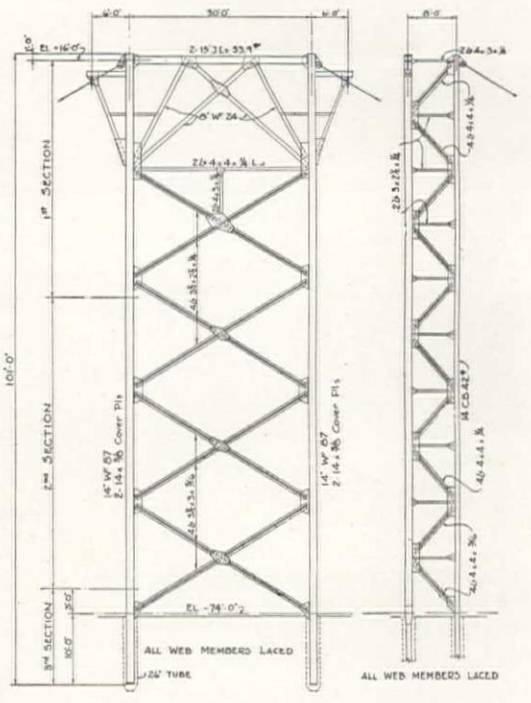
The Hydraulic Problem—The question naturally arises as to what effect the placing of this large obstruction in the swift tidal currents would have on the currents around the fender. The access trestle is built with a clear waterway of 43 ft. just south of the guide tower posts and from observations there the velocity is increased about 15% as the ebb current passes the easterly curved portions of the fender wall.

Method of Concreting—A proportion of seven sacks of high silica or 'pink' cement to the cubic yard was used for all concrete in the fender. All concrete in the fender was poured with the tremie using a 12 in. pipe. High silica cement amply justified the claims as to its free flowing qualities, and concrete would flow out almost level from the tremie pipe. The deck of the fender was high enough (elev. 25 ft.) that transit mixer trucks could discharge into chutes serving the tremie pipe at that level with clearance below for removing sections of tremie pipe. Equipment consisting of a complete wooden deck 27 ft. 6 in. wide around the fender which was completed as fast as the fender units were erected. Whirleys served efficiently for holding chutes and raising tremie pipes as needed. The final quantity of concrete in the fender is 75,687 cu. yd.

the elder Stevenson allowed for his lighthouses on the coast of Scotland, or if it was unlimited in amount, as Smeaton, builder of the original lighthouse at Eddystone, had concluded. Judging from experience at this location, it is the writer's opinion that at the fender site the allowance made is adequate, as no waves break at the fender. Further inshore, about 700 ft. off from the sea wall where the waves break on the trestle, it is recommended that double the assumed value be used, on account of both breaking of waves and larger concentration of impact on the small members of the trestle. No phenomenon that has occurred during two years at the site cannot be fully explained by pressures far lower than those given. But while the force may be finite in amount it can act in almost any direction except downward. Success in designing similar structures lies in providing rigidity against forces comng from any direction.

The greatest destructive force at the pier site comes from big rollers that follow in the wake of a storm. The surge of water sets up harmonic motion of considerable amplitude in any interfering framed structures, and this motion may result in large stresses in various parts of the frame. To combat this it is necessary to get the solid concrete in place as quickly as possible. The effect of these rollers is most pronounced when they come in against the ebbing tide, which has the effect of increasing the waves height and shortening their length so that a much more severe surge and more destructive wave results.

The spectacular inshore wave demonstrations such as spray climbing the San Francisco pylon to elev. 90 ft., the



Personnel—The design of the combination fender and pier for the south pier of the Golden Gate bridge originated with Joseph B. Strauss, chief engineer of the Golden Gate Bridge and Highway District, and the plans were worked out by his office staff in charge of C. E. Paine, principal assistant engineer, under the direction of the chief engineer. The plan of an access trestle to supplement floating equipment in the construction of the pier was incorporated by Strauss in the first draft of the specifications, but subsequently was deleted under the program of allowing the contractor full latitude to design his temporary work.

The trestle method of handling the work was developed by Philip Hart, Vice-President, Pacific Bridge Co. and detailed plans for the fender and pier were carried out by the Pacific Bridge Co., subject to the approval of the chief engineer through his principal assistant engineer. The method of construction in units of five stories each was decided upon jointly between the Board of Engineers, engineers of Pacific Bridge Co. and Moran and Proctor, consulting engineers.

Construction was carried out under the direction of J. E. Graham of the Pacific Bridge Co. and his staff, comprising H. Ericksen and the company's chief diver, Chris Hansen. J. G. Wright performed valuable services for the contractors in working out the large amount of engineering detail involved in the structure. The steel frames were fabricated by Moore Drydock Co. of Oakland. Concrete for the fender was supplied in transit mix by the Pacific Coast Aggregates, Inc. All the work in the field was performed under the supervision of Russell G. Cone, resident engineer, and his assistant, T. M. Kuss, together with the field staff and the inspectors, reporting to the Chief Engineer through Paine and Cone. The field and office staff of the Engineer and the contractors are entitled to great credit for the efficient manner in which the work has been handled.

On December 2, the fender was pumped dry to elevation —35 feet and since then concreting of the main pier has proceeded rapidly. All concrete is expected to be in place in the pier shortly after January 1, 1935.

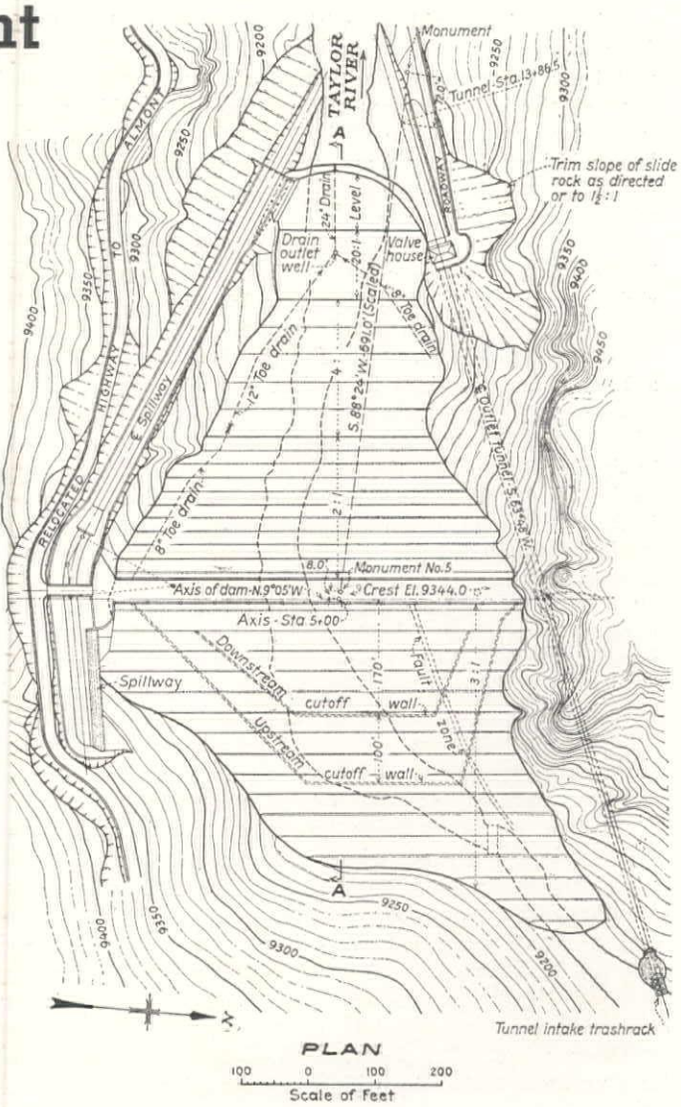
Taylor Park Irrigation Storage Dam May Be Earth Embankment

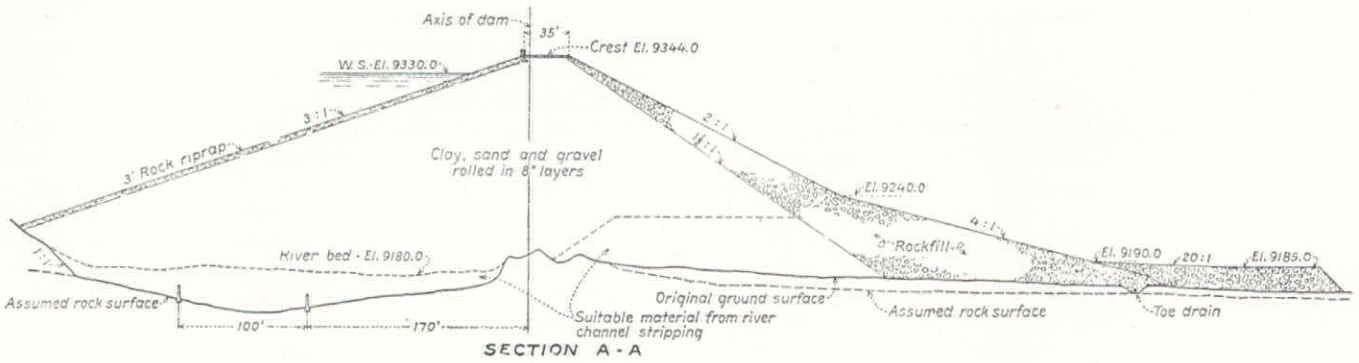
Plans For Earth and Rock Fill Dam As Alternative to Concrete Arch For Storage on Uncompahgre Project, Colorado

Following preliminary investigations on the Taylor Park concrete arch dam, designed by the Bureau of Reclamation, to be built with PWA funds, in western Colorado, further investigations have indicated that an earth and rockfill embankment will also be feasible at the site. (See September, 1934, issue, Western Construction News for description of arch type dam.) Accordingly, invitations for bids for the alternative types of construction were issued on November 10, 1934. to be opened in Gunnison, Colo., on February 18, 1935.

Embankment design—Should it be decided to build the embankment, it will have a maximum height of about 168 ft. above river bed and 215 ft. above lowest foundation excavation. The 35-ft. width crest, finished as a roadway, with a concrete parapet wall running along the upstream edge and a concrete curb along the downstream edge, will be 610 ft. long. It is planned to defer construction of the wall and curb until the embankment has had ample time for settlement.

The main or earthfill portion of the embankment will have a 3:1 upstream slope, which will be protected with 3 ft. of heavy rock riprap. The downstream slope, adjacent to the rockfill, will be 1½:1. The greater portion of the river bed upstream from the axis will be stripped to rock, and it is expected that most of the resulting material will be suitable for use in the lower part of the earthfill downstream from the axis. The remainder of the earthfill will consist of a mixture of silt, clay, sand and gravel, moistened and rolled in thin horizontal layers to





obtain the desired compaction. This material may be obtained from suitable required excavation or from borrow pits in the vicinity of the work. Two widely spaced reinforced concrete cut-off walls, varying from 5 to 10 ft. in height, will be constructed in the foundation rock about halfway between the axis and the upstream toe.

The downstream or rockfill portion of the embankment will have an outer slope of 2:1 from the crest to an elevation of 104 ft. lower, where it will break to a 4:1 slope for the next 50 ft., and then continue almost level for about 200 ft. downstream. The rockfill will be limited to pieces 1 cu. yd. or less in volume, and the grading will be equivalent to quarry run materials. It is planned to place this fill by dumping and roughly leveling off in 3-ft. horizontal layers, keeping each layer wet by sprinkling until the entire layer is completed. Material will be available in talus slopes relatively close to the damsite.

Spillway—The spillway with a capacity of 10,000 c.f.s. for a reservoir freeboard of 6 ft. to the crest of the dam will be constructed entirely in open cut, concrete lined, through the left abutment. It will be of the side channel type, having an uncontrolled crest 180 ft. long, a channel base width of 20-ft. and an overall length of about 925 ft. A bridge will be constructed across the channel in line with the axis of the dam.

Outlet tunnel and pipes—The main feature of the outlet works will be a concrete-lined tunnel through the right abutment, 1,100 ft. long, which may be used also for river diversion during construction. When the reservoir is filled, the upstream 572 ft. of this tunnel having a 10-ft. diam. standard horseshoe-shaped section, will be subjected to hydrostatic pressure. The downstream reach of the tunnel, in which two steel plate pressure pipes, one having a 72-in. diam. the other being 57-in. diam., are to be installed, will have a broad horseshoe-shaped section, 16-ft. wide by 11½-ft. high. Emergency slide gates will be installed at the upstream ends of these pipes in a concrete tunnel plug above which will be constructed a chamber housing the gate cylinders. Regulation of flow through the pipes will be effected by 48-in. balanced needle valves located at the outlet ends in a concrete valve house, where the emergency gates may also be operated by control piping running through the tunnel.

Quantities—Advance estimated quantities for the major features of work are: 1,046,000 cu. yd. of all classes of open-cut excavation; 6,000 cu. yd. of tunnel excavation; 825,000 cu. yd. of earthfill; 156,000 cu. yd. of rockfill and riprap; 10,000 cu. yd. of concrete; 451,000 lb. of reinforcement bars; and 530,000 lb. of pipe, gates, valves, etc.

Acknowledgments—Taylor Park dam is one of the numerous PWA projects delegated by PWA Administrator, Harold L. Ickes, to the U. S. Bureau of Reclamation. Elwood Mead, located at Washington, D.C., is commissioner of the bureau, and R. F. Walter, with headquarters at Denver, is chief engineer. A. A. Whitmore, now located at Gunnison, Colorado, will be construction engineer.

New Surface Applied Earliest Concrete

By F. D. EASON
Assistant Division Engineer, Oregon State Highway Commission, Salem

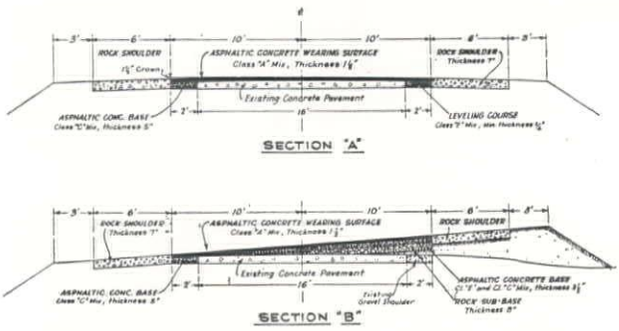
One of the earliest constructed pavements on the Oregon State Highway system was the section of the Tualatin Valley highway from Beaverton to Hillsboro, laid in 1919, as a portland cement concrete pavement 16-ft. wide and 6 in. thick. Due to methods of concrete pavement construction then prevailing which gave a much inferior road surface measured by today's standards, together with increased traffic of recent years on this important highway, considerable repair work had been performed and maintenance had become heavy.

The Tualatin Valley highway serves a dense and populous section of the main Willamette valley and the patched and uneven surface, narrow pavement, and steep shoulders had become quite inadequate for present traffic needs. Construction of the Wilson River and Wolf Creek highways to the coast was also impending, which would be served by the Tualatin Valley highway upon completion of the western portion of these arteries and during construction of their eastern sections. With this condition and the present and prospective needs, the Oregon State Highway Commission allocated funds from the NIRA money of 1933 and contracted for widening the grade and widening and resurfacing the pavement of the Beaverton-Hillsboro section; and also the Bertha-Multnomah County line section of the Bertha-Beaverton highway which connects with and divides the traffic of the Tualatin Valley highway.

These contracts were awarded in October, 1933, with the expectation of getting the grade widening and shoulder work done during the winter and following spring, so as to be prepared for bituminous paving work in the early summer of 1934. This was accomplished as planned. Kern & Kibbe, who had the $191,178 contract for the Beaverton-Hillsboro section, and J. C. Compton, contractor for the Bertha-Washington County line section, completed grading and shoulder work by the time weather conditions in this climate could be relied on for asphaltic paving.

The Beaverton-Hillsboro improvement consists of widening and resurfacing with asphaltic concrete of the existing 16-ft. cement concrete pavement. This project extends from the west side of the town of Beaverton to the full-width street pavement in the city of Hillsboro, a distance of 8.97 mi. In general the alignment and grades of the new pavement conform very closely to the old,

TYPICAL PAVING SECTIONS



to One of Oregon's State Highways

although betterments were made in several places. The new pavement is the Oregon standard two-lane 20-ft. width, obtained by constructing a 2-ft. bituminous shoulder 5-in. thick on a rock base on each side of the present cement concrete and then applying a minimum 2-in. bituminous surface over the entire 20-ft. width. Rock shoulders 6-ft. wide were constructed on each side of the new pavement. The portion of the project on the base line in the city of Hillsboro was improved by construction of concrete curbs and a full-width pavement of 36-ft. between curbs.

On new sections being paved, including the widening strip on each side of existing pavement, the subgrade was prepared by excavating and backfilling with 8-in. of compacted rock base. The asphaltic pavement was then laid in a 3½-in. base course and a 1½-inch top course where full width of new pavement is required. The widening strip was a 5-in. bituminous base. A leveling course of 'E' mix was used as needed to smooth and level the deformed and irregular surface of the old pavement to meet the new grade line and crown, upon which the top mix was placed to make a uniform 20-ft. surface. Machine-finish was required and used where full 20-ft. courses were laid. A non-skid surface was applied immediately behind the first rolling of the top course. This surface consists of hot asphalt-coated screenings of ¾-in. to ¼-in. size, spread over the wearing surface at the rate of about 6 lb. per sq. yd. and then rolled into the still hot pavement.

Surface smoothness of the finished pavement was required under Oregon state contract specifications to be such that the maximum variation in 10-ft. will not exceed 0.1 in.

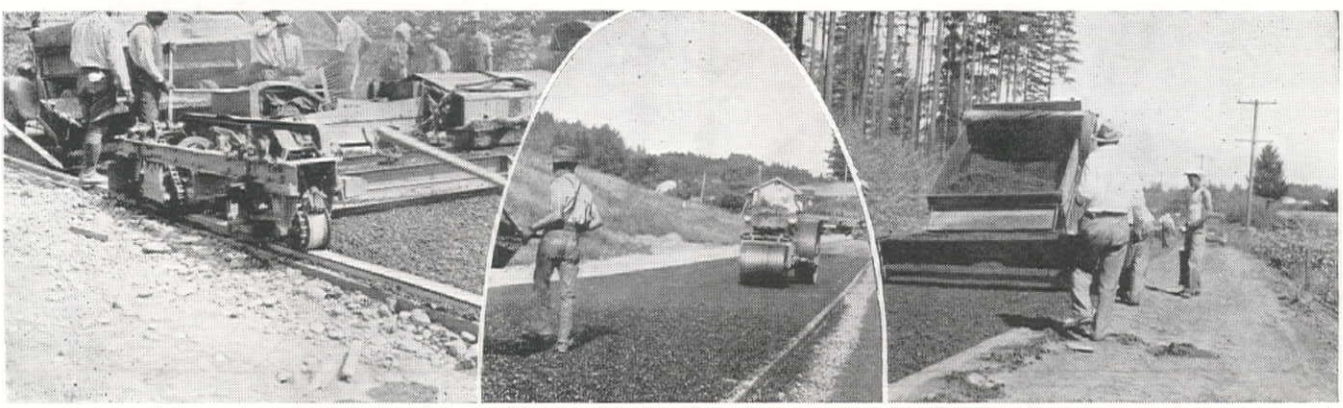
The asphalt paving plant supplying hot stuff for this project, and which also supplied materials for the recently completed Bertha-Multnomah County line section was probably the most modern and best constructed plant of its kind in the state, or perhaps even the Northwest. It was built and is owned by Kern & Kibbe. All materials were produced from the company's quarry at St. Helens or dredged from the Willamette river, and brought in on barges; then unloaded with a clamshell at the dock into a large hopper. From the hopper, materials were fed into a belt conveyor extending from the dock over a battery of 14 storage bins with a combined capacity of 6,000 cu. yd. The conveyor belt passed through an unloading mechanism which traveled on a track on top of the bins. This unloading tripper could be moved to any desired bin at any time and discharged the material from the belt from either side. There were also several large stockpiles of material in the yard adjoining the plant provided for the paving operations. Materials of the proper sizes and quantities were transported by yard trucks into a compartmented grizzly, with an automatically controlled feed. This feed arrangement loaded the material onto a conveyor belt leading into the rotary dryer. A bucket elevator then delivered the materials from the dryer into two 48-in. rotary screens on top of the storage bins. Dust was collected by a blower at the end of the rotary dryer and was blown through a 36-in. pipe to a dust collector on top of a 14 by 16-ft. steel settling tank.

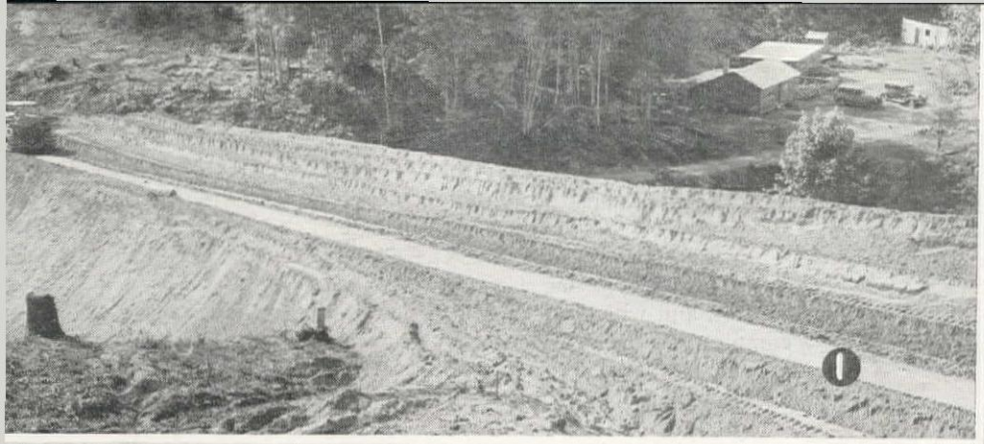
Material was weighed from the storage bins into the weighing compartment with multiple scales consisting of five beams, and was then passed into a pugmill mixer of 4,000 lb. capacity. Asphalt for the mix was pumped up to the weighing platform from an underground concrete storage tank of 30,000 gal. capacity, located back of the plant. Each batch was mixed in the pugmill mixer 45 seconds at 84 revolutions. The hot mix was transported to the street by 27 Ford and Chevrolet trucks in two-batch loads.

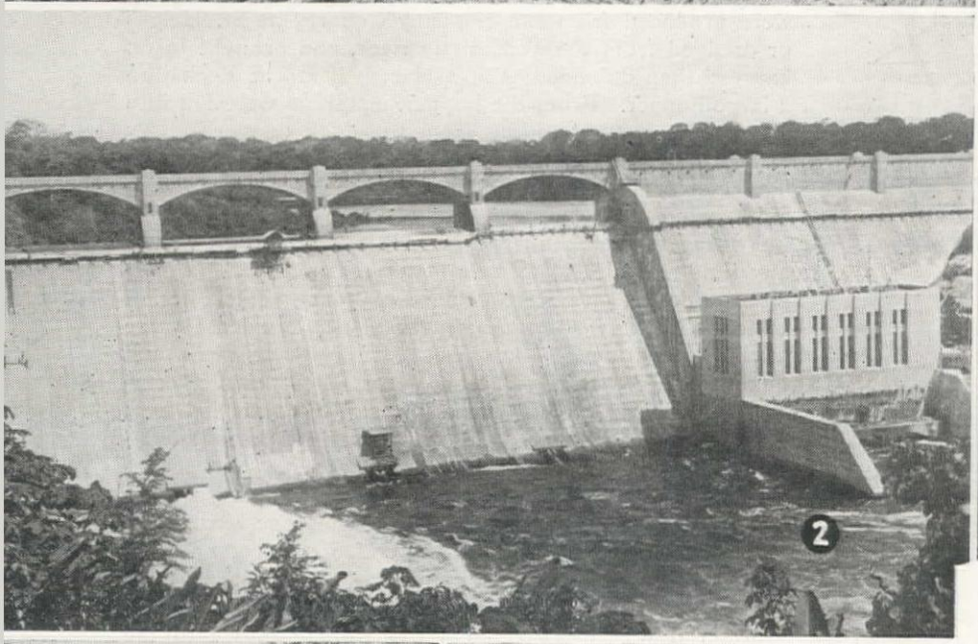
An Ord finisher, two Galion spreader boxes, two 3-wheel and one 2-wheel 10-ton rollers, a dual-drive and a single-drive power blade, and two water tanks were used on the street. Base and shoulder rock on the west end of the contract were supplied from the Saxton & Looney plant on Gales creek near Forest Grove and for the east end from Kern & Kibbe's plant at Portland.

The work, completed in the early fall of 1934, was handled by Earl Wood, paving plant superintendent, for the contractor. L. D. Mars was resident engineer for the State on this project and W. E. Chandler is division engineer, H. G. Smith is construction engineer, and R. H. Baldock is State highway engineer.

(Left) Placing Material and Finishing Leveling Course With Ord Finisher (Center) Rolling Asphalt-Coated Screenings Into Finished Surface (Right) Unloading Hot-Mix Material With Galion Spreader Box







On the Western

1—One of several large fills on new Navy Yard highway, Wash., unde contract to Northwest Construction Co., Seattle. Knapp bulldoze mounted on Caterpillar diesel '75' is used for placing the easily handle material.

2—Down stream face of completed Madden dam and power hous located in Chagras river near City of Panama.

3—Erecting East Bay double-deck steel structure of San Francisco-Oak land Bay bridge. Columbia Steel Co., general contractors.

4—Roadside widening with a Lima '601' shovel on Stevens Pass, Wash. project. J. Coyle, contractor.

5—Employing heat treatment (using Calol) for removing asphalt cover ing of salvaged oil pipe on Standard Oil Co. pipe line contract Bechtel-Kaiser Co., Contractors.

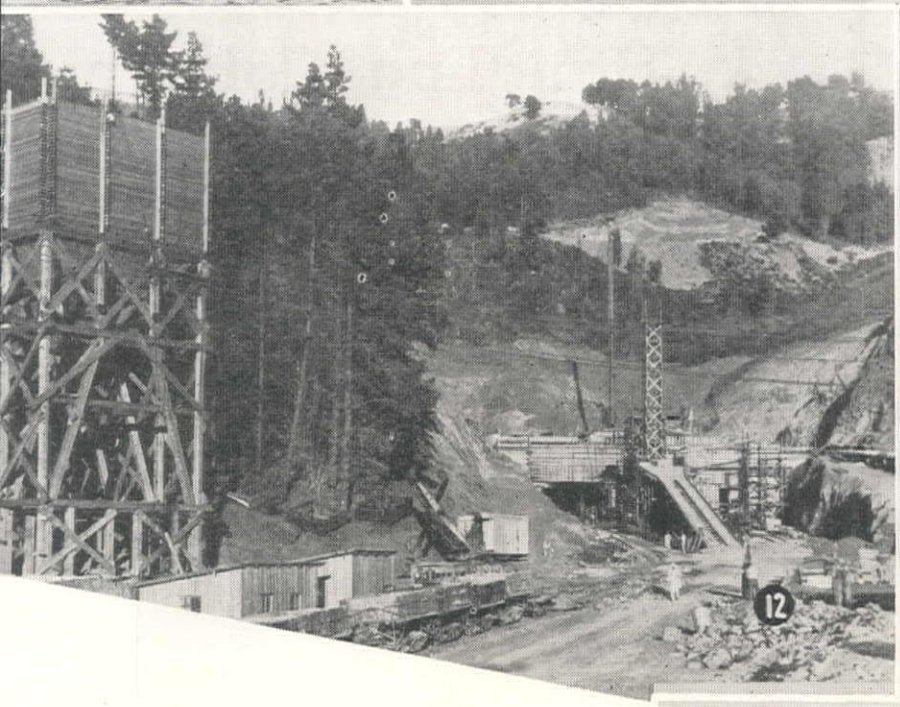
6—Drill carriage used in heading of Wide Canyon No. 1 tunnel o Colorado River Aqueduct.

7—One of four 1½ yd. Lorain shovels excavating the Fort Peck spillwa under contract to Martin Wunderlich Co. Hauling equipment consist of Euclid bottom-dump wagons drawn by Truck-Tractor units.

8—A Wood road-mix machine drawn by a Caterpillar tractor laying top surface on highway between Sheridan, Wyo. and Billings, Mont.

9—One of more than 150 Ford V-8 trucks being used on Fort Peck dam over-burden stripping.

10—Cofferdam for pier no. 10 of Coos Bay bridge, Oregon. Acces trestle and derrick car is used for foundation work. Northwest Road Co., contractors.



Construction Front

—Building oil shoulders on Castroville-Moss Landing highway in Monrey county, Calif. with a Wehr quadruple drive motor grader.

—West portal of Broadway tunnel near Oakland, Calif., showing unkers and batching plant.

—Bulldozers taking out cut on highway which shortens the distance nd eliminates the old Jack Rabbit trail between Los Angeles and mperial valley.

—Link-Belt loader filling cars with gravel from pit at Cole, Mont. for hipment to Fort Peck dam 75 mi. distance.

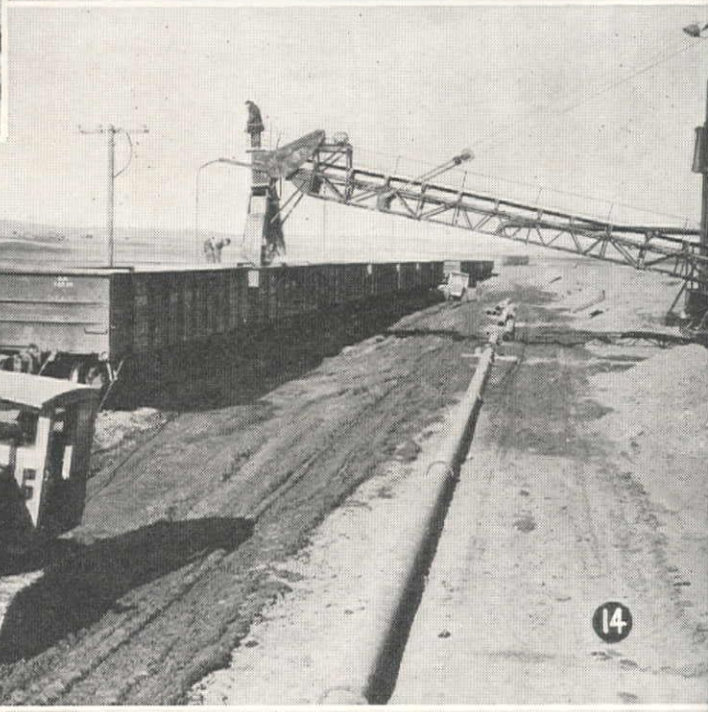
—A portion of 13,000 ft. of 16-in. Super-de Lavaud B & S supply line eing laid for the City of Gilroy, Calif.

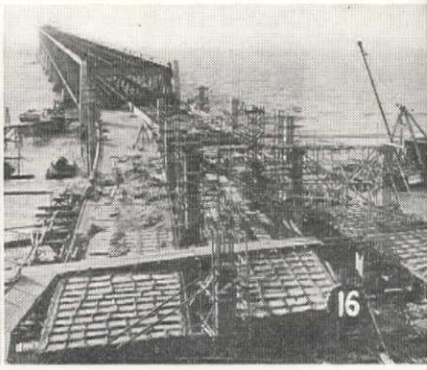
—Easterly terminus of San Francisco-Oakland Bay bridge showing ouble deck steel structure in background and lower concrete road eck in foreground. Note columns in place for supporting upper deck esigned for fast moving traffic. Inter-urban tracks occupy lower left oadway and the lower right is reserved for truck traffic.

—Surfacing material for highway near Quilcene, Wash., being taken om stock pile with a McCormick-Deering powered ½-yd. Austin ovel and an International truck, Kernan & Libby, Portland, contractors.

—Deck structure of Arvada bridge over Powder river in Wyoming.

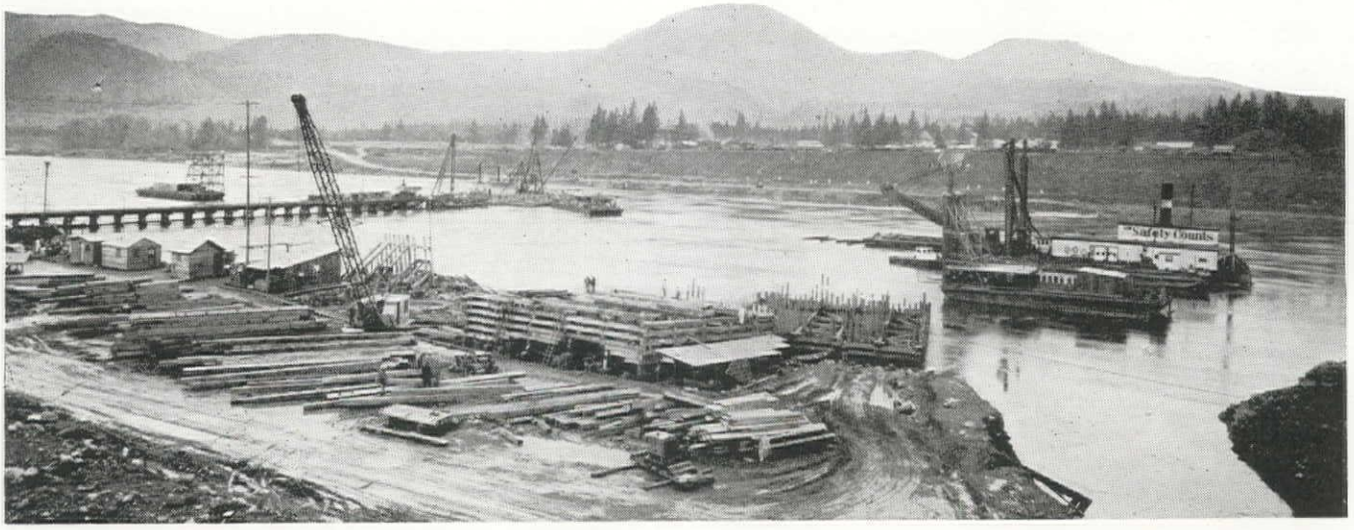
—Wooldridge 25-30 yd. side dump wagon used on excavation at oulee Dam. This wagon is mounted on 16 pneumatic tires and unloadg is accomplished by lifting one side with hydraulic jacks.





Unique Cofferdam Con Handling Columbia

Dam Site: The main spillway dam is being built across Columbia river, at a site 40 mi. east of Portland, Ore. At this point Bradford island divides the river into two channels, the minor or south channel, known as Bradford slough, being utilized in the development as the powerhouse site and forebay. As it is impracticable to enlarge this channel to take more than a minor percentage of the river flow, it was realized when the dam site was chosen that river diversion by means of cofferdams separately unwatering successive portions of the river bottom would have to be undertaken.



General View Of Main Dam Site Showing Crib Ways In Foreground And Placement Of Crib No. 13 At End Of Trestle. Sounding Barge, Drill Rig, And Dipper Dredge Operating Opposite Launching Ways.

Working season. The flow of Columbia river, is characterized by a regular summer flood, extending from May to July. Through the following three months the river falls steadily at a predictable rate. From November to March the river is near low water except for flash winter floods caused by heavy rainfall, usually on soft snow, in lower altitudes. These floods may occur at any time during the winter or spring. The annual summer rise, terminating the low water season, usually starts about April 1. The working season in the river is quite definitely limited to the 8-month period of August to March, inclusive, and construction work may be subjected to one or more winter floods, two of which during the 56-year period of record have materially exceeded 300,000 sec. ft.

Choice of type. Hydraulic studies showed that only minor channel obstruction would be caused by cofferdamming half the river in each of two construction steps, provided that timber or steel cribs were used and that the Washington bank was cut away to the entire extent ultimately to be provided for the main dam spillway opening before closing the first cofferdam. With this provision the backwater rise caused by cofferdamming the south half of the dam site would be approximately 2 ft. at a flow of 300,000 sec. ft. During the second half of construction the backwater at 300,000 sec. ft. with deep diversion slots left in the south half of the dam, would amount to approximately 3.5 ft. Considering these factors and the loss of channel cross section occasioned by overlapping the cribs in successive steps, it has appeared logical to lay out the cofferdam in two steps.

In the river bed near the center of the channel at the dam site, Eagle Creek bed rock lies exposed in part, and in part covered by heavy boulder or gravel overburden varying from 5 to 20 ft. in depth. The elevation of bed rock is highest in the middle of the river and slopes generally downward toward either shore so that the riverward cribs may be set on bedrock while the shore cribs must be set on gravel and boulder overburden. At the abutments the overburden cover ranges from 110 to 130 ft. in depth. It was decided to seat the center row of cribs (parallel with the stream axis) directly upon bedrock after removing the boulder and gravel cover on account of the relatively narrow channel and high natural velocities which range from 6 to 15 ft. per sec. at the dam site. Several types of cofferdams were studied in connection with dam construction schedules, relative safety, ease of construction, available working season, and cost. These included reinforced concrete caissons, steel sheet pile cells, steel pile walls braced with stoplogs as employed at the Keokuk project on Mississippi river and Dnieprostroy on Dnieper river, and a continuous line of timber cribs built from one end and shielded by a floating guard crib as used on St. Lawrence river for the Beauharnois project.

Adopted Plan. The type finally chosen consists of a line of timber cribs in contact, each 60-ft. long and 60, 48, or 36-ft. wide according to their height. Cribs 8 and 13 (see Crib Location Plan) are provided with noses to provide an easy corner for the river current passing the cribs. The south and north half enclosures each form an open U with oblique arms reaching from shore to connect with a river leg 460 ft. long these enlarging the effective channel capacity by providing a smooth entrance to the narrowest portion. This shape also enables placing the shore arms of the crib line at oblique angles up and downstream to gain working space within the cofferdam area for excavation and haulage.

For the outer portion of the south cofferdam a watertight seal will be provided by a line of steel sheet piling in front of cribs 4 to 17. Shore cribs 1 to 3 and 18 to 21 will be blanketed by an impervious outside fill which will also extend in front of the outer shore-leg portion of the steel pile wall. In addition all cribs are being faced on the water side by 3 by 12-in. tongue and groove sheathing. Along the river face of cribs 6 to 14, tee piles are being provided at 12-ft. intervals so that in case of leakage or lack of pen-

struction for River Flood Waters

In construction of the Bonneville main spillway dam across Columbia river, one of the largest rivers in United States, the government assumes responsibility for contingencies involved in cofferdam work

By H. G. GERDES

Engineer in Charge of Design, Main Spillway Dam

H. G. Gerdes graduated from the University of California in 1922 with a C. E. degree. In 1922 and 1926 he was connected with Fred H. Tibbetts, consulting engineer of San Francisco, as surveyor, draftsman, and designer on irrigation, reclamation and power projects. In the interval between 1923-1925 he was with the Standard Oil Co. in the engineering department. From 1926-1928 Gerdes was with Loveland Engineers, Inc., operators and consulting engineers in water works practice, serving as valuation engineer, designer, and superintendent of construction. During the following year he was designing engineer on the Hetch-Hetchy Water Supply project for the City of San Francisco. In 1931 Gerdes became associated with the United States Engineers' Department as hydraulic engineer on investigation work covering hydroelectric and flood control projects including the proposed Salt Water Barrier on San Francisco Bay, the San Joaquin Valley Flood Control project and Bonneville project. Since work was started on the later project, Gerdes has served as designing engineer on the spillway dam and in this work he has been active in all phases of the design.

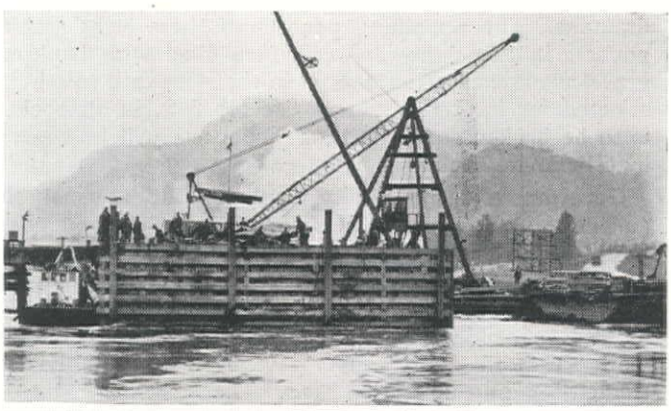
etration of the first pile line, additional piling may be driven and connected to the wall. These tee piles will also serve as points of attachment for triangular current deflectors, to be placed along the bottom of the pile wall to prevent erosion.

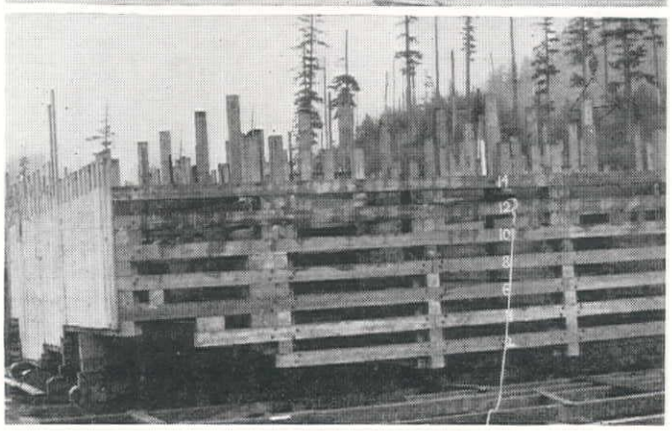
Steel sheet piles will also be driven between cribs 6-7 and 14-15, connecting with tee piles in the outer walls and extending into the unwatered area to connect with the future north cofferdam bulkhead.

North Cofferdam. Before completion of the south half of the dam a timber bulkhead of crib work loaded with rock and gravel will be built in the dry upon the north end of the completed concrete structure and connected with cribs 7 and 14.

Cribs 1 to 6 and 15 to 21 will be removed following the completion of the south half dam above high water and cribs 22 to 38 placed after the sumer flood will close the north half channel and divert the river flow through 9 deep diversion slots left in the south half dam and through the 4 power plant skeleton units in Bradford slough.

(Upper) Sinking No. 12 Crib At End Of Access Trestle. Bucyrus-Erie Crane And Derrick Barge Are Used For Handling Timber From Scow At Right. (Lower) Crib No. 12 On Launching Way. Note Bottom Timbers Have Been Cut Away To Fit Foundation Bedrock.





Engineers Having A Prominent Part In Construction Of Bonneville Project. Reading Left to Right: F. A. Cothran, Consulting Engineer; H. G. Gerdes, Designing Engineer; C. I. Grimm, Chief Civilian Engineer; Major C. F. Williams, District Engineer; Capt. J. S. Gorlinski, Resident Engineer; And B. E. Torpen, Construction Engineer.

