WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

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SAN FRANCISCO, DECEMBER 25, 1929

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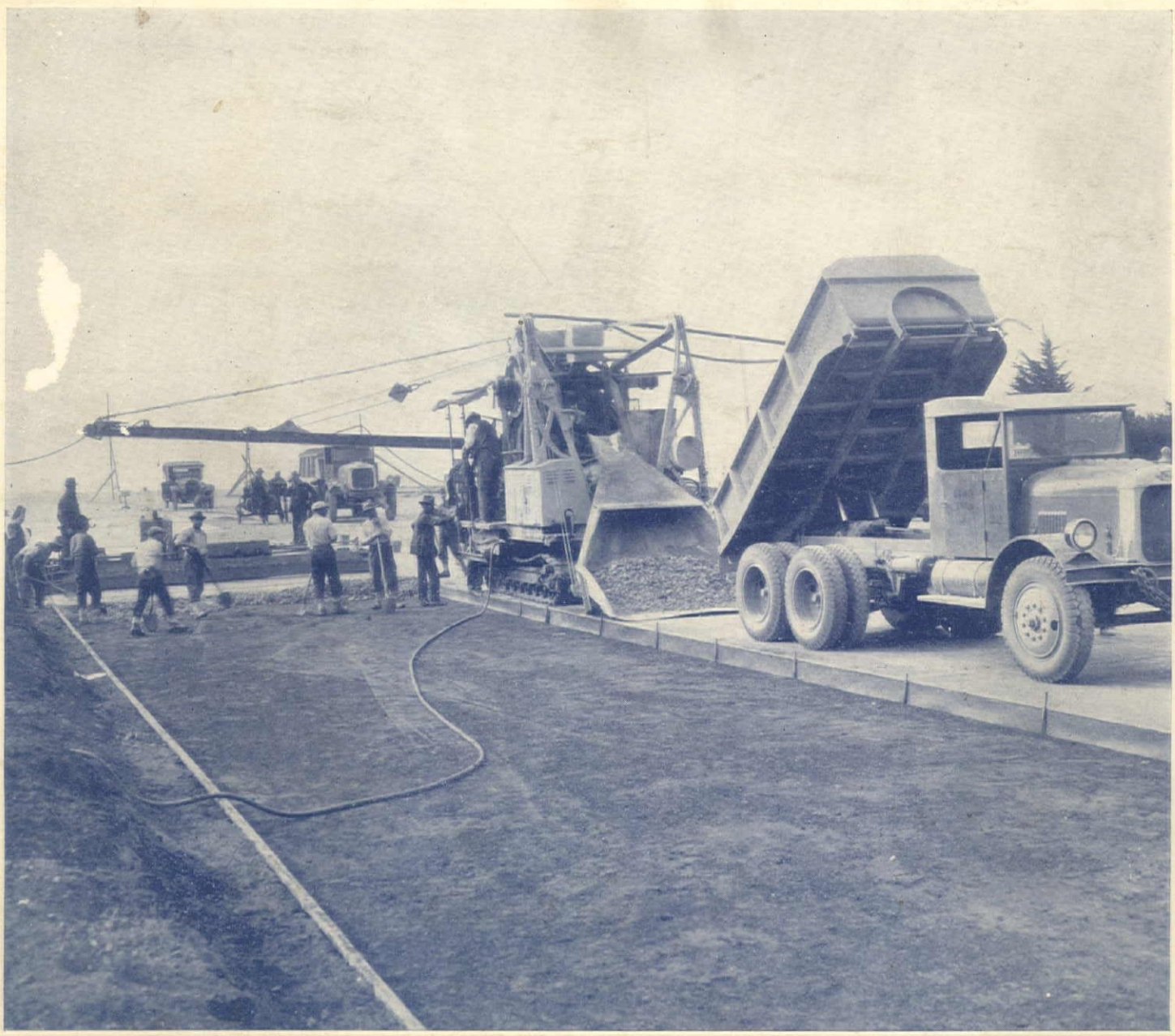