Closure of diversion slots. After completion of the north half dam and removal of the north cofferdam, these diversion slots, extending down to elev. —5 ft., will be closed one or two at a time by setting the permanent steel gates. After cutting off the flow, timber cofferdams will be set around the ends of each slot and the permanent sill will be concreted in at elev. 24 ft.

Crib design. Because of the large size and considerable number of cribs to be placed, special emphasis was placed upon their design in an endeavor to secure a uniformly strong as well as economical structure. Studies were made of crib work in connection with a number of jobs previously constructed and detailed analysis were carried out on cribs constructed in connection with the Beauharnois, Dnieprostroy, and Rock Island projects. The closest parallel with Bonneville was found at Dnieprostroy where cribs over 40 ft. high were placed in deep flowing water. The following tabulation gives the principal data on four cofferdams analyzed:

COFFERDAM CRIBS—COMPARATIVE FACTORS—4 PROJECTS

Item	Rock Island	Beauharnois	Dnieprostroy	Bonneville
1. Crib Pocket size	8′x8′	10′x10′	7′ to 9.5′	12′x12′
2. Maximum width of crib.	80′	20′	61′	60′
3. Maximum height of crib	58′	22′	42′	63′
4. Vertical timbers	12″x12″ in all outside corners	Bolted in outside corners	Scattering	8″x12″ bolted all outside corners og lower portion
5. Principal timber sizes.....	12″x12″	8″x8″	9″x9″	10″x12″, 12″x12″
6. Timber lengths	16′x32′	10′x20′	no data	24′x36′
7. Timber grade.	Doug. fir No. 1 and No. 2	B. C. fir	no data	Doug. fir No. 2 Common or better

Considerable variation in design was found in the cribs analyzed, low joint strength and heavy use of timber appearing to have been common practice.

After considering the loads imposed during placement, filling, and after unwatering, the Bonneville cribs have been designed as rock bins, the most important consideration being the strength against lateral loads of the unwatered (dry) side crib walls. Other side walls not exposed, after unwatering, were designed to withstand the weight of the submerged fill only. Weight pocket walls were designed for lateral thrust with floors to be connected through verticals with the upper crib walls so that the crib bottom would not pull off while floating.

Interior joints were designed as tension ties holding the crib walls together. Main holding line attachments were designed to withstand a 100,000 lb. pull each with diagonal bracing to carry this load into the crib. Side holding line attachments were somewhat arbitrarily designed for half this pull.

The hull resistance of the crib floating in the current was calculated from the velocity head formula:

$$P = 61.5CA \frac{V^2}{2g} \text{ or simply } P = 1.5A\ V^2$$

Where P = total pressure in pounds
A = projected area normal to current (in this case the end face)
C = head loss coefficient (assumed for design at 1.5)
V = The current velocity, taken from measurements as 9 ft./sec. at Q = 150,000 c.f.s.

Tensometer measurements on holding cables during placement of the first cribs showed rather widely varying values of C, 1.3 however being the average observed.

Timber working stresses were assumed at 1,600 lb. per sq. in. fiber stress and bearing parallel with the grain, and 400 lb. per sq. in. bearing perpendicular to the grain. Most of the timber connections are made with drift and machine bolts, though 4-in. 'Teco' split ring connectors were used in the weight pocket bottoms. Friction tests were made upon the river bank gravel intended for use as crib fill to determine the sliding coefficient of this material upon crib timber, sheathing, and upon itself, both wet and dry, with results as follows:

Friction Coefficient—Average of 4 Tests

	Dry	Wet
Gravel on alternate 12-in. timber and 12-in. spaces filled with gravel, slid across the layers	.71	.79
Gravel on gravel	.65	.71
Gravel on 2 by 12-in. sheathing	.60	.71

Cribs designed to fit bottom. Because of the relatively narrow river channel at the damsite and necessity for making the river leg of the first (south) cofferdam as thin as possible, specifications required seating cribs 6 to 15 in a trench dug through 5 to 15 ft. of gravel and boulder overburden to bedrock. After a part of this excavation had been made and the somewhat irregular surface of the bedrock became apparent, serious doubts were entertained by some as to the feasibility of fitting these cribs to their foundations and various substitute schemes were offered.

At this juncture in order to obtain the accurate river bottom contours desired, a sounding barge equipped with four 2-in. double extra strong pipe sounding rods operating through 4½-in. extra strong pipe wells, was designed, outfitted, and placed in successful operation in less than one week.

This rig working in 40 to 50 ft. of swift water made soundings for all crib seats on the river bottom at 4-ft. centers, positions being referred to a steel line stretched across the channel, and proved that such soundings were practicable with an accuracy of 2 ft. regarding position and less than 1 ft. for elevation. Bases of all cribs are being designed to fit the river bottom as developed by these soundings. To date twelve cribs, with irregular bottoms shaped to fit the river bed have been successfully landed, all within one foot of the designed elevation.

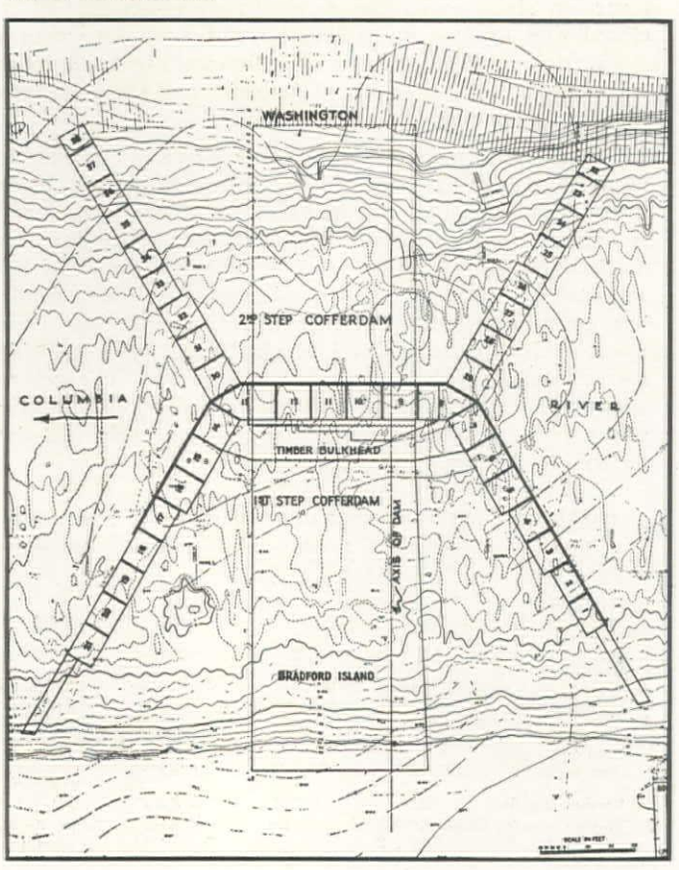
Crib fill. Bottoms of all pockets of cribs 4 to 17 except the two rows next to the river face and the entire height of the row of pockets on the 'dry' side are filled with broken rock to secure higher sliding resistance and free drainage. The remaining pockets of these cribs and all pockets in the shoreward cribs are filled with bank-run gravel from excavation, the fill in the riverward row being selected for imperviousness. The top 3 ft. in all pockets is to be broken rock and tops of pockets will be covered by 6 by 12-in. decking.

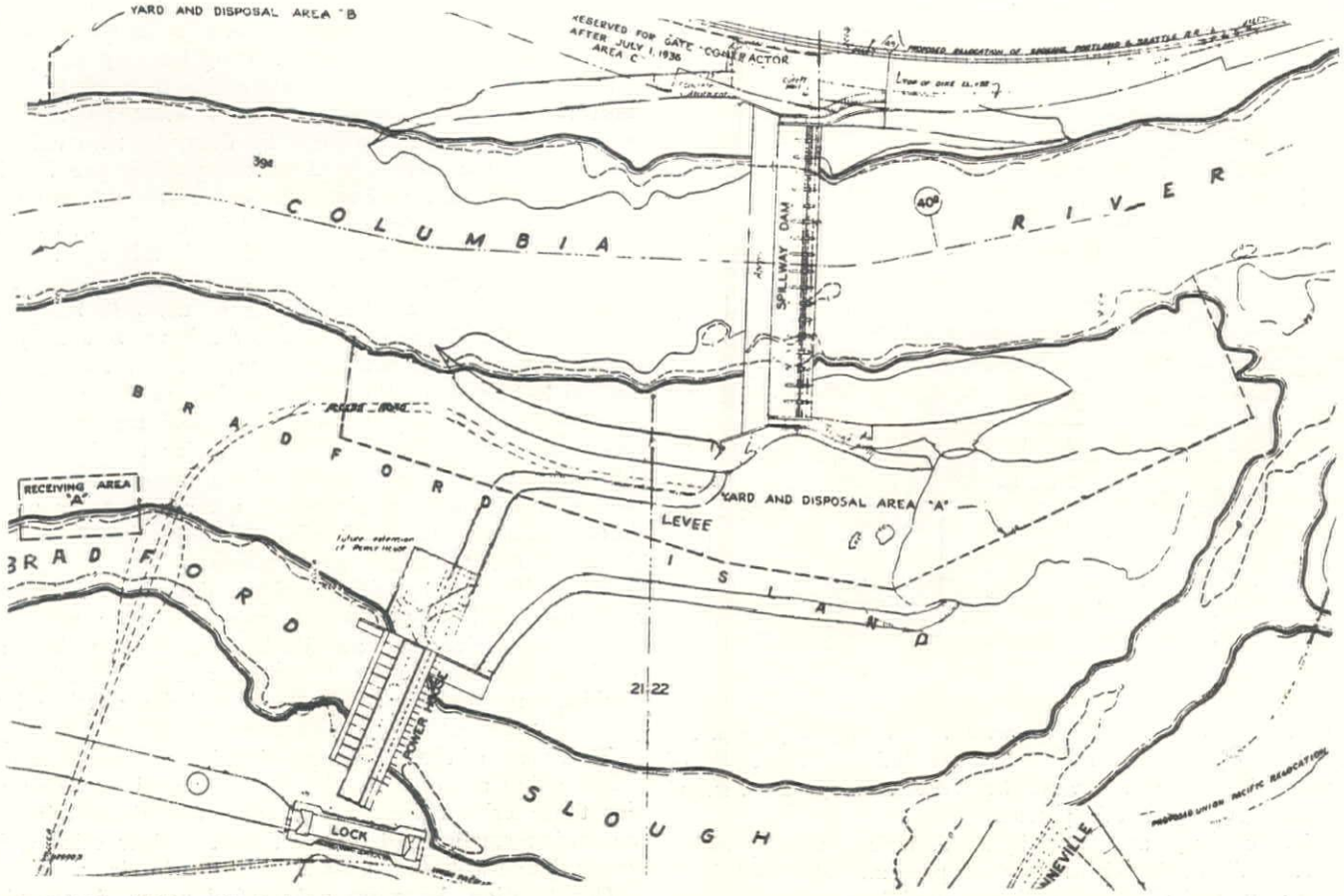
Government responsibility. Due to the unusual size and cost of these cofferdams (over $2,000,000) and possibility of an unusual river season delaying the work or requiring reconstruction of part of the cofferdam, it was decided that it would be economical for the United States to be responsible for contingencies involved in cofferdam work. Cofferdam operations have been accordingly contracted for on a unit price basis. The principal quantities involved are estimated as follows:

Item	Quantity	Unit	Price
Crib footing excavation	50,000 cu.yd.	$ 4.80	$240,000
Timber and lumber	8,000 M.f.b.m.	100.00	800,000
Crib fill	200,000 cu.yd.	.75	150,000
Steel sheet piling	90,000 sq.ft.	2.50	225,000
Toe and shore fill	200,000 cu.yd.	.50	100,000
Cofferdam removal	200,000 cu.yd.	1.20	240,000
Pumping from within cofferdam	60,000 ac.ft.	6.00	360,000
			$2,115,000

Under the specifications the contractor is responsible for the proper placing and loading of the individual cribs. After completion and acceptance of any crib, the United States will be responsible for its stability and for any damage by overtopping or other natural cause. In case of loss of any accepted part by flood or other natural cause before completion of the cofferdam or failure, overtopping or blow-out after closure has been made, the United States

Plan Of Cofferdam To Facilitate Main Dam Construction. Bradford Island Section Will Be Completed First.





General Plan Of Bonneville Project Showing Relative Location Of Lock, Power House, Levee, And Main Spillway Dam.

will pay the contractor for necessary reconstruction at the unit prices bid for construction and in addition, if the cofferdams are flooded after underwatering, the contractor will be paid $8,000 per month during the time lost. By these provisions the contractor is in large measure released from the extraordinary hazards of cofferdam work and is enabled to devote himself more closely to the actual construction, concerned with the dam proper.

Construction program. Study of the 20-yr. hydrograph, 1912-32, showed that for a flow not exceeding 250,000 c.f.s., an 8 month working period was available every year (one 20-day interruption in January, 1918, at maximum flow 300,000 c.f.s.) and a 9-month or longer season was possible 16 out of 20 yrs. Below 200,000 c.f.s. work could have proceeded all years for 6 months (1 month interruptions in January, 1918, and December, 1928) during 18 years for 7 months, and 17 years for 8 months or longer. For a flow below 150,000 c.f.s. construction could have proceeded 5 months during 19 years and 7 months during 16 years.

Based upon this data it has been assumed that on the receding river flow after the summer flood, cofferdam closure operations could be actively carried on during flows varying from 250,000 to 150,000 c.f.s. and that the cofferdam when closed should be safe against a flood of 300,000 c.f.s., insuring, with a risk of one change in 28, an 8 month continuous working season from August to March inclusive.

The specified construction plan contemplated building only cribs 8 to 13 during the 1934-35 working season, and closing the cofferdam and building the south half dam during the 1935-36 season. The contractor has however received additional authorization to build and place cribs 1 to 3 and 19 to 21, and completing closure of the south cofferdam will probably be made during the current (1934-35) low water season.

This early enclosure will permit unwatering to test the cofferdam and possibly some excavation work to be done. No damage is anticipated from overtopping the cofferdam by the summer flood of 1935.

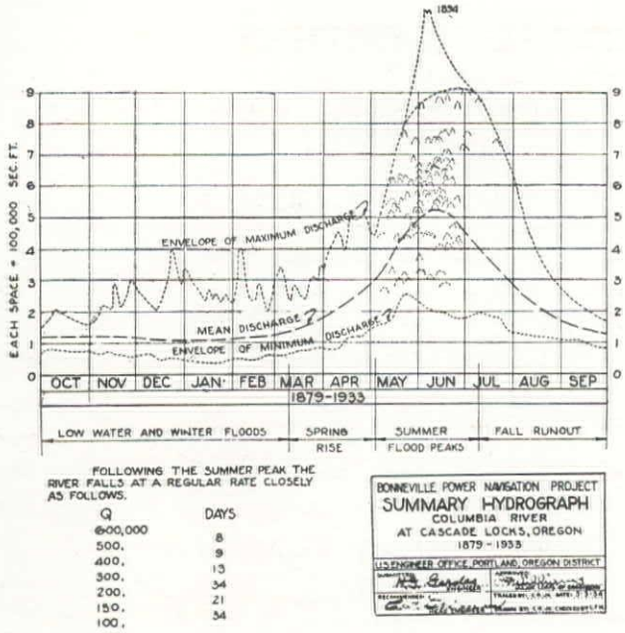
During the 1935-36 working season excavating and concreting those portions of the south half dam below high water will be completed. Between the piers of this half dam 9 diversion slots 50 ft. wide and extending 29 ft. downward to elev. —5 ft. will be left open. At the close of this season the timber crib bulkhead connecting cribs 7 and 14 across the dam will be completed in the dry and the south cofferdam cribs 1 to 6 and 15 to 21 removed.

During the 1936-37 working season, cribs 22 to 29 and 30 to 35 will be placed and the north half dam built in a similar manner except that no diversion openings will be left. During the latter part of 1937, the 9 diversion slots in the south portion of the dam will be individually closed and the dam completed.

Crib footing excavation. To provide a seat for cribs 6 to 15 on rock in mid-channel it is necessary to excavate overlying boulders and gravel. This material is being dug by a 5-yd. dipper dredge, loaded into dump scows and deposited outside the cofferdam area. The maximum cut is about 15 ft. but most of the work consists merely of scraping off an uneven layer of boulders and cobbles overlying the bedrock. Some boulders are of large size requiring considerable drilling and blasting, and individual rocks stuck in the dipper are a common occurrence.

In addition to the midchannel dredging some work is also being done in smoothing off the bottom for the side-arm cofferdams to permit easier placement of cribs.

Building and Placing cribs. Timber cribs are being built on a launching ways on the Bradford island shore between the damsite and the upper cofferdam leg. The ways, consisting of a set of 24-in. square timbers on a 10% slope extending to the waters edge, permit building 2 cribs adjacent to each other simultaneously. Each crib is built on a timber sliding way, the irregular bottoms being sup-



ported by blocking, which, with the sliding way, is withdrawn after launching. Cribs are built to a height of about 14 ft. on the ways before launching, all vertical framing being in this portion.

The cribways are served by an 'American' whirley which picks individual sticks from stock piles immediately behind the ways and places them for the building gang. Lumber for this operation is delivered from Portland and local mills by truck. All bolt and drift pin holes are drilled by air augurs and pins and bolts are driven by air hammers.

After launching, river cribs are attached to two 1½-in. holding lines leading over a tight line barge and an equalizing block raft to a 2-drum 12 by 17-in. steam head hoists located on Picture rock, 2,000 ft. upstream. Because of a slight bend in the river at the damsite, this hoist fortunately is almost in direct line with the midchannel cribs, which facilitates handling and placement.

When properly hooked up, cribs are taken out into the river and set in approximate position for building up to full height. Side-holding lines are used, leading to 200 h.p. electric hoists on the Washington and Bradford shores. Building of upper crib portions has been done both by a crawler crane operating from the adjacent crib already in place and by a floating stiff-leg derrick. Both rigs take lumber from scows loaded at Portland. As the crib settles deeper in the water additional holding lines are attached so that when built full height and ready for placement 5 parts of 1½-in. rope are employed in the main holding lines, attached at 6 points on the crib and equalized through the block raft and the tight line barge. From 4 to 6 side-holding lines of 1-¼ and 1-⅛ in. rope have also been employed at the time of placement.

During the latter stages of building up the cribs, it is necessary to ballast the weight pockets to keep the crib from overturning and laying on its diagonal. This load, composed of bank run gravel, is shoveled from the pit into skips or dump trucks, hauled out the construction trestle, and placed with the same crawler crane used for handling lumber.

The construction trestle, built to facilitate cofferdam work, extends from the Bradford shore direct to crib 13, and was connected with the latter as soon as it was in place. All crib fill is hauled on this trestle, built with a 20-ft. deck on 5-pile bents at 16-ft. centers. The trestle carries a single track roadway, walk way, air and telephone lines, and is an indispensable adjunct to this work.

When the crib has been completely built up and partly ballasted for stability, it floats about 8 to 10 ft. off the river bottom. It is then carefully placed in exact position and additional loading is provided by dumping skip loads of gravel into the weight pockets, maintaining the floating crib in a horizontal position. As soon as the crib is on the bottom, which is only manifested by a decided slowing up in the rate of sinking with added load, this operation is stopped and careful rock soundings are made along each timber line to check the position of the crib base with respect to the river bottom. After this work, usually requiring about 6 hrs., is done, weight pocket are completely loaded to fully settle the crib in its final resting place. To date, no serious misfits requiring special treatment have been encountered, and settlement under the load added following check soundings has been less than 1 ft. In addition, and most gratifying of all, cribs so far placed have all come to rest within 1 ft. of the designed location, in alignment, position, and elevation.

After filling the weight pockets, dumping of rock or gravel direct from trucks continues until all pockets except for the river row are filled. The latter pockets are held open until after the steel sheet pile face is driven, to facilitate inspection of the piling, and for possible later special treatment.

Treatment of the shore-arm cribs differs from the above only in that use of the main holding lines is not required for those cribs close to shore and that these cribs are somewhat smaller and lighter than the river cribs which approximate a 4-story apartment house in size.

Construction Progress. As of January 3 considerable progress has been made and work is proceeding at an accelerating rate. The Washington channel enlargement cut being dug by an 8-yd. Bucyrus-Monighan electric dragline is about 60% complete and more than 4,000 cu. yd. of material is being taken out per day. The Bradford diversion cut has been dug down to elev. 30 ft. by the contractor's 2 Marion and Bucyrus 2½-yd. electric shovels, one of which has been converted into a dragline.

The construction trestle was completed in October and cribs 13, 12, 11, 10, 9, 1, 2, 3 have been placed. Crib 3 has been launched and 9 is ready for launching. Current crib construction is averaging 1 river crib and 1 shore crib in place per week.

Personnel. The Main spillway dam (No. 14 on Bonneville schedule) contract is held by Columbia Construction Co., largely a Six Companies organization. Edgar F. Kaiser is administrative manager, Clay Bedford, general superintendent, and George Havas, chief engineer at Bonneville. These men have contributed greatly to the success of the cofferdamming operation.

The Bonneville cofferdam was designed by the writer under the direction of C. I. Grimm, chief civilian engineer of the project. Assisting the writer on this work were R. R. Clark, C. L. Koehm, E. L. Henny and L. F. Henshaw. F. H. Cothran, consulting engineer on the project, contributed materially from his large fund of experience on cofferdam work.

At Bonneville, B. E. Torpen, construction engineer; Otto C. Hartman in charge of main dam construction; and Richard Holbrook, inspector in charge of soundings, have been chiefly responsible for the successful progress of the work.

The Bonneville power and navigation project is being built by the Corps of Engineers, U. S. Army. Col. T. M. Robins is division engineer, Pacific Northwest; Major Charles F. Williams, District Engineer at Portland; Major H. S. Skerry, executive officer at Portland; and Captain J. S. Gorlinski is resident engineer at Bonneville.

Highway Budgets Indicate Record Program for 1935

California's Biennial Budget Goes to $61,250,000

A total of $61,285,000 will be spent during the biennium 1935-37 by the California Division of Highways. Of this amount $37,807,000 will be spent on new construction and already $26,498,980 has been allocated to 181 projects which are included in the following tabulation. Of this new construction, $19,735,254 is to be spent in northern California and $18,071,746 will be spent in southern California in accordance with terms of the Breed Bill.

Disbursement of the budget to be obtained from the estimated revenue from the 3c gasoline tax, motor vehicle fees, and Federal Aid during the coming biennium is as follows:

New construction	$37,807,000
Maintenance	15,215,500
Administration and engineering	2,450,000
Allocation to cities (¼c)	5,812,500
TOTAL	$61,285,000

The revenue sources estimated to yield the budget requirements are as follows:

State's portion of gasoline tax (2c)	$46,500,000
Motor vehicle fees	5,300,000
Federal Aid	9,485,000
TOTAL	$61,285,000

The sum of $15,215,500 allotted to maintenance provides for satisfactory upkeep of 14,000 mi. of California's primary and secondary highway system. This work includes bridge repair and painting, slide removal, storm damage repair, reoiling of roadway surface and shoulders, snow removal on 3,000 miles of highway, traffic stripping, repairing guard rails, and installing signs and signals.

The individual jobs listed below range in cost from a few thousand to mare than $3,300,000 for approaches of the San Francisco-Oakland Bay bridge.

PRIMARY PROJECTS IN NORTHERN CALIFORNIA

County	Length (Mi.)	Description and Location	Allotted Cost
Butte-Plumas		Tunnel const. and oiling Jarboe Gap to Keddie (por.)	$ 117,000
Butte-Plumas		Grad., Jarboe Gap to Rock Cr. (por.)	520,000
Butte	19.0	Grad., surf. Biggs Road to Chico	95,000
Fresno	2.0	Grad., pav. South limits Selma to ¾ mi. N. of North limits	120,000
Fresno	4.0	Grad., pav. Fresno to Ashlan ave.	275,000
Humboldt	7.3	Grad., surf. Salmon creek to Bucksport	165,000
Humboldt	2.1	Grad., surf. Trinidad to McNeil	125,000
Humboldt		Grad., surf. in City of Eureka	60,000
Kings	1.5	Grad., pav. 1.5 mi. E. of Hanford to Hanford	60,000
Marin		Grad., pav., bridge Waldo to Golden Gate bridge	1,000,000
Marin		Grading through San Rafael	200,000
Mendocino	1.9	Grad., surf. outlet to Ryan creek	196,000
Mendocino	0.8	Grad., surf., bridge, Eleven Oak road to Willits	60,000
Monterey	6.8	Gra., pav., bridge, Bradley to 6 mi. of San Ardo, Haines Creek	335,000
Monterey	8.0	Grad., pav., Solidad to Gonzales	158,000
Monterey		Grad., surf. in Thompson gulch	27,000
Monterey		Grade separation over Southern Pacific in Salinas	260,000
Nevada-Sierra	5.0	Grad., surf., Floriston to State Line	50,000
Sacramento	0.3	Grad., pav., Sacramento to American river	50,000
San Francisco-Alameda		Grad., pav., bridges, San Francisco to Oakland	3,300,000
Santa Clara	3.7	Grad., pav., bridge, Santa Clara-Alviso road to San Jose; Guadalupe river	425,000
Santa Cruz	3.9	Grad., surf., Scotts Valley to 1 mi. N. of Santa Cruz	220,000
Shasta-Lassen	18.0	Surf., Fall River Mills to Hillside	67,500
Shasta		Bridges and approaches, China Gulch and Olney creek	52,000
Shasta	3.0	Grad., surf., near Old Shasta to Redding	130,000
Shasta	5.0	Grad., surf., 1.5 mi. E. of Bella Vista to Diddy Hill (portions)	130,000
Solano-Napa	9.8	Grad., pav., surf., Vallejo-Benecia road to Cordelia	330,000
Solano	4.0	Grad., pav., bridge, 3.5 mi. N. of Fairfield to 0.6 mi. S. of Vacaville, Alamo creek	200,000
Stanislaus	6.0	Resurf., Turlock to Esmar	50,000
Sutter		Grad., pav., in Yuba City	25,000
Tehama	13.8	Surf., Route 3 to 1.5 mi. E. of Dales	175,000
Tehama		Grad., shoulders, Southern Boundary to Red Bluff (portions)	100,000
Yolo-Colusa	8.9	Grad., surf., Dunnigan to Arbuckle	180,000
Yolo	3.5	Grad., pav., East end of Causeway to M St. subway	170,000
Yuba	9.0	Grad., pav., Morrisons Crossing to Marysville	235,000
Yuba		Grad., surf., Downieville road (portions)	75,000
Plumas		Grading Storrie to Belden	155,000
		Total	$9,892,500

PRIMARY PROJECTS IN SOUTHERN CALIFORNIA

County	Length (Mi.)	Description and Location	Allotted Cost
Imperial	4.0	Resurf., 3 mi. W. of Westmoreland to Trifolium canal	$ 48,000
Inyo	8.0	Grad., surf., Big Pine to Keough Hot springs	150,000
Inyo	0.7	Grad., surf., in vicinity of Evans ranch	16,000
Kern	5.2	Grad., pav., L. A. Co. Line to Ft. Tejon	400,000
Kern	1.5	Grad., pav., struc., Famosa grade separation and approach	145,000
Kern	10.0	Surf., Mojave to 10 mi. North	15,000
Los Angeles	1.4	Grad., pav., Verdugo road to Flintridge Country club	150,000
Los Angeles		Grading Newhall tunnel	100,000
Los Angeles Ventura		Grad., pav., Calabasas to Conejo grade	200,000
Los Angeles	2.0	Grad., pav., Scoville ave. to Big Tujunga wash	85,000
Los Angeles		Grad., bridges, Big Tujunga wash N. and S. Channels	90,000
Los Angeles	10.0	Pavement widening Lancaster to N. Boundary	50,000
Los Angeles Ventura	5.7	Grad., pav., Encinal Canyon to Little Sycamore	268,000
Los Angeles Ventura		Widening bridges, Arroyo Sequit and Little Sycamore creeks	22,000
Los Angeles		Structure in Santa Fe R.R. yard in Wilmington	475,000
Los Angeles	1.4	Bridge in Tujunga wash	225,000
Los Angeles	1.2	Grad., pav., Truman St. through San Fernando	92,000
Los Angeles		Grad., pav., State St., Lime St. to Stanley ave.	50,000
Los Angeles		Grad., pav., struc., Rts. 2, 4 and 60 in City of Los Angeles	132,000
Mono	7.5	Grad., surf., 2.2 mi. S. of Rush Creek to 2.7 mi. South of Mono Inn	125,000
Mono	2.7	Grad., surf., 4 mi. to 1.3 mi. S. of Coleville	34,000
Mono	3.0	Grad., surf., Conway Summit to Bodie rd.	53,500
Mono	2.2	Surf., Mattly Ranch to Leevining	10,000
Orange	4.2	Grad., resurf., Seal Beach to Huntington Beach	54,000
Orange	4.2	Grad., resurf., Huntington Beach to Newport Beach	38,000
Riverside	1.5	Grad., pav., northern boundary to W. limits of Beaumont	77,000
Riverside	9.0	Storm protection, drainage County Line to Ave. 62	78,000
San Bernardino Riverside	15.0	Grad., surf., shoulders, Ontario to Riverside	40,000
San Bernardino	5.5	Grad., pav., Santa Ana River to Redlands, Mission Storm Drain	111,000
San Bernardino		Grad., surf. in Barstow	35,000
San Bernardino		Grad., bridges, drainage, Ludlow to 20 mi. E. of Amboy (portions)	20,000
San Diego	6.3	Grad., pav., struc., Delmare to Encinitas; Delmar Grade separation	272,000
San Diego	8.0	Grad., pav., Oceanside to Las Flores underpass	444,000
San Diego		Paving El Cajon ave.	200,000
Santa Barbara	2.0	Grad., pav., Tajiguas creek to Arroyo Quemado and Arroyo Hondo to 1½ mi. west	137,000
Santa Barbara	1.2	Grad., pav., Arroyo Quemada to Arroyo Hondo	66,000
Santa Barbara	1.6	Grad., pav., 1 mi. N. of Rincon creek to Carpenteria	85,000
Santa Barbara		Carpenteria bridge over Carpenteria creek	40,000
Santa Barbara	1.5	Grad., pav., Richfield tower to Santa Maria river	65,000
Tulare	5.0	Grad., surf., Yokohl to Lemon Cove	150,000
Ventura	7.0	Grad., pav., bridge, Conejo grade; Conejo creek	550,000
Ventura	1.0	Grad., pav., bridge, Big Sycamore Line Change and bridge	150,000
Ventura	4.9	Grad., pav., Oxnard to Hueneme road	73,000
		Total	$5,620,500

SECONDARY PROJECTS IN NORTHERN CALIFORNIA

County	Length (Mi.)	Description and Location	Allotted Cost
Alameda-Contra Costa	5.4	Grad., pav., Ashby to San Pablo aves...	$ 550,000
Butte	7.7	Surf. westerly boundary to Biggs road....	15,000
Contra Costa	5.0	Grad., surf., Oakland to Walnut creek (portions)	325,000
Del Norte	5.1	Grad., surf., 0.7 mi. S. State Line to 0.5 mi. N. Winton Corner	140,000
El Dorado	9.0	Surf., Kyburz to Strawberry	115,000
El Dorado		Bridges ,Echo crk., Little Truckee river..	25,000
El Dorado	1.0	Surf., Oglesby canyon	13,000
Fresno		Grading Kings River canyon	300,000
Kings	2.5	Grad., pav., Hanford westerly	40,000
Lake	1.2	Grad., surf., Upper lake to Rasmussen rch	68,000
Mendocino	1.7	Grad., surf., Clow creek and Oaks Line change	43,000
Modoc		Grad., surf., Alturas to Cedarville (portions)	75,000
Monterey	1.2	Grading Lewis Creek to Priest Valley..	30,000
Monterey	6.5	Grad., surf., Partington's canyon to Post's Summit	622,000
Monterey		Bridge, Torre canyon	67,000
Monterey	2.3	Grad., surf., Post's Summit to Big Sur..	78,000
Monterey		Bridge, Convict gulch	27,000
Monterey	1.6	Grad., surf., Moleras Ranch to 1.6 mi. southerly	81,000
Madera	8.0	Grad., surf., Kelshaw to Coarsegold	230,000
Napa		Purchase of Sears Point road	41,800
Napa	1.4	Paving, 1 mi. N. of Carquinez bridge to Vallejo-Benecia road	75,000
Sacramento	33.0	Grad., surf., Isleton to Sacramento	80,000
San Benito		Grad., surf., Pinnacles park to Hollister (portions)	100,000
San Joaquin	6.4	Grad., surf., drawbridge Potato slough, bridge and approaches, w. of terminous	150,000
Siskiyou		Grading, Klamath River road (portions)	100,000
Solano		Grad., surf., in City of Benecia	10,000
Sonoma		Grad., surf., Cotati to Sebastopol	75,000
Trinity		Grading, Trinity River Road (portions(..	100,000
Tuolumne	3.5	Grad., surf., Sullivan Creek to Pooley's..	100,000
		Grading, prison labor camps	478,000
		Total	$4,153,800

SECONDARY PROJECTS IN SOUTHERN CALIFORNIA

County	Length (Mi.)	Description and Location	Allotted Cost
Imperial		Resurf., bridge, Holtville to Brawley (portions) and Alamo River bridge	104,000
Imperial	12.9	Grad., surf., bridges, Calexico to Highline canal, Alamo river and Highline canal..	100,000
Imperial		Grad., surf., Brawley to Calipatria (port.)	75,000
Imperial		Grad., surf., East Heber to East Brawley (portions)	50,000
Inyo	7.3	Grad., surf., Death Valley Junc. to State Line	9,000
Inyo	18.0	Grad., surf., 6 mi. W. of Darwin to Panimint sink	25,000
Inyo		Purchase Eichbaum toll road	18,900
Inyo	18.0	Grading, Lake Sabrina to Bishop	20,000
Inyo-Mono	20.0	Grad., surf., Rt. 23 to 20 mi. north	38,000
Kern	14.0	Surfacing, Seivert to Bear Mountain ranch	45,000
Kern		Grad., surf., Tehachapi to Mojave (port.)	125,000
Kern	2.5	Grad., surf., 4 mi. S. of Shafter northerly 2.5 mi.	75,000
Kern	1.0	Grad., surf., bridge, Kern River bridge and approach	75,000
Kern		3 bridges, Oak St. route	30,000
Kern		3 bridges, East of McKittrick and of Junc. Rt. 139	32,000
Kern	6.7	Grad., surf., Searls to Randsburg	8,000
Kern		Grad., surf., Weldon to Onyx (portions)..	8,000
Kern	9.8	Grad., surf., 8 mi. W. of Freeman to 18 mi. east	22,500
Los Angeles		Bridge over Rio Honda	135,000
Los Angeles		Pumping system, Union Pac. subway at Telegraph road	5,000
Los Angeles	2.0	Grad., pav., Cerritos ave., L. A. st., to Artesia st.	75,000
Los Angeles		Bridge over San Gabriel river	$ 70,000
Los Angeles		Grad., surf., Red Box to Mt. Islip (port.)	300,000
Los Angeles	1.2	Grad., pav., Sepulveda blvd., Culver Ctiy to Centinella ave.	85,000
Los Angeles	1.4	Grad., pav., Rt. 170 to Rt. 171, through Santa Fe Springs	100,000
Los Angeles	7.0	Grading, Coldbrook camp to Ranger sta	40,000
Los Angeles		Bridge, Glendora ave. over Walnut creek	10,000
Los Angeles		Bridge, over L. A. River on Atlantic blvd.	135,000
Los Angeles	10.0	Grad., pav., bridge, Rosemead ave., Whittier blvd., to Foothill blvd. (portions), Rio Hondo	350,000
Los Angeles	6.5	Grad., pav., 3rd St. at City Limits to San Gabriel blvd.	440,000
Los Angeles		Grad., pav., structures, Sepulveda blvd. (portions)	250,000
Los Angeles		Grad., pav., structures, Santa Monica blvd., Beverly Hills to Seward	200,000
Los Angeles		Grad., pav., struc., Santa Monica blvd., Heath to Sepulveda	350,000
Los Angeles		Grad., pav., struc., Figueroa st. (port.)	481,930
Los Angeles		Grad., pav., 4th St., Indiana to Fresno..	50,000
Los Angeles		Grad., pav., 10th st. (portions)	250,000
Mono	6.0	Grad., surf., Bridgeport to 3 mi. E. of Walker River dam	15,000
Mono		Grad., surf., Rt. 23 to Tioga summit (portions)	15,000
Mono		Grad., surf., near Coleville to State Line	15,000
Mono	11.3	Grad., surf., Rt. 23 to Sonora summit (portions)	13,000
Orange	3.4	Grad., surf., struc., Carolina ave. to Yorba Linda, Pacific Electric grade separation	110,000
Orange	1.3	Manchester ave., Anaheim to Miraflores, grad., pav.	48,000
Orange	2.6	Grad., pav., Santa Ana Canyon road, Gypsum creek to County Line	150,000
Orange	1.0	Grad., pav., southeast of Placentia	36,000
Orange		Bridge over Santa Ana river	42,000
Riverside	8.9	Grad., surf., Box Springs to Theodore st	167,000
Riverside	2.3	Grad., surf., grade separation, Beaumont	
Riverside	2.5	to Bad Lands	73,000
Riverside		Grad., surf., Junc. of Rts. 194 and 19 to new connection	39,000
Riverside		Bridge over Santa Ana river (Prado)	21,000
Riverside		Bridge over San Jacinto river at Elsinore	25,000
Riverside		Bridge over Temecula creek mile post 72.3	10,000
Riverside		Principal and interest, Ehrinberg bridge	50,850
Riverside		Grad., surf., Mecca to Rt. 26 (portions)	25,000
Riverside	10.0	Grad., surf., bridge, 10 mi. W. of Indio to Indio	140,000
Riverside	17.5	Grad., surf., Palo Verde to Route 64	50,000
San Bernardino	1.9	Grad., pav., bridge, E. limits of Colton to Waterman ave., Santa Ana river	330,000
San Bernardino		Bridge over Indian Creek wash	10,000
San Bernardino		Bridge over dip on Verdemont Cutoff..	10,000
San Bernardino	4.0	Grad., surf., Pomona, Garey ave. to Merrill ave.	66,000
San Bernardino	7.5	Grad., surf., Rt. 43 to N. of Arrowhead dam (portions)	75,000
San Bernardino	3.0	Grad. and surf., Mt. Anderson to Camp Seeley	40,000
San Diego	3.1	Grad., resurf., Lake Hodges to Escondido	85,000
San Diego		Bridge over San Vicente creek	23,000
San Diego		Bridge, grad., Pauma creek & approaches	20,000
San Luis Obispo	7.5	Grad., surf., Cholame to Kern Co. Line	217,000
San Luis Obispo		Bridge over Cholame creek	23,000
Santa Barbara	5.7	Grad., surf., bridge, Santa Barbara ave. to Los Olivas	141,000
Tulare	3.0	Grad., pav., 1 mi. S. to 1 mi. N. of Lindsay	150,000
Ventura		San Antonio Creek bridge and approaches	35,000
Ventura		Grad., pav., Camarilla to Oxnard (port.)	100,000
Ventura		Grad., pav., Sespe ranch to Fillmore and at Piru	180,000
Ventura	6.3	Grad. and shoulders, Somis to Saticoy	53,000
		Total	$6,832,180

Oregon to Spend $10,700,000 on Highways

A total of about $10,700,000 will be expended during 1935 by the Oregon State Highway Commission, approximately one-half of which is already under contract. Included in this total are the following expenditures: Construction on the 5 Coast bridges at an estimated cost of $3,500,000 (funds for this purpose are provided from the sale of bonds which are to be retired from bridge tolls to the amount of $2,700,000, and from a Federal grant of about $800,000); the regular Federal Aid program involving $3,600,000, of which approximately $2,050,000 will be from state funds derived from gas tax, license fees, etc.; an additional state fund of about $300,000 available for non-federal aid construction; the 1935 NRA allotment of about $3,300,000 which has been definitely programmed and more than half of the projects have been placed under contract.

The following is a summary (in miles) of various classes of work included in the latter program:

	NRH	NRS	NAM	Total
Grading	26.6	40.0	2.0	68.0
Surfacing	29.7	44.2	.5	74.4
Paving	6.1	...	13.3	19.4
Oiling	8.8	11.7	...	20.5
Bit. Macadam	...	7.9	.6	8.5
Bridges (number)	5	7	3	15

The classification of Federal funds provided by the above program as to kind of work and distribution of allotment is as follows:

	NRH	NRS	NRM	Total
Grading	$ 966,000	$343,000	$ 97,000	$1,406,000
Surfacing	181,000	189,000	3,000	383,000
Paving	270,000	.....	491,000	761,000
Oiling	70,000	100,000	.....	17,0000
Bit. Macadam	.....	41,000	10,000	51,000
Bridges	118,000	158,000	200,000	476,000
Landscaping and R. R. Crossing	37,000	.....	12,000	49,000
Totals	$1,642,000	$831,000	$803,000	$3,296,000

Expenditures during 1934 in connection with the NRA allotment have amounted to approximately $150,000, which leaves $3,150,000 to be carried over to 1935. There will also be an approximate carry-over of $350,000 of uncompleted construction under the 1934 NRA program.

A tentative survey of possible grade elimination projects reveals that there are 24 sructures that can be advertised for bids within 3 months time if Federal funds are provided.

A total of $7,270,000 was dispursed for road and bridge construction in 1934. This includes Oregon's 1934 NRA allotment of more than $6,000,000, state funds amounting to $800,000 and $470,000 from bridge bond funds for construction on the 5 Coast bridges.

During 1934 the following highway construction and improvements were carried out:

Type of Work	Uncompleted Work Carried Over Into 1935 (Miles)	Work Completed in 1934 (Miles)
Cement Concrete Paving		34.9
Asphalt Concrete Paving	27.6	4.6
Grading	30.1	41.0
Grading and Surfacing	16.1	44.1
Surfacing	35.2	162.9
Bridges	0.9	1.4
Oiling	33.4	412.9
Guard Rail		10.2
Riprapping		0.3
Landscaping	8.8	11.7

Colorado Governor Approves Highway Budget

The 1935 Colorado State highway budget of $6,971,000 as drafted by the state highway advisory board has been approved by Governor E. C. Johnson. The budget provides for class 'A' and 'B' projects. Class A allocation, receiving first consideration, provides for the expenditure of $2,800,000 and class B which is provided from remaining available funds, amounts to $1,781,000.