PLACING CONCRETE ON JUNIPERO SERRA BLVD., SAN FRANCISCO. EATON & SMITH, CONTRACTORS

Mobility, High Speeds and Stability make P&H Cranes Big Producers

1930
CONVENTION &
ROAD SHOW
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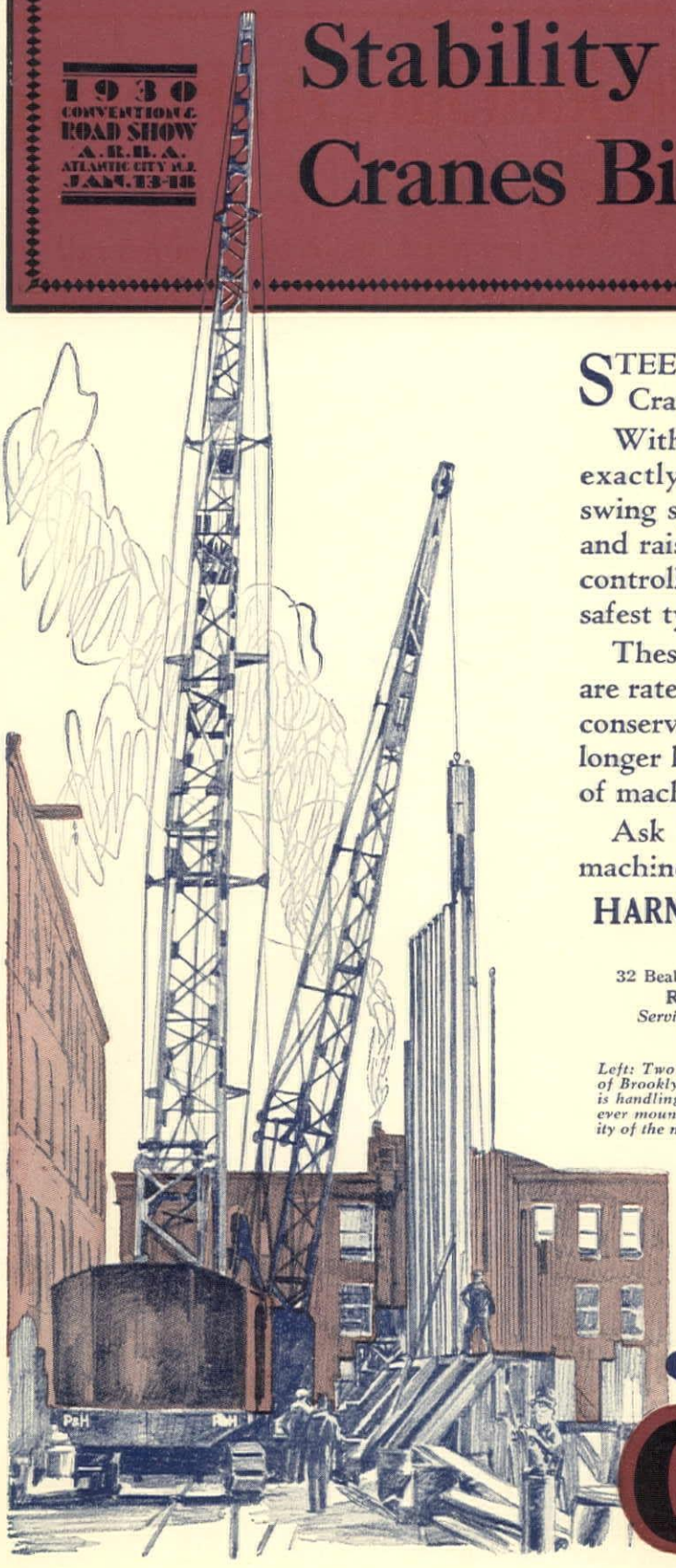

STEEL erectors and bridge builders find P&H Crawler Cranes a profitable investment.

With their steering brakes they can be steered exactly where needed in jig time. Line and swing speeds are exceptionally fast. Lowering and raising of the load can be very accurately controlled. The safety worm boom hoist is the safest type known to engineers.

These cranes are exceptionally stable. They are rated at only 75% of the tipping load. This conservative method of rating insures a far longer life than is usually expected in this class of machinery.

Ask for detailed Bulletins describing these machines.

HARNISCHFEGER SALES CORPORATION

Established 1884

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ROBERT M. TAYLOR, *Pacific Coast Manager*

Service Stations, Complete Repair Part Stocks and Excavators at San Francisco, Los Angeles and Seattle, Wash.

Left: Two P & H 20-ton cranes owned by the Todd Shipbuilding Company of Brooklyn. Although the standard boom is 50 ft. long one of these cranes is handling a 3200 lb. load with a 100 ft. boom. This is the longest boom ever mounted on a crawler crane of this capacity, showing the reserve stability of the machine.