The program of road oiling which last year amounted to $600,000 will be continued this year at a cost of $500,000. The maintenance allowance amounts to $1,383,500 for betterments and equipment on 3570 mi. of federal aid roads and 339 mi. of forest service highways. Estimated receipts to make up the budget are as follows:

Federal aid	$2,288,811
Additional revenue on loan (if obtained)	890,000
70% of state gas tax	3,360,000
Bus and private carrier fees	50,000
Internal improvements	30,000
Miscellaneous receipts	50,000

The outstanding feature of the 1935 budget is a concentration of heavy expenditures on Colorado's main arterial highways. Three of the most important jobs are the widening of pavement on 3 main highways into Denver, namely: The Golden approach road at a cost of $100,000; the Bromfield approach at a cost of $200,000; and the Littleton approach at a cost of $100,000.

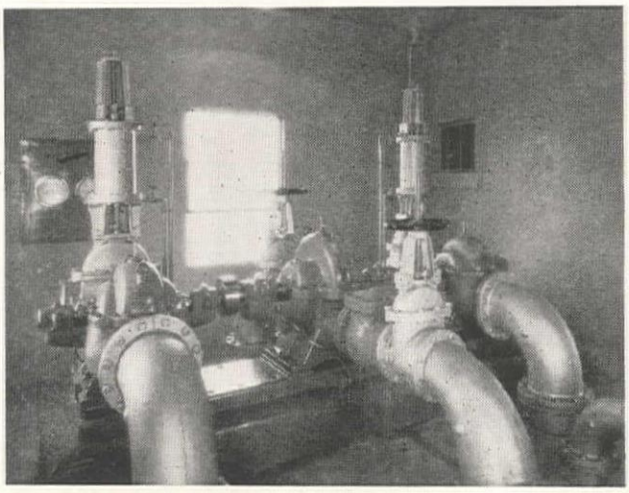
Washington Legislature Drafts New Code to Regulate Highway Funds

Immediately following the present biennium ending March 31, 1935, a new highway code will be submitted to the Washington State Legislature which will provide for redistribution of Department of Highway funds by the state and counties in a manner entirely different than exists at present.

The budget for the Department of Highways will not be made up until after this new code has been approved by the legislature. Under the present statutes, allocation of motor vehicle fees and gas tax monies are only sufficient to match the federal aid allotment of $1,900,000 for the state of Washington.

The mileage of work completed during 1934 and the amount of uncompleted work carried over into 1935 is as follows:

Concrete paving and widening	20 mi.
Bituminous macadam wearing surface	130 "
Oil treatment	72 "
Crushed rock surfacing	51 "
Grading and grade widening	72 "
Bridges over 20 feet in length	75 only



Seattle Adds Third Hydraulic Turbine-Driven Pumping Station

By J. C. LINDSAY
Pump Foreman, Seattle Water Department

In 1900 the City of Seattle built its first full hydraulic pumping station at Lincoln park. Pumping equipment consisted of two 10 by 12-in Goulds triplex double acting pumps connected through reducing gears to 90 hp. Pelton water wheels. These old units gave splendid service until the spring of 1931, at which time they were replaced by a modern 120 hp. Worthington unit, the 16-in. reaction type turbine being direct connected to a 12 by 10-in. single stage double suction centrifugal pump.

This new unit proved so satisfactory that the Water Department installed a DeLaval 50 hp. unit at Green Lake reservoir in 1933 at a cost of $1500, completely installed in a concrete vault and fully automatic. This unit effects an annual saving of $1000 over an electric pumping unit previously operated.

In January, 1934, Seattle Water Department broke ground for its West Trenton street hydraulic pumping station, and completed this station about May 15. This station was built and the machinery bought and installed at a cost of $15,219. For the first seven months of its operation an average of $1260 a month has been saved over that previously paid for electric power at the West Kenyon street and West Spokane street electric pumping stations. The West Kenyon street station has been permanently shut down and the West Spokane street station will be operated only at partial capacity during June, July and August of each year.

The station is located easterly and below the new 68-M. gal. West Seattle reservoir, which has an overflow at elev. 430 ft. The pumping station floor is at elev. 321.5 ft., while the overflow of the two low service standpipes into

which the turbines exhaust is at elev. 320 ft. The power water to the turbine and pump intakes is brought from the reservoir through one 36-in. steel pipe, providing an effective head of approximately 100 ft. on the turbines and pump suctions.

The larger hydraulic driven turbine pumping unit at the West Trenton street station consists of a 10 by 8-in. double suction single stage centrifugal pump driven by two 12-in. reaction type, hydraulic turbines, one on each end of the pump shaft. The turbines operate under a net effective head of 110 ft. and require 9,150 g.p.m. for their operation. The turbine efficiency at full load is 83% and the operating speed is 1,370 r.p.m.

The 10 by 8-in. pump delivers 3,000 g.p.m. at a total head of 210 ft. and operates under suction pressure of 100 ft., making a total discharge head of 310 ft. The efficiency under these conditions is 86% and the pump requires 184 b.h.p. This unit can be operated with one turbine disconnected and delivers 1,000 g.p.m. at a 300-ft. head.

The unit is operated by means of two 12-in. hydraulically operated square bottom gate valves which in turn are operated by one 4-way cock. The hydraulic gate valves are kept synchronized by needle valves, one at each cylinder port which are set for approximately 3 min. opening and closing periods, so as to preclude possibility of water hammer.

The smaller unit consists of a 10-in. turbine operating under a net head of 100 ft. and requiring 3,500 g.p.m. for its operation. The efficiency is 80% and it operates at 1,750 r.p.m. This turbine is direct connected to a double suction single stage 5 by 4-in. pump and delivers 100 g.p.m. at a total discharge head of 300 ft. The efficiency is 72% and the pump requires at 73.6 b.h.p. at 1,750 r.p.m.

The West Trenton street station pumps to a 500,000 gal. elevated tank with an overflow at elev. 575 ft., formerly supplied from the West Kenyon street electric pump station, and through a gate to a 1,000,000 gal. standpipe with an overflow at elev. 490 ft., which was formerly taken care of by the West Spokane street station.

Normally about 95% of the exhaust water from the turbines is absorbed by the low service, a large gravity fed district. During peak periods practically 100% is absorbed. The Seattle Water Department is now using a total of 428 h.p. in turbines, of reaction type, which are direct connected to centrifugal pumps. By using this water power which is easily available, the Department is effecting a total cash saving in power bills conservatively estimated at $30,000 per annum. These installations were all conceived and executed by Seattle Water Department under the direction of H. D. Fowler, superintendent of water.

Preliminary Report on San Gabriel Dam No. 1 Unfavorable

Following the agreement reached a few weeks ago between the Board of Supervisors of Los Angeles Flood Control District and West Slope Construction Co., Los Angeles, contractors on San Gabriel dam No. 1, which provides for a 120-day suspension of the work now under contract, a preliminary and informal report on the dam project was submitted to the Board of Supervisors by C. H. Howell, chief engineer of Middle Rio Grande Conservancy District of Albuquerque, N. M.

San Gabriel dam No. 1 is the world's largest rock fill structure with a crest length of 1650 ft. and a height above bedrock of 360 ft. The thickness at the base is 900 ft. and the crest width is 30 ft.

Preliminary construction on this $11,890,000 flood control and conservation project located on San Gabriel river, 7 mi. above the Azusa and 33 mi. from Los Angeles, was begun in December, 1932, by the Flood Control District. The main contract for the dam and outlet works was awarded to the West Slope Construction Co. at a price of $8,600,527 and actual dam construction was started March 3, 1933.

The report of Howell, who was called in as a consultant by the District, is in no sense a final report or conclusive. His ideas are expressed after a brief inspection trip was made over the damsite. The report in abstracted form is as follows:

(1) The rock is not suitable for a high loose rock dam because it is too soft and is subject to disintegration. These two defects are liable to result in excessive settlement.

(2) The slopes of the dam are too step, providing a dam section that is too light. These slopes appear to be slightly flatter than the angle of repose of loose rock.

It is proposed to abandon the loose rock fill entirely and make a rolled fill instead. It is proposed that quarried materials, which have been crushed, be placed in the dam in 4 to 6 in. thick layers. This fill material will be spread in layers with a bulldozer or trail-builder and compacted by rollers weighing not less than 2 ton per foot of width after being well wetted down. This method will result in a dense heavy embankment and will show little if any shrinkage or settlement.

(3) From observations made from the narrow ridge forming the right-hand abutment (looking down stream) indications are that the rock may be a mass of soft and badly shattered granitic rock with possibilities that it may be a land slide. These observations were made on exposed base rock and in cuts of the highway extending through the top of the ridge. Further geological investigation is recommended, and this may require driving tunnels, drifts, and shafts.

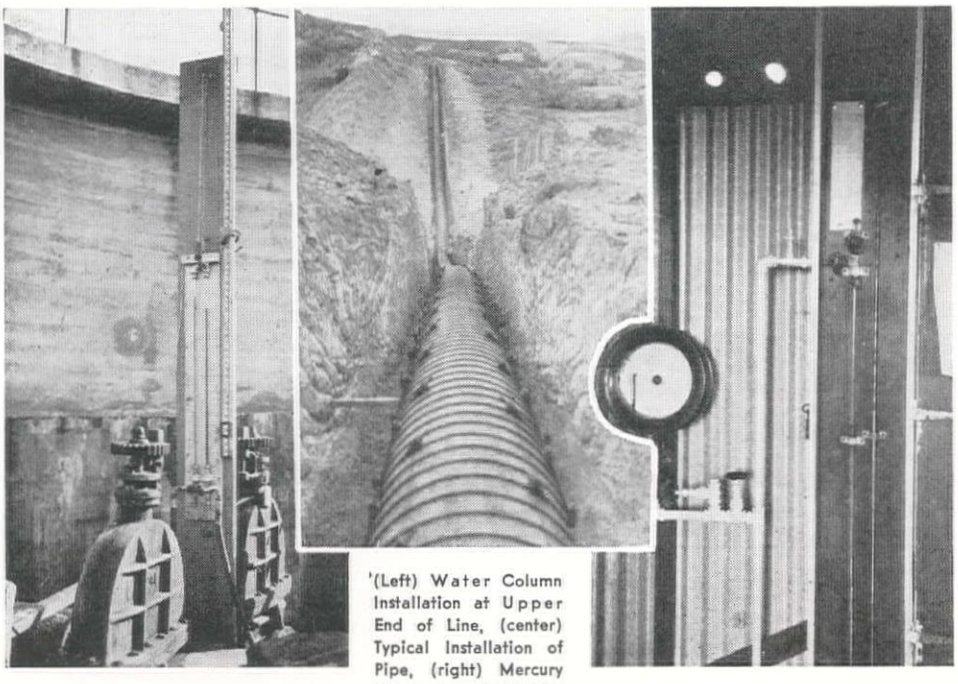
If investigations reveal that this abutment is not a slide, it is recommended that pressure grouting be applied to the upstream third of the entire abutment. This will consist of drilling numerous parallel lines of 4-in. diameter holes to a depth of about 100 ft. below the riverbed and applying grout under pressure not exceeding 100 lb. per sq. in. Spacing of holes will be determined by the amount of grout necessary to transform the abutment into a solid mass. No recommendations were made in case the abutment proved to be a land-slide.

(4) It is recommended that rock already in place be checked as to specified weight, hardness, and soundness. If the material does not meet specifications under which it was placed, it should be entirely removed and replaced in the form of a rolled fill as previously mentioned. Should the material already placed be satisfactory, the upstream 100 to 150-ft. portion should be removed regardless, and replaced by a rolled fill. This is necessary to properly back up and support the cut-off wall against water pressure and to prevent percolation under the base of the dam.

(5) The proposed laminated concrete face will probably not be flexible enough to adjust itself to such settlement as will occur if the dam is built as proposed. Because of the inevitable change in composition and character of asphalt, due to the action of water, the deck slab will probably not remain watertight and, undoubtedly, would have a tendency to buckle. As a substitute to the concrete deck, two alternatives are suggested: (1) A steel plate deck on the upstream face; (2) a vertical cellular reinforced corewall in the center of the dam.

The steel plate deck could probably be attached to the present cutoff wall (assuming this cutoff to be satisfactory as to depth, etc.). Plates would range in thickness from ⅝ or ¾ in. at the base of dam to ¼ in. for the top 100 or 150 ft. The upstream slope should not be steeper than 1¾:1 with 10 or 15-ft. berms at 100-ft. vertical intervals. The down stream slope should be at least 2½:1 with a similar arrangement of berms.

This proposed dam section is more massive than would be used for an ordinary dam in a remote locality, but due to earthquake probability and dense population and an enormous property interest immediately below, such a dam section is recommended.



'(Left) Water Column Installation at Upper End of Line, (center) Typical Installation of Pipe, (right) Mercury Manometer Installation at Lower End of Line.

Studies in Wood Stave Irrigation Pipe Shows High Capacity

By W. C. BROWN
Formerly Superintendent
San Dieguito Irrigation District Encinitas, California

TESTS were undertaken in 1933 to enable San Dieguito Irrigation District to predict the performance of pipe lines under conditions assumed in a study of storage requirements. It was realized that due to increasing peak demands increased terminal storage would eventually be necessary to balance the flow.

San Dieguito Irrigation District, which comprises 4,000 ac. of townsite and agricultural land lying along the Pacific coast in San Diego county, Calif., is supplied with water from Lake Hodges through a transmission line consisting of about 10 mi. of continuous Redwood-stave pipe. This pipe receives water from a balancing reservoir at Rancho Santa Fe, and delivers it into a number of lateral lines connected at intervals throughout the last 4 mi. of its length. This pipe, varying from 14 to 26-in. diam. was constructed in 1923 by Redwood Manufacturers Co., San Francisco, and has since been in continuous service.

The portion tested consists of the upstream 7 mi. of line, of 26-in. diam. pipe and was designed to carry a maximum of 10 c.f.s. with a loss of head of 1-ft. per 1,000 ft. of pipe, corresponding to a coefficient of 126 in the Hazen-Williams formula. Briefly stated, the average of the results of 30 sets of observations made during this test indicates a coefficient of 150 in the Hazen-Williams formula.

The variations from uniform straight pipe in the test section are as follows: Five 24-in. gate valves; nine 26 to 24-in. tapers, each 12 ft. long; 53 curves, with a total length of 9,400 ft., central angles totalling 1,509 deg., radii vary from 130 to 1,500 ft., also a considerable number of vertical curves; and 4 lateral pipe connections which were closed during the test.

Air was prevented from accumulating at summits by both manually and automatically operated air relief valves, and all low points were flushed out frequently through blow-off valves. Leakage was so small that it was considered negligible.

The test consisted of accuarately determining loss of head in the measured length of pipe, with various rates of flow. Coincident observations of rate of flow and elevation of hydraulic gradient at the ends of the test section were made at regular intervals over periods of several hours, in order to minimize the effect of possible errors of observation and those due to occasional surges or changes in rate of flow at the instant of observation.

A Simplex venturi meter with 24 by 8⅝-in. tube was used to measure the flows, which consisted of the normal water use augmented by opening blow-off valves downstream from the lower gauge. Adjustments of the meter were checked before test. Flow rates varied from 3.11 to 8.20 c.f.s. and were fairly steady during most of the test period.

The head at the upper end of the test section was measured by a water column connected at a point immediately downstream from the venturi tube; and at the other end of the line by a mercury manometer. The difference in elevation of the two gauges was accurately determined by instrumental levelling and also by observation of pressure head at times when the flow was practically zero. The latter agreed with the instrumental levelling with an error of 0.2 ft., which is practically negligible for the present purpose considering the length of pipe. The elevation by instrumental levelling was used because there was no opportunity of reading the mercury gauge at absolutely zero flow.

It is believed that the total error in measurement of head loss, due to all causes, does not exceed 0.01 ft. per 1,000 ft. of pipe; and that the error in measurement of rate of flow does not exceed 2%. The inside diameter of the pipe was measured by caliper, both vertically and horizontally, and the mean of the two (26.08 in.) was used as the true diameter, with a probable error of not more than 0.1 in. The slope length of 36,200 ft. was obtained from the carefully checked estimate upon which the contractor was paid.

Field Methods—The mercury manometer consisted of a 6 mm. inside diam. glass U-tube mounted on a pine plank, on which the graduations were marked. The quantity of mercury was adjusted so that upper and lower readings were spaced approximately the same distance above and below a zero mark, corresponding to the true elevation of 202.23 ft., and the upper and lower readings were separately recorded and reduced for each observation. Graduations on the plank were in inches, and readings were taken to hundredths of an inch by means of a scale.

The odd appearance of the water column gauge is due to the fact that a U-tube manometer was used inverted, venting it by opening the drain cock. The other leg of the tube was also used as a water column in making a concurrent test of the loss of head in a screen and an adjustable swing joint outlet pipe on the up-stream side of the dam. A few drops of ink were inserted in these water columns to facilitate reading.

Office Methods — On account of the length of pipe tested, it was not considered necessary to make temperature corrections to the manometer and water column readings, as errors introduced by neglecting these items were much smaller than possible errors in other elements involved.

Specific gravity of the mercury was taken as 13.58. Hydrometer tests of the water at 15 deg. C. failed to show any perceptible variation from 1.000, the hydrometer graduation being such that the interval between 1.000 and 1.010 occupied a length of about one eighth inch on the scale.

The constant factors for reducing the manometer readings to feet of water, were derived as follows:

S = specific gravity of mercury
H = reading up from O (elev. 202.23 ft.) in inches
h = reading down from O in inches

$$\text{Head at O (in feet)} = \frac{S}{12}H - \frac{S-1}{12}h$$
$$= 1.132\,H - 1.048\,h$$

Sample Computation

Water column elevation (at upper end of pipe line) ..... 240.35 ft.
Mercury manometer:
Elevation of zero mark 202.23
Upper reading "H" = 9.15
× 1.132 = 10.34
Lower reading "h" = 9.00
× 1.048 = 9.44
Elevation of hydraulic gradient = 222.01 ft.
Loss of head between gauges = 18.34 ft.

$$\text{Loss of head per 1000 feet} = \frac{18.34}{36.2} = 0.502 \text{ ft.}$$

Substituting in Hazen-Williams formula:
$V = C, r^{0.63} S^{0.54}$ 0.001—0.004
$V = 1.319\ C, r^{0.63} S^{0.54}$

where
l = length of pipe in feet (36,200 ft.)
H_1 = loss of head due to friction in feet in length l
d = diameter of pipe in feet (26.08 in.)

$$r = \text{mean hydraulic radius} = \frac{d}{4}$$

$$S = \text{mean slope of hydraulic gradient in distance considered} = \frac{H_1}{l}$$

V = mean velocity of water in feet per second.

Coefficients were determined as are shown in the following table which contains a few typical sets of observations and results, and indicates approximately the range of values encountered in the test, with aid temp. of 18 to 21 deg. C. and water temp. of 15 deg. C.

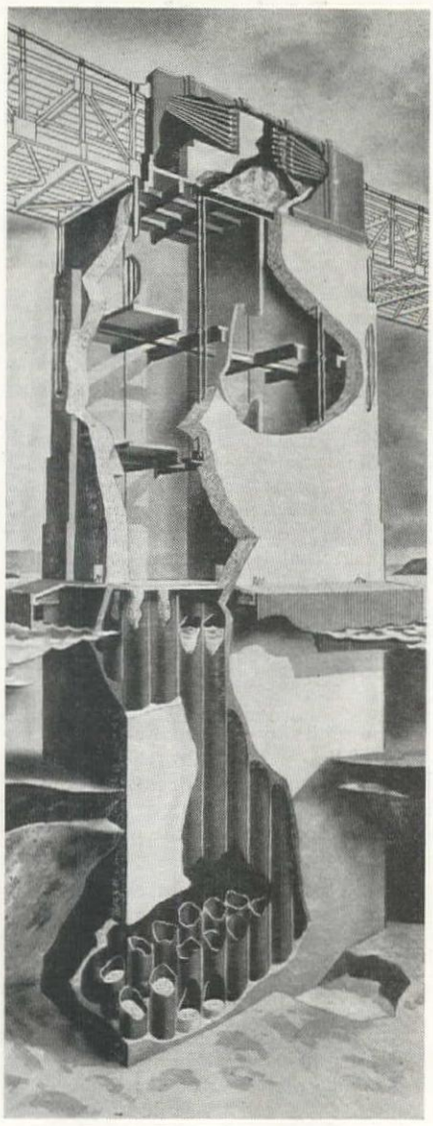
Rate of Flow c.f.s.	m.g.d.	Vel. ft. per sec.	Total Head Loss	Hyd. slope ft. per 1000	Hazen-Williams Coeff.
4.54	2.93	1.225	6.47	0.179	144
7.10	4.58	1.915	13.46	0.372	152
4.68	3.02	1.263	6.50	0.180	149
3.11	2.01	0.840	3.16	0.087	146
4.72	3.05	1.274	7.08	0.196	143
8.20	5.29	2.213	18.34	0.502	149
3.92	2.53	1.057	4.24	0.117	156
6.20	4.01	1.673	10.75	0.297	150
Average result of 30 sets of observations					150

Cable Spinning Preliminaries Hinge on Completion of Bay Anchorage

IMMEDIATELY following completion, about March 1, 1935, of the San Francisco-Oakland Bay bridge center anchorage, construction of the catwalk to facilitate spinning of the main cables will be started. This marks the completion of the two larger substructure contracts in both the East and West bay and beginning of work on the superstructure on the two suspension spans on the West bay crossing. The concrete center anchorage is 504 ft. from bedrock to its highest point, the average elevation of the base being 217.4 ft. At one spot the concrete seal goes to elev. 222.4 ft. The pier below water consist of a concrete block honeycombed with 55 teel cylinders each 15 ft. in diameter. These cylinders are hollow and contain water except for 34 ft. of concrete in the bottom of each. The cylinders at each corner of the pier filled with concrete seal from bottom to top of the fender at about elev. 25 ft.

Walls of the anchorage above water are more than 14 ft. thick into which are anchored steel 'A' frames to which are tied eyebars for connecting to the 37 strands of each cable. The cables consist of 17,464 wires which are divided into 37 strands of 472 wires each.

A fender of hoop-skirt design surrounds the pier with a 2-ft. thick concrete skirt to minimize the injury to ships in case of collision. The fender is fitted with timber to withstand the impact of small boats. The center anchorage contains approximately 165,000 cu. yd. of concrete.



A summary of the construction program from July 9, 1933, the date of ground breaking ceremonies, to December 31, 1934, is as follows:

Money spent in construction..$22,500,000
Peak number of employees.....5953
Amount concrete placed.550,000 cu. yds.

East bay sub-structure—All piers (43) completed.

West bay substructure—All piers and underwater work and superstructure (to elev. + 207 ft.) of center anchorage completed.

Yerba Buena island—Tunnel approach excavation completed; three pilot tunnels driven full length; outer tunnel raised to full height and concrete lining started; West Island anchorage concreted to elev. 120 ft. which completes work to a point which permits stringing of cables; erection of four steel viaduct spans on east side of island started.

East bay superstructure—Thirteen 288-ft. spans and 6 towers erected; steel is 60% fabricated, 52% delivered, and 25% erected.

West bay superstructure—Towers W2, W3, and W6 completely erected and tower W5 is 25% erected.

San Francisco piers—Concrete anchorage 50% completed; anchorage steel 100% fabricated, and 86% erected; Pier No. 1 completed with steel saddle erected; remaining piers in various stages of completion.

Cable wire—84% drawn, 66% completed, 65% delivered.

Work contemplated during 1935 under contracts already awarded is as follows:

San Francisco Automobile Approach Ramps—A low bid of $1,172,622 was submitted by Healy-Tibbitts Construction Co. for construction of the main concrete viaduct and ramps leading off Rincon Hill. This work, involving 330,000 cu. yd. of excavation, 40,000 cu. yd. of concrete, 6,100,000 lb. of reinforcing steel and other miscellaneous items, is scheduled to start immediately and will be 65% completed by the end of 1935.

West Bay Suspension Structure—Catwalk to be started March 1; cable spinning to be started April 1 and completed for the twin suspension spans during the year; placing of 50% of the suspended structure from San Francisco to the center anchorage.

Yerba Buena Island Tunnel—Tunnel through island and viaduct over east side of island to be completed.

Eost Bay Superstructure—All spans to be completed except the 576-ft. suspended span at center of 1400-ft. cantilever span.

East Bay Approaches—Entire system to be 50% completed.

In addition to the contracts already obligated, the following work will be advertised for bids during 1935:

(1) Folger Avenue subway, Berkeley—Bids to be received about January 21 on work involving 16,000 cu. yd. excavation, 5,700 cu. yd. concrete, 500,000 lb. of reinforcing steel. (2) Traffic dis-

tribution structure crossing over S. P. tracks and Key Route Subway at east end of approach fill—Bids will be received about March 1, principal contract items being 200,000 lin. ft. of timber piles, 26,000 cu. yd. of concrete, 3,000,000 lb. of reinforcing steel, and 2,500,000 lb. of structural steel. (3) Administration building and toll plaza—Bids will be advertised about April 1 for these facilities which are located on fill at east end of bridge. (4) Bridge lighting and navigation signals—Bids will be advertised about May 1. (5) Overhead approach structure—Bids will be advertised about June 1 for the structure extending from the east end of the distribution ramps to Market and 36th sts. in Oakland.

These contracts will complete the vehicle portion of the bridge except for paving of the recently completed fill paralleling the Key Route mole and extending north to Ashby ave., Berkeley, paving of the Cypress st. branch and a short portion of paving from the east end of Folger Avenue subway to Ashby and 9th sts. in Berkeley. Bids for this paving will probably be called for about January 1, 1936, so that it may be completed in time for the bridge opening now schedulel for September, 1936.

Second Loan Granted Twin Lakes Tunnel

A second loan of $875,000 has been made by RFC to Twin Lakes Reservoir and Canal Co. for construction of a second unit in the company's water division project, near Leadville, Colorado. This loan will supplement the original loan of $1,225,000 which was used to finance the driving of a 3.8 mi. long tunnel under the continental divide and Independence Pass. This work is now under contract to Platt Rogers, Inc. The first tunnel taps one branch of Roaring Fork river on the west slope, diverting the water through the tunnel into Twin Lakes on the eastern slope. The water will be used ultimately for irrigation purposes in Crowley county near Ordway, Colo. The new loan will cover construction of a 2 m. concrete lined tunnel from 6 to 7 ft. diam., construction of diversion dam on the main fork of Roaring Fork river, and 2 mi. of open ditches connecting the two tunnels. The second tunnel will tap the main branch of Roaring Fork river and will feed the one now under construction. The second unit is designed to increase the amount of water from 30,000 to 50,000 ac. ft. per year.

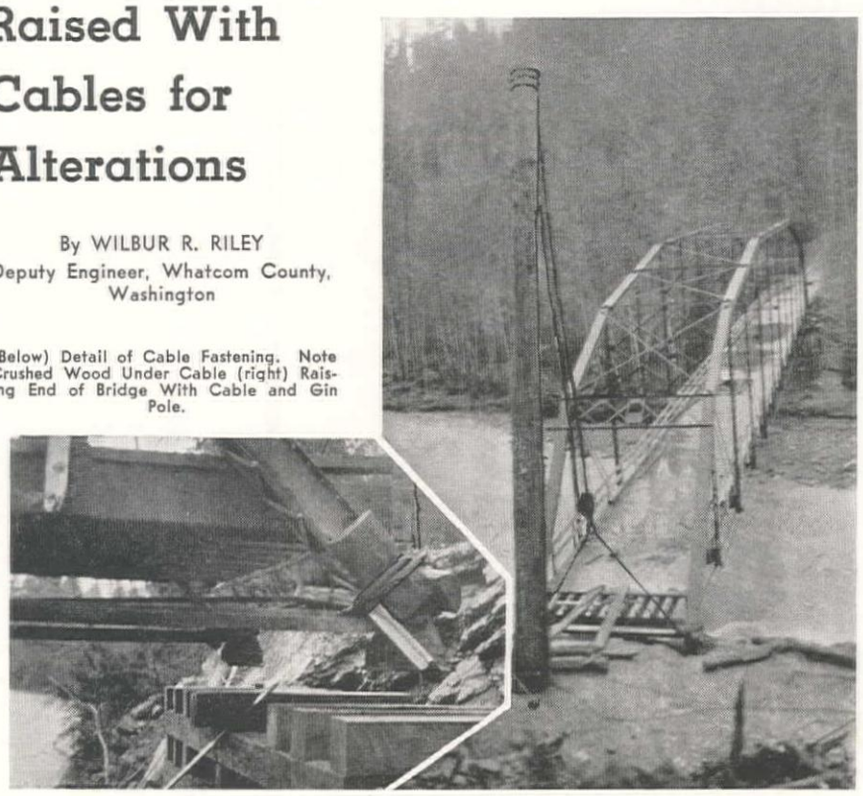
Due to necessity of making out deeds, gathering engineering data, and holding necessary stock-holders' meetings, advertising of bids will not take place for several months. The new work will be built under a separate contract.

G. D. Macy on January 2 resigned his position as State Highway Engineer in Mexico. Grover F. Conroy of Alburqueque was immediately appointed in his place.

A PWA loan and grant of $30,000 has been made to the city of Farmington, Utah, for construction of a sewerage system with an Imhoff tank.

Damaged Bridge Span is Raised With Cables for Alterations

By WILBUR R. RILEY
Deputy Engineer, Whatcom County, Washington



(Below) Detail of Cable Fastening. Note Crushed Wood Under Cable (right) Raising End of Bridge With Cable and Gin Pole.

A UNIQUE method was employed to raise and hold the end of a bridge until a temporary pier could be built under it. A queer combination of the forces of nature was responsible for the washing out of the east pier supporting the bridge across the middle fork of Nooksack river in Whatcom county, Wash. A slight earthquake caused a faulty formation of the rock under the pier to slide slightly. A piece of the Deming glacier, on the south side of Mt. Baker was broken off by the same tremor which caused large ice blocks and a quantity of stored up water to rush down the river bed clearing it of all logs and drift. The flood water washing against the east bearing of the bridge removed the loosened foundation rock from under the pier, allowing the end of the bridge to drop about 12 in.

To facilitate raising the brige to permit construction of a temporary pier, a husky 3-ft. diam. Douglas fir, 30 ft. long, was snaked into place to be used as a gin pole for raising the span with block and tackle. In true lunmberjack fashion it was raised and guyed to stumps and trees, and blocks and cables were attached. A Caterpillar tractor furnished power to string and tighten the cables for guy lines and to pull on the blocks which were attached to a bridle fastened around the end post and lower chords. The other end of the bridge, mounted on rollers, was held in place with cables fastened back to trees as a safeguard so that the rollers would not slip off the pier. Due to the weight of the span, cables sunk into blocks of wood which were used as lagging and in one case where a cable passed around unprotected steel the member was crumpled.

The present bridge, the third to be located at this site, is a 240-ft. span which was moved from Nugents crossing, 10 mi. downstream in 1930. In 1914 a 105-ft. wooden Howe truss was built by the County, this structure giving good service until 1930 when it was replaced because of its weakened condition. During 1930 construction evidence showed that another bridge had spanned the river at this same point prior to the Howe truss. There was no record in the County Engineer's office as to when it was built or how it was destroyed. This rock point has always been considered a safe bearing for a bridge although it is a fairly soft schist formation. After disclosure of the fault, investigation revealed a layer of very greasy clay on which the schist could slide.

A temporary crib pier is being built to carry the bridge while tests can be made to determine the extent and action of the fault. The work is being done under the supervision of John M. Adams, County Engineer of Whatcom County.

Status of 'Activated Sludge' Litigation in California

By R. F. GOUDEY
Sanitary Engineer
Los Angeles Bureau of Water Works and Supply

A GREAT many engineers in southern California cities are somewhat concerned about the status of activated sludge in view of the Milwaukee and Chicago decisions favoring Activated Sludge, Inc.

The cities of Pasadena, San Marino, Laguna Beach, Ontario, Lodi, Salinas, and San Francisco have been served with papers which, when answered, will require setting a date for trial. Owing to the present schedule of the Federal Courts, it might be a year and a half before any case could actually be heard. Those cities which have been using the activated sludge process for quite sometime have, so far as I know, not been approached with any suggested basis of settlement. Those cities which are now proposing to install activated sludge plants, or are in the process of building them, have been propositioned. For small communities the amount said to be asked is well worth paying, rather than in fighting their cases, while if the large communities were to pay in the same ratio they are warranted in fighting the cases. It is, therefore, well for each community which has been notified of patents violation to determine whether it is cheaper to settle or whether it is worthwhile to fight the case.

It should be realized at the outset that the Chicago, Indianapolis, and Milwaukee cases are all against cities in the same Appelate Court district and, accordingly, it is not permissible to introduce new evidence or to have a trial as if it were a new matter. However, California is in another appelate jurisdiction, and it is quite possible the Federal Court here might give significance to the earlier work of inventors prior to the patents in question, and might also favorably interpret the invalidity of the Jones patents. It is a well-followed procedure, regardless of the nature of the patents, to have patent cases re-tried in other Appelate jurisdictions, so that the matter can be properly presented to the United States Supreme Court for review.

Engineers will be interested to know that the spiral-flow patent was held invalid by Judge Lindley in a recent decision in the Chicago case. This means that all the other patents in litigation expire by the end of November, 1935. Communities, therefore, which are planning to install activated sludge works would by waiting one year before going ahead with their projects thereby avoid any patent infringements which are now under litigation.

In either event, whether the patents of the activated sludge process are retried or whether communities wait for a year before going ahead with new activated sludge plants, there is not the blackeye given to the activated sludge process that various engineers have been lead to believe. The activated sludge process in most instances is by far the best means of treating sewage, both from installation and operating costs, and engineers should be the last ones to become panicky and lose their heads. As a matter of fact, there are fewer patents involved in the activated sludge process than are to be found in the sprinkling-filter or chemical-treatment processes. If someone were to buy up these patents and commercialize them, the situation as it affects the need of sewage treatment would be far more complicated than is the case of the activated sludge process at the present time.

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Federal Aid Alotments Made to States

In keeping with the provisions of the Hayden-Cartwright Road Act which provides for an expenditure of $522,000,000 over a period of 3 years. $200,000,000 in state grants will have been made for the year ending July 1935, and $125,000,000 for the years 1936-37 will be matched by State Funds similar to the system in effect prior to the emergency program in 1933. The apportionments of this federal aid fund for 1935 for the eleven western states is as follows:

Arizona	$ 1,781,347
California	4,756,959
Colorado	2,288,811
Idaho	1,531,162
Montana	2,560,449
New Mexico	1,999,299
Oregon	2,044,633
Utah	1,410,752
Washington	1,949,957
Wyoming	1,559,444
Total	$21,882,813

In addition to these amounts, federal funds will also be appropriated for forest roads and trails, public lands, national parks, and Indian reservation roads. The Hayden-Cartwright bill also abolishes diversion of gasoline tax money other than that prior to passage of this bill under penalty of losing one-third of the federal aid for that year.

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Construction will start January 15 on the $49,000 water works extension by the town of Medicine Bow, Wyo. which is being financed with PWA funds. The project consists of construction of an 8-mi. supply line from existing artesian wells to the town's existing distributing system. The supply was formerly pumped from Medicine Bow river but due to drought conditions prevailing for several years, the supply and quality of water has been inadequate. Acute conditions during the past summer necessitated hauling water for domestic purposes. The work is under contract to Schwartz Construction Co., Colorado Springs, Colorado. Elmer K. Nelson is engineer in charge.

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Safety Work on Metropolitan River Aqueduct

In keeping with the provisions of the active safety campaign sponsored in all work on the Colorado river aqueduct, the safety committee at Little Morongo consisting of the superintendent, tunnel foreman, and two men chosen from the workmen's crew have recently put into practice the following:

(1) installation of block signals at the curves at both portals to warn motormen of the approach of a train in the opposite direction. (2) installation of safety bumpers on rear of all mucking machines to reduce the hazard to the men coupling cars. (3) universal use of ring handles for couplings and pins. (4) extinguishing of all lights in the headings during loading operations, power being cut off 300 ft. back from the heading and flood lights from locomotive batteries being put into use for illumination. (5) use of safety clamps to hold stored cars on grades. (6) installation of sanitary drinking fountains in the headings to replace the old tin cup.

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An allotment of $156,000 has been made by PWA to Price, Utah, for replacement of 5 sections of the existing water supply line with steel and cast iron pipe. Construction is estimated to require 14 mo. providing employment for 40 men for that period.

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A loan and grant of $46,000 has been made to the town of Orem, Utah, by PWA for replacement of 24,000 lin. ft. of wood-stave supply line and distribution mains with cast iron pipe. Three months will be required for construction, providing work for 30 men.

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An allotment of $180,000 has been made to Frenchtown Irrigation project near Missoula by PWA to cover construction of the canal system for irrigation of about 7,500 ac. of land under cultivation. This project lies in an established wheat growing community and irrigation will permit diversification of crops including sugar beets. A sugar beet factory is located at Missoula. No engineering difficulties are involved and the allotment is to be returned by water users under the provision of the Reclamation Act.

Placing Concrete at Boulder Dam

At the end of 1934 a total of 3,101,382 cu. yd. of concrete had been placed in Boulder dam leaving only 148,618 cu. yd. to place. On Nov. 4, 1934, the Lomix concrete plant was shut down and dismantling operations started. This plant has mixed about 2,200,000 cu. yd. of concrete since its initial operation in June, 1933. During 1934, the amount of concrete placed each month is as follows:

	Concrete in Dam Cu. Yd.	All Concrete Cu. Yd.
January	185,209	205,872
February	189,712	212,500
March	222,710	262,204
April	214,975	258,915
May	206,325	250,312
June	176,778	218,866
July	172,683	209,491
August	169,940	209,000
September ...	171,441	202,600
October	184,871	213,430
November	142,265	175,042
December	121,350	148,043

Concrete placing records continue to be broken on this gigantic project. On December 27, 1934, two hundred and forty 8-yd. buckets of concrete were placed during one shift with one cableway; and on December 30, two hundred and seventy-seven 8-yd. buckets of concrete were placed in the dam.

This exceeds any other known record for single cableway placement. The major dam contract is scheduled to be completed about July, 1935. The dam is completed except for about the top 25-ft. section which will be completed within a month, leaving only the power house and minor concrete operations to be finished.

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A PWA loan and grant of $170,000 has been made to the City of Torrence, Calif. for the purchase of an existing privately owned water works system and for improvements of same comprising the following: installation of well and pumping plant, treatment plant and accessories, elevated storage tank, booster, pumping plant, and extensions to the distribution system for fire and household services.

Crystal Creek is Third Unit For Colorado Springs System

CONSTRUCTION was started in November on Crystal Creek dam which is a part of the water supply system for Colorado Springs, Colo. This is the third unit in the North Slope Division water development designed to utilize the entire potential source of this drainage area on Pike's Peak. The first unit consisting of pipeline and tunnel construction was recently completed after 1½ yr. of work and the second unit covering additional pipeline work is nearly finished. Provided funds are available, the fourth unit in the development will be constructed as soon as the present dam is completed. This will be a dam of similar construction to be known as Catamount dam, the site being about one mile above the Crystal Creek location.

The Crystal Creek project located at an elevation of 9,155 ft. (outlet tunnel) consisting of an intercepting dam which has a drainage area of 2,200 ac., an impounding capacity area of 2,200 ac., and a reservoir area of about 80 ac. Water is conducted through an outlet tube which discharges into the steel pipeline constructed under prior contracts. A 20-in. line will carry the flow to Colorado Springs hydro plant at Manitou, a suburb. The dam will be gravel fill with an electrically welded steel face and has a crest length of 815 ft. and a height of 90 ft. It is 390 ft. wide at the base with a top width of 20 ft. which provides for a roadway. Both faces have slopes of 2:1. The upstream side has a steel face built up of ¼-in. copper bearing plate made up in sections of approximately 8 by 24 ft. being continuously welded at all joints.

The welded steel face is supported on concrete pedestals and is welded to steel connections embedded in the concrete at the cutoff wall, outlet tunnels, and end walls of dam.

The main dam has a concrete cutoff wall along the center line, transverse to the stream bed, and extends the full length of the dam. A cutoff wall on the up-stream face will be filled with selected materials. Materials for the dam enbankment will be taken from the spillway excavation and near-by borrow pits. This material consists of granitic gravel with a maximum diameter of not more than 8 in. The gravel will be placed in the dam in continuous and approximately horizontal layers not more than 8 in. in thickness after rolling.

The down stream will be faced with rock having a maximum dimension of not more than 18 in. Earth cofferdams will be used for unwatering the dam site. The outlet tunnel is located near the center line of the stream and the concrete line spillway will be built in natural rock at the west end.

Plans have been approved by Colorado State Engineer, C. Hinterlider. D. C. Henney, Portland, Ore. is consultant on the project and work is being done under the direction of E. L. Moseley, City Manager, Colorado Springs.

New MATERIALS and EQUIPMENT

New Pioneer 15-35 Duplex Gravel Plant

The Pioneer 15-35 Duplex Crushing, Screening and Loading Plant has just been announced by Pioneer Gravel Equipment Mfg. Co., of Minneapolis. The Production capacity of this unit has been increased according to the manufacturers, because of its increased crushing, screening and conveying capacity.

This unit has an 836 or 1036 Primary Jaw Crusher with SKF bearings, overhead eccentric, forcefeed action, and reversible manganese jaws with adjustment. The Secondary Crusher is 40" x 20" roll crusher with mangenese shells, 40" in diameter and 20" wide, carried on heavy shafts, with Timken bearings fully enclosed in self-aligning dust-proof housings.

The makers claim The Shaker Screen has almost three times as much effective screening area producing finished material as former portable plants—28⅔ lineal feet, and produces pay material on both decks.

More conveying capacity is attained for the return conveyor now replaces the bucket elevator, and less working and wearing parts. The lower conveyor passes directly under both crushers which eliminates the cross conveying. Crushed material is returned to the upper deck of the Shaker Screen and not to the feeder conveyor.

A Duplex circuit feature requires no scalping screen, permits both decks to produce material, does not mix crusher material with pit run material and enables the operator to balance the work of both crushers without shut down and without changing screens.

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New High Lift Pump

Recent development of a specially designed pump for high lifts or a high-pressure water supply, is announced in a bulletin just off the press and issued by the Byron Jackson Co.

The pump, known as the Hydropress, embodies the proven principle of centrifugal pumps and permits the building of pressures up to 2800 lbs. The number of stages ranging from 4 to 54, depends upon conditions. The pump capacity ranges from 10 to 250 gallons per minute. Four standard sizes are available, 8", 10", 12", and 15".

This type of pump is especially desirable in plants, mills and factories where a high-pressure supply of water is required to clean equipment, rinse floors, hose vats, and for elevating water to high tanks.

A copy of the new bulletin, describing the Hydropress Pump, may be procured from the manufacturers, Byron Jackson Co., Dept. 58, Berkeley, Calif.

Association Notes . . . .

The Ninth Annual Highway Conference was held at the University of Colorado, Boulder, on January 17-18. Speakers from 5 states discussed highway problems, including highway finance, bituminous treated surfaces, highway landscaping, compaction of embankments, tests of materials, subgrade stability, highway and bridge design, costs o fday labor construction, and grade separation structures.

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Officers of the Los Angeles section of American Society of Civil Engineers for the coming year are as follows: Alfred Jones, president; Ralph W. Lawton and Oliver G. Bowen, vice-presidents; D. Arnold Lane, secretary, and J. C. Albers, treasurer.

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The meeting of the Portland section of American Society of Civil Engineers held on Dec. 18 was featured by a talk by C. I. Grimm, chief engineer of the Bonneville project, who discussed various phases of design and construction of that project.

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At the regular weekly luncheon of the engineers' club of Fresno held December 19 several interesting discussions were presented. Prof. Wood, University of California, explained the operation of the Research Division of University of California. Among major projects undertaken by the University are cooling of concrete at Boulder dam, and tests on models of San Francisco-Oakland Bay bridge and Golden Gate bridge.

●

Colorado Section of American Society of Civil engineers held a meeting on December 10 which was featured by a talk by John B. Driscoll on 'Searching for Hydraulics.' His lecture which was illustrated was based on observations during two years spent in Danzig and Berlin. This meeting was sponsored by junior members.

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Colorado Society of engineers will hold its annual meeting at Denver, January 18 and 19. This meeting will be featured by a program of educational talks by nationally known speakers from the four Founder Societies. Officers will also be elected for the coming year.

Colorado Association of State Highway Contractors held its annual meeting at the Browne Palace Hotel, Denver, on January 12 at which time officers were elected for this year.

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Colorado Engineering Council held its annual meeting of past presidents at Denver on December 19. This novel affair is restricted entirely to past executives only and includes some of the most distinguished engineers in the west.

California Chapters of A. G. C. Hold Their Annual Meetings

A. B. ORDWAY
President

Northern California A.G.C. Urges Large Construction Program

The annual meeting of the Northern California chapter of Associated General Contractors of America was held at San Francisco on December 15, 1934. A well planned program had been provided by Floyd O. Booe, secretary manager of the chapter which was covered in an informal discussion during the business session of the meeting.

Directors elected for the coming year were A. B. Ordway, C. G. Clifford, N. M. Ball, and W. J. Tobin. The holdover directors are W. A. Bechtol, H. S. Lord, and G. V. Isbell. The Board of Directors elected A. B. Ordway, president for 1935.

The following resolutions were adopted: (1) Urging federal and state authorities to use every means to secure prompt approval and financing for actual construction of the Central Valley Water Project; (2) Urging and recommending continuance of the Federal Aid highway program in an amount in excess of that heretofore provided on the sound theory that maximum employment will be afforded in the shortest possible time; (3) Establishment of a uniform 40-hr. week instead of a 30-hr. week as is now prevalent on public works projects; (4) Continuance of a similar Federal works program on a scale equal to or in excess of that carried on in 1933, and that allocation of such funds be made on equitable basis between federal, state, cooperative, and municipal projects as well as allocation of funds to primary and secondary highways and roads and states within municipalities; (5) Carrying out a nation-wide grade-crossing elimination program through a period of years under joint jurisdiction of federal and state authorities, and financed either wholly or in part with federal funds as an outright grant or on a cooperative loan basis with railroads; (6) Urging California Division of Highways to take such steps as are necessary to immediately place under actual construction as many projects as possible which will entirely obligate all of the unexpended balances now available as a means for providing employment through the winter season; (7) Prohibiting the use of prison labor on construction of state roads and that adequate facilities should be provided for maintenance of the prison population; (8) That a message of condolence be conveyed to Charles S. Pope, construction engineer for California Division of Highways, who, at the time of the meeting was critically ill.

Of special interest during the business session was the discussion on the federal and state highway program, proposed grade crossing program, national re-employment service, 30-hour week instead of 40-hr. week, and code compliance practice.

L. I. Hewes, deputy chief engineer, U. S. Bureau Public Roads, gave a brief summarization of the highway officials' meeting held in November at Santa Fe, during which time the 40-hr. week was recommended and that greater latitude in the selection of skilled workers be accorded contractors. G. T. McCoy, California Assistant State Highway Engineer, discussed the aspects of the California State highway program—bringing out the point that more than $6,000,000 for grade separation projects could be under contract within 60 days if federal funds were available; and $15,000,000 in this type of work could be placed under contract in California during 1935.

It was the general concensus of opinion that it would be more favorable to the contractor to allow employees to work the allotted time in one period during the month rather than a certain number of hours per day or per week. Following a discussion as to the advisability of continuing the construction code, the Chapter went on record as favoring continuation of the Code until June 15, 1935, the time of code limitation.

Munsen Dueprey, associated with a local chapter in relation to code matters, interpreted a section of the code dealing with competitive sub-bids. He called special attention to the distinction between 'standard' products and other products in that the 'standard' product is one which can be purchased from a manufacturer or distributor without special specifications.

Dueprey pointed out that a general contractor is permitted to handle sub-bids in any way he sees fit as long as the material is a 'standard' product. In the case of products requiring special specifications, a sub-bid constitutes a binding obligation on the part of the general contractor and he is accordingly obligated to accept this bid.

C. V. Isbell, chairman of the membership committee, reported that a total of 20 new members and 11 new associate members had been added during 1934, bringing the total chapter registration to 67 regular and 51 associate members.

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The resignation of S. M. Fisher, chief engineer of the Los Angeles County Flood Control District, was accepted by the Board of Supervisors on December 13, 1934. Fisher was appointed to his office last September.

H. M. Walker
President

F. J. Connolly
Manager

Southern California Members Meet With Aqueduct Staff

At the January 15 meeting of the Southern California Chapter, Associated General Contractors, installation of officers was held. These officers, elected at a previous directors' meeting, are as follows: President, H. M. Walker; vice-president, H. Stanley Bent; vice-president, N. F. Jahn; treasurer, H. M. Baruch; directors, S. M. Griffith, Lynn Atkinson, Harold R. Crowell, C. G. Fitz-Gerald, Wm. A. Johnson.

F. J. Connolly is manager. The annual meeting on December 11 was held at the Biltmore Hotel and was devoted to engineering construction work, and the Metropolitan Aqueduct.

The meeting was the occasion for paying tribute to directors and officials of the Metropolitan Water District. All contracting organizations engaged in aqueduct work and the district staff was well represented by field and office men.

Speakers on the program included. W. P. Whitsett, chairman of the Metropolitan District Board, gave a brief history of the aqueduct project; Frank E. Weymouth, general manager and chief engineer of the Metropolitan Water District, gave a brief summary of the present status of the project as well as a discussion of the design and construction problems encountered throughout the work; J. C. Agnew of Winston Bros. Co., contractors on the Coxcomb tunnel, spoke on behalf of the aqueduct contractors in which he expressed an appreciation of the manner in which the work had been handled. Agnew paid a special tribute for the outstanding work done by the District in providing domestic water supply, roads, power and telephone lines, and medical inspection. In this way many of the construction difficulties encountered in construction of the aqueduct through the country's worst desert were shouldered by the District rather than the contractor.

The following directors of the Metropolitan Water District were present: O. E. Steward, Anaheim; George R. Barker, Beverly Hills; J. L. Norwood, Burbank; William H. Foster, Compton; Walter Humphreys, Fullerton; Bernard Brennan, Glendale; J. H. Ramboz, San Marino; Franklin Thomas, Pasadena; S. H. Finley, Santa Ana; Charles T. Rippey, Torrance; D. W. Pontius, I. Eisner, Perry H. Greer, Walter A. Hamm, Victor Rosetti, W. P. Whitsett, and John E. Richards of Los Angeles. The total attendance numbered more than 500.

Personally Speaking

Blaisdale Speaks at C.V.D.I. Code Meeting

A. C. Blaisdale, National Secretary of Code Authority for the Construction Machinery Distributing Trade, was the guest speaker at a special meeting held December 6 of the Construction Machinery Distributors Association, Los Angeles, and on December 13 before the Western Construction Equipment Dealers and Distributors Association of San Francisco. In his talk Blaisdale brought out the importance of adhering to the provisions of the C. M. D. T. code. Both meetings were well attended.

●

Immediately following the awarding of the $546,690 contract to F. O. Bohnett and D. McDonald for construction of the Almaden, Calero, and Stevens Creek dams of the Santa Clara Valley Water Conservation District, resident engineers were appointed on each of the three dams. These are as follows: Geo. W. Hunt, former San Jose City Engineer, Calero dam; Frank W. Moore, former designing engineer in district engineer's office, Stevens Creek dam, and R. P. Bryan, associated with Fred H. Tibbets, district engineer, Almaden dam.

●

James Peters has been appointed general manager of Marin Municipal Water District succeeding John Burt who was retired January 1. Peters has been associated with the district for the past 22 years and Burt has been general manager since the system was built and service established in 1916. Peters immediately started work of preparing the plans and specifications for construction of a new spillway at Lake Lagunitus, one of three large artificial reservoirs of the district.

●

Julien Roussel, Los Angeles, has been appointed secretary of the California State Highway Commission to succeed John W. Howe who has been serving in the dual capacity of Commission secretary and editor of 'California Highways and Public Works.' Howe will continue as editor of the official publication of Department of Public Works.

Roy G. McGlone, chief engineer of the Long Beach Harbor Department, has tendered his resignation, effective January 16. He has been associated in harbor development and operation for more than 10 years.

●

Isbell Construction Company has moved its office and repair shop from Carson City, where they have been long established, to 1300 East 4th st., Reno, Nev.

●

Albert H. Seimer, city engineer of San Anselmo, was recently elected chairman of the general contractors association of Marin County, Calif. J. O. Dahl was elected secretary of the new association and an office will be established soon at 831 Fourth st., San Rafael.

●

F. A. Savage has been appointed city engineer and superintendent of water and street departments of San Bruno, Calif. Savage is a graduate of West Point and he served in both the Spanish-American and late World War. Savage was engineer for the Oakland municipal airport, assistant engineer on San Mateo bridge construction, and also resident engineer on Golden Gate bridge construction.

Obituaries

John Harvey, representative for Marion Steam Shovel Co. in Los Angeles, died January 5 in Rochester, Minn. Harvey had been connected with the Marion firm for 20 years in various capacities. Burial was in his native city, Iron Mountain, Mich. He is survived by his widow, Mrs. Selma Harvey.

●

George A. Elliott, 54, chief engineer of Spring Valley Water Co. until the City of San Diego acquired its properties, died December 23 in San Diego following a short illness. He was a native of New Zealand and attended the University of California and the University of Colorado, graduating from the latter institution in 1904.

At various times Elliott was employed by General Electric Co., California Gas & Electric Co., Pacific Gas & Electric Co., and Great Western Power Co. Elliott constructed Calaveras dam in Alameda county, California, and a tthe time of his death was engineer for Los Angeles and Orange County Flood Control Districts as well as consulting engineer for the State-Wide Water Plan and San Jose Water Co.

Elliott was a member of American Society of Civil Engineers and American Water Works Association. Elliott is survived by his wife, Rose M. Elliott, one brother and three sisters.

●

W. H. Hess, valuation engineer for Colorado & Southern Railroad died December 14. Hess was widely known throughout the west having been with this railroad for more than 20 yr., being former chief engineer. His successor has not yet been appointed.

NEW Materials and EQUIPMENT

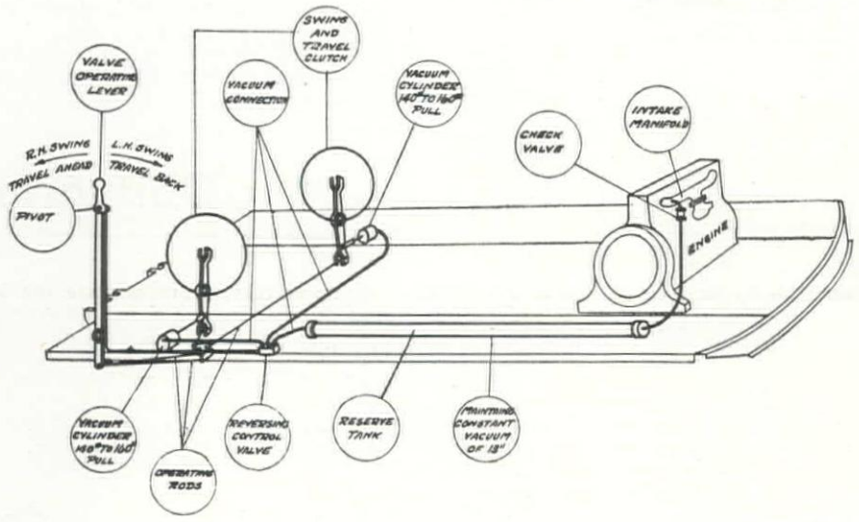
Osgood Develops New Clutch Control

An entirely new application of a well known force has been brought out by the Osgood Co., of Marion, Ohio, and applied to the operation of its various power excavators.

In this application, vacuum created by the engine is employed to actuate the swining clutches. The simplicity of this method, according to Osgood, is almost unbelievable. Vacuum is taken from the engine and led to the operator's position where it is controlled by a simple, efficient valve, which requires no more pressure than can easily be exerted by the touch of one finger, directly controls all the swinging and traveling motions.

Power already in the machine is employed with no drain on the plant. A flexible line is led from the manifold on the engine, to a reservoir conveniently located, which stores up enough vacuum so that the clutches can each be operated several times, permitting enough energy at hand for use during all periods of the cycles of operation.

This operating control device can be put on any Osgood in the field and is available on all new machines.



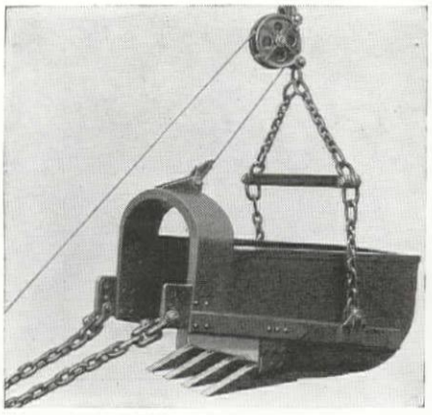
Infilco Super-Settler Offers Advanced Sedimentation Methods

New flow handling methods are disclosed in the latest addition to the Infilco line of water purification equipment. The Super-Settler provides every facility for assisting in the rapid separation of solids and liquids, and is a departure from present methods of handling sedimentation problems in the water and industrial waste treatment fiields.

The Super-Settler design is based on the accurate control of the various flows and accelerated handling of the liquid. Maximum utilization of the tank volume is obtained by automatic control over every portion of the entire tank. Settling area can be increased to any desired capacity without changing the length of flow of the material.

The Super-Settler requires space approximately one-third the volume required by present day settling basins equipped with sludge removal mechanisms. This is made possible by positive control of the various factors which affect sedimentation, such as; flow control of both sludge and liquid, shallow settling depths, rapid evacuation of the material after separation has taken place, velocity of flow, short circuiting, etc. Another exclusive feature of particular advantage is that, the entire sludge removal mechanism may be lifted out and later put back into the tank without stopping the flow through the apparatus.

The unit is designed to handle any sedimentation problem in the water or industrial waste treatment field. International Filter Company, Chicago, Illinois.



New All-Welded Bucket Is Strong, Light

A new lightweight bucket, designed to reduce dead weight to a minimum and at the same time provide great strength through all-welded construction, has just been announced by the Harnischfeger Corporation of Milwaukee.

This new dragline bucket presents the combination of strength, perfect balance and tapered design with a smoother inside surface face.

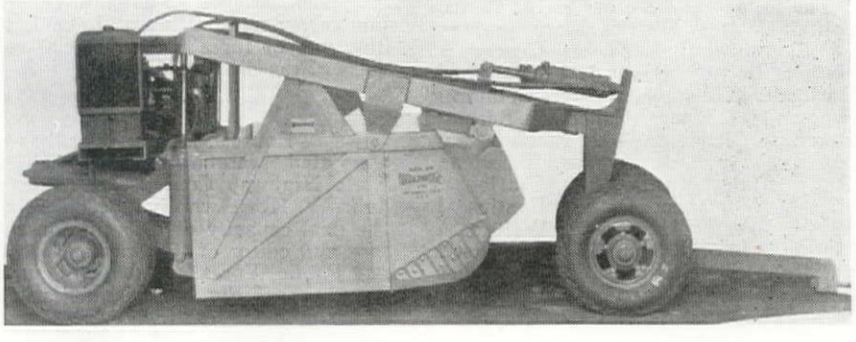
The bottom, sides and back are formed by a single heavy steel plate seamed at the back and with a heavy angle reinforcement mounted around the entire upper edge for additional rigidity. Four forged wearing shoes or runners are welded to the bottom to take the wear from the bucket shell.

The arc and side reinforcements are fabricated as a single unit with the lip plate, the latter being 2 inches thick. The manufacturers state this new bucket is an ideal general purpose unit for high production work.

Wooldridge Presents New 10 Yard Hydraulic Scraper

Mack Wooldrige Co., Inc., of Los Angeles, has developed a new independent power hydraulic scraper with a capacity of 10 yards. It is designed with a main wishbone frame which supports the bowl. This new type of construction allows the dirt to be loaded with a shovel whenever it is desirable to haul the dirt with these scrapers instead of with trucks.

The bowl is braced with heavy members. Side cutters are used on each corner of bowl which enters ground. Two hydraulic cylinders raise and lower the cylinders. One cylinder operated the rear apron. Independent power is standard equipment, which allows 100 per cent of tractor horsepower to be used at the drawbar. These units can be hooked up in tandem if desired. The 10 yard size can be pulled by a 65 h.p. tractor.



With The MANUFACTURER and DISTRIBUTOR

Caterpillar Tractor Names New Executive

C. Parker Holt was named Executive Vice-Pres. of Caterpillar Tractor Co. at a meeting of the Board on December 7th. Thomas J. Conner was made Vice-Pres. in charge of manufacturing to fill the vacany on the Board caused by the recent death of Pliny C. Holt, one of the founders of the company.

Shepherd Moves to Larger Quarters

Shepherd Tractor & Equip. Co. moved on Dec. 15th to their new home at 150 S. Jefferson St., Los Angeles, which occupies the greater part of the block between Broadway and Hill St. Every convenience is incorporated in the new headquarters for Caterpillar Tractors and LeTourneau earth moving equipment, including trackage connecting with an S. P. railway spur.

William E. Shepherd, head of the organization, has a very interesting history in this business. In 1905, Shepherd joined the Holt Mfg. Co. and appointed general manager in 1920. In 1924, he established his own business as distributor for Holt in S. California and Arizona. Then came the merger of Holt and Best in 1925 to form the Caterpillar Tractor Co., and at the same time Shepard concentrated on the three best counties — Los Angeles, Orange and Ventura. More recently, he has added Mono and Inyo Counties to his field of activity.

New Edition of Boulder Dam Bulletin

As work progresses on Boulder Dam, Ingersoll-Rand Co., manufacturers of air-compressing and rock drilling equipment, has issued booklets covering the progress of the vast undertaking. The latest booklet (vol. 4) contains descriptions of the cofferdam; the aerial cableways; and the tunnels for the penstock headers, the pelstocks, and the canyon wall outlets. Free copies of the latest release are available upon request at the company's main office, 11 Broadway, New York, or at any western branch office.

Lang to Handle Marion Shovels in Utah

The Marion Steam Shovel Company has recently announced the appointment of The Lang Company as distributors for the state of Utah and Southern Idaho. The Lang organization has headquarters at 267 West First South St., Salt Lake City.

John B. Lough Joins Dana Kepner in Denver

John B. Lough, formerly with Allis-Chalmers at Milwaukee, has become associated with Dana E. Kepner of Denver, widely-known water works supply man, as sales representative for the Atlas Imperial line of diesel engines.

Harron-Rickard & McCone Appointed by Gardner-Denver

The Gardner-Denver Co. announces the appointment of Harron-Rickard & McCone, San Francisco and Los Angeles distributors, as sales agents for their line of contracting and industrial equipment.

Phoenix Distributors Move to New Home

Neil B. McGinnis Company have recently removed into larger quarters at 1401 South Central Avenue, Phoenix, Arizona. The firm are distributors for the state of Arizona for Northwest shovels, cranes and draglines, Allis-Chalmers tractors, Adams graders, Gardner-Denver compressors and drills, Wooldridge scrapers and rippers, and a number of other important accounts.

In their new establishment in Phoenix are carried complete stocks. The illustration shows four F-W-D 3-ton trucks recently sold to the Arizona highway department.

Air Travel Service Aids the Construction Industry

In a recent report made by Robert Johnson, United Air Lines, is cited a number of examples whereby time, effort, and money has been saved through the use of air transportation.

An oil well got out of control in a far removed spot in Montana and a 750-lb. metal part of the capping device was required immediately. Within twelve hours after a wire was sent to Chicago, the sorely needed equipment was on the field. A mining dredge near Sacramento, developed a broken part which could only be secured from Cleveland, and overnight a plane flew the part to the job. One of the outstanding examples of air service is that of the delivery of plans to a bidder on the Grand Coulee project in the state of Washington. The blue prints and estimates had to be in Spokane at a given hour, and delay in the compilation of the material in New York would have prevented the company from submitting the bid. The regularly scheduled operations of the air service came to the aid, as the blue prints which left New York at noon were delivered to the individual in the Davenport Hotel at Spokane when he came down to his breakfast.

Probably no group has a more vital interest in this particular form of transportation and communication than people engaged in the construction busines. Particularly true is this right now when the Government is spending tens of millions of dollars on major construction projects in the West. Almost every one of these is served by United Air Lines from the larger town and cities.

Four Wheel Drive Auto Company Celebrates Silver Anniversary

An exhibit at the American Road Builders' Exposition to be held in Washington, D. C., will depict the growth and accomplishments of a quarter of a century for the Four Wheel Drive Auto Co. A very unique display of the widespread activities of this company, together with their advance in the truck building field will hold the center of attraction.

Job Quotation Form Issued by Union Oil

The Contractors' Service Bureau of the Union Oil Companv is issuing a form to aid the contractor in compiling bidding data, and keeping a record of all important information on each project. This new form contains accurate information on unit items, location of the job, type of construction, date of bid opening, quotation on petroleum products required, freight rates and other miscellaneous information. In addition, they have provided space for recording unit and total bids as made by the individual and competing bidders. It is in a handy form for carrying in the pocket, and is made of stiff cardboard which allows tabulations to be made in unhandy places.

The last fold of the form contains a map of the state of California and the locality of the project is marked with an "x." These forms may be obtained by addressing the Contractors' Service Bureau, Union Oil Co., 220 Bush St., San Francisco, Calif.

UNIT BID SUMMARY

Note: These unit bids are extracted from our Daily Construction News Service

DAM CONSTRUCTION

SAN JOSE, CALIF.—ALMADEN AND CALERO DAMS, CALERO CONDUIT AND STEVENS CREEK DAM

Contract awarded to F. O. Bohnett, Campbell, Calif., and D. McDonald, 204 23rd Street, Sacramento, $372,020 (for Almaden and Calero Dams and Calero Conduit) and $174,670 (for Stevens Creek Dam) by Santa Clara Valley Water Conservation District, 62 Grant Bldg., San Jose, Calif. (subject to P.W.A. approval). Almaden Dam, to be 475 feet long, 105 feet high, earthfill, concrete facing; the Calero Dam, to be 850 feet long, 90 feet high; Calero Auxiliary Dam, to be 550 feet long, 35 feet high; and the Calero Conduit, to be 4 miles long, under CONTRACT 2.

Bids received from the following concerns:

(A) F. O. Bohnett and D. McDonald.....$372,020
(B) Frederickson & Watson Const.....$427,874
(C) Morrison-Knudsen Co., L. A.....$458,609
(D) Mittry Bros. Const. Co.....$466,756
(E) Peninsula Paving Co., S. F.....$466,986
(F) Bent Bros., Los Angeles.....$496,402
(G) A. Teichert & Son, Inc., Sacramento.....$545,641
(H) W. A. Bechtel Co., S. F.....$547,915
(I) George Pollock Co., Sacramento.....$617,675
(J) Guy F. Atkinson, S. F.....$628,960
(K) Engineers estimate $582,643

ALMADEN DAM

		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
9,500	cu.yd. foundation stripping...	$ 1.00	$ 1.00	$ .30	$ .50	$ .53	$ .54	$ 1.00	$ 1.50	$ 1.00	$ .20	$ .40
107,500	cu.yd. spw. exc., comp. dam..	.17	.31	.33	.30	.25	.375	.37	.30	.60	.50	.65
137,000	cu.yd. embankment	.17	.215	.22	.245	.285	.285	.40	.38	.60	.40	.40
825	cu.yd. conc. (outlet wks, etc.)	14.00	16.50	17.00	18.50	16.00	12.50	17.50	16.00	25.00	15.00	17.50
88,000	sq.ft. concrete (facing).....	.17	.17	.22	.20	.215	.22	.20	.20	.23	.25	.20
53,000	sq.ft. concrete lining.....	.34	.24	.38	.40	.42	.38	.35	.35	.37	.35	.40
260,000	lb. reinforcing steel	.045	.04	.05	.045	.043	.042	.05	.045	.05	.04	.045
4,500	lbs. structural steel.....	.08	.08	.10	.10	.08	.11	.07	.15	.10	.10	.10
690	lin.ft. 36" outlet pipe.....	11.00	10.00	8.80	7.60	9.60	7.50	9.00	11.00	9.00	6.00	8.00
500	lin.ft. 12" corr. culvert.....	1.50	2.20	1.50	1.50	1.45	1.00	1.75	2.50	1.00	2.00	1.50
2,500	lin.ft. 12" half-rd. dr. tile.....	.30	.60	.75	.40	.70	.25	.30	1.25	.30	1.00	.40
L. S.	install gates and valves, etc...	900.00	100.00	700.00	150.00	340.00	470.00	800.00	1500.00	1000.00	500.00	1100.00
L. S.	bronze tablet	75.00	50.00	100.00	80.00	85.00	82.50	75.00	150.00	100.00	100.00	100.00

CALERO CONDUIT

75,000	cu.yd. canal exc. Sta. 0-85/91-80	.44	.165	.145	.18	.14	.24	.28	.25	.30	.50	.30
11,500	cu.yd. canal ex. St. 91-80/120-25	.22	.50	.25	.60	.40	.60	.70	.60	.30	.60	1.00
5,000	cu yd. can. exc. Sta. 120-25/136	.22	.18	.25	.50	.17	.60	.50	.60	.30	.40	.90
31,500	cu.yd. can. exc. Sta. 136/142-60	.22	.35	.40	.40	.32	.70	.60	.60	.30	.45	.60
45,000	cu.yd. can. ex. St. 142-60/233-40	.22	.12	.12	.15	.225	.28	.35	.25	.30	.20	.30
1,000	cu.yd. exc. misc. structures...	1.50	1.00	1.50	.80	1.45	.50	2.00	1.25	1.50	1.50	2.00
240	cu.yd. concr. misc. structures..	15.00	24.00	17.50	20.00	20.50	24.00	20.00	16.00	25.00	18.00	22.50
1,550	lin.ft. 48" concrete pipe.....	16.00	17.00	16.00	15.00	16.25	15.60	17.00	15.00	17.00	15.00	10.00
600	lin.ft. 36" concrete pipe.....	11.00	12.00	10.50	10.50	11.00	10.80	12.00	10.00	12.00	11.00	6.50
2	ea. wasteway radial gates....	400.00	240.00	475.00	450.00	400.00	385.00	375.00	400.00	100.00	750.00	375.00
35,000	lb. reinforcing steel	.045	.04	.05	.05	.043	.044	.05	.045	.05	.05	.045
8,500	lb. structural steel	.08	.08	.10	.10	.08	.11	.07	.15	.10	.10	.10
4	ea. farm bridges (concrete)...	200.00	200.00	350.00	200.00	255.00	575.00	200.00	250.00	200.00	200.00	300.00

CALERO DAMS AND SPILLWAYS

25,000	cu.yd. foundation stripping...	.60	.18	.18	.35	.17	.20	.20	.40	.25	.20	.225
50,000	cu.yd. spillw. ex. & comp. dam	.24	.37	.40	.30	.48	.21	.60	.40	.50	.60	.50
492,000	cu.yd. embankment	.13	.23	.23	.24	.23	.25	.25	.30	.28	.40	.30
950	cu.yd. concr. (outlet works, etc)	14.00	16.00	16.50	18.50	16.00	14.00	17.50	16.00	25.00	15.00	17.50
185,000	sq.ft. concrete facing	.16	.15	.21	.20	.215	.22	.20	.20	.22	.25	.20
48,000	sq.ft. concrete lining	.34	.225	.37	.40	.38	.38	.35	.35	.38	.35	.40
340,000	lb. reinforcing steel	.045	.04	.05	.045	.043	.042	.05	.045	.05	.04	.045
3,500	lb. structural steel.....	.08	.08	.10	.10	.08	.11	.07	.15	.10	.10	.10
450	lin. ft. 36" outlet pipe.....	11.00	10.00	9.00	7.60	11.50	7.70	9.00	9.00	9.00	6.00	7.50
L. S.	install gates and valves, etc.....	600.00	100.00	700.00	150.00	255.00	385.00	650.00	1500.00	1500.00	500.00	950.00
L. S.	bronze tablet	75.00	60.00	100.00	80.00	85.00	82.50	75.00	100.00	150.00	100.00	100.00
L. S.	premium on 50% surety and 100% performance bond	$5600	6322.00	6777.00	7000.00	7000.00	7413.00	8064.00	8200.00	9100.00	10,000.	8610.50

STEVENS CREEK DAM

Stevens Creek Dam, to be 100 ft. long, 120 ft. high, earthfill, concr. facing. Bids received from:

(A) F. O. Bohnett & D. McDonald.....$174,670
(B) Frederickson & Watson Const.....$222,351
(C) Morrison-Knudsen Co., L. A.....$238,220
(D) Bent Bros., Los Angeles.....$246,675
(E) Peninsula Pav. Co., S. F.....$255,457
(F) A. Teichert & Son, Inc., Sacto.....$261,012
(G) J. E. Haddock, Pasadena.....$262,061
(H) Mittry Bros. Const. Co., L. A.....$262,852
(I) W. A. Bechtel Co., S. F.....$265,090
(J) Bodenhamer Const. Co.....$268,910
(K) Guy F. Atkinson, S. F.....$272,860
(L) George Pollock Co., Sacramento.....$281,800
(M) V. R. Dennis Const. Co.....$287,973
(N) Engineer's estimate $296,850

Bids received on:

(1) 3,000 cu.yd. foundation stripping
(2) 122,000 cu.yd. spillw. exc & compact in dam
(3) 410,000 cu.yd. embankment
(4) 1,000 cu.yd. concr (outlet works, etc.)
(5) 165,000 sq.ft. concrete facing
(6) 73,000 sq.ft. concrete lining
(7) 380,000 lb. reinforcing steel
(8) 5,500 lb. structural steel
(9) 635 lin.ft. 50" outlet pipe
(10) L.S. install gates and valves, etc.
(11) L.S. bronze tablet
(12) L.S. premium on 50% surety and 100% performance bond

(Continued on Next Page)

"HERCULES" RED-STRAND REG. U. S. PAT. OFF WIRE ROPE

The Service Record of This Wire Rope Continues to Make and Hold Friends

A TRUE measure of value is "the amount of work that an article can do in return for each dollar of its cost", and this is the yardstick that we would like to have you use to determine the worth of "HERCULES" (Red Strand) Wire Rope.

The strength and stamina of this wire rope is not a matter of chance, for we use our 78 years of manufacturing experience to make sure that it possesses in proper balance and to a correct degree, all of the qualities that hard work requires.

Another big advantage of this wire rope is that it is made in a wide range of constructions, including Round Strand, Flattened Strand, Preformed, Non-Rotating and Steel Clad types. There is a right construction of "HERCULES" (Red-Strand) Wire Rope for every kind of wire rope using equipment.

Made Only by **A. Leschen & Sons Rope Co.** Established 1857

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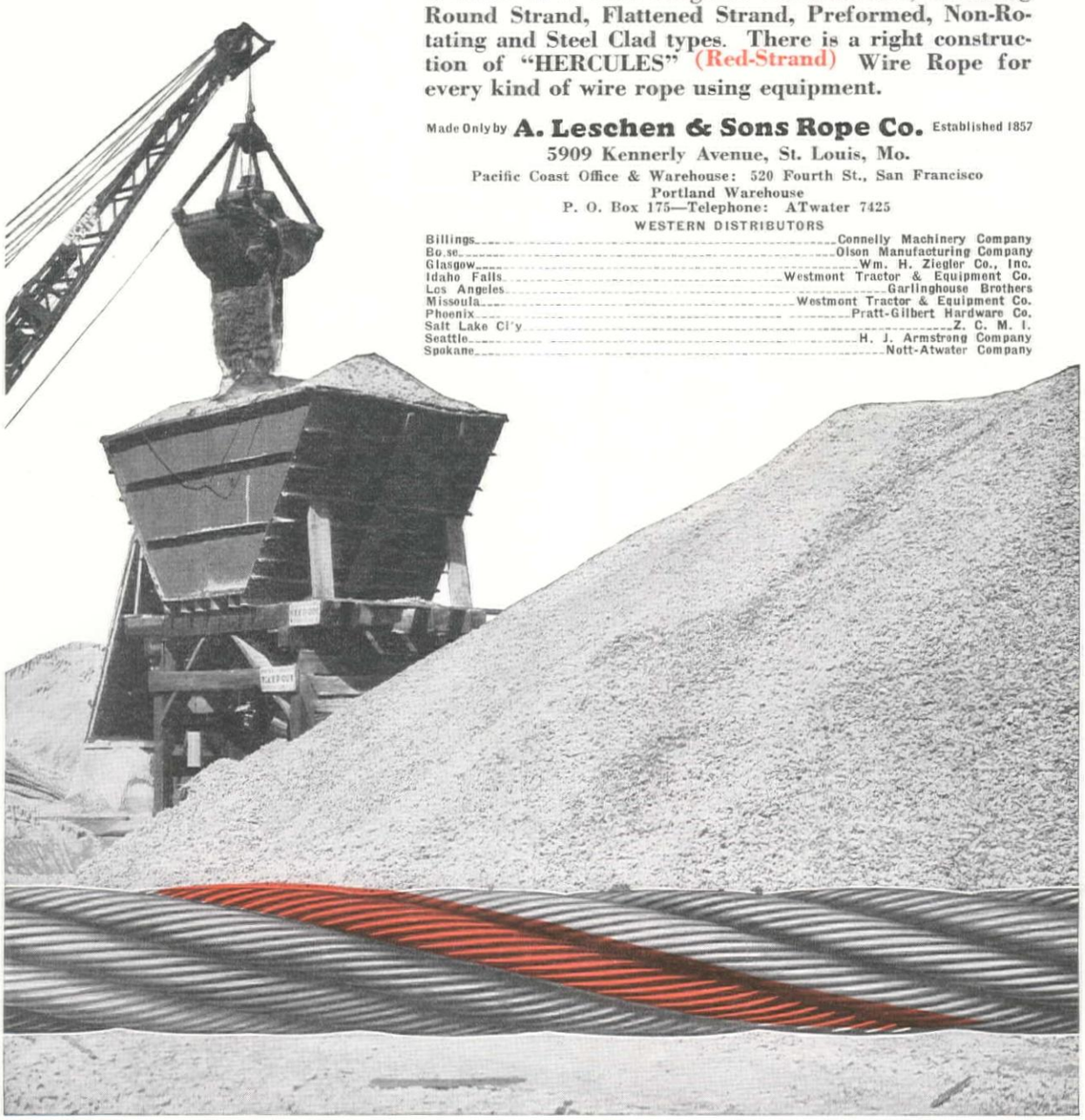
WESTERN DISTRIBUTORS

Billings	Connelly Machinery Company
Boise	Olson Manufacturing Company
Glasgow	Wm. H. Ziegler Co., Inc.
Idaho Falls	Westmont Tractor & Equipment Co.
Los Angeles	Garlinghouse Brothers
Missoula	Westmont Tractor & Equipment Co.
Phoenix	Pratt-Gilbert Hardware Co.
Salt Lake City	Z. C. M. I.
Seattle	H. J. Armstrong Company
Spokane	Nott-Atwater Company



	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)
(1)	1.00	1.15	.55	.67	.52	1.00	1.50	1.00	2.00	.55	.30	2.00	.20	.40
(2)	.14	.23	.25	.325	.30	.252	.30	.30	.28	.30	.37	.30	.34	.45
(3)	.13	.225	.22	.25	.26	.294	.295	.25	.28	.27	.30	.28	.34	.32
(4)	$15	$17	$17	13.45	16.00	17.00	20.00	18.50	16.00	17.00	14.00	25.00	17.50	17.50
(5)	.17	.19	.22	.21	.215	.18	.17	.22	.20	.22	.22	.22	.20	.20
(6)	.36	.27	.38	.33	.38	.35	.26	.50	.38	.35	.35	.38	.30	.40
(7)	.045	.04	.05	.042	.044	.05	.04	.045	.045	.045	.04	.05	.045	.045
(8)	.08	.08	.10	.11	.08	.07	.10	.10	.15	.10	.10	.10	.10	.10
(9)	$17	$18	$16	14.50	15.50	16.00	20.00	13.50	14.00	16.00	12.00	16.00	17.50	11.00
(10)	$900	$125	$1500	$770	$560	$1000	$500	$150	$2500	$1000	$500	$1500	$1000	$1650
(11)	$75	$50	$100	82.50	88.00	75.00	$100	80.00	$100	$100	$100	$150	75.00	$100
(12)	$2650	$3286	$3520	$3700	$3832	$3858	$3931	$3950	$3975	$4000	$4000	$4000	$4255	$4415

TUNNEL CONSTRUCTION

LOS ANGELES, CALIF.—MONROVIA AND PASADENA TUNNELS

Contracts awarded as follows by Metropolitan Water District of Southern California, 306 W. 3rd St., L. A., for constructing the Monrovia Nos. 1, 2, and 3 and Pasadena Tunnels and appurtenant works, under Spec. No. 77:

SCHED. 1—Monrovia No. 1 7,865' long and Monrovia No. 2 940' long to West Const. Co., 615 Richfield Bldg., Los Angeles, $528,100. Bids received from:

(1) West Const. Co., Los Angeles.....$528,100
(2) L. E. Dixon, Bent Bros., Johnson, Inc., L. A...$529,800
(3) J. F. Shea Co., Inc., Mecca $547,500
(4) Shofner & Gordon & Hinman Br. $560,220
(5) Rohl-Connolly Co., Los Angeles $562,250
(6) Utah Const. & Morrison-Knudsen $588,220
(7) Merritt Chapman & Scott Corp. $599,265
(8) Winston-Kaiser-Bechtel $663,120
(9) Dravo Contracting Co. $676,150
(10) S. S. Magoffin, Inc., Pasadena $740,065
(11) West Slope Const. Co., Los Angeles.....$791,880

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1,700 cu. yd. exc. appr. cut.....	1.80	3.00	1.00	2.00	1.00	1.20	1.85	2.00	3.50	1.25	2.00
46,000 cy. tun. exc. & air vent.....	7.30	7.55	7.25	7.90	8.50	8.30	8.00	9.20	$10	11.83	$11
100 cy. exc. tunnel enlgm.	$10	$10	8.00	9.00	8.50	$10	8.00	$12	$20	12.00	$11
18,000 cy. tunnel concrete	6.80	6.00	7.75	7.00	6.00	8.00	6.40	8.10	7.50	6.27	10.85
300 tons erec. st. support	$40	$60	$40	$38	$20	$35	$65	$90	$50	60.00	$50
200 M. ft. BM perm. timber	49.95	$110	$50	$60	$50	$70	$110	$115	$85	80.00	$108
500 cy. gunite coat rock	$24	$14	$20	$24	$20	$20	$35	$14	$15	20.00	$25
4,000 ft. drill grout holes	.60	.30	.50	.80	1.00	.60	3.00	.85	.90	1.00	.60
1,000 grout connections	2.25	2.50	5.00	1.50	3.00	2.00	2.50	4.00	3.00	5.00	5.00
400 cy. mix & place grout.....	$25	$20	$25	$25	$20	$20	$40	$17	$18	27.00	$35
1,000,000 lb. reinf. steel (pl)	.015	.008	.02	.012	.015	.01	.012	.014	.015	.0125	.012
4,000 tons mi. haul steel	.10	.10	.10	.20	.20	.10	.25	.30	.25	.20	.12
26,000 tons mi. haul cement	.05	.05	.10	.12	.15	.08	.37	.12	.15	.10	.10

SCHED. 2—Monrovia No. 3—32,114' long, to West Const Co., Los Angeles, $1,782,400. Bids received from:

(1) West Const. Co., Los Angeles.....$1,782,400
(2) Dixon, Bent & Johnson, Los Angeles.....$1,905,215
(3) J. F. Shea Co., Inc., Mecca.....$2,131,150
(4) Utah & Morrison-Knudsen $2,171,600
(5) Dravo Contracting Co. $2,309,600
(6) Winston, Kaiser-Bechtel $2,395,150
(7) West Slope Const. Co., Los Angeles.....$2,624,000

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L. S. Tunnel access works	$80,160	$123,675	$85,000	$110,000	$200,000	$150,000	$200,000
2,000 cy. exc. appr. cut	1.80	2.30	1.00	1.00	1.50	3.25	2.00
165,000 cy. tunnel excav.	6.30	7.22	7.65	8.00	8.75	8.50	9.50
200 cy. exc. tunnel enlargem.	10.00	10.00	8.00	10.00	12.00	20.00	15.50
68,000 cy. tunnel concrete	6.15	5.00	7.50	7.75	6.15	7.00	8.20
1,000 tons erect st. supports	40.00	60.00	40.00	35.00	90.00	50.00	50.00
700 M. ft. BM perm, tun. timb.....	50.00	110.00	50.00	70.00	115.00	85.00	100.00
1,000 cu. yd. gunite coat rock	25.00	13.00	20.00	20.00	14.00	15.00	23.00
20,000 lin. ft. drill gr. holes.....	.60	.30	.50	.60	.85	.90	.60
4,000 grout connections	2.25	2.50	5.00	2.00	4.00	3.00	5.00
1,500 cy. mix & place grout.....	25.00	20.00	25.00	20.00	17.00	18.00	32.00
5,000,000 lb. pl. reinf. steel	.015	.008	.02	.01	.014	.015	.012
10,000 ton mi. haul steel	.10	.12	.10	.10	.40	.25	.12
60,000 ton mi. haul cement	.05	.06	.10	.08	.16	.15	.10

SCHEDULE 3—Pasadena Tunnel, 12,143 ft. long—To L. E. Dixon, Bent Bros., and Johnson, Inc., 609 South Grand Ave., Los Angeles, $621,180. Bids received from:

(1) L. E. Dixon, Bent Bros. and Johnson, Inc.....$621,180
(2) Rohl-Connolly Co., Los Angeles $646,000
(3) Shofner & Gordon and Hinman Bros. $677,625
(4) West Construction Co., Los Angeles.....$722,550
(5) Utah Const. Co., et al $826,150
(6) J. F. Shea, Inc., Mecca $847,390
(7) S. S. Magoffin, Pasadena $946,390
(8) Winston-Kaiser-Bechtel $1,137,250

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
500 cu. yd. approach excav.	1.00	1.00	1.50	1.00	2.00	1.00	1.00	2.00
61,000 cu. yd. tunnel excavation	6.20	7.00	6.50	6.80	7.50	7.25	10.77	11.70
100 cu. yd. excav, tun, enlargem.	10.00	7.00	9.00	8.00	8.00	9.00	12.00	12.00
21,000 cu. yd. concrete	5.00	5.00	6.80	7.05	8.00	9.00	6.27	10.00
550 tons steel support	48.00	20.00	38.00	45.00	50.00	50.00	60.00	90.00
650 M. ft. BM timber	90.00	50.00	60.00	60.00	$120	50.00	75.00	$110
200 cu. yd. gunite coating	14.00	20.00	15.00	20.00	15.00	20.00	20.00	14.00
6,000,000 lb. reinf. steel	.008	.01	.012	.015	.015	.025	.0115	.014
3,500 ton mi. haul steel	.12	1.00	.25	.10	.10	.10	.20	.50
6,000 ton mi. haul cement	.06	.30	.15	.05	.10	.10	.10	.30

Work is to begin within 30 days of execution of contract and be completed on or before October 31st, 1938.