P&H
CORDUROY
CRANES

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DEVOTED TO CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

VOLUME IV DECEMBER 25, 1929 NUMBER 24

CONTENTS

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Joints that are Stress and Vibration Proof

Unusual situations often met in laying bell and spigot pipe —lines over bridges or railroad crossings—lines to be lowered to grade—are successfully met when the joints are made with Hydro-Tite.

The 8 in. line pictured above is slung across a pond with cables—a span of more than fifty feet.

Easy to Prepare

Every test shows that Hydro-Tite joints will remain perfectly tight when subjected to severe vibration or deflection.

Easy to Pour

If you have never used Hydro-Tite let us tell you more about it. Requires no caulking—19 years of proven dependability—a real 75% saving and an ever-increasing list of satisfied users.

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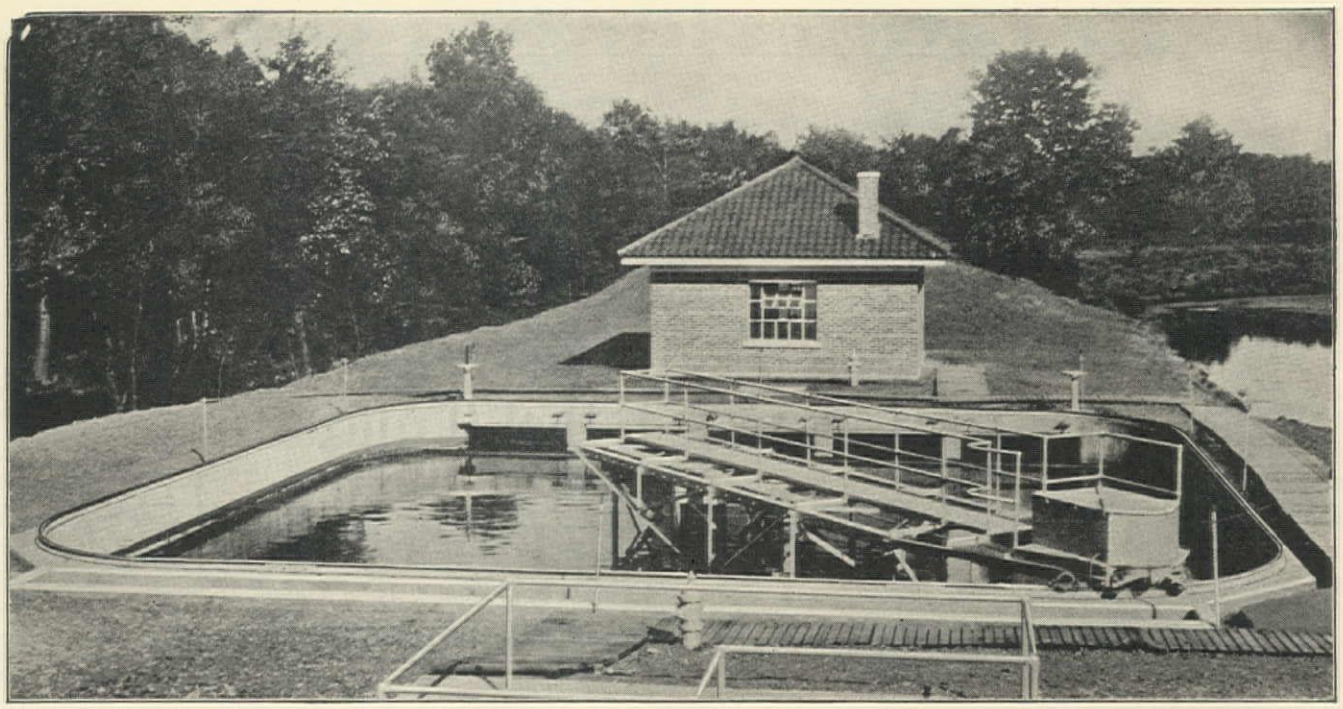
HYDRO-TITE

REG. U. S. PAT. OFF.

The MODERN JOINT MATERIAL



A Dorr Traction Clarifier used for sedimentation of trickling filter effluent in the Urbana-Champaign, Ill., Sanitary District's sewage treatment plant. Pearse, Greeley & Hansen, Consulting Engineers.

Settling Trickling Filter Effluent the Modern Way . . . *in a Dorr Traction Clarifier*

LEADING sanitary engineers recognize that it is just as advantageous to use Dorr Traction Clarifiers for sedimentation of final effluent in plants where trickling filters are operated, as it is to use the Clarifiers for all other sedimentation operations in sewage treatment plants.