STIPULATIONS—West Const. Co. will accept any schedule at the bid price; if awarded Sched. 1 and 2 deduct .20 yd. from tunnel excav. in both Sched. 1 and 2 and also .90 yd. from concrete in tunnel in both Scheds. 1 and 2; if awarded Scheds. 1 and 3 deduct .20 yd. from tunnel excav. and .80 yd. from tunnel concrete in both scheds. 1 and 3; if awarded Scheds. 2 and 3, deduct .10 yd. from tunnel excav. in Scheds. 2 and 3 and also .70 yd. from tunnel concrete in both Sched. 1 and 3; if awarded all 3 schedules deduct .21 yd. from tunnel excav. and .95 yd. from tunnel concrete in Scheds. 1, 2 and 3.

L. E. Dixon, Bent Bros. and Johnson, Inc., if awarded all 3 schedules deduct 2% from all prices quoted herein.

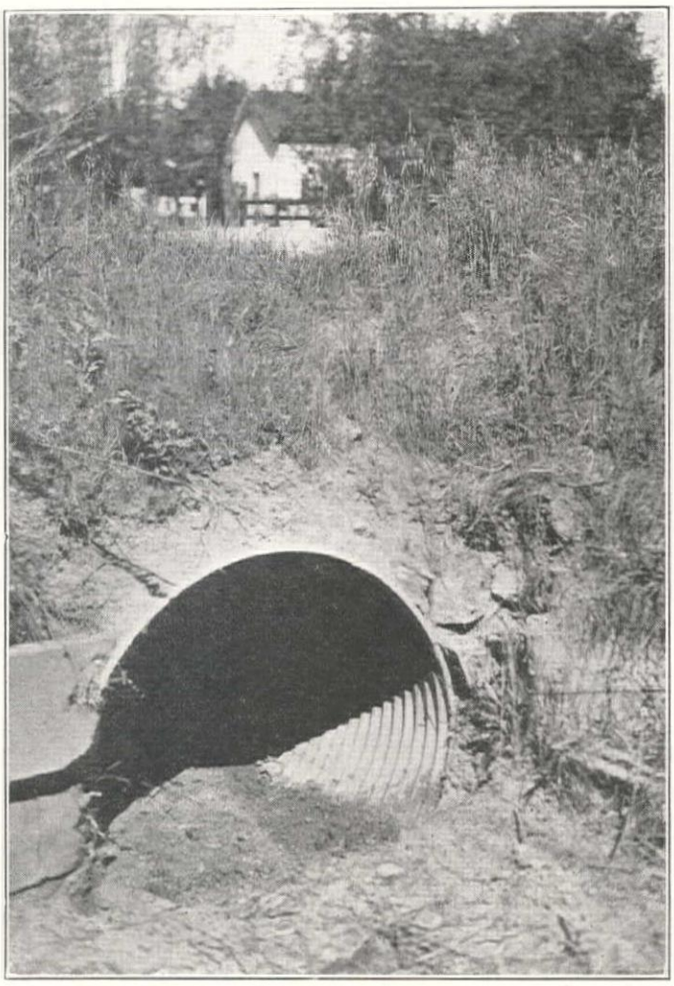
Rohl-Connolly will accept either Sched. 1 or 3, but not both.

J. F. Shea—if awarded Sched. 1 and 2 disregard bids on Sched. 3; if awarded Sched. 2, disregard bid on Sched. 3.

S. S. Magoffin will accept 1 only; will not accept Sched. 1 if in line for award on Sched. 3.

Winston-Kaiser-Bechtel—if awd. Sched. 1 and 2 deduct $125,000 from tunnel access work under Sched. 2; if awd. Sched. 1, 2 and 3, deduct as above plus $1.00 per cy. from tunn. concrete in Sched. 3. Shofner & Gordon and Hinman Bros. will accept 1 sched. only.

Utah & Morrison-Knudsen, if awd. Sched. 1 and 2 deduct 2% from all unit prices on both schedules. West Slope Const. Co., will accept either Sched. 1 or 2 or both.



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TUNNEL CONSTRUCTION

SAN FRANCISCO, CALIF.—CITY—TUNNEL 1B, LOWER CHERRY AQUEDUCT

Contract awarded to Kemper Const. Co., Ltd., 2701 S. Overland Avenue, Los Angeles, $77,860.00. To Public Utilities Comm., S. F., for construcing Tunnel No. 1B, Lower Cherry Aqueduct, to be 2,910 ft. long, under Spec. H.H.W.S. 151.

Bids received from:

(1) Kemper Const. Co., Ltd., L. A. $77,860.00
(2) Morrison-Knudsen Co., L. A. 88,370.00
(3) Geo. Hess, Los Angeles 88,655.00
(4) T. E. Connolly, S. F. $92,200.00
(5) Hetch Hetchy Water Supply 92,371.00
(6) Bodenhamer Const. Co. 94,645.00

	(1)	(2)	(3)	(4)	(5)	(6)
6,900 cu. yd. tunnel excavation	$10.50	$12.00	$11.75	$12.90	$12.30	$12.75
5 M. ft. BM perm. tunnel timber	100.00	50.00	100.00	28.00	75.00	100.00
200 cu. yd. tunnel concrete lining	20.00	20.00	30.00	12.00	30.00	25.00
20 cu. yd. open cut excavation	300	3.00	5.00	1.00	2.50	2.00
10 cu. yd. concrete in open cut	25.00	20.00	30.00	12.00	30.00	25.00
20 bbl. extra cement	5.00	3.00	4.00	3.00	3.80	4.00
5,000 lb. reinforcing steel	.04	.10	.06	.05	.08	.06
5,000 lb. place City metal work	.06	.10	.06	.04	.10	.06

BRIDGES and CULVERTS

SAN FRANCISCO, CALIF.—STATE—REINFORCED CONCRETE VIADUCT—GRADING AND PAVING—S. F.-OAKLAND BAY BRIDGE

Healy Tibbitts Const. Co., 64 Pine St., San Francisco, $695,175. CONTRACT 15 and $477,447. CONTRACT 15A—total $1,172,622 low to San Francisco-Oakland Bay Bridge, Room 811, 500 Sansome St., San Francisco, for constructing a reinf. concrete viaduct, with grading and paving of the street and all incidental work necessary to complete, except wiring and fixtures for the lighting of the bridge, the San Francisco viaduct section and approaches of the San Francisco-Oakland Bay Bridge.

Bids received from:

	Contr. 15	Contr. 15A	TOTALS
(1) Healy Tibbitts Const. Co., San Francisco	$695,175	$477,447	$1,172,622
(2) Clinton Const. Co., San Francisco	$665,327	$555,940	$1,221,267
(3) Transbay Const. Co., San Francisco	$756,661	$562,470	$1,319,131
(4) C. W. Caletti, M. B. McGowan & Peninsula Pav.	$827,720	$590,606	$1,418,326
(5) Bates & Rogers Const Co., Oakland	$809,652	$649,975	$1,459,627
(6) Barrett & Hilp, San Francisco	$809,164	$688,880	$1,498,044

CONTRACT 15—SAN FRANCISCO SECTION

	(1)	(2)	(3)	(4)	(5)	(6)
L.S. rem. buildings and clear site	$7,500	$17,000	$23,000	$100,000	$35,170	$32,000
16,000 cu. yd. excavation, unclass.	.50	.60	.55	.69	.65	.72
10,000 cu. yd. excavation, struc.	2.50	2.40	1.75	1.25	2.95	1.50
3,700 cu. yd. conc. (viaduct and wall ftgs.)	11.00	8.50	9.00	15.00	8.75	8.50
21,200 cu. yd. conc. (vad. and walls above footings)	16.50	15.80	20.00	19.00	20.95	20.50
800 cu. yd. concrete (railings)	30.00	21.00	30.00	40.00	39.65	50.00
4,100,000 lb. reinforcing steel	.04	.042	.04	.04	.038	.042
6,600 lb. bronze castings	.28	.37	.40	.30	.50	.34
45,000 lb. cast. ir. drain pipe and fittings	.05	.06	.06	.05	.07	.12
20,000 lb. castings	.07	.07	.11	.05	.10	.13
6,000 lin. ft. 16" concrete piles	3.50	1.75	1.75	1.25	2.45	2.50
8,500 lin. ft. 18" concrete piles	4.25	2.40	2.40	1.50	2.95	3.05
800 lin. ft. 6" vitr. pipe	1.50	1.00	2.30	2.00	2.40	2.00
1,000 lin. ft. 8" vitr. pipe	1.75	4.00	4.60	2.00	4.75	2.50
150 lin. ft. 10" vitr. pipe	2.00	4.50	3.50	2.00	5.35	3.50
L. S. electrical conduits and fittings	$5,302	$8,400	$7,456	$12,500	$6,450	$7,000
4,000 bbl. extra Portland cement	1.25	2.00	2.30	2.00	2.10	2.40

CONTRACT 15A—SAN FRANCISCO APPROACH

	(1)	(2)	(3)	(4)	(5)	(6)
L. S. rem. buildings and clear site	$2,500	$17,000	$14,000	$50,000	$15,700	$28,000
300,000 cu. yd. excavation, unclass.	.40	.575	.55	.69	.65	.72
4,000 cu. yd. excavation, struc.	2.50	2.70	1.75	1.25	3.80	1.50
1,200 cu. yd. concrete (viad and wall ftgs.)	11.00	10.00	10.00	15.00	8.75	11.00
8,000 cu. yd. concr. (viaduct and walls above footings)	17.50	17.30	20.00	12.50	23.00	22.50
800 cu. yd. concr. (railings)	30.00	22.00	25.00	40.00	42.85	50.00
3,000 cu. yd. concr. (pavement)	7.00	10.00	9.25	10.00	11.00	11.50
400 cu. yd. concr. (curbs and gutters)	10.00	19.00	12.50	12.50	16.65	17.00
400 cu. yd. concr. (sidewalks)	10.00	15.00	13.00	12.50	16.65	14.50
2,000,000 lb. reinforcing steel	.04	.042	.04	.04	.0375	.042
5,000 lb. bronze castings	.28	.33	.40	.30	.50	.34
15,000 lb. cast ir. drain pipe and fittgs.	.05	.07	.06	.05	.07	.12
14,000 lb. castings	.07	.06	.11	.05	.10	.13
4,000 lin. ft. 16" concrete piles	2.50	2.15	1.75	1.25	2.45	2.50
4,000 lin. ft. 18" concrete piles	4.25	2.75	2.40	1.50	2.95	3.05
100 lin. ft. 6" vitrified pipe	1.50	1.00	2.30	2.00	2.40	2.00
1,000 lin. ft. 8" vitrified pipe	1.75	4.00	4.60	2.00	4.75	2.50
1,200 lin. ft. 10" vitrified pipe	2.00	2.00	3.45	2.00	4.75	3.50
2,800 tons crusher run base	1.00	1.85	2.00	2.00	1.85	2.10
2,200 tons asphalt concrete	3.50	4.60	5.50	3.50	4.50	5.50
L. S. elec. conduits and fittings	$4,802	$5,000	$6,850	$12,000	$4,810	$7,000
L. S. rem. & replace 12"x18" brick sewer on Essex St. betw. Harrison and Folsom Streets	$1,890	$1,700	$2,300	$3,356	$3,150	$2,400
L. S. rem & rebuild 12"x10" vitr. sewers on Harrison betw. 1st and 2nd Streets	$3,375	$2,800	$2,300	$5,000	$5,500	$6,000
L. S. rem & replace 12" cast iron water main on Harrison St. betw. 2nd and Essex	$1,000	$1,200	$2,300	$2,000	$3,575	$1,500
2,200 bbl. extra Portland cement	1.25	2.00	2.30	2.00	2.10	2.40

STREET and ROAD WORK

PORTLAND, OREGON—GOVT.—GRADING AND TUNNEL—PIERCE COUNTY

Contract awarded to Sam Orino, E. 3104 Boone Ave., Spokane, Wn., $223,729. (USING CORR. METAL PIPE) by Bureau of Public Roads, 316 New Postoffice Bldg., Portland, Oregon, for 3.117 mi. grading and constructing tunnel on Mt. Rainier National Park East Side Highway, PEC-5-D, in Mt. Rainier Natl. Park, PIERCE COUNTY, Oregon. Bids from:

(1) Sam Orino, Spokane $223,729
(2) A. C. Greenwood Co., Portland $231,386
(3) Colonial Const. Co., Spokane $234,308
(4) Myers & Goulter, Seattle $235,428
(5) J. D. Harms, Inc., Seattle $246,635
(6) Elliott & Co., Inc., Seattle $247,220
(7) L. Romano Engr. Corp., Seattle $279,428

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
2 acres clearing	$550.00	$500.00	$700.00	$600.00	$600.00	$600.00	$500.00
22 acres grubbing	400.00	500.00	500.00	400.00	400.00	500.00	300.00
203,000 cu. yd. excavation	.70	.68	.70	.68	.72	.70	.80
1,000 cu. yd. excavation for struc.	1.00	1.50	2.00	1.50	1.50	2.00	1.00
2,000 cu. yd. excavation for borrow	.65	.40	.70	.50	.60	.50	.50
320,000 sta. yd. overhaul	.01	.015	.02	.01	.0175	.02	.01
3.117 mi. finish earthgraded road	500.00	400.00	300.00	500.00	400.00	300.00	500.00
4.000 mi. yd. cushion haul	.18	.20	.20	.26	.20	.20	.20
15,900 lin. ft. round cut slopes	.07	.10	.15	.20	.12	.10	.10
70 ea. dangerous trees and snags	9.00	10.00	15.00	10.00	10.00	10.00	10.00
65 M. ft. BM untr. timb. (tunn. lining)	60.00	70.00	60.00	60.00	65.00	70.00	50.00
11 acres roadside cleanup	50.00	100.00	400.00	200.00	200.00	300.00	100.00
250 cu. yd. masonry retaining walls	15.00	10.00	15.00	15.00	12.00	12.00	15.00
43 cu. yd. masonry headwalls	17.00	10.00	17.00	15.00	15.00	15.00	20.00
90 lin. ft. 18" reinforced concrete pipe	2.50	2.50	2.50	2.50	2.15	2.25	2.00
120 lin. ft. 36" reinforced concrete pipe	7.25	8.00	7.50	8.00	7.40	8.00	10.00
930 lin. ft. 18" corr. galv. metal pipe	1.75	1.70	2.00	2.00	1.75	2.00	2.00
120 lin. ft. 24" corr. galv. metal pipe	2.70	2.70	3.00	2.75	2.60	3.00	4.00
40 lin. ft. 30" corr. galv. metal pipe	3.25	3.50	4.50	3.50	4.00	3.50	6.00
40 cu. yd. masonry guardrail, Type 2	25.00	18.00	19.00	20.00	20.00	25.00	30.00
400 lin. ft. 6" porous tile underdrain	.60	.40	.75	.50	.50	.50	.75
600 lin. ft. 8" porous tile underdrain (tunnel drainage)	.75	.60	1.00	.75	.70	.60	1.00
930 lin. ft. 18" reinf. conc. pipe (ALT)	2.50	2.50	2.50	2.50	2.15	2.25	2.50
120 lin. ft. 24" reinf. conc. pipe (ALT)	3.75	3.50	4.00	4.00	3.80	4.00	4.50
40 lin. ft. 30" reinf. conc. pipe (ALT)	5.00	5.00	5.00	5.25	5.25	5.00	8.00
170 lin. ft. 18" reinf. conc. pipe (ex str.)	2.75	2.75	3.00	3.00	2.50	3.00	3.00
750 lin. ft. 24" reinf. conc. pipe (ex str)	3.75	3.85	4.50	4.50	4.25	4.25	5.00
370 lin. ft. 30" reinf. conc. pipe (ex. str)	6.00	6.50	6.25	6.50	6.60	6.00	10.00
150 lin. ft. 36" reinf. conc. pipe (ex. str)	8.00	9.00	8.50	9.00	8.50	10.00	15.00
10,000 cu. yd. overruns in slides and overbrk.	.70	.68	.70	.68	.72	.70	.80
510 lin. ft. tunnel	65.00	81.00	60.00	85.00	92.00	90.00	125.00
160 cu. yd. struc. excav. in tunnel	3.50	4.00	5.00	6.00	2.50	10.00	10.00
Lump sum, slope stabilization	$1000.00	$1000.00	$1000.00	$1000.00	$1000.00	$1000.00	$1000.00

SACRAMENTO, CALIF.—STATE—GRADING AND PAVING—SAN MATEO COUNTY

Contract awarded to Union Paving Co., Call Bldg., San Francisco, $201,813.00 to California Division of Highways, Sacramento, for 1.7 mi. grad. and asph. concr. paving between Huron St. and San Pedro Avenue in Daly City, SAN MATEO COUNTY, Calif. Bids from:

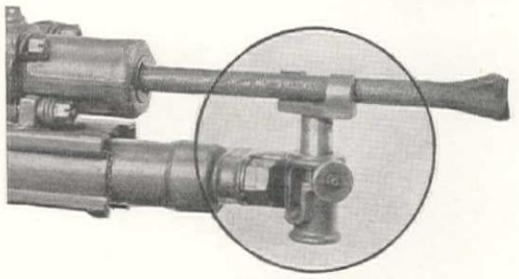
(1) Union Paving Co., S. F. $201,813.00
(2) Pacific States Const. Co., S. F. 207,528.00
(3) A. G. Raisch, San Francisco 209,874.00
(4) Eaton & Smith, S. F. 213,225.00
(5) Hanrahan Wilcox Corp., S. F. $214,538.00
(6) Fredrickson & Watson & Fred. Br. 218,388.00
(7) Fay Improvement Co., S. F. 228,917.00
(8) Charles L. Harney, S. F. 229,637.00

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
30,500 cu. yd. roadway excavation	$ .25	$ .50	$ .44	$ .39	$ .39	$ .42	$ .51	$ .42
80,000 sta. yd. overhaul	.005	.0075	.017	.006	.02	.01	.0025	.01
60 cu. yd. struck excavation	1.00	3.75	.90	1.90	1.00	1.50	1.00	3.00
110 M. gallons water	1.00	2.50	.70	1.90	1.00	1.25	2.60	2.00
5,700 cu. yd. remove concrete	2.75	2.35	3.50	1.64	2.00	1.60	3.40	2.50
16,000 sq. yd. remove asphalt surface	.15	.25	.15	.23	.15	.13	.378	.18
9,250 tons crusher run base	1.45	2.10	1.30	1.54	1.65	1.08	1.50	1.50
4.5 tons emuls. asph. road oil	19.00	26.00	20.00	25.00	30.00	25.00	22.00	30.00
18 tons screenings	2.00	4.15	4.00	3.80	4.00	4.50	4.00	5.00
46,000 sq. yd. asph. paint binder	.001	.02	.02	.016	.02	.02	.023	.03
21,350 tons asphalt concrete	3.85	3.50	3.53	3.90	3.50	3.64	3.98	4.20
850 cu. yd. 'A' concr. (pavement)	8.00	9.00	9.00	9.50	9.00	10.00	10.78	10.00
15 cu. yd. 'A' concr (struc.)	15.00	25.00	17.90	25.00	20.00	25.00	19.00	40.00
1,400 cu. yd. 'A' conc. (sidew., etc.)	13.50	11.00	12.80	15.20	15.00	13.90	13.80	15.00
35 cu. yd. 'A' conc. (curb backing)	5.00	7.50	6.00	8.05	8.50	11.00	7.50	7.00
5,400 cu. yd. 'C' concrete	6.75	6.75	7.70	7.50	8.00	8.25	7.62	7.00
1,100 lb. reinforcing steel	.04	.06	.045	.05	.07	.07	.05	.06
1,550 ft. rem. and reset stone curbs	.40	.25	.45	.32	.35	.50	.31	.50
400 sq. ft. redress stone curb	1.00	.70	.30	1.25	.90	.10	.76	1.00
300 ft. 8" perf. met. pipe underdr.	1.00	1.65	1.48	1.54	1.35	1.40	1.05	2.00
200 ft. 12" corr. metal pipe	1.30	1.75	1.82	1.66	1.35	2.10	1.98	2.00
2,060 ft. 12" reinf. concr. pipe	1.75	1.60	1.42	1.59	1.50	1.70	1.20	2.00
1,660 ft. 15" reinf. concr. pipe	2.00	1.50	1.62	1.90	1.90	1.82	1.67	3.00
865 ft. 18" reinf. concr. pipe	2.50	1.90	1.92	2.10	2.40	2.32	2.00	3.50
5,250 ft. 4" vitrified pipe	.50	.50	.70	.64	.55	1.08	.69	1.00
800 ft. 6" vitrified pipe	.60	.65	.90	1.25	1.30	.88	1.38	1.00
9 ea. new brick catchbasins	70.00	85.00	70.00	75.00	65.00	90.00	67.00	100.00
5 ea. new lamp holes	5.00	12.00	15.00	25.00	12.00	20.00	23.00	25.00
5 ea. new brick manholes	75.00	55.00	70.00	82.00	80.00	105.00	73.50	100.00
25 ea. adjust manholes	2.00	10.00	5.00	6.30	6.00	19.00	15.00	10.00
20 ea. spec. offset manholes	100.00	85.00	80.00	88.00	72.00	105.00	85.00	100.00
80 remove and reset meter boxes	.50	8.00	1.00	2.50	2.00	3.70	2.00	5.00
100 ea. cross walk markers	.25	.25	.25	.32	.30	1.25	.72	.50
89 sta. finish roadway	2.00	3.00	2.00	6.30	5.00	5.00	4.00	5.00
38 ea. monuments	2.00	3.00	2.75	5.00	3.00	3.00	3.50	3.00

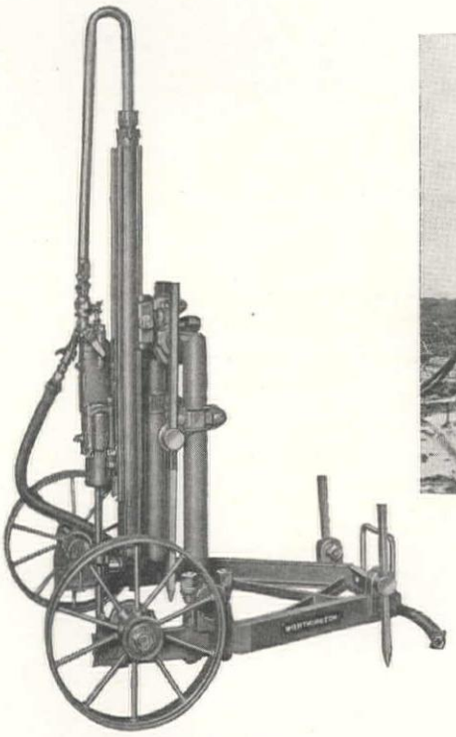
In Rock Drilling Equipment

Worthington has pioneered the Pneumatic Self-feed Drifter • the Hole Spotter • the Multiple Drilling Rig • the Tilting Tower on Wagon Drills • the Rock Master

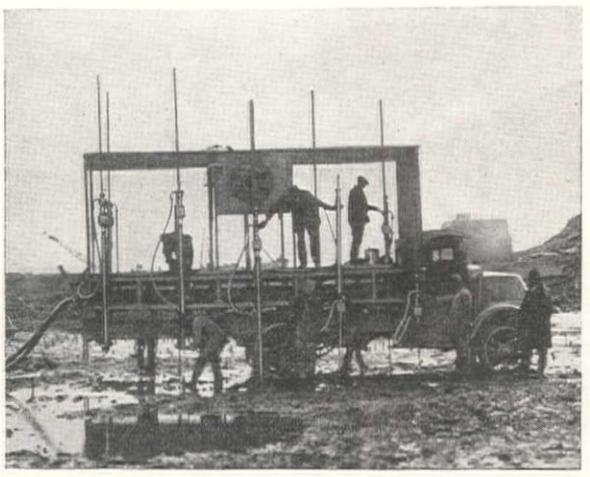
Pneumatic Self-feed Drifter
Automatic feed increases productive drilling time



Hole Spotter
Collars the hole quickly, without danger of injuring the operator



The Rock Master
Meets the demand for a light weight, mobile, all-purpose drill



Mobile Multiple Drilling Rig
Speeds up operations by having a battery of Rock Drills mounted on truck

Tilting Tower on Wagon Drills
Rapid adjustment to vertical position gets machine at work more quickly

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General Machinery Company,
E. 3500 Block, Riverside Avenue, Spokane, Washington

Garlinghouse Brothers,
2416 East 16th Street, Los Angeles, California

Contractors Equipment & Machinery Co.,
14th at National Avenue, San Diego, California

Star Machinery Company,
1741 First Avenue South, Seattle, Washington

Vandercook Company,
1014—8th Street, Sacramento, California

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WORTHINGTON

When writing to WORTHINGTON PUMP AND MACHINERY CORP., *please mention Western Construction News*

STREET and ROAD WORK

PHOENIX, ARIZ.—GOVT.—GRADING—YAVAPAI COUNTY

Contract awarded to Skousen Bros., Albuquerque, N. M., $117,728 to U. S. Bureau of Public Roads, Phoenix, for 4.582 miles grading Section 1 of Ronte 7, the Oak Creek Nat'l Forest Highway, Coconino Nat'l Forest, YAVAPAI COUNTY, ARIZONA. Bids from:

(1) Skousen Bros., Albuquerque $117,728
(2) Daley, Vinson & Pringle, Phoenix $118,080
(3) Hodgman & MacVicar, Pasadena $122,210
(4) H. J. Hagen, Globe $123,091
(5) K. DeWitt, Mesa $123,600
(6) Lee Moor Constr. Co., El Paso $126,522
(7) Morrison Knudsen Co., L. A. $131,223
(8) Pearson & Dickerson, Prescott $140,320
(10) Engineers Estimate $127,393

Bids received on:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
26 acres clearing	80.00	75.00	100.00	25.00	150.00	75.00	100.00	112.00	40.00	80.00
100,000 cy. unclas. excav.	.73	.75	.80	.82	.80	.85	.84	.97	.98	.80
7,900 cy. same for borrow	.30	.25	.25	.40	.30	.175	.40	.38	.33	.35
960 same for structures	2.00	1.50	2.00	2.50	2.00	1.50	2.00	2.25	2.65	2.00
70 cu. yds. foundation fill	3.00	2.50	2.50	2.00	1.00	2.50	1.50	1.28	1.30	2.00
363 cy. hd. ld. rk. embankment	5.00	2.50	1.75	3.00	3.00	3.50	2.50	3.85	2.00	4.50
34,000 sta. yd. overhaul	.03	.025	.03	.01	.03	.03	.02	.03	.04	.04
3,200 cy. mi. borrow haul	.40	.25	.20	.30	.30	.37	.30	.25	.26	.25
12 lin. ft. 8" C.M.P.	1.50	1.16	1.00	1.00	1.00	1.25	1.00	1.08	1.20	1.25
110 lin. ft. 18" C.M.P.	2.00	2.00	1.75	2.00	2.00	2.10	2.00	1.93	2.00	2.25
842 lin. ft. 24" C.M.P.	2.75	3.00	2.75	3.00	3.00	2.95	2.80	2.82	3.35	3.50
100 lin. ft. 30" C.M.P.	4.00	3.70	3.50	4.00	3.80	3.60	4.00	3.58	3.75	4.25
258 lin. ft. 36" C.M.P.	5.50	5.60	5.50	5.50	6.10	5.40	5.00	5.68	5.90	5.50
54 lin. ft. 42" C.M.P.	7.00	6.40	6.50	7.00	7.10	6.30	7.00	6.54	6.85	7.00
84 ft. 48" C.M.P., 12 gau.	8.50	7.40	7.25	8.00	8.10	7.60	8.50	7.64	7.45	8.50
44 ft. 48" C.M.P., 10 gau.	10.00	7.70	9.00	10.00	10.00	8.60	9.50	9.39	9.85	10.00
1 "A" spillway inlet	50.00	13.50	25.00	15.00	15.00	17.50	15.00	19.27	26.00	20.00
104 ft. remove exist. CMP	2.00	.90	1.00	.50	.75	1.25	.75	1.28	1.35	1.00
305 cy. "A" concrete	22.00	26.00	22.00	23.00	19.00	23.00	30.00	12.00	23.50	27.50
100 cy. "B" concrete	22.00	26.00	22.00	23.00	20.00	23.00	20.00	21.00	23.50	27.50
130 cu. "D" concrete	24.00	26.00	22.00	23.00	21.00	26.50	21.00	23.00	23.50	30.00
54,250 lbs. reinf. steel	.055	.048	.055	.05	.055	.05	.06	.05	.05	.06
143,000 lbs. struc. steel	.06	.066	.065	.06	.058	.063	.07	.06	.06	.055
60 cy. hd. laid riprap	3.00	2.50	2.00	1.50	5.00	3.00	4.00	3.85	2.00	4.50
15,100 ft. protec. ditch	.17	.10	.12	.05	.15	.065	.15	.06	.37	.10
1 cattle guard	$700	$575	$600	$750	$700	$700	$350	$600	$750	$700
5,500 ft. remove fence	.02	.03	.02	.04	.02	.02	.04	.05	.05	.03
7,240 ft. fence, in place	.08	.08	.10	.10	.09	.08	.10	.09	.08	.15
13 R/W monuments	7.00	3.00	3.00	4.00	8.00	3.50	3.00	3.50	3.00	4.00

ALMIRA, WASHINGTON—GOVT.—SURFACING, ETC.—COLUMBIA BASIN PROJECT

Contract awarded to Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, Wn., $94,849.00 by Bureau of Reclamation, Almira, Wn., for construction of highway, street, alley, and parking area surfacing; sidewalks; curbs and gutters, catch basins; and storm sewers for the Govt. Camp at Grand Coulee Dam, Columbia Basin Project, Wn., under Spec. No. 581. Bids received from:

(1) Standard Asphalt Paving Co. $94,849.00
(2) Harold Blake, Portland 98,885.00
(3) Northwest Roads Co. $109,376.00
(4) Goodfellow Bros., Inc. 117,306.00
(5) L. Romano Engineering Corp. 117,335.00

	(1)	(2)	(3)	(4)	(5)
600 lin. ft. 8" diam. storm sewers	$ .95	$1.25	$1.00	$ .68	$2.50
6 catchbasins	45.00	20.00	30.00	67.00	75.00
70 sq. yd. dry rock paving	3.30	3.00	4.00	2.50	3.00
16,500 lin. ft. 'A' and 'B' curb and gutter	.51	.55	.60	1.15	1.00
5,000 lin. ft. Class 'C' curb	.46	.50	.40	.85	.60
99,000 sq. ft. sidewalks	.125	.13	.18	.20	.15
3 alley entrances in residential district	40.00	65.00	50.00	77.00	75.00
4 alley entrances in business district	55.00	150.00	60.00	97.50	100.00
16,600 cu. yd. cr. rock for waterbound macadam	1.75	1.95	2.50	1.70	2.75
1,370 cu. yd. Keystone for waterbound macadam	1.75	2.15	2.50	1.80	3.00
320 cu. yd. screenings for waterbound macadam	1.75	2.15	2.75	2.50	3.00
230 M. gallons water for waterbound macadam	2.75	2.60	3.00	5.00	5.00
33,300 sq. yd. wear. crse. for Class I pavement	.75	.73	.67	.83	.50
19,400 sq. yd. wear. course for Class II pavement	.47	.45	.35	.50	.45
5,500 sq. yd. wear. course for Class III pavement	.43	.35	.27	.40	.40
500 cu. yd. shoulder material	2.50	2.00	2.25	1.00	1.50

WATER SUPPLY SYSTEMS

SAN FRANCISCO, CALIF.—CITY—LAYING 12" AND 16" FEEDER MAINS

Contract awarded to W. J. Tobin, 3701 Balfour Avenue, Oakland, $44,361, to Public Utilities Commission, San Francisco, for laying 12" and 16" cast iron feeder mains in Northwest and Southwest sections of San Francisco, under Specifications W. D. No. 55.

Bids received from:

(1) W. J. Tobin, Oakland $44,361
(2) Herman Lawson Co., San Francisco $49,859
(3) E. J. Treacy, San Francisco $54,539
(4) Pacific Pavements Co., Ltd. $54,722
(5) Lowrie Paving Co., Inc., San Francisco $57,838
(6) Frank O'Shea, San Francisco $57,978
(7) Fay Improvebent Co., San Francisco $75,481

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
14,920 lin. ft. exc. & backf. 12" pipe trench	.48	.66	.69	.63	.55	.80	.95
15,200 lin. ft. exc. & backf. 16" pipe trench	.56	.74	.742	.72	.55	.83	1.00
970 cu yd. addtl. excav. and backfill	.80	1.50	1.50	2.50	2.50	2.00	2.00
1,860 sq. ft. addtl. pav. remove and replace	.30	38	.29	.40	.36	.35	.33
14,920 lin. ft. install 12" pipe	.10	.12	.22	.17	.15	.17	.34
15,200 lin. ft. install 16" pipe	.20	.17	.2475	.23	.20	.19	.42
76,430 lb. install fittings	.04	.02	.014	.02	01	.015	.02
8,800 lin. ft. joints	.35	.23	.69	.78	.60	.85	1.10
74,600 sq. ft. pavement	.225	.25	.225	.225	.36	.225	.28

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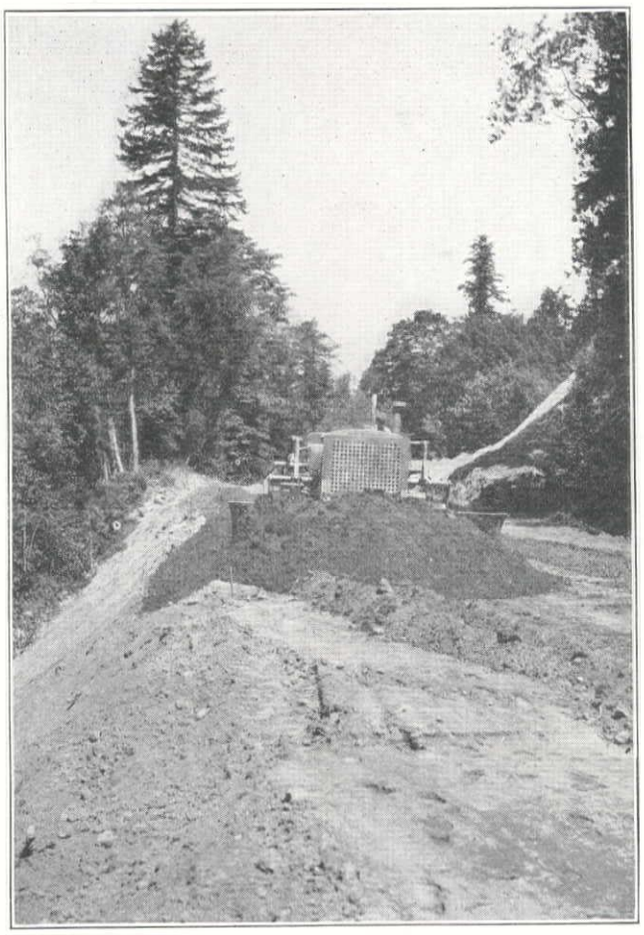

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San Francisco Paving Co., San Francisco
H. W. McKinley Co., Glendale, Calif.
Poston Bros., Kalispell, Mont.
Young, Cox & Christensen, Siguard, Utah
Wilder & Montfort, Blaine, Wash.
Santa Clara Holding Co., Cupertino, Calif.
E. E. Black, Ltd., Honolulu
Wheelright Construction Co., Ogden
Thomas Scalzo, Seattle
Northwest Construction Co., Seattle
U. S. Bureau of Public Roads
U. S. Forest Service
U. S. National Park Service
Utah State Highway Commission
Contra Costa County, California
Monterey County, California
Mendocino County, California
Stanislaus County, California
Snohomish County, Washington

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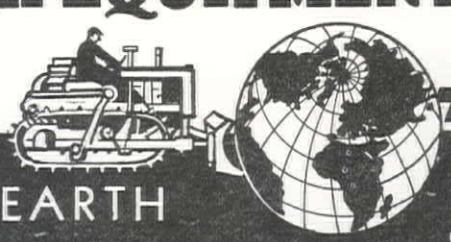

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IRRIGATION and RECLAMATION

ONTARIO, OREGON—GOVT.—MALHEUR RIVER AND DEAD OX SIPHONS, OWYHEE PROJECT

Contracts awarded as follows by the Bureau of Reclamation, Ontario, Oregon, for constructing the Malheur River siphon and Dead Ox siphon, North Canal, Dead Ox Flat Division, Owyhee Project, Oregon-Idaho, under Spec. No. 598

SCHEDULE 1—Malheur River Siphon, Plate steel pipe design. Bids from:

(1) Parker Schram Co., Portland, Oregon (awarded) $64,764.00
(2) Puget Sound Machinery Depot, Seattle..... 53,718.00
(3) J. A. Terteling & Sons, Boise, Idaho..... 65,214.00
(4) Babcock & Wilcox, Denver, Colo..... 68,163.00
(5) Morrison Knudsen Co., Boise, Idaho..... 68,525.00
(6) James J. Burke & Co., Salt Lake City..... 71,009.00
(7) Barnard-Curtiss Co., Minneapolis 82,887.00

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
5,300	cu. yd. struc. excav., Class 1	$ .30	$ .30	$ .30	$ .30	$ .25	$ .33	$ .35
1,000	cu. yd. struc. excav., Class 2	.40	.40	.30	.50	.50	1.10	1.00
10	cu. yd. struc. excav., Class 3	1.00	4.00	1.00	1.00	1.50	5.00	1.00
21,000	cu. yd. trench excav., Class 1	.20	.15	.14	.20	.20	.22	.30
4,600	cu. yd. trench excav., Class 2	.30	.25	.14	.40	.30	.55	.60
10	cu. yd. trench excav., Class 3	1.00	4.00	1.00	1.00	1.50	5.00	.60
6,100	cu. yd. exc. piers and anchors, Class 1	.20	.30	.30	.30	.45	.55	.60
500	cu. yd. excav. piers and anchors, Class 2	.30	.60	.30	.60	.60	1.10	.60
10	cu. yd. excav. piers and anchors, Class 3	1.00	4.00	1.00	1.00	1.50	5.00	1.00
800	cu. yd. excav. river xing piers, Class 1	1.50	2.50	3.00	5.50	4.00	7.00	5.00
90	cu. yd. excav. river xing piers, Class 2	2.00	4.00	3.00	5.50	6.00	7.70	5.00
10	cu. yd. excav. river xing piers, Class 3	3.00	10.00	10.00	8.00	10.00	10.00	10.00
12,000	cu. yd. backfill	.20	.20	.15	.18	.20	.27	.25
200	cu. yd. puddle or tamp backfill	.50	.50	.40	.50	1.00	.80	.50
1,055	cu. yd. conc. inlet and outlet and abutment	17.50	11.50	16.00	16.00	17.00	16.70	18.50
1,415	cu. yd. conc. piers and anchors	14.00	11.00	15.00	14.50	14.00	13.50	17.50
460	cu. yd. conc. river crossing piers	14.00	11.00	20.00	14.50	14.00	11.30	16.50
324,000	lb. place reinforcing steel	.02	.02	.015	.0175	.02	.01375	.02
140	sq. yd. dry rock paving	1.50	3.00	2.00	1.50	2.00	1.60	2.50
50	cu. yd. riprap	3.00	4.00	3.00	3.00	3.00	4.40	4.00
3.7	M. ft. BM erect timb. in bridge	20.00	30.00	15.00	30.00	50.00	39.00	25.00
2,600	lb. inst. gates and gate hoists	.03	.05	.05	.05	.05	.025	.04
6,000	lb. inst. struc. steel and metal work	.03	.02	.05	.05	.03	.0225	.04

SCHEDULE 2—Malheur River Siphon, Plate Steel Pipe, S1 Type Supporting Rings.
Bids Received from:

(1) Consolidated St. Corp. (awarded)..... $522,457.00
(2) Puget Sound Mchy. Depot..... 565,057.00
(3) Western Pipe and Steel Co..... $567,111.00
(4) Babcock & Wilcox Co..... 633,092.00
(5) Chicago Bridge & Iron Works..... 809,264.00

		(1)	(1)	(3)	(4)	(5)
Lump sum,	80" plate st. pipe (Comm. B/L)	$510,775.00	$558,700.00	$558,660.00	$625,078.00	$799,750.00
Lump sum,	80" plate st. pipe (Govt. B/L)			486,750.00	547,831.00	674,250.00
2,800	cu. yd. exc. (conc. encasem. Cl. 1)	1.00	.30	.80	.68	.90
10	cu yd. exc. (conc. encasem. Cl. 2)	5.00	.50	1.00	.85	2.00
5	cu. yd. exc. (conc. encasem. Cl. 3)	10.00	6.00	1.50	1.50	5.00
2,800	cu. yd. backfill	.50	.40	.30	.30	.30
200	cu. yd. puddle or tamp backfill	.90	.50	.50	.55	.60
294	cu. yd. concr (encasem. of steel pipe)	23.00	13.00	16.00	16.00	18.50
22,000	lb. place reinforcing bars	.02	.02	.025	.02	.025

STREET and ROAD WORK

DENVER, COLORADO—STATE—GRAVEL SURFACING—LAS ANIMAS AND OTERO COUNTIES

Contract awarded to Kirchhof-Hanes, Inc., 718 Lawrence St., Denver, $169,438.00 by State Highway Engineer, Denver, Colorado, for 12.749 mi. gravel surfacing between Simpson and Delhi on State Highway No. 12, LAS ANIMAS AND OTERO CO., NRH 267-D. Bids from:

(1) Kirchhof-Hanes, Inc., Denver..... $169,438.00
(2) Pople Bros. & Selander..... 170,401.00
(3) Driscoll Const. Co., Pueblo..... 174,582.00
(4) M. E. Carlson, Denver..... $175,876.00
(5) Owen, Babb & Thorkeldsen..... 178,279.00
(6) Hamilton & Gleason, Denver..... 188,356.00
(7) Monaghan & Horner, Denver..... 195,362.00

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
169,000	cu. yd. unclass. excavation	$ .17	$ .175	$ .16	$ .13	$ .17	$ .20	$ .19
23	mi. cut slope treatment	50.00	150.00	100.00	100.00	150.00	300.00	100.00
340	cu. yd. dry rock struc. exc.	1.00	1.50	1.00	1.50	2.00	1.50	1.25
4,105	cu. yd. dry com. struc. exc.	.50	.65	.70	.75	.75	.75	.80
630	cu. yd. wet rock struc. exc.	1.50	1.75	2.00	3.00	2.00	2.50	2.00
1,210	cu. yd. wet com. struc. exc.	1.00	1.00	2.25	2.00	1.50	1.50	1.50
209,000	sta. yd. overhaul	.02	.02	.015	.02	.02.	.02	.02
1,000	mi. yd. overhaul	.20	.20	.15	.10	.20	.20	.16
44,890	tons gravel surfacing	.90	.82	.80	1.10	.90	.80	1.25
5	M. ft. BM untr. bridge timber	70.00	75.00	80.00	80.00	90.00	75.00	85.00
334.1	M. ft. BM tr. bridge timber	90.00	93.00	95.00	91.50	100.00	95.00	96.00
3,390	sq. ft. asph. plank surface	.45	.43	.50	.40	.40	.45	.42
1,014	cu. yd. 'A' concrete	16.00	18.50	20.00	18.00	20.00	21.00	18.00
2,040	sq. yd. water tar waterproofing	.30	.20	1.00	.40	.40	.25	.40
102,900	lb. reinforcing steel	.045	.046	.05	.045	.045	.05	.047
121,300	lb. struc. steel	.045	.045	.045	.046	.046	.0525	.048
714	lin. ft. 18-in. corr. metal pipe	1.50	1.28	1.50	1.20	1.10	1.20	1.05
1,628	lin. ft. 24-in. corr. metal pipe	2.00	1.85	2.00	1.75	1.65	1.70	1.62
192	lin. ft. 30-in. corr. metal pipe	3.00	2.25	3.00	2.15	2.00	2.25	2.00
606	lin. ft. 36-in. corr. metal pipe	4.50	3.50	4.20	3.30	3.00	3.40	3.10
72	lin. ft. 48-in. corr. metal pipe	10.00	5.50	7.00	4.30	5.00	5.50	5.00
8,996	lin. ft. tr. timber piling	.90	.95	1.00	.95	1.00	1.25	1.00
322	ea. metal pile shoes	1.80	2.50	2.50	2.50	2.50	2.00	2.50
3,504	lin. ft. tr. sheet piling	.25	.25	.30	.20	.25	.25	.21
2,372	lin. ft. wire cable guard fence	.80	.75	1.00	.70	.70	.75	.70
134,100	lin. ft. galv. barbed wire fence	.07	.06	.07	.065	.06	.08	.075
105	right-of-way markers	5.00	3.00	2.50	5.00	4.00	3.00	4.00

SACRAMENTO, CALIF.—STATE—GRADING & OILING—LASSEN AND SIERRA COUNTIES

Contract awarded to Harms Bros., 5220 21st Ave., Sacramento, $82,984, to Calif. Div. of Highways, Sacramento, for 10.5 mi. grad. & oiling betw. 2.8 mi. North of Junction of Rt. 21 and 29 and the Nevada State Line, in LASSEN AND SIERRA COUNTIES, Calif. Bids from:

(1) Harms Bros., Sacramento $82,984
(2) Geo. Pollock Co., Sacramento $82,984
(3) Frederickson & Watson Const. Co. $91,553
(4) Morrison-Knudsen Co., Los Angeles $96,893
(5) Peninsula Pav. Co., San Francisco $98,829
(6) A. Teichert & Son, Inc. $99,681
(7) Dodge Const., Inc., Fallon $100,124
(8) Isbell Const. Co., Carson City $107,301

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
70.4	acres clearing and grubbing	30.00	30.00	40.00	15.00	25.00	25.00	20.00	25.00
220,000	cu. yd. roadway excavation	.17	.185	.22	.25	.215	.245	.26	.22
716,000	sta. yd. overhaul	.01	.01	.005	.006	.015	.005	.01	.01
1,650	cu. yd. struc. excavation	.75	1.50	1.00	1.00	1.50	1.00	1.50	1.00
197	cu. yd. 'A' concr. (struc.)	27.00	25.00	24.00	22.00	25.00	24.00	27.50	30.00
14,700	lb. reinfor. steel (struc.)	.06	.05	.08	.07	.05	.05	.07	.06
330	lin. ft. 8" corr. met. pipe	1.00	1.00	1.00	1.20	1.25	1.00	1.00	1.25
108	lin. ft. 12" corr. met. pipe	1.25	1.50	1.30	1.50	1.50	1.50	1.25	1.50
1,912	lin. ft. 18" corr. met. pipe	1.75	2.00	1.70	2.00	2.00	1.80	1.75	2.00
272	lin. ft. 24" corr. met. pipe	2.75	3.00	2.50	3.00	2.75	3.00	2.50	2.75
92	lin. ft. 30" corr. met. pipe	3.50	4.00	3.25	4.00	2.50	4.00	3.00	3.50
62	lin. ft. 36" corr. met. pipe	4.50	6.00	5.00	5.00	5.50	5.50	5.00	5.50
33	ea. 8" C.M.P. elbows	7.50	5.00	5.00	7.00	5.00	8.00	8.00	7.00
33	ea. spillw. assemblies	15.00	10.00	15.00	15.00	15.00	15.00	15.00	20.00
102	ea. culvert markers	3.00	2.00	1.75	3.00	2.50	2.50	2.50	3.50
706	M. gallons water	1.50	1.50	1.50	2.50	2.00	2.25	1.50	2.00
220	tons fuel oil	14.00	15.00	14.00	16.50	15.00	19.50	15.00	20.00
152,250	sq. yd. prep. roadway (oil tr.)	.02	.05	.04	.025	.03	.03	.02	.04
155	tons asph. road oil	20.00	20.00	19.00	22.50	20.00	26.00	22.00	80.00
2,200	tons fine screenings	4.00	3.50	3.00	3.60	4.00	4.25	2.50	6.00
550	sta. finish roadway	6.00	2.00	6.00	3.00	5.00	5.00	5.00	8.00
84	ea. monuments	3.00	2.50	3.00	4.00	2.50	3.00	3.00	3.50

SEWER CONSTRUCTION

SEATTLE, WASHINGTON—CITY—VITRIFIED AND WOODSTAVE TRUNK SEWER

Contract awarded to Felix Arcorace & Co., 8423 48th Ave., South, Seattle, $94,336.00 (using clay pipe and machine banded woodstave pipe) by the Board of Public Works, County-City Bldg., Seattle, Wn., for constructing the Seward Park Trunk Sewer, subsewer, lateral and branch sewers, pumping plants and submerged storm water overflows in City of Seattle. Total bids received on the following Alternates.

(A) Clay pipe and continuous woodstave pipe
(B) Clay pipe and machine banded woodstave pipe.
(C) Concrete pipe and continuous woodstave pipe.
(D) Concrete pipe and machine banded woodstave pipe

Bids received from:

	(A)	(B)	(C)	(D)
(1) Felix Arcorace & Co., Seattle	$ 95,523.00	$ 94,336.00	$ 96,069.00	$ 94,881.00
(2) Queen City Construction Co., Seattle	96,782.00	96,181.00	97,425.00	96,824.00
(3) Joe Coluccio, Seattle	105,417.00	104,037.00	106,389.00	105,009.00

		(1)	(2)	(3)
5,360	ft. 8" vitr. sewer	$1.45	$1.44	$1.40
5,360	ft. 8" conc. sewer (Alt)	1.48	1.54	1.42
125	ft. 10" vit. sewer	1.61	1.61	1.60
125	ft. 10" conc. sewer (Alt)	1.64	1.68	1.70
2,632	ft. 12" vit. sewer	1.85	1.85	1.80
2,632	ft. 12" conc. sewer (Alt)	1.88	1.88	1.81
2,910	ft. 15" vit. sewer	2.55	2.53	2.50
2,910	ft. 15" conc. sewer (Alt)	2.58	2.29	2.50
1,810	ft. 18" vit. sewer	2.70	2.69	3.15
1,810	ft. 18" conc. sewer (Alt)	2.73	2.69	3.20
4,900	ft. 21" vit. sewer	3.10	2.98	3.45
4,900	ft. 21" conc. sewer	3.13	3.23	3.60
118	ft. 24" vit. sewer	3.95	3.84	5.40
118	ft. 24" conc. sewer (Alt)	3.98	3.77	5.40
335	ft. 30" vit. sewer	7.25	7.05	9.00
335	ft. 30" conc. sewer (Alt)	7.28	5.56	9.00
305	ft. 12" cont. woodst. pipe	3.50	2.92	4.37
305	ft. 12" mch. band. WSP	2.75	2.54	3.45
618	ft. 16" cont. W. S. P.	4.00	3.49	5.18
618	ft. 16" mch. band. WSP	3.00	3.08	4.03
682	ft. 24" cont. WSP	4.50	4.87	5.75
682	ft. 24" mch. band WSP	4.00	4.53	5.18
844	ft. 20" mch. band. WSP	3.00	2.95	4.60
10	cu. yd. conc. collars	55.00	30.00	69.00
10	ft. 8" cast iron pipe	2.00	2.00	3.45
10	ft. 10" cast iron pipe	2.50	2.25	5.75
1	flush tank	150.00	100.00	150.00

		(1)	(2)	(3)
54	manholes	$68.00	$60.00	$80.50
1	spec. manhole	100.00	200.00	230.00
16	shallow manholes	50.00	70.00	75.00
1	drop manhole	250.00	200.00	138.00
L.S	overflow manholes	100.00	250.00	287.50
L.S	overflow manh. 57th Ave.	120.00	250.00	287.50
L.S	overflow. manh. Seward	425.00	250.00	287.50
20	cu. yd. conc. blocking	20.00	20.00	12.65
100	cu. yd. gravel	5.00	5.00	5.75
2	rebuild manholes	25.00	60.00	28.75
1	fill manhole	10.00	5.00	5.75
260	ft. 2" conduit	.75	.45	.74
260	ft. 1½" conduit	.40	.35	.49
280	ft. No. 10-3 ld. cable	.40	.25	.20
280	ft. No. 4 lead cable	.65	.50	.46
140	ft. 2" galv. iron pipe	.75	.45	.64
950	ft. 1½" galv. iron pipe	.50	.35	.58
3	ea. 1½" gate valves	5.00	4.00	3.45
3	cast iron valv. boxes	7.00	6.50	8.00
L.S	pumping plant, Grattan St.	8,500.00	9,750.00	9,187.00
L.S	grade plant site	100.00	195.00	190.00
L.S	pump pl. 57th Ave.	6,500.00	8,000.00	8,153.00
L.S	grade pl. site (57th)	100.00	175.00	165.00
175	sq. yd. 6" conc. pav.	2.00	2.00	2.30
110	ft. 'A' 6" curb	.25	.50	.64
50	cu. yd. extra excav.	3.00	2.00	2.30

LOS ANGELES, CALIF.—OUNTY—SAN GABRIEL OUTLET, UNIT NO. 8

Contract awarded to Shannahan Bros., 6181 Eastern Ave., Los Angeles, $87,915, by County Board of Supervisors, Los Angeles, for construction of Unit No. 8, San Gabriel River Outlet, Alamitos Bay. Bids received on:

(1) 203,000 cu. yd. excavation
(2) 34,000 tons rock riprap by rail
(3) 4,200 lin ft. railroad track
(4) 27.5 M. ft. BM timber bulkheads
(5) Totals

	(1)	(2)	(3)	(4)	(5)
Shannanan Bros., Los Angeles	.22	1.15	.40	.90	$ 87,915
Garl Kumpe, Long Beach	.222	1.24	.28	.60	90,052
James Taylor and R. A. Wattson, Los Angeles	.22	1.25	.50	.40	90,360
Merritt-Chapman & Scott, Wilmington	.23	1.285	.30	.62	93,345
George Hess, Los Angeles	.29	1.485	.55	1.50	115,795

CONSTRUCTION

Note: For additional information regarding projects in this summary refer to Daily Construction News Service, date appearing at end of each item.

Large Western Projects

WORK CONTEMPLATED

95 mi. new railroad const. for Gold Coast R.R. Co., c/o G. E. Gale, Port Orford, Ore. Est. cost $500,000 to be financed.

Canal system for the Frenchtown Irrigation Dist., Missoula, Mont. $180,000 P.W.A. loan made.

Hoffman Dam for Ventura, Calif. Election Feb. 5th to vote $1,150,000 bonds.

2 mi. tunnel, diversion dam and ditches for Twin Lakes Reservoir & Canal Co., Ordway, Colo. $875,000 R.F.C. loan has been made.

CALL FOR BIDS

Enlargement of O'Shaughnessy Dam by raising crest of dam 85.5 ft., for Public Utilities Comm., S. F., bids to Jan. 24th, involving: 107,600 cu. yd. excav., 280,200 cu. yd. concrete; 850,000 lb. reinf. steel, and 277,000 bbls. cement. Est. cost $3,000,000.

Moffatt Tunnel enlargement and lining for Denver, Colo., bids to Jan. 16. Est. cost $1,750,000, involving: 37,000 cu. yd. concrete, lining and 7,000,000 lb. reinf. steel.

3.6 mi. grad. and asph. conc. pav. betw. Sea Cliff and Benham in Ventura County for Calif. Div. of Highways. Bids to Jan. 24, involving: 62,400 cu. yd. excav.; 1,832,000 lb. steel sheet piles; 461,000 lb. reinf. and struct. steel and metal, and 14,200 tons asph. concrete.

Moon Lake Dam, Utah, for Bureau of Reclamation, Salt Lake City. Est. cost $1,500,000. Bids to Feb. 4.

Taylor Park Dam, Uncompahgre Proj., Colorado, for Bureau of Reclamation, Gunnison, Colo. Est. cost $2,000,000. Bids to Feb. 18.

BIDS RECEIVED

1,528 ft. steel sheet pile bulkhead for U. S. Coast Guard, Oakland, Ben C. Gerwick, Inc., S. F., $239,017 low.

CONTRACTS AWARDED

Malheur River and Dead Ox Siphons, Ore.-Idaho, for Bureau of Reclamation to (1) Parker-Schram Co., Portland, $64,764. EXCAV. (2) to Consolidated Steel Corp., L. A., $536,057, STEEL PIPE, and (3) to J. A. Terteling & Sons, Boise, $6,051 excav.

3.117 mi. grad. and tunnel in Mt. Rainier Natl. Park for Bureau of Public Roads, Portland, to Sam Orino, Spokane, $223,729.

S. F. Viaduct and approaches for S. F.-Oakland Bay Bridge, S. F., to Healy Tibbitts Const., S. F., $1,172,622.

1.7 mi. grad. and asph. conc. pav. in Daly City for Calif. Div. of Highways to Union Paving Co., S. F., $201,813.

Monrovia Tunnels Nos. 1, 2 and 3, for Metropolitan Water Dist. of South. Calif., to West Const. Co., L. A., $2,310,500.

Pasadena Tunnel for Metropolitan Water Dist. of South. Calif. to L. E. Dixon, Bent Bros. and Johnson, Inc., L. A., $621,180.

8,127,000 cu. yd. dredging at Newport Bay for U. S. Engr. office, L. A., to Standard Dredging Co., L. A., $879,255.

12.8 mi. aqueduct construction for Metropolitan Water Dist. of South. Calif. to Griffith Co., L. A., $1,739,846.

5,000,000 bbls. Portland cement for Metropolitan Water Dist. of South. Calif. to California, Monolith, Riverside and Southwestern Portland Cement Cos., L. A., $7,000,000.

University Mound Pipeline for Pub. Utilities Comm., S. F., to M. J. Lynch, S. F., $89,365, Sec. A, and to Sibley Grading & Teaming Co., S. F., $133,494, Sec. B.

Almaden, Calero and Stevens Creek Dams for Santa Clara Valley Water Conservation Dist., San Jose, to F. O. Bohnet, Campbell & D. McDonald, Sacramento, $546,690.

12-story court house for Alameda County, Oakland, Calif., to Geo. Wagner and K. E. Parker, S. F., $948,574. GENERAL CONST.: (2) to J. Catucci, Oakland, $59,631, excav. and found.; (3) to Pacific Coast Steel Corp., S. F., $158,416, struct. steel; (4) to Otis Elevator Co., S. F., $104,387, elevators; (5) to Alta Elect. & Mech. Co., S. F., $228,880, mechanical work; (6) to Pacific Elect. Mfg. Co., S. F., $68,985, jail equipment.

STREET and ROAD WORK

WORK CONTEMPLATED

ANTIOCH, CALIF.—Plans and specifications completed and call for bids will be issued (after approval by State Highway Dept.) by City Clerk, J. E. McElheney, City Hall, Antioch, for repairing and renovating 4th Street from O to J Streets and for paving 4th Street between J and K Streets. Cost $14,000. 12-18

LOS ANGELES, CALIF.—Plans completed by County Road Comm., Los Angeles, and call for bids will be issued shortly for improving Alexander Avenue from Holt Avenue to Cucamonga Ave., in cities of Pomona and Claremont, a distance of 1.88 mi., involving 8,500 tons asph. conc. med. wear. surf. 12-28

LOS ANGELES, CALIF.—Plans completed by City Engineer, Los Angeles, for improving alley south of 59th Place betw. Halldale and Denker, involving: Lump sum, grading (235 cu. yd. cut) 9,581 sq. ft. 6" concrete pavement. Est. cost $2,500. 12-11

LOS ANGELES, CALIF.—Hearing at 2 p.m., Jan. 29, by Public Works Committee of City Council, Los Angeles, for improving alley west of Pacific Avenue from 5th to 6th St., Wilmington. Work involves: Lump sum, grading 2,970 sq. ft. concrete pavement, 53 sq. ft. asph. concrete pavement, 56 lin. ft. concrete curb, 71 sq. ft. sidewalk. Est. cost $1,000. 1-3

PITTSBURG, CALIF.—Plans and specifications are being completed and call for bids will be issued shortly by City Clerk, City Hall, Pittsburg, for 20-ft. widening of 10th Street for a distance of 650 lin. ft. To cost $5,000. 12-18

NEWS SUMMARY

Note: For additional information regarding projects in this summary refer to Daily Construction News Service, date appearing at end of each item.

SAUSALITO, CALIF.—Plans and specifications completed by City Engineer and call for bids will be issued in about 2 weeks to be opened at a later date by City Clerk, Sausalito, for improvements to Water St. betw. San Carlos St. and Princess St. Work involves grading, resurfacing existing pavement, constructing curbs and sidewalks. Est. cost $10,850. 12-27

SOUTH SAN FRANCISCO, CALIF.—Plans and specifications are being prepared by City Engineer, and call for bids will be issued (after plans have been approved by State Highway Department) by City Clerk, South San Francisco, for resurfacing of Grand Avenue, from Mission Road to Linden Ave.; Railroad Ave. from Linden Ave. to a point 500 ft. westerly; and from Railroad Ave. to Armour Ave. on Linden Ave. Est. cost $7,295. 12-18

CALL FOR BIDS

PHOENIX, ARIZ.—Bids to 10:30 a.m., Jan. 15, by Ariz. State Highway Comm., Phoenix, Ariz., for 1 1/3 mi. grading and draining of roadway, located approx. 35 mi. south of Safford on the Douglas-Safford road near the junction with the Bowie Road, Douglas-Safford Highway. NRS 114 (1934) COCHISE COUNTY, Ariz., involving: 17,100 cu. yd. roadway excavation. 12-28

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 17, by the Calif. Div. of Highways, State Bldg., Los Angeles, for 4 mi. grad. and bitum. tr. cr. gravel or stone surfacing betw. 4 mi. west of Shaver Summit and Shaver Summit in RIVERSIDE COUNTY, Calif., involving: 88,500 cu. yd. roadway excavation, 175,000 sta. yd. overhaul, 93,000 cu. yd. ditch excavation, 2,450 cu. yd. struc. excav., 214 lin. ft. 24" corr. metal pipe, 334 lin. ft. 30" corr. metal pipe, 11,300 tons cr. grav. or stone. 12-24

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 24, by Calif. Div. of Highways, State Bldg., Los Angeles, for 0.8 mi. asph. concr. and Portland cement concr. paving betw. California Ave. and Colorado Ave. in Santa Monica, LOS ANGELES COUNTY, Calif. Work involves: 42 sta. clearing and grubbing, 46,000 cu. yd. roadway excavation, 66,000 sta. yd. overhaul, 1,800 cu. yd. struc. excavation, 24,500 sq. yd. subgrade preparation, 4,700 sq. yd. asphalt paint binder, 1,420 tons asph. concr. leveling and Type A surface course, 160 tons cr. grav. or stone bit. tr. surf., 10 tons cutb. asph. bitum. tr. surf., 580 cu. yd. "A" conc. (curbs, gutters, etc.), 30 cu. yd. "A" conc. (struc.), 6,000 sq. ft. gunite slope protection, 210 lb. steel wire mesh reinf., 1,300 lb. reinf. steel (struc.), 1,400 lb. misc. iron and steel, 140 lin. ft. pipe handrail, 130 lin. ft. 18" reinf. concr. pipe, 1,024 lin. ft. 24" reinf. concr. pipe, 24 lin. ft. 36" reinf. concr. pipe, 130 lin. ft. 24" corr. metal pipe, 15 cu. yd. remove concrete, L. S. rem. and salv. 30" C.M.P. and timb. bents, L. S. rem. and salv. timb. pedestrian overhead, 42 sta. finish roadway. ALTERNATE "A", 7,700 tons asph. conc. base, leveling and Type "A" surf. course. ALTERNATE "B", 3,420 cu. yd. "A" concrete pavement, 9,200 lb. reinforcing steel pavement, 5,000 pavement dowels. 12-31

LOS ANGELES, CALIF.—Bids to 10 a.m., Jan. 28, by the Metropolitan Water Dist. of Southern Calif., 306 W. 3rd St., L. A., for const. 16.3 mi. Patrol Road and 1.4 mile stub roads along route of Transmission line for Colorado River Aqueduct under Spec. No. 85, involving: 72,500 cu. yd. excavation, Group 1, 13,500 cu. yd. excavation, Group 2, 3,000 cu. yd. excavation, Group 3. 12-31

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 24, by Calif. Div. of Highways, State Bldg., Los Angeles, for 3.6 mi. grad. and asph. concr. pav. betw. Sea Cliff and Benham in VENTURA COUNTY, Calif., involving: 192 sta. clearing and grubbing, 60,000 cu. yd. roadway excavation, 78,000 mi. yd. overhaul, 2,400 cu. yd. struc. excavation, 18,100 sq. yd. subgrade preparation, 24,300 sq. yd. asph. paint binder, 14,200 tons asphalt concrete, 230 cu. yd. "A" concrete (pavement), 390 cu. yd. "A" concrete (struc.), 49,000 lb. reinforcing steel, 440 pavement dowels, 2,300 lb. misc. iron and steel, 2 spillway assemblies, 8 lin. ft. 8" corr. metal pipe, 16 lin. ft. 15" corr. metal pipe, 100 lin. ft. 18" corr. metal pipe, 60 lin. ft. 24" corr. metal pipe, 30 lin. ft. 30" corr. metal pipe, 30 lin. ft. 36" corr. metal pipe, 100 cu. yd. remove concrete, 2,050 lin. ft. solid timb. guardrail, 0.8 mi. new fence, 2.2 mi. move and reset fence, 7 fence gates, 1,832,000 lb. furn. steel sheet piles and T. P., 2,147 each drive steel sheet piles and T. P., 66.5 M ft. BM creo. Doug. fir timber (seawall and groin), 215 cu. yd. "A" concr. (seawall and groin), 12,000 lb. reinf. steel (seawall and groin), 304,000 lb. struc. steel (seawall and groin), 145,000 lb. struc. metal (seawall and groin). 12-31

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 31, by Calif. Div. of Highways, State Bldg., Los Angeles, for: (1) RIVERSIDE COUNTY—16.8 mi. grad. and portions paved with concr. and portion tr. with oil tr. cr. grav. or stone (plant mix) betw. 1 mi. east of Beaumont and Whitewater, involving: 37,000 cu. yd. roadway excavation, 1,600,000 sta. yd. overhaul, 1,560 cu. yd. structure excavation, 6,300 sq. yd. subgrade pavement, 1,180 cu. yd. "A" concr. (pavement), 5,900 cu. yd. "A" conc. (pavem. widen.), 166 cu. yd. "A" conc. (struc.), 25,000 lb. reinforcem. steel, 3,000 pavement dowels, 252 lin. ft. 18" corr. metal pipe, 1,062 lin. ft. 24" corr. metal pipe, 28 lin. ft. 30" corr. metal pipe, 280 lin. ft. 36" corr. metal pipe, 156 lin. ft. 48" corr. metal pipe, 1,010 cu. yd. remove concrete, 1,040 lin. ft. furn. redwood piles, 52 ea. drive redwood piles, 21 M ft. BM redw. timb. (dense), 13 M ft. BM redw. timber (select), 3,490 tons cr. gr. or st. (plant mix surf.), 150 tons fuel oil (plant mix surf.), 1,510 tons fuel oil shoulders, 148,000 sq. yd. mix and shape shoulders, 154 tons asph. road oil (seal coat), 1,260 cu. yd. screenings (seal coat), 2,900 sq. yd. asph. paint binder, 6.7 mi. new fence, 25 fence gates, 710 lin. ft. lam. timber guardrail, 85 ea. timber guideposts, 855 sta. finish roadway, 215 monuments. (2) LOS ANGELES COUNTY—3.7 mi. grade and asph. conc. or Portland concr. pav. betw. State St. and Los Angeles St. on Rt. 168, involving: 196 sta. clearing and grubbing, 41,000 cu. yd. roadway excavation, 345,000 sta. yd. overhaul, 24,150 tons selected material, 550 cu. yd. struc. excavation, 43,500 sq. yd. subgrade preparation, 125 cu. yd. "A" concr. (struc.), 16,000 lb. reinf. steel (struc.), 560 M gallons water, 160 tons cr. gr. or stone (bit. tr. surf.), 8 tons cutback asph. (bit. tr. surf.), 355 tons fuel oil, 43,500 sq. yd. prep., mix and shape shoulders, 55 tons asph. road oil (seal coat), 550 tons screenings (seal coat), 2 culvert markers, 196 sta. finish roadway, 42 monuments. ALTERNATE "A"—18,600 tons asph. concrete. ALTERNATE "B"—8,100 cu. yd. 'A" concrete (pavement), 22,000 lb. reinf. steel, 11,760 pavement dowels. 12-31

SACRAMENTO, CALIF.—Bids to 2 p.m., Jan. 23, by the Calif. Div. of Highways, Sacramento, for 3.7 miles grading between Coarse Gold and Hawkins School in MADERA COUNTY, Calif. Work involves the following approximate quantities: L. S. clearing and grubbing, 140,000 cu. yd. roadway excavation, 280,000 sta. yd. overhaul, 2,965 cu. yd. structure excavation, 722 cu. yd. "A" concrete (struc.), 52 cu. yd. "B" concrete (struc.), 81,200 lb. reinforcing steel. 12-31

SACRAMENTO, CALIF.—Bids to 2 p.m., Jan. 23, by the Calif. Div. of Highways, Sacramento, for 2.5 mi. grading, surfacing with untr. cr. gravel and applying seal coat betw. 1 mi. east of Upper Lake and Manila Ranch in LAKE COUNTY, Calif., involving: 20 acres clearing and grubbing, 79,000 cu. yd. roadway excavation, 530,000 sta. yd. overhaul, 2,200 cu. yd. structure excavation, 12 spillway assemblies, 200 lin. ft. 8" corr. metal pipe, 900 lin. ft. 18" corr. metal pipe, 1,000 lin. ft. 24" corr. metal pipe, 120 lin. ft. 30" corr. metal pipe, 110 lin. ft. 36" corr. metal pipe, 50 lin. ft. 42" corr. metal pipe, 62 lin. ft. 48" corr. metal pipe, 1,000 lin. ft. 8" perf. met. pipe underdr., 9.0 M ft. BM redwood timber (dense), 27 M ft. BM redwood timber (select), 23,500 tons creek run gravel base, 7,700 tons screened gravel surfacing. 12-31

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 21, by County Board of Supervisors, Hall of Records, Los Angeles, for improving Alexander Ave. from Holt Ave. to Cucamonga Ave., in cities of Pomona and Claremont, a distance of 1.88 mi., involving: 8,500 tons asph. concr. mead. wear. surf. 1-5

SACRAMENTO, CALIF.—Bids to 2 p.m., Jan. 30, by Calif. Div. of Highways, Sacramento, for: (1) SHASTA COUNTY—0.9 mi. grad. and pav. at north entrance to City of Redding, involving: 6.4 acres clearing and grubbing, 142,500 cu. yd. roadway excavation, 3,560,000 sta. yd. overhaul, 1,250 cu. yd. struc. excavation, 5,400 sq. yd. prepare subgrade, 3,030 cu. yd. cr. run base, 17 tons fuel oil (prime coat), 1,300 cu. yd. cr. grav. or stone (bit. tr. surf.), 112 tons cutb. asph. (bit. tr. surf.), 220 cu. yd. "A" concr. (curbs, gutters, etc.), 600 cu. yd. "A" conc. (clope paving), 434 cu. yd. "A" conc. (structures), 24,400 lb. reinf. steel, 24,600 lb. mesh reinf. steel (slope pav.), 91,000 lb. struc. steel (erect only), 4,700 lb. bridge pipe handrail (erect), 128 lin. ft. retain. wall (pipe handrail), 1 lot bridge light. equip. (erect), 424 lin. ft. 18" and 214 24" C.M.P., 4 cast steel frames and cover drop inlets, 330 cu. yd. remove asphalt concrete, 185 cu. yd. remove concrete, 60 cu. yd. rubble masonry, 8 culvert markers, 1,700 M gallons water, 45 sta. finish roadway, 19 monuments. ALTERNATE 'A'—2,176 tons asph. concr. pavement. ALTERNATE 'B'—1,005 cu. yd. 'A' concr. pavem., 1,400 lb. reinf. steel, 714 pavem. dowels. (2) MADERA COUNTY—1.5 mi. grad. and asph. concr. pav. in City of Madera, involving: 14 remove trees, 1,400 cu. yd. roadway excavation, 1,500 sta. yd. overhaul, 2,300 cu. yd. imported borrow, 825 cu. yd. struc. excav., 10,450 sq. yd. subgrade (pavement), 8,800 sq. yd. asph. paint binder, 6,525 tons asph. concr., 12,000 sq. yd. planing pavement, 29 tons emuls. asphalt road oil, 250 tons screenings, 1,230 tons cr. grav. or stone borders. 12-31

MILES CITY, MONTANA—Bids to 12 noon, to be opened at 8 p.m., Jan. 14, by the City Clerk, Ray Addington, City Hall, Miles City, Mont., for excavation, graveling and oiling of streets in Miles City, Special Improv. Dists. No. 98, No. 99 and No. 100. Oiling is to be a plant mix process with combination concrete curb and gutter with alternate bid for straight curbing, involving: DISTRICT NO. 98—34,361 lin. ft. old curb removal, 34,361 lin. ft. new curb and gutter, 105,300 sq. yd. bitum. cr. gr. gravel, 105,300 sq. yd. pit run base course, 20,300 cu. yd. excavation. DISTRICT NO. 99—17,553 lin. ft. old curb removal, 17,553 lin. ft. new curb and gutter, 40,602 sq. yd. bitum. tr. cr. gravel, 40,602 sq. yd. pit run base course, 8,100 cu. yd. excavation for oiling, 1,200 cu. yd. excav. for storm sewer, 1,605 lin. ft. storm sewer 12" vitr., 1,115 lin. ft. storm sewer 8" vitr., 5 manholes, 32 inlet basins. DISTRICT NO. 100—1,583 lin. ft. old curb removal, 1,583 lin. ft. new curb and gutter, 2,890 sq. yd. bitum. tr. cr. gravel, 2,890 sq. yd. pit run base course, 700 cu. yd. excavation. 1-5

PHOENIX, ARIZ.—K. DeWitt, Phoenix, $16,873 low to State Highway Comm., Phoenix, Ariz., for furn. and placing base course in Kingman and extending northeast approx. 23.6 mi. on the Ashfork-Kingman Highway, NRH 80-G, MOHAVE COUNTY, Ariz. 12-27

BIDS RECEIVED

PHOENIX, ARIZ.—Bids received as follows by Arizona State Highway Comm., Phoenix, Ariz., for: (1) COCONINO COUNTY (NRH 95-I)—Skousen Bros., Albuquerque, N. M., $75,797 low for 10 2/3 mi. grading, draining and placing base course about 28 mi. north of Flagstaff. (2) PIMA COUNTY (NRH 29)—White & Miller, Phoenix, $36,916 low to Ariz. State Highway Comm., for 1.2 mi. widening and resurfacing of existing conc. pav. with asph. plant mix. 12-26

LOS ANGELES, CALIF.—Charles Booth, 5922½ Estrella Ave., Los Angeles, low bid, $3,949, to Board of Public Works, City Hall, Los Angeles, for improving Canyon Drive, from Bronson Ave. to Foothill Blvd., under Cash Contract. 12-28

LOS ANGELES, CALIF.—All bids received by Board of Public Works, City Hall, Los Angeles, for improving El Modena St., Figueroa to Colorado, under Cash Contract, have been rejected. Griffith Co., L. A. Railway Bldg., Los Angeles, submitted low bid, $50,758. 1-3

SAN FRANCISCO, CALIF.—Only bid of C. L. Harney, Call Bldg., San Francisco, $9,163 (as stated issue of Dec. 7), has been rejected by the Dept. of Public Works, City Hall, San Francisco, for improving Moraga St., 17th Ave., 18th Ave., etc., in City of San Francisco. 12-27

DENVER, COLO.—Bids received as follows by the State Highway Engineer, Denver, Colo.: OTERO COUNTY (NRH 267-)E—Larson Const. Co., Denver, Colo., $60,366 low for 5.946 mi. grav. surf. betw. Benton and Timpas on State Highway No. 12. 12-21

PORTLAND, ORE.—Kern & Kibbe, 42 S. E. Salmon St., Portland, Oregon, $92,504, low to Oregon State Highway Comm., Portland, for 1.41 mi. paving on Clinton Street-Foster Road Section of 82nd Avenue, MULTNOMAH COUNTY, NRM 199-F, Oregon.