The Clarifiers prevent the formation of septic sludge in the tank and resultant contamination of the effluent, by continuously removing the solids from the tank as they are deposited.

In appearance, Dorr Traction Clarifiers are neat and attractive, a credit to any plant; they are quiet in operation; and their mechanical performance is backed up by successful operating records at up-to-date sewage treatment plants in the United States, Canada and abroad. Traction Clarifiers are described in Bulletin 6191. May we send you a copy?

If you do not already have copies of our bulletins "Modern Sanitary Engineering Practice" and "Modern Sewage and Water Treatment Plants" our nearest office will gladly forward them to you.

DORRCO

THE DORR COMPANY

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247 PARK AVENUE NEW YORK CITY

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Locarno House.

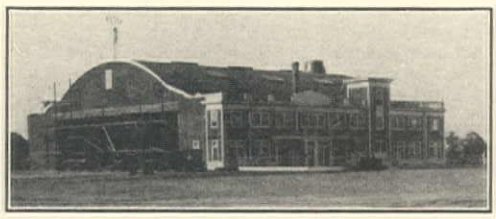
Pacific Pipe for Air Mail!

MAYBE you haven't connected *McWane-Pacific* Cast Iron Pipe with the Air Mail—except that both are leaders of progress! But air mail requires air ports, and at the important Medford, Oregon, city air port where the big mail planes pause between San Francisco and Portland, McWane-Pacific Precalked Joint Cast Iron Pipe is being installed as shown above to supply water to the field. Reliable pipe for reliable mail service.

WESTERN-MADE PIPE END RUST AND ROT

Pacific States Cast Iron Pipe is making the Intermountain and Pacific Coast states increasingly independent of other parts of the country for pipe.

Utah iron is being melted and moulded by Utah labor to make a high-grade western product—Pacific States Cast Iron Pipe.



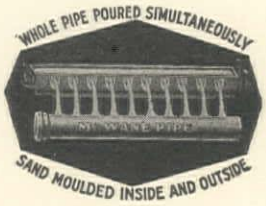
Medford, Oregon's modern municipal air port. McWane-Pacific Precalked Joint Cast Iron Pipe used for water mains.

No longer need high freight rates and long hauls force the Far West to use perishable substitutes for the enduring cast iron pipe. An end to rust, rot, and replacement troubles is made automatically when you use Pacific States Cast Iron Pipe.

Sizes: 1¼ through 12 inches. Standard lengths. Precalked Joint Fittings, too.

PACIFIC STATES CAST IRON PIPE IS FURNISHED WITH OR WITHOUT PRECALKED JOINTS

WRITE FOR ILLUSTRATED LITERATURE



McWANE CAST IRON PIPE

CAST IRON PIPE

McWANE CAST IRON PIPE CO. BIRMINGHAM, ALA.

PACIFIC STATES CAST IRON PIPE CO. PROVO, UTAH.