DAYTON, WN.—H. C. Rogers & Sons, P. O. Box 181, Dayton, Wn., $8,250, low to County Commissioners, Dayton, Wn., for grading, draining and surfacing with cr. rock on Secondary Highway No. 15 in Payne Hollow, 8 mi. southwest of Dayton, Wn. 1-2

OLYMPIA, WN.—Bids received as follows by Director of Highways, Olympia, Wn., for: (1) KITTITAS COUNTY (NRM 114-H)—Albertson & Cornell Bros., 1113½ A St., Tacoma, Wn., $1,868 low for straightening, widening and deepening the channel of Roslyn Creek in Cle Elum on State Road No. 2. (2) ISLAND COUNTY (NRS 218-A)—H. P. Dorsey & Co., 2006 State St., Bellingham, Wn., $33,622 only bid submitted for 4.9 mi. grad., surf. with cr. stone, const. bitum. surf, (road mix method) and apply dust palliative on county road Stanwood to Utsalady, Wn. 12-20

YAKIMA, WN.—H. C. Rogers & Son, P. O. Box 181, and Rogers Construction Co., 5131 Lincoln Ave., Yakima, Wn., $36,450, low to County Commissioners, Yakima, Wn., for reconstruction of about 6 mi. of the Naches Heights road from the top of Garreston grade to Tieton headquarters. 1-4

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Skousen Bros., Albuquerque, N. M., $127,390 to Bureau of Public Roads, Phoenix, Ariz., for 4.582 mi. grading Sec. I of Rt. 7, the Oak Creek Natl. Forest Highway, Coconino Natl. Forest, YAVAPAI COUNTY, Ariz. 12-24

BERKELEY, CALIF.—To Ransome Co., 4030 Hollis St., Oakland, $660 by City Clerk, Berkeley, for improvement of Grove Street between Yolo and Hopkins Streets. 12-11

EARP, CALIF.—To R. A. Wattson, 1026 McCadden Place, Los Angeles, $21,998 to the Bureau of Reclamation, Metropolitan Water District Camp No. 1, Earp, for construction of streets, sewers, etc., for the Govt. Camp at Parker Dam, Parker Dam Project, California-Arizona, Under Spec. No. 638-D. 12-20

LOS ANGELES, CALIF.—To Osborn Co., 1570 San Pasqual, Pasadena, $43,029 to County Supervisors, Los Angeles, for improving La Canada-Verdugo Road from Michigan Ave., southeast to Devils Gate Dam and along Highland Road. 12-26

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bldg., Los Angeles, $35,455 by Calif. Div. of Highways, Los Angeles, for 1.5 mi. grading and asph. concr. paving betw. Atlantic Blvd. and New Ave. in Monterey Park, LOS ANGELES COUNTY, Calif. 1-5

SACRAMENTO, CALIF.—To Basich Bros., 20550 Normandie Ave., Torrance, $34,202 by Calif. Div. of Highways, Sacramento, for 1 mi. grading and asph. concr. paving in City of Tulare, TULARE COUNTY, Calif. 12-15

SACRAMENTO, CALIF.—Awards as follow by Calif. Div. of Highways, Sacramento, for: (1) SAN MATEO COUNTY—To Union Paving Co., Call Bldg., San Francisco, $201,813 for 1.7 mi. grad. and asph. concr. paving betw. Huron St. and San Pedro Ave. in Daly City. (See Unit Bid Summary.) (2) SAN BENITO COUNTY—To A. J. Raisch, Burrell Bldg., San Jose, $56,930 for 2.6 mi. grad. and cr. run base and oil tr. crusher run surf. betw. Rt. 2 and San Juan Bautista. 12-27

SACRAMENTO, CALIF.—To J. R. Reeves, R. D. No. 3, Box 100, Sacramento, $82,984 by Calif. Div. of Highways, Sacramento, for 10.5 mi. grading and bitum. tr. cr. gravel or stone surfacing (road mix) betw. Martel and Jackson in AMADOR COUNTY, Calif. 1-5

SACRAMENTO, CALIF.—To Harms Bros., Inc., 5220 21st Ave., Sacramento, $92,984 by Calif. Div. of Highways, Sacramento, for 10.5 mi. grad. and oiling betw. 2.8 mi. north of Junction of Rt. 21 and 29 and the Nevada State Line, in LASSEN and SIERRA COUNTIES, Calif. 12-15

SAN FRANCISCO, CALIF.—To D. C. McCabe, 74 New Montgomery St., San Francisco, $1,760 to Dept. of Public Works, San Francisco, for constructing 8,000 sq. ft. 1-course concr. sidewalks on Lombard St., Steiner and other streets in San Francisco. 12-27

SAN FRANCISCO, CALIF.—To Smith Bros. Co., 1636 B St., Eureka, $2,440 to the Bureau of Public Roads, San Francisco, for widening a portion of Section A of Route 51, the Hoopa National Forest Highway, Trinity National Forest, UNIT 1, HUMBALDT COUNTY, Calif. 12-12

SAN FRANCISCO, CALIF.—To Hemstreet & Bell, 501 11th St., Marysville, $2,499 to Bureau of Public Roads, San Francisco, for widening a portion of Section A, Route 51, the Hoopa National Forest Highway, Trinity National Forest, UNIT 2, HUMBOLDT COUNTY, Calif. 12-12

DENVER, COLO.—Awards as follow by State Highway Dept., Denver, for: (1) JEFFERSON COUNTY (NRS 372-B)—To Lawrence Const. Co., 112 S. Elati St., Denver, $26,719 for 0.360 mi. gray, surf. betw. Denver and Golden on State Highway 58. (2) MINERAL COUNTY (NRH 354-E)—To W. A. Colt & Son, Lyons, Colo., $211,213 for 4.778 mi. grad. on easterly side of Wolf Creek Pass on State Highway No. 10. (3) GARFIELD COUNTY (NRS 366-B)—To Gardner Bros. & Glenn, 1128 Grand St., Glenwood Springs, Colo., $16,123 for 2.582 mi. gr. surf. betw. Glenwood Springs and Carbondale on State Highway No. 82. (4) FREMONT COUNTY (NRS 365-B)—To L. Leone, South Fork, Colo., $19,832 for 1.144 mi. grav. surf. betw. Colorado Springs and Florence on State Highway No. 115. 12-17

DENVER, COLO.—To Gordon Const. Co., 1900 31st St., Denver, Colo., $83,634 by State Highway Dept., Denver, Colo., for 1.189 mi. grav. surf. betw. Loveland and Estes Park on State Highway No. 16, NRH 9, Const. Div. No. 1, 1935, IN LARIMER COUNTY, Colo. 12-31

DENVER, COLO.—Kirchhof-Hanes, Inc., 718 Lawrence St., Denver, $169,438 by State Highway Engineer, Denver, Colo., for 12.749 mi. gravel surfacing betw. Simpson and Delhi on State Highway No. 12, LAS ANIMAS and OTERO COUNTIES, NRH 267-D. (See Unit Bid Summary.) 12-22

BOISE, IDAHO—To Western Const. Co., Pocatello, Idaho, $11,546 by Commissioner of Public Works, Boise, Ida., for 1.744 mi. grading, draining and surfacing on Idaho Central Highway from Arco south in BUTTE COUNTY, Idaho. 12-11

BOISE, IDAHO—To Olof Nelson, Logan, Utah, $46,802 to Commissioner of Public Works, Boise, Idaho, for 6.834 mi. grading, draining and surf. with cr. grav. on the Roosevelt Highway betw. Springfield and Aberdeen, NRS 186 (1935) in BINGHAM COUNTY, Idaho. 12-14

BOISE, IDAHO—To Wheeler & England, Harrison, Idaho, $27,106 to Comm. of Public Works, Boise, Ida., for 1.832 mi. grading, drain. and surf. with cr. rock on the Coeur d'Alene Valley Highway from Harrison Flats to Cave Lake in KOTOENAI COUNTY, NRS 179-B. 12-31

MISSOULA, MONTANA—To E. C. Powell, Missoula, Mont., $49,988 to Bureau of Public Roads, Missoula, Montana, for grading and surfacing the Columbia Falls-Glacier Park Completion Forest Road Project, located in the Lewis and Clark Natl. Forest, Montana. 12-17

MISSOULA, MONTANA—To Clifton & Applegate, Hutton Bldg., Spokane, Wn., $68,655 to Bureau of Public Roads, Missoula, Mont., for 6.8206 mi. grading on the Clark Fork Highway, in Cabinet Natl. Forest, SANDERS COUNTY, NR-6-L, FHEC-6-M, Mont. 12-22

MISSOULA, MONTANA—Award recommended to Ralph Davis, St. Johns, Wn., $61,327 to the Bureau of Public Roads, Missoula, Mont., for 5.989 mi. grading on the Bitterroot-Salmon Highway, Proj. NR-19-C, located in the Bitterroot Natl. Forest, RAVALLI COUNTY, Montana. 1-5

CARSON CITY, NEVADA—Awards as follow by the Nevada State Highway Comm., Heroes Memorial Bldg., Carson City, Nevada: (1) DOUGLAS COUNTY—To Frederickson & Watson Const. Co., 873 81st Ave., Oakland, $59,918 for 3.86 mi. grad. and surf. betw. 4 mi. south of Minden and State Line. (2) PERSHING COUNTY—To Nevada Rock and Sand Co., Inc., Box 1626, Reno, Nev., $13,992 for 0.62 mi. grad. and surf. in City of Lovelock, Nev. (3) CHURCHILL COUNTY—To Peninsula Paving Co., 9 Main Street, San Francisco, $42,164 for 0.86 mi. grad. and surf. in City of Fallon, Nev. 12-29

SANTA FE, NEW MEXICO—Awards as follow by State Highway Engineer, Capitol Bldg., Santa Fe, N. M., for: (1) OTERO COUNTY (NRH 165-E)—To Lee Moor Contracting Co., El Paso, $79,877 for 5.205 mi. grad. minor drainage struc., double 10x10x40-ft. concr. box culvert and base surf. betw. Tularosa and the Mescalero Indian Reservation, on U. S. Highway Route 70. (2) SANDOVAL COUNTY (NRS 203-D-1935)—To Henry Thygesen, Albuquerque, $110,133 for 6.717 mi. grading, minor drainage struc., two tr. timber bridges and two triple 7x3-ft. concr. box culverts and cr. grav. surf. betw. Bernalillo and Cuba on State Road No. 44. (3) TAOS COUNTY (NRS 218-A-1935 and NRS 218-B)—To L. R. Allison, Albuquerque, $81,527 for 3.472

mi. grading, drain. struc., includ. 2 tr. timber bridges and one double 10x4-ft. concr. box culvert and cr. grav. surf. course on State Road No. 75 betw. Rio Pueblo and Dixon. (4) LEA COUNTY (NRS 237, 1935)—To Skousen Bros., Albuquerque, $79,084 for 14.489 mi. grad., minor drain. struc. and select matl. surf. betw. Eunice and Jal on State Road No. 18. 12-29

PORTLAND, ORE.—Awards as follow by Oregon State Highway Comm., Public Service Bldg., Portland, Ore., for: (1) UMATILLA COUNTY (NRS 233-D)—To Newport Const. Co., Governor Bldg., Portland, $36,571 for 5.58 mi. grade widening, surf. and oil mat. surf. tr. and furn. cr. rock in stockpiles on Holdman-Meiner's Ranch Sec. of Pendleton-Cold Springs Highway. (2) COOS COUNTY (NRM 141-F)—To R. J. Stuart & Sons, Medford, Ore., $12,150 for 0.34 mi. pav. widening and resurf. on Golden Ave.-Johnson Ave. Unit, Marshfield Sec. of Oregon Coast Highway. (3) DOUGLAS COUNTY (NRH 140-C)—To Haskins & Brooks Contr. Co., La Center, Wn., $40,364 for 0.39 mi. grad. on Belon Island Sec. of Oregon Coast Highway. (4) DOUGLAS COUNTY (NRM 78-C and NRM 78-D)—To R. I. Stuart & Sons, Medford, Ore., $26,914 for 0.61 mi. pavem. widen. and resurf. on Roseburg Sec. of Pacific Highway. 12-8

PORTLAND, ORE.—To Tomlinson-Arkwright Const Co. and J. L. McLaughlin, Great Falls, Mont., $77,976. (USING METAL PIPE FOR CULVERT) to the Bureau of Public Roads, Portland, Ore., for constructing or improving the Glacier Natl. Park, Transmountain Highway, West Side project, NH-1B, 1C9 Portions), reconst. grading, and surfacing located in Glacier Natl. Park, FLATHEAD COUNTY, Montana. 12-22

PORTLAND, ORE.—Awards of contracts recommended to following by Bureau of Public Roads, Portland, Ore.: (1) YAKIMA COUNTY (FHEC-13-P)—To Columbia Power & Investment Co., Stevenson, Wn., $30,907 (USING CONCRETE PIPE) for 1.8859 mi. grad. and const. bridge on Randle-Yakima Highway, in Snoqualmie Natl. Forest. (2) COWLITZ COUNTY (FHEC 15-A4)—To J. D. Harms, Inc., 1st Ave. S. and Hudson St., Seattle, Wn., $41,212 (USING METAL PIPE) for 2.325 mi. reconst. grading on St. Helens Highway, located in Columbia Natl. Forest. 12-24

PORTLAND, ORE.—Awards as follow by the Oregon State Highway Dept., Portland, Ore.: (1) COLUMBIA and WASHINGTON COUNTIES (NRS 213-F and NRS 213-G)—To Edlefson & Weygandt Co., Peninsular Ave. and Columbia Blvd., Portland, $38,153 for 9.2 mi. cr. rock or grav. resurf. and furn. 1,000 cu. yd. cr. rock or grav. in stockpiles on Trehorn-Buxton Section of Nehalem Secondary Highway. (2) LAKE COUNTY (NRH 32-A, NRM 32-B and NRS 241)—To Dunn & Baker, Klamath Falls, $86,099 for 1.8 mi. grading; 0.8 mi. cr. rock surf.; 8.5 mi. bitum. macadam wear. surf. and furn. 2,200 cu. yd. cr. rock in stockpiles on White Rock-Lakeview Section of Fremont Highway and Fremont Junction Section of Warner Sec. Highway. 12-24

PORTLAND, ORE.—To Schmeer, Williams & Gentemann, 3233 N.E. 12th Ave., Portland, $49,728 by Bureau of Public Roads, Portland, Ore., for 8.130 mi. surf. on the Pendleton-John Day Proj. NR-33-E1, F1, located in the Whitman Natl. Forest, GRANT COUNTY, Oregon. 12-10

PORTLAND, ORE.—To Jacobsen-Jensen Company, 517 N.E. Stanton St., Portland, Ore., $11,902 to Oregon State Highway Comm., Portland, Ore., for 0.54 mi. paving and resurf. on 3rd Street, 15th Street, Unit of Corvallis Section of Corvallis-Newport Highway. 12-29

PORTLAND, ORE.—Awards as follows by the Oregon State Highway Comm., Portland, Ore., for: (1) JACKSON COUNTY (NRM 157-A and NRM 157-C)—To Jacobsen-Jensen Co., 517 N.E. Stanton St., Portland, $18,312 for 1.4 mi. pavement resurf. on the north Medford Section of Pacific Highway. (2) JOSEPHINE COUNTY (NRM 131-F)—To Jacobsen-Jensen Co., 517 N.E. Stanton St., Portland, $18,437 for 0.94 mi. paving widen. and resurf. on Evelyn Ave.-L Street Unit of Grants Pass Section of Pacific Highway. 12-29

PORTLAND, ORE.—To Sam Orino, E. 3104 Boone Ave., Spokane, Wn., $223,729 by Bureau of Public Roads, Portland, for 3.117 mi. grading and const. tunnel on Mt. Rainier Natl. Park E. Side Highway, PEC-5-D, in Mt. Rainier Natl. Park, PIERCE COUNTY, Wn. 12-31

PORTLAND, ORE.—Awards as follow by Oregon State Highway Comm., Portland, Ore.: (1) COLUMBIA COUNTY (NRS 213-E)—To A. T. Dolan, Tillamook, Ore., $20,525 (USING ROAD MIX OIL) for 1.91 mi. cr. rock or grav. surf. and bitum. macad. wr. surf., etc., on Pittsburg-Veronia Sec. of Nehalem Secondary Highway. (2) JACKSON COUNTY (NRM 190-D)—To Mountain States Const. Co., Eugene, Ore., $9,346 for 1,188 lin. ft. pavement widening and resurf. on South Ashland Sec. of Pacific Highway. 12-31

PORTLAND, ORE.—To Sam Orino, E. 3104 Boone Ave., Spokane, Wn., $60,456 to the Bureau of Public Roads, Portland, Ore., for grading the Randle-Yakima Highway, FHEC-13-M2, Q, in the Rainier Natl. Forest, LEWIS COUNTY, Wn. 1-2

SALT LAKE CITY, UTAH—To Lamph, Smith & Stevens, Price, Utah, $56,591 to State Road Commission of Utah, Salt Lake City, for concr. and bitum. concr. OR natural rock asph. road betw. Provo and South City Limits, Proj. NRM 36-C, UTAH COUNTY, Utah.

SALT LAKE CITY, UTAH—Awards as follow by the State Road Comm. of Utah, Salt Lake City, Utah, for 0.635 mi. concr. paving road in Manti City, Proj. NRM 29 (1935) and NRH 29 and 91-A (1935) to Olof Nelson, Logan, Utah, $34,111, in SANPETE COUNTY. (2) PIUTE and SEVIER COUNTIES (NRS 150-B)—To J. W. Whiting, Springville, Utah, $8,058 for 2.642 mi. grav. surf. road on State Road No. 26, betw. Fish Lake Junction and Loa. 12-14

SALT LAKE CITY, UTAH—Awards as follow by Utah State Road Comm., Salt Lake City, Utah, for: (1) UINTAH COUNTY—To Reynolds Ely Con. Co., Springville, Utah, $19,730 for 9.371 mi. natural rock asph. surf. road betw. Half Way Hollow and Vernal. (2) WEBER COUNTY—To F. Bothwell, Salt Lake City, Utah, $49,049 for 4.043 mi. grav. surf. road betw. Beaver Creek-Monte Cristo. (3) UTAH COUNTY—To B. D. Palfreyman, Provo, Utah, $93,601 for 5.148 mi. grav. surf. road betw. Birdseye-Thistle. 12-24

OGDEN, UTAH—Award recommended to Wheeler & England, Moreland, Idaho, $92,663 by Bureau of Public Roads, Ogden, Utah, for 4.313 mi. grad. and surf. on Warm River-Yellowstone Highway in Targhee Natl. Forest, FREMONT COUNTY, Idaho, NR 34-A10. 1-5

ALMIRA, WN.—To Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, Wn., $94,849 by Bureau of Reclamation, Almira, Wn., for const. of highway, street, alley, and parking area surfacing; sidewalks; curbs and gutters, catchbasins, and storm sewers, for the Govt. Camp at Grand Coulee Dam, Columbia Basin Project, Wn., under Spec. No. 581. 12-31

EPHRATA, WN.—To Ralph Davis, St. John, Wn., $15,924 to Grant County Comm., Ephrata, Wn., for 4.91 mi. grading and surf. on Secondary Road No. 14, beginning 6½ mi. northwest of the town of Ephrata and running in a westerly direction. 12-21

OLYMPIA, WN.—Awards as follow by the Director of Highways, Olympia, Wn., for: (1) KING COUNTY (NRM 150-E)—To Northwest Const. Co., 3950 6th N.W., Seattle, Wn., $53,587 for 1.5 mi. conc. paving unpaved portion betw. exist. pavements and retopping portions of exist. pavement with asph. concr. on State Road No. 1, East Marginal Way—Paving in City of Seattle. (2) PIERCE COUNTY (NRH

171-E)—To Joseph Warter, Sr., 631 N. Fife St., Tacoma, $68,607 for 1.6 mi. conc. paving on State Road 1, Lakeview to Union Ave. 12-20

OLYMPIA, WN.—Awards as follow by the Director of Highways, Olympia, Wn., for: (1) WHATCOM COUNTY (NRS 191-B)—To Erickson Paving Co., 1550 N. 34th St., Seattle, $129,562 for 4.4 mi. paving with conc. and retopping portions of existing pavement with asph. conc. on State Road 1 (Lake Samish Road Br.). (2) KLICKITAT COUNTY (FLP 3)—To United Contr. Co., Stock Exchange Bldg., Portland, $41,992 for 2.7 mi. surf. with cr. rock stockpiling oil rock and const. bitum. mat by (Bit. method) and 3.9 mi. stockpiling oil rock only on State Road No. 8, Yakima-Klickitat Co. Line to Reservation Boundary. (3) OKANOGAN COUNTY (NRS 195-C)—To Henry Hagman, Cashmere, Wn., $57,954 for 0.8 mi. grad., surf. with cr. stone and const. a reinf. concr. girder bridge 438.5 ft. long on the Methow Valley Highway, Methow River Bridge and Approaches at Carlton, Wn. (4) CLARK COUNTY (NRS 214-A)—To O. A. Gordon, 1230 N. 46th St., Seattle, $20,306 for 1.6 mi. grading and const. timber bridge on Washougal River County Road, Washougal-East. 12-20

PORT ORCHARD, WN.—To J. S. Pederson, Enumclaw, Wn., $3,239 to County Comm., Port Orchard, Wn., for clearing, grubbing, grading, draining and surf. with gravel borrow on 0.615 mi. of Secondary Highway known as Wildcat Lake cutoff. 12-20

OLYMPIA, WN.—Awards as follow by the Director of Highways, Olympia Wn., for: (1) CLARK COUNTY (NRM 44-1935)—To United Contracting Co., Stock Exchange Bldg., Portland, $11,806 for 0.7 of a mi. concr. paving and asph. concr. paving on State Road No. 8 in City of Camas, Wn. (2) SKAMANIA COUNTY (112-E and 21)—To Arino & Nyberg, Realty Bldg., Spokane, $199,792 for 2.0 mi. grading on State Road No. 8, Cooks East to Underwood West, and Underwood vicinity. (3) THURSTON COUNTY (USPW 171-C)—To M. S. Ross, Peyton Bldg., Spokane, $182,473 for 1.7 mi. grading and const. channel change and timb. bridges on State Rd. No. 1, Olympia to Nisqually, Sec. 2. 1-5

CHEYENNE, WYOMING—Awards as follow by the State Highway Comm., Capitol Bldg., Cheyenne, Wyo.: (1) WESTON COUNTY (NRH 194-H)—To Inland Const. Co., Omaha, Neb., $38,471 for 3.455 mi. oil tr. by road mix method on Moorcroft-Upton road and 7.483 mi. on the Lusk-Newcastle road. (2) NIOBRARA and GOSHEN COUNTIES (NRH 150-F)—To R. Spatz, Cheyenne, $34,703 for 17.260 mi. cr. rock surf. on the Lusk-Lingle road. (3) SWEETWATER COUNTY (NRH 5)—To R. Spatz, Cheyenne, Wyo., $51,009 for 14.097 mi. oil tr. by road mix method on the Rock Springs-Pinedale road. (4) SUBLETTE COUNTY (NRH 140-F, NRM 140-G and FLHP 6B combined)—To M. E. Carlson, Denver, $58,958 for 16.461 mi. grad., drain. and misc. work on the Farson-Pinedale road and 0.733 mi. of the Pinedale streets. (5) NIOBRARA COUNTY (NRH 194-E, NRH 40-R)—To W. A. Norris, Inc., Cheyenne, $81,824 for 17.375 mi. oil tr. by road mix method on Lusk-Newcastle road. (6) NATRONA COUNTY (NRH 31)—To Rognstad & Olsen, Casper, $12,703 for 0.317 mi. landscaping on the Casper-Shoshoni road. 12-26

BRIDGES and CULVERTS

WORK CONTEMPLATED

SPOKANE, WN.—The City of Spokane will hold an election Mar. 12, 1935, to vote on $95,000 in bonds to finance construction of a 555-ft. reinf. concr. bridge across Spokane River at Boone Ave. Bridge to consist of 4 spans, 114', 106', 97' and 89' respectively, to have 30-ft. roadway with 7½' sidewalk on each side. West approach will be 126' long. 12-28

CALL FOR BIDS

PHOENIX, ARIZ.—Bids to 2 p.m., Jan. 15, by Arizona State Highway Comm., Phoenix, for construction of a railroad underpass with grading, draining, concrete pavement and cutback road mix, extending from the town of Casa Grande westerly one mile, in PINAL COUNTY, on the Casa Grande-Gila Bend Highway. Work involves: 1,050 cu. yd. drainage excavation, 11,400 cu. yd. struc. excavation, 12,400 cu. yd. mi. earthwork haul, 1,640 cu. yd. concrete, 189,300 lbs. reinforcing steel, 3,624 sq. yd. concrete pavement. 12-26

PHOENIX, ARIZ.—Bids to 10 a.m., Jan. 15, by Arizona State Highway Comm., Phoenix, for replacing concrete dips with concrete box culverts and oil surfaced approach fills at 3 separate bridge sites, one at 2¾ mi. east of Welton, one at 4½ mi. east of Welton, and one at 2 mi. west of Mohawk on the Phoenix-Yuma Highway, in YUMA COUNTY. Work involves: 2,500 cu. yd. drainage excavation, 480 cu. yd. structure excavation, 12,400 cu. yd. imported borrow, 700 cu. yd. shoulder material, 590 cu. yd. 'A' concrete, 64,800 lbs. reinf. steel. 12-26

MISSOULA, MONTANA—Bids to 10 a.m., Jan. 15, by Bureau of Public Roads, Missoula, Mont., for constructing or improving a 3-span bridge over the east fork of the Bitterroot-Salmon Highway, FHEC-19-C1, located in the Bitterroot Natl. Forest, RAVALLI COUNTY, Mont. Work involves: 300 cu. yd. unclass. excav. (struc.), 94 cu. yd. 'A' concrete, 35 cu. yd. 'B' concrete, 109 cu. yd. 'D' concrete, 47 cu. yd. 'S' concrete, 33,500 lbs. reinf. steel, 116,500 lbs. struc. steel, 1,000 lin. ft. untr. timber piling. 12-29

TACOMA, WN.—Bids to 8:30 a.m., Jan. 14, by County Clerk, Court House, Tacoma, Wn., for constr. of a steel bridge with concr. piers over the Marshall River at Eatonville. Est. cost $16,000. 12-21

BIDS RECEIVED

JUNEAU, ALASKA—Warrack Construction Co., McDowall Bldg., Seattle, Wn., $12,100, low to Bureau of Public Roads, Juneau, Alaska, for const. a 60-ft. span on concrete abutments supported by four steel girders, to have an 8" reinf. concr. floor and to be 20' in width with steel guard rails, over Lemon Creek. 12-17

PORT ANGELES, Wn.—Creech Bros. Contracting Co., foot of Alder St., Aberdeen, Wn., $21,299, low to Clallam County Comm., Court House, Port Angeles, Wn., for const. a 220-ft. steel bridge having concr, piers and pile trestle approaches, across the Sol Duc River, Secondary Project No. 4, P.W.A. Docket No. 6115, in CLALLAM COUNTY, Wn. 12-31

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Wm. Peper, Box 1564, Phoenix, Ariz., $1,828 by Ariz. State Highway Comm., Phoenix, for widening concr. bridge in City of Miami on Miami-Globe Highway, Proj. NRM 91-A-1935, GILA COUNTY, Ariz. 12-17

LOS ANGELES, CALIF.—To L. A. Paving Co., 3200 E. Vernon Ave., L. A. (approved by P.W.A.), $39,247 to Board of Public Works, City Hall, L. A., for improv. 55th St., from Alameda to Central Ave. 12-21

PLACERVILLE, CALIF.—To C. R. Fiedler, 2631 30th St., Sacramento, $2,022.45 to the County Board of Supervisors, Placerville, El Dorado County, Calif., for constructing a reinforced concrete bridge across New York Ravine, near Salmon Falls in Road District No. 4 and for clearing for bridge site, EL DORADO COUNTY, Calif. 12-21

SACRAMENTO, CALIF.—Award to R. R. Bishop, Long Beach, $64,014, by Calif. Div. of Highways, Sacramento, for const. steel bridge with concr. deck across Burns Creek about 46 mi. S. of Monterey, in MONTEREY CO., Calif. 12-27

SACRAMENTO, CALIF.—To Rocca & Co., 15 4th St., San Francisco, $69,469 to Calif. Div. of Highways, Sacramento, for const. a bridge across the North Fork of the Feather River at Tobis, consisting of one 290-ft. through steel truss span and 2 35-ft. concrete box abutments, in PLUMAS COUNTY, Calif. 12-20

SACRAMENTO, CALIF.—To Wm. C. Horn Co., 465 Holt Ave., Pomona, $68,813 by Calif. Div. of Highways, Sacramento, for steel beam bridge with concr. deck across Kings River 1½ mi. east of Centerville, consisting of 1 70′ span, 2 63′ spans and 2 62′ spans, and concr. piers and abutments and 1.2 mi. grad. and bitum. tr. cr. grav. or stone surf. on roadway approach, in FRESNO COUNTY, Calif. 12-18

SAN FRANCISCO, CALIF.—To Healy Tibbitts Const. Co., 64 Pine St., San Francisco, $695,175, CONTRACT 15 and $477,447 CONTRACT 15A—total $1,172,622, by San Francisco-Oakland Bay Bridge, Room 811, 500 Sansome St., San Francisco, for constr. a reinf. concr. viaduct, with grading and paving of the street and all incidental work necessary to complete, except wiring and fixtures for the lighting of the bridge, the San Francisco viaduct section and approaches of the San Francisco-Oakland Bay Bridge. (See Unit Bid Summary.) 0

BOISE, IDAHO—To Bell & Morgan, Rupert, Idaho, $1,808, to Commissioner of Public Works, Boise, Idaho, for const. a 39-ft. timber bridge across Big Lost River on the Idaho Central Highway near Arco in BUTTE COUNTY, Idaho, NRH 128-B. 12-31

RENO, NEVADA—To Wade H. Wine, Reno, Nev., $21,750 to Treasury Dept., Procurement Div. Pub. Works Branch, Washington, D. C., for const. a retaining wall for the U. S. Postoffice at Reno, Nev. 1-4

PORTLAND, ORE.—To Averill & Philpott, Route 10, Portland, Oregon, $21,153 to the Oregon State Highway Comm., Portland, Ore., for constructing a 190′ plate girder bridge over the Yamhill River on Dallas-Coast Second Highway at junction with McMinnville-Tillamook Highway about 3 mi. west from Willamina, POLK COUNTY, NRS 215-C. 12-8

PORTLAND, ORE.—To R. H. Jones, Baker, Ore., $5,944 to Oregon State Highway Comm., Portland, Ore., for const. a bridge over Tualatin River Overflow on the Tualatin Valley Highway near Gaston, NRH 240-A in WASHINGTON COUNTY, Oregon. 12-24

SALT LAKE CITY, UTAH—To Strong & Grant, Springville, Utah, $136,743 by the State Road Comm. of Utah, State Capitol, Salt Lake City, Utah, for const. three grade separations and approaches at and near Springville, in UTAH COUNTY, Utah, Proj. NRM 37-A and NRH 37-B, a distance of 1.176 mi. 1-5

CHEYENNE, WYOMING—To J. E. Crum, Casper, Wyo., $19,924 by State Highway Comm., Cheyenne, Wyo., for constructing two tr. timber bridges and 6 reinf. concr. culverts on the Farson-Pinedale road and 0.733 mi. of the Pinedale streets in SUBLETTE COUNTY, Wyo. 12-26

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

TORRANCE, CALIF.—The P.W.A. has made a loan and grant of $170,000 to Torrance, Calif., to finance purchase of privately owned waterworks system and for improvements to same, consisting of installation of a well and pumping plant, treatment plant and accessories, elevated storage tank, booster pumping plant, extensions to distribution system and fire hydrants, services and appurtenances. 12-24

EMERY TOWN, UTAH—The P.W.A. has made a loan and grant of $20,000 to Emery Town, Emery County, Utah, for replacement of wood stave gravity and distribution lines with cast iron pipe, involving: 7,577 lin. ft. 2″ cast iron pipe, 4,774 lin. ft. 3″ cast iron pipe, 6,176 lin. ft. 4″ cast iron pipe, 1,650 lin. ft. 6″ cast iron pipe, valves, fire plugs and fittings. 12-18

HEBER, UTAH—P.W.A. has made a loan and grant of $33,000 to Heber City, Wasatch County, Utah, for improv. to waterworks system comprising const. of a 47,000-gal. reinf. conc. reservoir and installation of approx. 4,800 ft. of cast iron supply main. 12-18

OREM, UTAH—The P.W.A. has made a loan and grant of $46,000 to Orem, Utah County, Utah, for replacement of 24,050 lin. ft. of wood-stave supply and distribution lines with cast iron pipe, involving: 11,350 lin. ft. 8″ cast iron pipe, 12,700 lin. ft. 12″ cast iron pipe, also valves and fittings. 12-18

PRICE, UTAH—P.W.A. has made a loan and grant of $156,000 to Price, a municipal corporation, Carbon County, Utah, for replacement of 5 sections of existing water supply line with steel and cast iron pipe. Approximate cost of labor and materials is $146,000, of which 30% is a grant. 12-18

CALL FOR BIDS

DALY CITY, CALIF.—Bids to 8 p.m., Jan. 21, by the City Clerk, City Hall, Daly City, for guniting floor and walls of water storage reservoir. 12-28

LOS ANGELES, CALIF.—Bids to 10 a.m., Jan. 15, by the Metropolitan Water District, 306 W. 3rd St., Los Angeles, for drilling three 24″ holes and installing therein such water well casings as is required by the District at the Cabazon Shaft of the San Jacinto Tunnel near Cabazon, Riverside County, under Spec. No. 86. 1-3

SAN FRANCISCO, CALIF.—Bids to 3 p.m., Jan. 24, by the Public Utilities Comm., Room 287, City Hall, San Francisco, for enlargement of the O'Shaughnessy Dam by the construction of an addition to the existing dam, for the purpose of increasing the capacity of Hetch Hetchy Reservoir. The addition will raise the crest of the dam by 85.5 ft. from elev. 3726.5 to elev. 3812. Construction of a new spillway, installation of new outlet control valves and spillway gates, clearing of the reservoir area betw. the present and future high water surface elevations, road and trail construction, and other appurtenances and incidental work are included in the required work, under HHWS Contract No. 149. 12-22

CENTERFIELD, UTAH—Bids to 11 a.m., Jan. 23, by City Clerk, Centerfield, Utah, for trenching and laying 19,400 lin. ft. cast iron pipe. 12-24

BIDS RECEIVED

LOS ANGELES, CALIF.—Petersen Bros., 239 Olive St., Inglewood, $10,328 low to District Engineer, Calif. Div. of Highways, State Bldg., Los Angeles, for 5.9 mi. water pipeline to be installed on Ramona Blvd. and Garvey Ave. betw. Mission Road in Los Angeles and Atlantic Blvd. in Monterey Park, LOS ANGELES COUNTY, Calif. 12-26

LOS ANGELES, CALIF.—Roscoe Moss, 4360 Worth St., Los Angeles, only bid submitted to U. S. Indian Irrigation District, 751 S. Figueroa St., Los Angeles, for drilling, developing and testing one water well, 16″ in diameter and approximately 75′ deep, on the San Carlos Indian Reservation, Arizona, FP 199. 12-29

ROSEVILLE, CALIF.—Western Pipe & Steel Co., 444 Market St., San Francisco, $12,700, low to City Clerk, Roseville, Placer County, for constructing 1,900 lin. ft. 22" pipeline betw. Rocklin Highway and City reservoir, and for repairing 30" pipe at reservoir and constructing a 16" by-pass. 12-27

CONTRACTS AWARDED

BEVERLY HILLS, CALIF.—To Roscoe Moss Company, 4360 North St., Los Angeles, $6.94 for 24" gravel packed or enveloped 12" diameter casing well; $6.70 to install 28" diameter concrete; $300 for developing same, $.80 per ft. for tent hole; $.55 deduct for 10 ga. per ft. to the City Council, Beverly Hills, for drilling and equipping two gravel envelope water wells. 12-21

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bldg., Los Angeles, $1,739,846 on SCHEDULES 20A, 20B, 20C, 21, 22, 23 and 23A to the Metropolitan Water District of Southern California, 306 W. 3rd St., Los Angeles, for construction of 12.8 mi. monolithic concrete siphons, cut and cover conduit and appurtenant works of the Colorado River Aqueduct, Station 10812-65 to 12122-00, under Specification No. 82. 12-8

MARCH FIELD, CALIF.—To Frank Beatty, Perris, $390 to Const. Quartermaster, March Field, for swabbing and cleaning well No. 3. 12-31

SAN FRANCISCO, CALIF.—To the Lowrie Paving Co., Inc., 1540 16th St., San Francisco, $25,895 to Public Utilities Commission, San Francisco, for laying 6" and 8" cast iron mains in West section of Sunset District, under Specifications No. W. D. 68. 1-3

SAN FRANCISCO, CALIF.—To W. J. Tobin, 3701 Balfour Ave., Oakland, $44,361 by Public Utilities Comm., San Francisco, for laying 12" and 16" cast iron feeder mains in Northwest and Southwest section of San Francisco, under Spec. No. W. D. 55. 1-3

SAN FRANCISCO, CALIF.—To the Lowrie Paving Co., Inc., 1540 16th St., San Francisco, $25,157 to Public Utilities Comm., San Francisco, for laying 6" cast iron mains in Excelsior District under Spec. No. W. D. 69. 1-3

SAN FRANCISCO, CALIF.—To M. J. Lynch, Barneveld and Oakdale Sts., S. F., $89,365 SEC. A, and to Sibley Grad. & Teaming Co. Ltd., 165 Lander St., S. F., $133,494 SEC. B, by Pub. Utilities Comm., S. F., for const. the University Mound Pipeline completion from Brannan St. to Broadway, under Spec. W. D. 65. 12-11

HOT SPRINGS, MONTANA—To M. F. Kiely, Butte, Mont., $8,637.22 to Town Clerk, Hot Springs, Mont., for const. and improvements to the town water plant in Hot Springs, Mont., under P.W.A. Project 7728. 12-17

WELLINGTON, UTAH—Awards as follow by City Clerk, City Hall, Wellington, Utah, for improvements to water system: (1) To Mullins & Wheeler, 22½ E. 1st So., Salt Lake City, $10,062 for labor. (2) To Pacific States Cast Iron Pipe Co., Provo, Utah, for furnishing pipe. (3) To Salt Lake City Hardware Co., Salt Lake City, Utah, for hydrants. 12-31

CAMP MURRAY, WN.—Award recommended to Pandrea Sons, 3217 S. 11th, Tacoma, Wn., $1,149 to U. S. Property and Disbursing Officer for Washington, Rt. 1, Box 143, Tacoma, Wn., for extension of water system at Camp Murray, Washington. 1-4

SEWER CONSTRUCTION

WORK CONTEMPLATED

ANAHEIM, CALIF.—Plans and specifications have been completed by City Engineer for repairs to Section 1 of the joint outfall sewer at an estimated cost of $50,054, involving repairing the 1st mile south of the screening plant at Verano near Talbert. Labor on the above project is to be done by State Emergency Relief Administration. 12-20

CARPINTERIA, CALIF.—The P.W.A. has made a grant of $8,000 to the Carpinteria Sanitary Dist., Carpinteria, Santa Barbara County, Calif., to aid in the installation of 7,600 lin. ft. of sanitary sewer extensions. Total est. cost is $29,800. 12-18

LOS ANGELES, CALIF.—No protests were received by Health and Sanitation Committee of City Council, City Hall, L. A., and City Engineer has been authorized to prepare ordinance of intention for construction of a sanitary sewer in 'O' St., betw. Wilmington Ave. and Frigate Ave., involving: 1,285 cu. yd. trench excavation, 1,096 lin. ft. 8" extra strength pipe, 350 lin. ft. 8" std. strength pipe, 24 Y's 8" extra strength, 11 Y's 8" standard strength, 21 manholes 'B', 2 flushing structures, 3,045 sq. ft. 'A' trench resurfacing, 325 sq. ft. 'C' trench resurfacing. Est. cost $3,600. 1-3

LOS ANGELES, CALIF.—No protests were received by City Council, L. A., and City Engineer has been authorized to prepare final ordinance for constr. of sanitary sewer, 791 ft. long, in Durango Ave. near Ntal. Blvd., involving: 566 lin. ft. 8" cement pipe, extra strength, 225 lin. ft. 6" cement pipe, standard strength. 1-3

LOS ANGELES, CALIF.—No protests were received and preparation of final ordinance has been authorized by City Council, L. A., for const. of a sanitary sewer in 'G' St., betw. Frigate Ave. and Figueroa. Work involves: 565 cu. yd. trench excavation, 22,080 sq. ft. 'A' resurfacing, 505 ft. main line sewer, 160 ft. house conn., 1 flush struc., 1 'B' manhole, 24 Y's, 2 frame and cover sets, 8 ¼ bends. Est. cost $1,600. 12-13

LOS ANGELES, CALIF.—Plans and specifications have been completed by L. W. Armstrong, City Storm Drain Engineer, and call for bids will be issued shortly by Board of Public Works, City Hall, Los Angeles, for const. a storm drain in right-of-way south of Buchanan St. from Ave. 54 to Ave. 53. 12-27

POMONA, CALIF.—Plans and specifications have been completed and protests were heard Jan. 8 by the City Council, City Hall, Pomona, for improvements to Huntington Blvd. betw. Orange Grove Ave. and Burdick Drive and betw. Burdick Drive and White Ave.; and on Burdick Drive betw. Huntington Blvd. and White Ave. and the alley betw. Huntington Blvd. and White Ave. Work involves: 2,827 lin. ft. 8" vitrified pipe, 662 lin. ft. 4" vitrified pipe, Wye branches, bends, manholes, etc. 1-3

RIVERSIDE, CALIF.—Plans completed by W. Stewart Button, Chairman of the County Board, and have been forwarded to Sacramento for acceptance or rejection, for const. of $19,500 storm drain project for Corona and 6 projects for other parts of Riverside County. 1-3

SANTA BARBARA, CALIF.—Public Works Administration has made a loan and grant of $8,000 to City of Santa Barbara for extension of a sewer. 12-12

WORK CONTEMPLATED

SEAL BEACH, CALIF.—Plans are being completed by Currie Engineering Co., Andreson Bldg., San Bernardino, for construction of a proposed $96,000 sewage disposal system to serve Seal Beach and the Sunset Beach Sanitary District. Project provides for the expenditure of $52,000 by the City and $44,000 by Sunset Beach. 12-28

FARMINGTON, UTAH—The PWA has made a loan and grant of $30,000 to Farmington, Davis County, Utah, for construction of a sewerage system with Imhoff tank. 12-24

BIDS RECEIVED

HALFMOON BAY, CALIF.—Oakland Sewer Const. Co., 9915 Walnut St., Oakland, $38,500 only bid submitted to Secretary of Sanitary Board of Halfmoon Bay Sanitary Dist., Halfmoon Bay, Calif., for construction of a sanitary sewer system at Halfmoon Bay. 12-8

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Fred Greenfield Co., 7310 S. Figueroa St., L. A., $12,884, by Board of Public Work, L. A., for constructing the Harbor Blvd. Sewage Pumping Plant, PWA 5633, Unit 4-A. 12-17

LOS ANGELES, CALIF.—T. L. W. Odell, 6417 Drexel Ave., Los Angeles, $18,994, to Board of Public Works, L. A., for const. decanters, pumping plant, foundation, Venturi flume, drainage sump and roadway at the Terminal Island Sewage Treatment Plant, PWA 5633, Unit 3-A. 12-17

OXNARD, CALIF.—T. J. C. Hickey, 320 S. Palm Ave., Alhambra, $54,526 (subject to P.W.A. approval) by City Council, Oxnard, for construction of a sewage treatment plant using Imhoff tank type. 12-14

SEATTLE, WASH.—To Felix Arcorace Co., 8423 48th Ave., South, Seattle, Wash., $94,336 (CLAY PIPE & MACHINE BANDED WOOD-STAVE PIPE) by Board of Public Works, Seattle, Wash., for const. the Seward Park Trunk Sewer, subsewer, lateral and branch sewers, pumping plants and submerged storm water overflows in City of Seattle. (See Unit Bid Summary.) 12-17

RIVER and HARBOR WORK

WORK CONTEMPLATED

LOS ANGELES, CALIF.—The Engineering Dept., Venice, City Hall, Venice, Calif., is preparing plans for widening of the Venice Beach from Lick Pier southward to Del Rey and const. parking space. An allocation of approx. $500,000 for the project will be asked from the $24,000,000 sta. relief bond issue passed in November elections. 1-3

OAKLAND, CALIF.—Plans and specifications have been completed and call for bids will be issued in about 30 days to be opened about two weeks later by the Port of Oakland, foot of 14th St., Oakland, for construction of a reinforced concrete wharf to be 304 ft. long, 112 ft. wide with creosoted apron; area at rear of wharf is to be filled in and surfaced with oil macadam. Work involves the following approximate quantity. 3,500 cu. yd. concrete and other items. Estimated cost $160,000. 1-3

REDONDO BEACH, CALIF.—The City of Redondo Beach will ask S.E.R.A. to accept the project known as The Salt Lake development which calls for construction of a canal from the ocean at 7th St. through to the inland sea, also dredging of the Salt Lake and a breakwater extending along the north side of the channel entrance. Approximate lengths of the canal, ¼ mile. 1-3

SEAL BEACH, CALIF.—The P.W.A. has made a loan and grant of $82,000 to Seal Beach, Orange County, Calif., for const. of 1400 lin. ft. riprap breakwater betw. Neptune & Electric Ave., Seal Beach. 12-18

VENTURA, CALIF.—Dept. of Public Works, State of Calif., has asked War Department permit to construct about 2,000 ft. of seawall and 10 groins, each about 70 ft. long, on the shore of the Pacific Ocean between Punta Gorda and Rincon Point in Ventura County, Calif. 12-18

CALL FOR BIDS

SAN FRANCISCO, CALIF.—Bids to 9 a.m., January 19th, by the Board of State Harbor Commissioners, Ferry Building, San Francisco, for laying asphaltic pavement on Pier 42, San Francisco. Work involves the following approximate quantities: 450 tons Topeka wearing surface, 150 tons bituminous base. 1-3

PORTLAND, ORE.—Bids to 3 p.m., Jan. 24th, by U. S. Engineer Office, Customhouse, Portland, Oregon, for reconstruction and repair to the outer 4700 lin. ft. link of the Columbia River south jetty. Work consists of raising the jetty, 26 ft. from its present level and involves: 700,000 tons rock. Estimated cost $1,500,000. 12-24

GALVESTON, TEXAS.—Bids to Jan. 14th by the U. S. Engineer Office, Galveston, Texas, for dredging 1,510,000 cu. yd. from the Houston Ship Channel, Texas, under Cir. No. 125. 12-24

BIDS RECEIVED

OAKLAND, CALIF.—Ben C. Gerwick, Inc., 112 Market St., San Francisco, $239,017, low bid to U. S. Coast Guard Headquarters, Washington, D. C., for construction of a steel sheet pile bulkhead approximately 1528 ft. long, anchorages, and bollard piles and accessories at the U. S. Coast Guard Base Eleven, Govt. Island, Oakland. 12-13

PORTLAND, ORE.—O. K. Tittle, Tillamook, Oregon, $1190, low to U. S. Engineer Office, Portland, Ore., for excavating approximately 8500 cu. yd. material for a channel at the mouth of Kilchis River, Tillamook Bay, Oregon, under Cir. No. 344. 12-20

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Standard Dredging Co., Central Bldg., Los Angeles, $879,255 to U. S. Engineer Office, L. A., for dredging and excavating in Newport Bay and entrance. 12-22

MARTINEZ., CALIF.—Award recommended (subject to P.W.A. approval) to Duncanson & Harrelson, de Young Bldg., San Francisco, $48,742 (net) by City Clerk, City Hall, Martinez, for construction of a Yacht Harbor at Martinez. 12-15

RICHMOND, CALIF.—To Edwin Anderson, 998 Gilman Ave., S. F., $6883 by City Clerk, Richmond, for gunite of piles on Wharf No. 1 in Richmond Outer Harbor. 12-11

SAN DIEGO, CALIF.—To Hull, Smaley & Ramage, Box 815, Wilmington, $1935 to 11th Naval District, San Diego, for relaying moorings, 'A", 'B" and 'C" at Los Angeles Harbor, San Pedro, under Spec. No. 7853. 12-26

STOCKTON, CALIF.—Award recommended (sub. to P.W.A. approval) to G. H. Dodd, 1738 W. Rose St., Stockton, $76,832, by Stockton Port Dist., City Hall, Stockton, for const. Warehouses "B", "J" and "K" located at Deep Draft Terminal. 12-29

Irrigation and Reclamation

WORK CONTEMPLATED

PHOENIX, ARIZ.—The Verde Irrigation and Power Distribution may seek an $8,000,000,000 P.W.A. loan to replace the $19,000,000 allotment which was rescinded Oct. 15th. 1-3

MISSOULA, MONTANA—The P.W.A. has made an allotment of $18,000 to the Frenchtown Irrigation District, near Missoula, Mont., to be used in financing construction of a canal system for the irrigation of approximately 7,500 acres. Allotment is to be repaid by water users under the Provisions of the Reclamation Act. 12-20

SIERRA COUNTY, NEW MEXICO—Allotment of $100,000 additional for the Caballo Dam on the Rio Grande in New Mexico to make provision for raising the dam at a later date to make possible the development of power at the Elephant Butte Dam which is above the Caballo Dam. The Caballo low dam is being built with P.W.A. funds allotted to the Intl. Boundary Comm., U. S. and Mexico, for rectification of the Rio Grande in El Paso and Hudspeth Counties, Texas, and the dam and reservoir in Sierra County, New Mexico. Estimated low dam cost approximately $1,500,000 and the high dam approximately $1,000,000 more. The allotment announced today is for foundations making it possible to increase the height of the dam in the future is so desired. The low dam will provide a reservoir storage of 100,000 ac. ft. and the high dam 350,000 ac. ft. The Elephant Butte Dam is now utilized for irrigation, but if at a later date it is decided to develop power at Elephant Butte it will be necessary to build a higher dam at Caballo. In this event the Caballo reservoir will supply the water for irrigation and the Elephant Butte reservoir, the water for power.

CALL FOR BIDS

ONTARIO, ORE.—Bids to 10 a.m., Jan. 15th, by Bureau of Reclamation, Ontario, Ore., for const. earthwork and struc., North Canal, Laterals, Mitchell Butte Div., Owyhee Proj., Oregon-Idaho, under Spec. No. 644-D, inv.: 51,300 cu. yd. excv. and laterals (all class), 2,500 cu. yd. excav. for structures, 1,500 sta. cu. yd. overhaul, 1,500 cu. yd. backfill, 780 cu. yd. concrete in struc., 950 sq. yd. dry rock paving, 49,000 lb. reinforcement bars (place), 878 lin. ft. 15" to 36" diam. concr. pipe (lay), 6,600 lb. gates and gate hoists (install), 1.0 M. ft. BM timb. in struc. (erect). Work located near Dunaway, Oregon. 12-24

HYRUM, UTAH—Bids to 10 a.m., January 21st, by the Bureau of Reclamation, Hyrum, Utah, for construction of a pumping plant, structures, and canal lining on the Hyrum-Menden, Hyrum Feeder, and Wellsville Canals, Hyrum Project, Utah, under Specification No. 606. Work is located near Hyrum and Wellsville, Utah, and involves in the main: 15,750 cu. yd. excavation, all classes, 2,200 sq. yd. trimming canal section for concrete lining, 3,600 cu. yd. backfill, 1,070 cu. yd. concrete, 20 sq. yd. dry-rock paving, 100,000 lb. reinforcement bars (place), 300 lin. ft. 8" diam. clay sewer pipe drain (construct), 4,500 lb. gates and misc. metal work (inst.), L. S. install windows, doors, structural steel, built-up asphalt-saturated felt roofing, and pumping machinery in pumping plant, L. S. erect plate-steel penstock, wasteway and discharge pipes. Spec. No. 606. 12-29

BIDS RECEIVED

MODESTO, CALIF.—Pacific Construction Co., 334 Stockton St., San Francisco $.90 per cu. yd., only bid submitted to Modesto Irrigation District, 823 11th St., Modesto, for making a rock cut along the Main Canal of the Modesto Irrigation District, involving 8500 cu. yd. rock excavation. 12-18

CONTRACTS AWARDED

FAIRFIELD, MONTANA—To Tomlinson, Arkwright Const. Co., Great Falls, Montana, $44,847, by Bureau of Reclamation, Fairfield, Mont., for const. of earthwork and struc. Mill Coulee Canal, Sta. 326 to 564 and laterals and sub-laterals, Greenfields Division, Sun River Project, Montana, under Spec. No. 596. 12-17

ONTARIO, ORE.—Awards as follow by the Bureau of Reclamation, Ontario, re., for const. the Malheur River and Dead Ox Siphons, North Canal, Dead Ox Flat Div., Owyhee Project, Oregon-Idaho, under Spec. No. 598: **Sched. 1**—To Parker Schram Co., Couch Bldg., Portland, $64,764 for exc., etc., Malheur River Siphon. **Sched. 2**—To Consolidated Steel Corp., Ltd., 65 E. Slauson Ave., L. A., $522,457, for Malheur R. siphon, Plate st. pipe. **Sched. 8**—To J. A. Terteling & Sons, 2223 Fairview Ave., Boise, $6,051, Dead Ox S. **Sched. 9**—To Consolidated St. Pipe Co., L. A., $13,600, Dead Ox Siph. Steel Pipe. (See Unit Bid Summary.) 12-31

TUNNEL CONSTRUCTION

WORK CONTEMPLATED

ORDWAY, COLORADO—The R.F.C. has made a loan of $875,000 to the Twin Lakes Reservoir and Canal Co., c/o O. R. Smith, Consulting Engineer, Ordway, Colo., to finance construction of a second tunnel near Leadville, Colo., to be 2 mi. long, 6 or 7 ft. in diameter, and concrete lined. Above loan will also finance construction of a diversion dam on the Roaring Fork River and two miles of open ditches to connect two tunnels. 12-27

CALL FOR BIDS

DENVER, COLORADO—Bids to 10 a.m., Jan. 16th, by Bd. of Water Comm., City-County Bldg., Denver, Colo., for enlarging and lining the Moffatt Tunnel, intake shaft and wye, const. intake works at West Portal and the outlet works at East Portal in GILPIN AND GRAND COUNTIES, Colo., involving: 37,000 cu. yd. concrete lining, 860 cu. yd. concr. (intake and outlet works), 7,000,000 lb. reinforcing steel, 105,000 lb. weld. steel plate lining, 12,000 cu. yd. excavation enlarge tunn.), 5,300 cu. yd. exc. (intake and outlet struc.)

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Awards as follow by Metropolitan Water District of So. Calif., 306 W. 3rd St., L. A., for construction of Monrovia No. 1, No. 2 and No. 3 tunnels, and Pasadena tunnel and appurtenant works, under Spec. No. 77, LOS ANGELES COUNTY. **Sched. 1**—To West Const. Co., 615 Richfield Bldg., L. A., $528,100 for Monrovia Nos. 1 and 2 tunnels and appurtenant works, lengths of tunnels 7865 and 940 ft. **Sched. 2**—To West Const. Co., 615 Richfield Bldg., L. A., $1,782,400 for Monrovia tunnel No. 3 and appurtenant works; 32,114 ft. long. **Sched. 3**—To L. E. Dixon, Bent. Bros., Johnson, Inc., 609 S. Grand Ave., Los Angeles, $621,180 for const. of Pasadena tunnel and appurtenant works. (See Unit Bid Summary.) 12-24

SAN FRANCISCO, CALIF.—To Kemper Const. Co., Ltd., 3701 S. Overland Ave., Los Angeles, $77,860, by Public Utilities Comm., San Francisco, for constructing Tunnel No. 1B, Lower Cherry Aqueduct, to be 2910 ft. long, under Spec. H. H. W. S. 151. 1-3

FLOOD CONTROL WORK

WORK CONTEMPLATED

LOS ANGELES, CALIF.—Plans and specifications are being completed by S. M. Fisher, County Flood Control Engineer, 205 S. Broadway, Los Angeles, for construction of a concrete conduit in Little Dalton, Wash. Estimated cost of work is $83,000. 12-28

LOS ANGELES, CALIF.—Call for bids will be issued shortly by County Board of Supervisors, Hall of Records, Los Angeles, for construction of a concrete conduit in Balloona Creek on Venice Boulevard, between Redondo Blvd. and Cochran Ave., Los Angeles, east of Culver City. Estimated cost $100,000. 12-28

VENTURA, CALIF.—Special election will be held Feb. 5th (tentative date) by City of Ventura to vote $1,150,000 in bonds to finance construction of the Hoffman Dam on Coyote Creek. The structure will be 87 ft. in height with a reservoir capacity of 9800 acre feet, so constructed that it may be raised to 130 ft. in height with a capacity of 42,000 acre ft. J. B. Lippincott is Consulting Engr. 1-2

DENVER, COLORADO—Plans and specifications have been completed by A. K. Vickrey, City Engineer, Denver, Colorado, and protests will be heard at 11 a.m., Feb. 6th, by Manager of Improvements and Parks, 79 City-County Bldg., Denver, Colo., for construction of the Cherry Creek Retarding Dam to be located near Sullivan, Colo., 5 mi. southeast of Denver. Estimated cost $734,000. 12-27

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 14th, by County Board of Supervisors, Los Angeles, for construction of 6800 feet single pile and wire revetment on east and west banks of San Gabriel River, Beverly Blvd., to 5700 ft. upstream. 1-5

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 14th, by County Board of Supervisors, Los Angeles, for pile and wire revetment on San Jose Creek, 2600 ft. upstream and 2000 ft. downstream from Mission Mill road, involving: 2,160 cu. yd. channel excavation, 3,880 lin. ft. single pile and wire revetment. 1-5

BIDS RECEIVED

NOGALES, ARIZ.—Harry J. Karns submitted low bid of $21,424 to International Boundary Comm., 1st Natl. Bank Bldg., El Paso, Texas, for construction of Unit No. 2, Nogales Flood Control Project. 12-21

LOS ANGELES, CALIF.—J. L. McClain, 5850 Brynhurst Ave., Los Angeles, $57,073 and $56,045 ALT., low to County Board of Supervisors, Hall of Records, Los Angeles, for construction of a debris basin in Brand Canyon, Glendale.

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Sharp & Fellows Constr. Co., 533 Central Bldg., L. A., $3,658 by County Bd. of Superv., L. A., for const. of pile and wire revetment on upper Los Angeles River in vicinity of Barham Blvd. and Buena Vista Ave. 12-19

LOS ANGELES, CALIF.—To B. L. Rhea, 4315 E. 15th St., Long Beach, $2295 to County Board of Supervisors, Los Angeles, for construction of pile and wire revetment on San Gabriel River, from Firestone Blvd., upstream. 12-19

LOS ANGELES, CALIF.—To B. L. Rhea, 4315 E. 15th St., Long Beach, $1,396.50 to County Board of Supervisors, Los Angeles, for construction of 1300 ft. pile and wire revetment on north bank of Rio Hondo above Foster Bridge Blvd. 1-5

LOS ANGELES, CALIF.—To Oscar Oberg, 150 N. Vista, Los Angeles, $18,812 to County Board of Supervisors, Los Angeles, for construction of pile and wire revetments on L. A. River from Victory Blvd., downstream. 1-5

LOS ANGELES, CALIF.—To Shannahan Bros., 6181 Eastern Ave., Los Angeles, $87,915, to County Board of Supervisors, Hall of Records, Los Angeles, for construction of Unit No. 8, San Gabriel River Outlet, Alamitos Bay. (See Unit Summary.) 1-5

SAN JOSE, CALIF.—Contract officially awarded as follows (with P.W.A. approval) by Santa Clara Valley Water Conservation Dist., 62 Grant Bldg., San Jose, Calif. (1) To F. O. Bohnett, Campbell, Calif., and D. McDonald, 204 23rd St., Sacramento, $372,020 for const. the Almaden Dam, to be 475 ft. long, 105 ft. high, earthfill concr. facing; the Calero Dam, to be 850 ft. long, 90 ft. high; Calero Auxiliary Dam, to be 550 ft. long, 35 ft. high; and the Calero Conduit, to be 4 mi. long, under Contract 2. (2) To F. O. Bohnett, Campbell & D. McDonald, Sacramento, $174,670 for const. the Stevens Creek Dam, to be 100 ft. long, 120 ft. high, earthfill, concrete facings. (See Unit Bid Summary.) 12-27

VENTURA, CALIF.—To Moorpark Cement Pipe & Const. Co., Moorpark, by County Bd. of Supervisors, Court House, Ventura, for construction of Bradley Road Debris check dam. Bids received on: 55 cu. yd. "A" concrete, $20.00; 4,000 lb. reinforcing steel, $.045. 12-24

VENTURA, CALIF.—To C. F. Robbins and J. P. Immel, P.O. Box 902, Ventura, $3.12 per ft. to County Superv., Ventura, for const. 1800 lin. ft. all steel kellner jetty (ALT. BID). 12-10

MACHINERY and SUPPLIES

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 15th by D. P. Nicklin, Purch. Agent, Dept. Water & Power, 207 So. Broadway, L. A., for furnishing one USED mine hoist with drum cable capacity of not less than 1000 ft. of 1-in. cable, and one same with drum cable capacity of not less than 400 ft. of 1-in. cable; to be complete with motor, control equipment, etc. Specifications No. 1579. 12-28

MANHATTAN BEACH, CALIF.—Bids to 8 p.m., Jan. 17th, by City Clerk, City Hall, Manhattan Beach, for furnishing FOB trenchside 3300 ft. 8", Class 150, Bell and Spigot cast iron water pipe in nominal laying lengths of 12, 14, 16 or 18 ft. (16 ft. preferred.) 1-3

MARE ISLAND, CALIF.—Specifications have been completed and call for bids will be issued shortly by the Bureau of Yards and Docks, Navy Dept., Wash., D. C., for two 20-ton locomotive cranes for the Navy Yard, Mare Island, under Spec. No. 7857. 1-5

SAN FRANCISCO, CALIF.—Bids to 10 a.m., Jan. 23rd, by Signal Officer, Headquarters 9th Corps Area, Presidio of San Francisco, San Francisco, Calif., for furn. 1 ea. 250-watt radio transmitter, frequency to range from 1500 to 15,000 kcs., 200 to 20 meters wavelength—power source, 110-volts, 60 cycle, single phase, alternating current. 1-5

DENVER, COLO.—Bids to 2 p.m., Jan. 28th, by the Bureau of Reclamation, Denver, Colo., for furnishing the following under Spec. No. 648-D: 12—15, 2" x 14' bulkhead gates for turbine draft tubes, with lifting hooks, rollers, storage brackets, seals, and shoes; 1——11' 4" x 14' bulkhead gate for turbine draft tubes, with lifting hooks, rollers, storage brackets, seals, and shoes. Above are for installation in the Boulder Power Plant, Boulder Canyon Project, Arizona-California-Nevada. Delivery FOB cars at factory shipping point or Boulder City, Nevada.

LOS ANGELES, CALIF.—To California, Monolith, Riverside and Southwestern Portland Cement Cos., care of Louis Carmon, 1120 Bartlett Bldg., Los Angeles, $7,000,000 ($1.40 bbl.) to Metropolitan Water District, Los Angeles, for furnishing 5,000,000 bbl. of Portland cement, under Spec. No. 79. 12-8

LOS ANGELES, CALIF.—To Western Pipe & Steel Co., 5717 Santa Fe Ave., Los Angeles, $6,765 to S. A. Joseph, Purch. Agent, Metrop. Water Dist., L. A. for 22" I. D. fabricated pipe, under Bid No. 30438, FOB cars, manufacturers' plant. 12-14

LOS ANGELES, CALIF.—To Western Pipe & Steel, 5717 Santa Fe, L. A., $13,600 to D. P. Nicklin, purch. agent., Dept. Water & Power, L. A., for 20,000 ft. 18" welded steel ventilating pipe under Spec. No. 1564. 12-19

LOS ANGELES, CALIF.—To Reliable Iron Foundry, 1583 Fishburn, Los Angeles, $11,200 to D. P. Nicklin, purch. agent, Dept. Water & Power, Los Angeles, for furnishing cast iron fittings for period of six months, under Spec. No. 1540. 12-19

LOS ANGELES, CALIF.—To Pittsburgh Equitable Meter Co., 1918 E. 7th St., L. A., $10.50 each to D. P. Nicklin, purch. agent, Dept. Water & Power, L. A., for furnishing 500 ¾" x 1" positive displacement type water meters, FOB 410 Ducommun St., Los Angeles, under Spec. No. 1552. 12-19

LOS ANGELES, CALIF.—To Keenan Pipe & Supply, 825 Maple, Los Angeles, $9,492, to D. P. Micklin, purch. agent, Dept. Water & Power, L. A., for copper service connection tubing under Spec. No. 1559. FOB 410 Ducommun St., Los Angeles. 12-19

LOS ANGELES, CALIF.—To National Tank & Mfg. Co., 8201 Santa Fe Ave., Los Angeles, $1430, to U. S. Forest Supervisor, 751 South Figueroa St., Los Angeles, for 22 galvanized corrugated steel tanks, 8-ft. diameter, 5-ft. 5 in. 12-19

LOS ANGELES, CALIF.—To American Pipe & Steel Co., $1800, to D. P. Nicklin, Purch. Agent, Dept. Water & Power, L. A., for one steel water tank under Bid No. 4185. 12-21

LOS ANGELES, CALIF.—To Southwestern Portland Cement Co., 727 W. 7th St., Los Angeles, $2.21 per bbl. to H. E. Russell, County Purch. Agent, Los Angeles, for 2000 bbl. gray Portland cement, under Spec. No. 8447. 12-21

LYNWOOD, CALIF.—To American Cast Iron Pipe Co., 412 W. 6th St., Los Angeles, $8,756, by City Clerk, City Hall, Lynwood, Calif., for cast iron water pipe under Spec. No. WWP421. 12-21

OAKLAND, CALIF.—To Byron Jackson Co., 6th and Carlton St., Berkeley, $4,010.17 to East Bay Municipal Utility District, Oakland, for furnishing 3 vertical shaft turbine pumps, 400 gal. per min., under L. S. 133.

OCEANSIDE, CALIF.—Awards as follow by City Council, City Hall, Oceanside, for furnishing water pipe: (1) To U. S. Pipe & Foundry Co., 417 S. Hill St., Los Angeles, who bid $3,258. (2) To Rensselaer Valve Co., Subway Terminal Bldg., Los Angeles, $72.80 for 26" and 24" gate valves. 12-7

PORTERVILLE, CALIF.—Awards as follow by the City Clerk, City Hall, Porterville: (1) To U. S. Pipe & Foundry Co., Monadnock Bldg., S. F., $7,544.32 for furn. 4 to 10" cast iron pipe and fittings. (2) To Rensselaer Valve Co., 65 New Montgomery St., S. F., $647.44 for valves. (3) To Grinnell Co. of the Pacific, 5th and Brannan Sts., S. F., $425.70 for hemp and lead. 12-14

RED BLUFF, CALIF.—To Montague Pipe & Steel Co., 1990 3rd Street, San Francisco, $4,860 (Del. on job) to City Clerk, City Hall, Red Bluff, for furnishing 6000 ft. 12-in. steel pipe for City Water Works. 12-7

SAN DIEGO, CALIF.—Awards recommended as follows by H. J. Schaper, Ass't City Purch. Agent, San Diego, for furnishing pipe, etc. (1) To U. S. Pipe & Foundry Co., 417 S. Hill St., L. A., cast iron pipe, $11,550. (2) To American Concrete & Steel Pipe Co., 4635 Firestone Blvd., South Gate, reinf. conc. pipe, $26,951. (3) To Standard Iron Works and Barth Foundry, pipe fittings, $1,930. 12-28

SAN FRANCISCO, CALIF.—To Vernon Foundry, Inc., 280 San Bruno Ave., San Francisco, (Factory, Hollydale, Calif.) $16,875, to Purchaser of Supplies, San Francisco, for furnishing cast iron specials (under P.W.A. provisions). Bid No. 1261, for City of San Francisco. 12-19

SAN FRANCISCO, CALIF.—To Chapman Valve Mfg. Co., 508 4th St., San Francisco, $72,095 to Purchaser of Supplies, San Francisco, for furnishing 30", 36", 42" and 48" gate valves, under Bid No. 1284. 12-27

SAN FRANCISCO, CALIF.—To Waterworks Supply Co., 501 Howard St., San Francisco, $2472, by Purchaser of Supplies, City Hall, San Francisco, for furnishing one Venturi meter (PWA provisions). 12-28

SAN FRANCISCO, CALIF.—To Pelton Water Wheel Co., 2929 19th Street, San Francisco, $5,725, to Purchaser of Supplies, San Francisco, for furnishing to the City and County of San Francisco, one 66" Butterfly valve under PWA Provisions, under Bid No. 1297. 12-28

DENVER, COLO.—To Babcock & Wilcox, Boulder City, Nev., $38,500, to Bureau of Reclamation, Denver, Colo., for furnishing one station service penstock for installation at the Boulder Power Plant, Boulder Canyon Project, Arizona-California-Nevada, under Spec. No. 633-D. 12-10

DENVER, COLO.—To McCintic-Marshall Corp., Bethlehem, Pa., $29,319, by Bureau of Reclamation, Denver, Colo., for furnishing 4 structural steel bridge spans for intake towers at Boulder Dam, under Spec. 634-D. 12-24

HOT SPRINGS, MONTANA.—Awards as follow by the Town Clerk, Hot Springs, Montana, for furnishing the following: (1) To Pacific States Cast Iron Pipe Co., Portland, Oregon, $17,531, for furnishing cast iron pipe. (2) To Monarch Pipe & Creocoting Co., Tacoma, Wn., $3,979.75, for furn. woodstave pipe. (3) To Pittsburgh Des Moines Steel Co., Des Moines, Iowa, $3,745, for steel water storage tank. 12-17

CENTERFIELD, UTAH—To Pacific States Cast Iron Pipe Co., Provo, Utah, 16,193, by City Clerk, Centerfield, Utah, for furnishing 19,392 lin. ft. 6" cast iron pipe and valves and fittings. 12-24

PULLMAN, WASH.—Awards as follow (subject to the P.W.A. approval) by the Board of Regents of the State College of Washington at the Davenport Hotel, Spokane, Wash., for furnishing and installing mechanical equipment for the Power Plant on the Campus of the State College of Washington at Pullman, Wash.: (1) To C. C. Moore & Co., Smith Tower, Seattle, Wash., $118,128, for furn. and installing mechanical equipment. (2) To Allis-Chalmers Co., Smith Tower, Seattle, Wash., $1,281, for furnishing transformers and motors. 1,2

MISCELLANEOUS

WORK CONTEMPLATED

CHULA VISTA, CALIF.—The P.W.A. has made a loan and grant of $43,600 to Chula Vista, San Diego County, Calif., for the purchase of a park site, landscaping and improvements to same and for construction of a swimming pool and bath house. 12-18

HAYWARD, CALIF.—The P.W.A. has made a loan and grant of $75,000 to Hayward, Alameda County, Calif., for construction of a fireproof Municipal Natatorium building with a swimming pool. 12-18

LOS ANGELES, CALIF.—Harbor Department, Los Angeles, has granted permit to Associated Oil Co., to erect two 10,000 bbl. oil tanks at rear of Berth 119. Estimated cost $11,900. 1-3

LOS ANGELES, CALIF.—Board of Harbor Commissioners has granted permit to the Associated Oil Co. to erect 4 oil tanks (estimated cost $7000) and a concrete firewall (estimated cost $2500) at rear of Berth 118, Los Angeles, Harbor. 12-21

LOS ANGELES, CALIF.—Board of Harbor Commissioners has granted permit to Vegetable Oil Products Co. (S. M. Cope, contractor) to construct a vegetable oil tank, 30 ft. diam., 20 ft. high at Berth No. 187, Wilmington. Estimated cost $3,300. 12-21

SAN DIEGO, CALIF.—City of San Diego will apply for more than $1,500,000 of the State Relief Funds for the following municipal projects to be started after Jan. 1st: Repair of Hodges Dam, $100,000; construction of a California Building for Intl. Exposition, $500,000; const. of a San Diego building for Intl. Exposition, $500,000; addition of 2 wings and repairs to City Library, $200,000; const. of prison, police station and courthouse, $250,000. 12-24

CALL FOR BIDS

SUMMIT, C. Z.—Bids to 11 a.m., Jan. 23 by Bureau of Yards & Docks, Navy Dept., Washington, D. C., for motor and hand-operated winches for antennas at Naval Radio Station, Summit C. Z., under Spec. No. 7800. 12-13

ELKO, NEVADA—Bids to 10 a.m., Jan. 16th, by Procur. Div., Treasury Dept., Public Works Branch, Wash., D. C., for const. of new conc. retaining walls, wall copings, etc., at the U. S. Postoffice at Elko. 1-2

MARE ISLAND, CALIF.—Bids will be called for shortly to be opened at a later date by the Bureau of Yards and Docks, Navy Dept., Washington, D. C., for a 40-ton outdoor electric gantry crane and runway at the Navy Yard, Mare Island, Calif., under Spec. No. 7855. 12-22

FARALLON ISLAND, CALIF.—Bids to 11 a.m., Jan. 16th, by the Public Works Officer, U. S. Navy Yard, Mare Island, Calif., for replacing two water tanks and supporting platforms; for providing a new water filter and a new water pump; for enlarging a bathroom in Quarters No. 6; for installing new windows in Quarters No. 3; for replacing all windows in Quarters No. 4 and for replacing or repairing wooden sidewalks all at the U. S. Naval Direction Finder Station, Farallon Island, Calif., under Spec. No. 7757. 12-21

SAN DIEGO, CALIF.—Bids to 11 a.m., Jan. 15th, by 11th Naval Dist., ft. of Broadway, San Diego, for grading for and provision and installation of concr. floor pavements in two hangars each 140 ft. by 110 ft. with one course Portland cement, 5-in. thickness, in landplane hangars at the Naval Operating Base (Air Station) San Diego. Spec. No. 7866. 12-31

LUALUALEI, T. H.—Bids to Jan. 23, 11 a.m., by Bureau of Yards & Docks, Navy Dept., Washington, D. C., for motor and hand-operated winches for antennas at the Naval Radio Station, Lualualei, Oahu, T. H., under Spec. No. 7801. 12-13

BIDS RECEIVED

SAN LUIS OBISPO, CALIF.—Theo M. Maino, 1424 Mill St., San Luis Obispo, $3,595 low to District Engineer, Calif. Div. of Highways, San Luis Obispo, for 0.6 mi. rem. and dispose of trees in Montecito, SANTA BARBARA CO. 12-17

CONTRACTS AWARDED

STOCKTON, CALIF.—To Bundesen & Lauritzen, P. O. Box 395, Pittsburg, $4,689, to the County Clerk, Court House, Stockton, for constructing a ferry boat. 12-19

BUILDING CONSTRUCTION

CALL FOR BIDS

WASHINGTON, D. C.—Bids will be received on the following dates by the Treasury Dept., Procurement Div., Public Works Branch, Washington, D. C., for the construction of U.S. Postoffices in the following cities: KINGMAN, ARIZ., Feb. 6, cost $44,000; PHOENIX, ARIZ., Feb. 15, cost $635,559; WINSLOW, ARIZ., Feb. 11, cost $49,500; BELL, CALIF., Feb. 8, cost $38,300; COMPTON, CALIF., Feb. 11, cost $77,000; HUNTINGTON PARK, CALIF., Feb. 21, cost $167,000; INGLEWOOD, CALIF., Feb. 25, cost $90,000; HOLLISTER, CALIF., Jan. 25, cost $45,100; NORTH HOLLYWOOD, CALIF., Feb. 8, cost $56,100; OCEANSIDE, CALIF., Feb. 14, cost $55,000; ROSEVILLE, CALIF., Feb. 8, cost $45,100; SAN MATEO, CALIF., Feb. 8, cost $117,000; SAN RAFAEL, CALIF., Feb. 11, cost $64,900; WOODLAND, CALIF., Feb. 8, cost $69,900; ALAMOSA, COLO., Feb. 4, cost $67,100; PUEBLO, COLO., Jan. 30, cost $177,000; BLACKFOOT, IDAHO, Feb. 6, cost $115,000; WALLACE, IDAHO, Feb. 15, cost $85,000; GLENDIVE, MONTANA, Feb. 6, cost $70,000; BAKER, ORE., Feb. 13, cost $49,000; McMINNVILLE, ORE., Jan. 21, cost $55,000; KELSO, WN., Feb. 18, cost $85,000; LAURIER, WN., Feb. 15, inspection station, cost $67,500; MT. VERNON, WN., Feb. 14, cost $75,000; PROSSER, WN., Jan. 16, cost $60,000; PUYALLUP, WN., Feb. 14, cost $70,000; GILLETTE, WYO., Feb. 19, cost $65,000; WHEATLAND, WYO., Feb. 4, cost $65,000; WORLAND, WYO., Feb. 1,: cost $65,000.

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., January 23rd, by the Dept. of Public Works, City Hall, San Francisco, for constructing the Glenn Park School to be located at Lippard and Bosworth Streets in City of San Francisco. Bids will be received on: General Contract, est. cost, $216,000; Electrical Work, ets. cost, $14,000 ! Mechanical and Plumbing, est. cost $31,000. 12-12

BIDS RECEIVED

SAN FRANCISCO, CALIF.—Bids received as follows by the Dept. of Public Works, City Hall, San Francisco, for construction of the Lawton School, located on Lawton St., betw. 30th and 31st Avenues, San Francisco: General Contract—Anderson & Ringrose, 320 Market Street, San Francisco (low) $142,715. Mechanical, Equipment and Plumbing—Alta Elec. & Mechan. Co., Inc., 467 O'Farrell St., S. F. (low) $17,671. Electrical Work—H. S. Tittle Co., 85 Columbia Square, S. F. (low), $9,402. 12-28

CONTRACTS AWARDED

CAMARILLO, CALIF.—Awards as follows by State Architect George B. McDougall, Public Works Bldg., Sacramento, for construction of Kitchen and Dining Room Building and Boiler Plant at the Camarillo State Hospital, Camarillo, Calif.: General Work—To Louis A. Geisler, 6212 Middleton St., Huntington Park, $162,593. Electrical Work—To Eddy Elec. Co., 309 E. Weber Ave., Stockton, Calif., $6,403. Mechanical Work—To Eddy Elec. Co., 309 E. Weber Ave., Stockton, Calif., $6,403. Mechanical Work—To F. C. Schilling, 3215 Beverly Blvd., Los Angeles, $26,852. Refrigerating Work—To York Ice Machinery Corp., Los Angeles, $13,325. 12-25

LONG BEACH, CALIF.—To Theo. A. Beyer Corporation, 3680 Fairway Blvd., Los Angeles, $32,180, to Treasury Dept., Procurement Div., Public Works Branch, Washington, D. C., for finishing the interior of the 4th, 5th, 6th, and 7th floors of the U. S. Postoffice, etc., at Long Beach, Calif. 12-10

OAKLAND, CALIF.—The Board of Supervisors, Court House, Oakland, has recommended awards of contracts (subject to P.W.A. approval) for const. a 12-story steel frame, reinf. conc. walled County Court House to be located betw. 12th and 13th Sts., and Fallon and Oak Streets, Oakland, as follow: Prop. 3. General Construction—To George Wagner, 181 S. Park, S. F. and K. E. Parker Co., 135 S. Park St., S. F., $948,574. Prop. 4. Excavation and Foundation—To J. Catucci. 1212 18th Ave., Oakland, $59,631. Prop. 5. Structural Steel—To Pacific Coast Steel Corp., 20th & Illinois, S., $158,416. Prop. 6. Elevators—To Otis Elevator Co., 1 Beach St., S. F., $104, 387. Prop. 7. Mechanical Work—To Alta Elec. & Mechanical Co., 467 O'Farrell, S. F., $228,880. Prop. 8. Jail Equipment—To Pacific El. Mfg. Corp., 5815 3rd St., S. F., $68,985. Oon basis of above awards—grand total is $1,568,873. 12-21

LIGHTING SYSTEMS

LOS ANGELES, CALIF.—Protests will be heard at 10 a.m., June 12th, 1935, by the City Council, Los Angeles, for ornamental lighting system on 165th Street between Hoover and Vermont. Work involves the following approximate quantity: 23 Union Metal Standards. 12-20

CONTRACTS AWARDED

HAMILTON FIELD, CALIF.—To Globe Elec. Co., 1899 Mission St., S. F., $5,786 by Const. Quartermaster, Hamilton Field, for installation of a night lighting system at Hamilton Field, Marin Co., Calif. 12-31

POWER DEVELOPMENT

WORK CONTEMPLATED

PAROWAN, UTAH—Bond election will be held Dec. 17 by Parowan, Utah, to vote on $20,000 in bonds to finance improvements to city's hydroelectric system. 12-8

Railroad Construction

WORK CONTEMPLATED

PORT ORFORD, OREGON—The Gold Coast Railroad Co., c/o G. E. Gale, Port Orford, Oregon, has applied to the Interstate Commerce Commission for authority to construct 95 miles of new railroad between Port Orford and Leland, Oregon. Application has been made to the R.F.C. for money for financing construction costs. 12-18

OPPORTUNITY SECTION

RATES: SITUATIONS WANTED—5c per word; HELP WANTED—No charge to subscribers; OFFICIAL BIDS—20c per line; ALL OTHERS—$2.50 per column inch.

When writing to the above advertisers please mention Western Construction News.

THE BUYERS' GUIDE

Refer to advertisements for address of companies listed. Advertisers index on Page 66

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Air Reduction Sales Co.

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Western Machinery Co.
Worthington Pump&Mach. Corp.

Air Hoists
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Great West. Electro-Chemical Co.

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Seaside Oil Co.
Union Oil Co.

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Bucyrus-Erie Co.
Harnischfeger Sales Corp.
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Marion Steam Shovel Co., The
Northwest Engineering Co.
Owen Bucket Co., Ltd.
Wellman Engineering Co., The

Bulldozers, Hydraulic
American Tractor Equip. Co.
Austin Western Road Machy. Co.
Le Tourneau, Inc., R. G.
Wooldridge Co., Mack.

Cableways
American Steel & Wire Co.
Columbia Steel Co.
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Carbide Torches
Air Reduction Sales Co.

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Portland Cement Association

Cement—Tan
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Northwest Engineering Co.
Ohio Power Shovel Co., The
Thew Shovel Co., The
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Northwest Engineering Co.
Thew Shovel Co., The

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Chicago Bridge & Iron Works

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Chicago Bridge & Iron Works

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Northwest Engineering Co.
Ohio Power Shovel Co., The
Thew Shovel Co., The

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Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Ohio Power Shovel Co.
Thew Shovel Co., The
Wellman Engineering Co., The

Drills, Rock
Gardner-Denver Co.
Western Machinery Co.
Worthington Pump&Mach. Corp.

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Austin Western Road Machy. Co.
Western Wheeled Scraper Co.

Engines—Diesel, Gasoline and Steam
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Bucyrus-Erie Co.
Caterpillar Tractor Co.
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Harnischfeger Sales Corp.
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Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Ohio Power Shovel Co.
Thew Shovel Co., The

Expansion Joints
Aquatite Co.
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Apache Powder Co.
Giant Powder Co., Cons., The
Herules Powder Co.
Trojan Powder Co.

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California Corrugated Culvert Co.
Chicago Bridge & Iron Works

Forms, Steel
Blaw-Knox & Western Pipe Corp.

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Sullivan Machinery Co.
Western Machinery Co.

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Chicago Bridge & Iron Works
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California Corrugated Culvert Co.

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California Corrugated Culvert Co.

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Adams Co., J. D.
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Caterpillar Tractor Co.
Galion Iron Wks. & Mfg. Co., e

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Austin-Western Road Mchy Co.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Iowa Mfg. Corp.
Link-Belt Co.
Northwest Engineering Co.
Smith Engineering Works

Grinders, for Detachable Bits
Ingersoll-Rand Co.

Hoists, Hand and Power
Alloy Steel & Metals Co.
American Hoist & Derrick Co.
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Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
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Reilly Tar & Chem. Corp.

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Neptune Meter Co.
Smith Co., The T. L.

Continued on Page 64)

OPPORTUNITY SECTION

HELP WANTED

WANTED — Salesman for construction equipment in Northern California and Nevada. Energy and ability more important than long experience and acquaintance. Mail qualifications to Box 401, Western Construction News, 114 Sansome St., San Francisco, Calif.

Notice to Contractors

Oakland, California, January 5, 1935.

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 5:30 o'clock p. m., Friday, January 18, 1935, and will at that hour be opened for constructing and furnishing, F.O.B. 22nd and Adeline Streets, Oakland, California, a pneumatic conveying system for alum and quicklime for the Orinda Filter Plant. Plans and specifications for this work may be obtained from the office of the purchasing agent of the district.

JOHN H. KIMBALL, Secretary.

THE BUYERS' GUIDE —Continued from Page 62

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Adams Co., J. D.
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J. D. Adams Co. (McCormick-Deering)
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Chicago Bridge & Iron Works

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Le Tourneau, Inc., R. G.

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Reo Motor Car Co.

Truck Tires
Goodrich Rubber Co., B. F.

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Bucyrus-Erie Co.
Harnischfeger Sales Corp.
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Turbines, Hydraulic
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Water Works Supply Co.

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California Corrugated Culvert Co.
Pelton Water Wheel Co., The
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Valves, Hydraulic
California Corrugated Culvert Co.
Pelton Water Wheel Co., The

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Allis-Chalmers Mfg. Co.
American Tractor Equipment Co.
Austin Western Road Machy. Co.
Western Wheeled Scraper Co.

Waterproof Cement
Pacific Portland Cement Co.

Waterproofing Materials
Aquatite Co.

Water Wheels
Pelton Water Wheel Co., The
Water Works Supply Co.

Welders, Acetylene
Air Reduction Sales Co.

Welders, Electric Arc
Harnischfeger Sales Corp.

Welding Apparatus
Air Reduction Sales Co.

Welding, Wire
Air Reduction Sales Co.
Columbia Steel Co.
Roebling's Sons Co., John A.

Wire Cloth
National Wire Cloth Co.

Wire Rope
American Cable Co., Inc.
Columbia Steel Co.
Leschen & Sons Co., A.
Roebling's Sons Co., John A.

OPPORTUNITY SECTION

UNITED STATES DEPARTMENT
OF THE INTERIOR

Bureau of Public Roads

Excavation, Grading, Crushed Gravel, Hauling, Road Material, etc.

OPPORTUNITY SECTION —WEST CONSTR

San Francisco, California, Jan. 9, 1035

Sealed bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p. m. on January 31, 1935, for placing a crushed gravel base course on Sections A and B of Route 51, the Hoopa National Forest Highway, Trinity National Forest, Humboldt County, California, involving major items of approximately: 1,000 cubic yards unclassified excavation, 8.606 miles fine grading subgrade and shoulders, 23,000 tons crushed gravel base course, 500 tons supplemental crushed gravel, 500 tons crushed gravel screenings, 58,000 ton miles hauling crushed gravel base course, 1,500 M gallons watering, 200 tons liquid asphaltic road material, 60 each right-of-way monuments. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for immediate labor and 60 cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the **compliance with codes of fair competition**; the **subletting** and **assignment** of the contract; and to the **alternate bids** which must be submitted in case the bidder desires to offer any **foreign** articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Riscal Agent, U. S. Forest Service. Plans, specifications and propsals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

OFFICIAL BIDS

Notice to Contractors

Oakland, California, January 10, 1935.

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8:00 p.m., Wednesday, January 23, 1935, and will at that hour be opened for furnishing and installing an automatic fire sprinkler system complete in the Sixteenth Street Office Building of the District.

The general prevailing rate of per diem wages in the locality in which the work is to be performed, for laborers and each craft or type of workman and mechanic needed to execute the contract, and the general prevailing rate for legal holiday and overtime work specifically set forth in the plans and specifications on file with the Secretary of the District, are referred to and incorporated **herein.**

Specifications (No. LS 137) may be obtained upon application at Room 33 of the office of the District.

JOHN H. KIMBALL, Secretary.

Notice to Contractors

Oakland, California, January 10, 1935.

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8:00 p.m., Wednesday, January 23, 1935, and will at that hour be opened, for performing all necessary work to install approximately 484 feet of 20" cast iron pipe and fittings, under the Oakland Inner Harbor from Derby Avenue, Oakland, to Broadway, Alameda.

The general prevailing rate of per diem wages in the locality in which the work is to be performed, for laborers and each craft or type of workman and mechanic needed to execute the contract, and the general prevailing rate for legal holiday and overtime work specifically set forth in the plans and specifications on file with the Secretary o fthe District, are referred to and incorporated herein.

Specifications (No. LS 136) may be obtained upon application at Room 33 of the office of the District.

JOHN H. KIMBALL, Secretary.

UNITED STATES DEPARTMENT OF
THE INTERIOR

Bureau of Reclamation

Federal Emergency Administration of
Public Works Project

Pumping Plant, Structures and Canal Lining

Washington, D. C., December 24, 1934.

Sealed bids (Specifications No. 606) will be received at the office of the U. S. Bureau of Reclamation, Hyrum, Utah, until 10 a.m., January 21, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the construction of **a pumping plant, structures and canal lining**, on the Hyrum-Mendon, Hyrum Feeder and Wellsville canals, Hyrum project, Utah. The work is located near Hyrum and Wellsville, Utah. The principal items and estimated quantities involved are as follows: 15,750 cubic yards of all classes of excavation; 2,200 square yards of trimming canal section for concrete lining; 3,600 cubic yards of back fill; 1,070 cubic yards of concrete; 20 square yards of dry-rock paving; placing 100,000 pounds of reinforcement bars; constructing 300 linear feet of 8-inch diameter clay sewer pipe drain; installing 4,500 pounds of gates and miscellaneous metal work; installing windows, doors, structural steel, built-up asphalt-saturated felt roofing, and pumping machinery in pumping plant; and erecting plate-steel penstock, wasteway, and discharge pipes. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be a part of the contract. The work must be completed within 120 calendar days. Bid security in an amount not less than 10 per cent and performance bond not less than 50 per cent will be required. No charge to prospective bidders for copies of the specifications and drawings; to others $1.50, not returnable. For particulars, address the Bureau of Reclamation, Hyrum, Utah; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD, Commissioner.

PROFESSIONAL DIRECTORY

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