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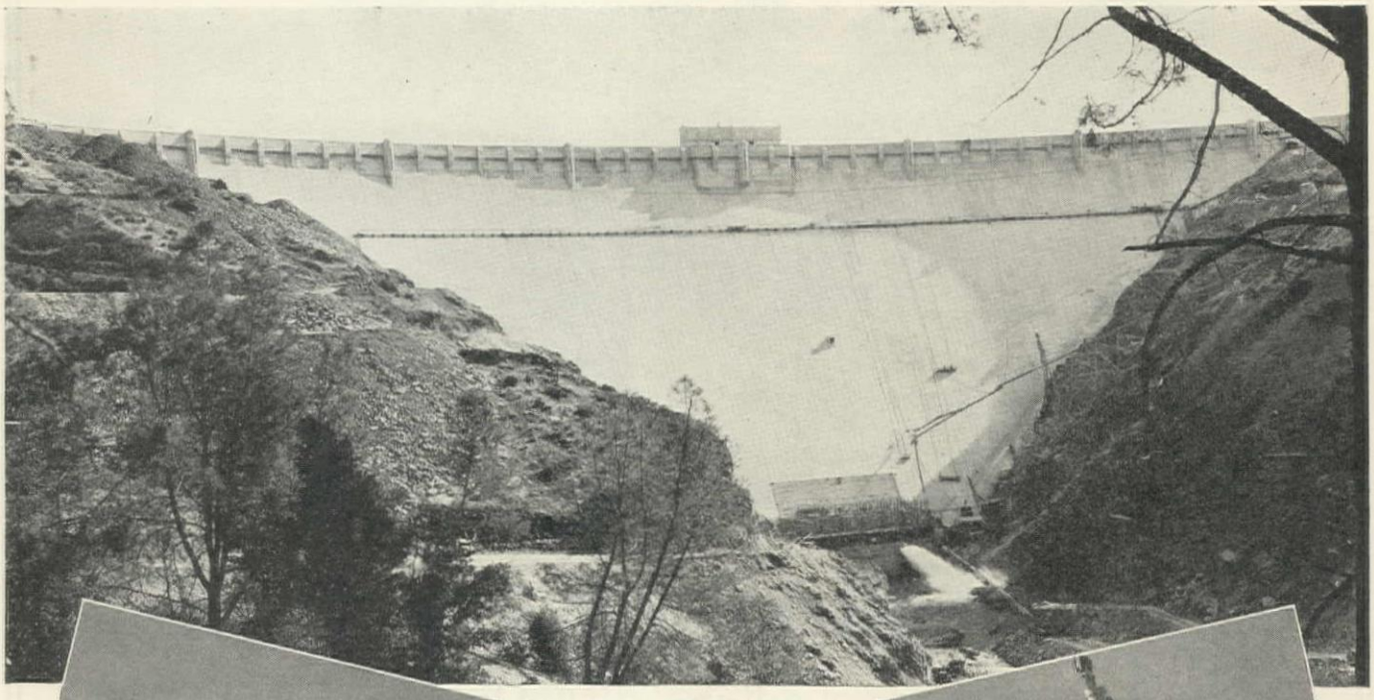
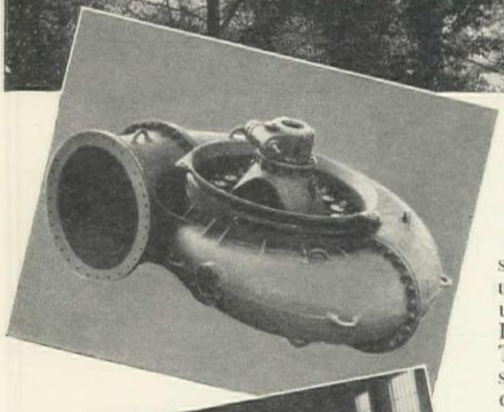
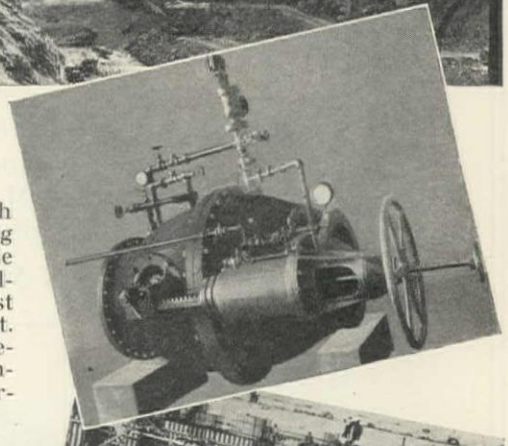
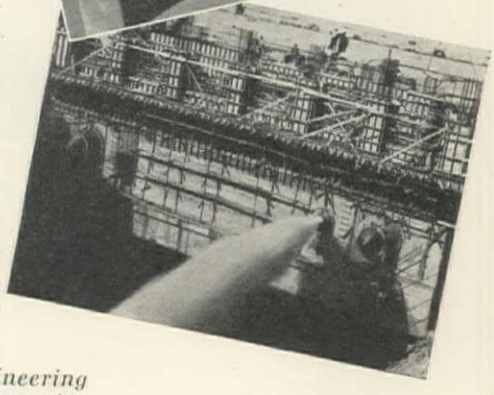
PELTON

Pelton Service on the Mokelumne Project









Downstream view of Pardee Dam. Larner-Johnson valves discharging in center foreground.

THE unusual extent to which Pelton hydraulic engineering service is available to a single utility is illustrated by the Mokelumne development of the East Bay Municipal Utility District. The major equipment items designed and built in our San Francisco works for this great undertaking include:

Two 10,000 Hp. reaction turbines.
Two 42x30" free discharge regulators.
Two 72x60" free discharge regulators.
One 48x35" main throttle valve.
Three 24" Type DS centrifugal pumps.
Three 30x24" check and throttle valves.
Four 42" synchronous stop and discharge valves.

Shop assembly views of one turbine, one check and throttle valve, and installation views of the centrifugal pumps and discharge regulators are shown in the small picture.

The full scope of Pelton hydraulic engineering service is readily available for any power, water works or irrigation problem

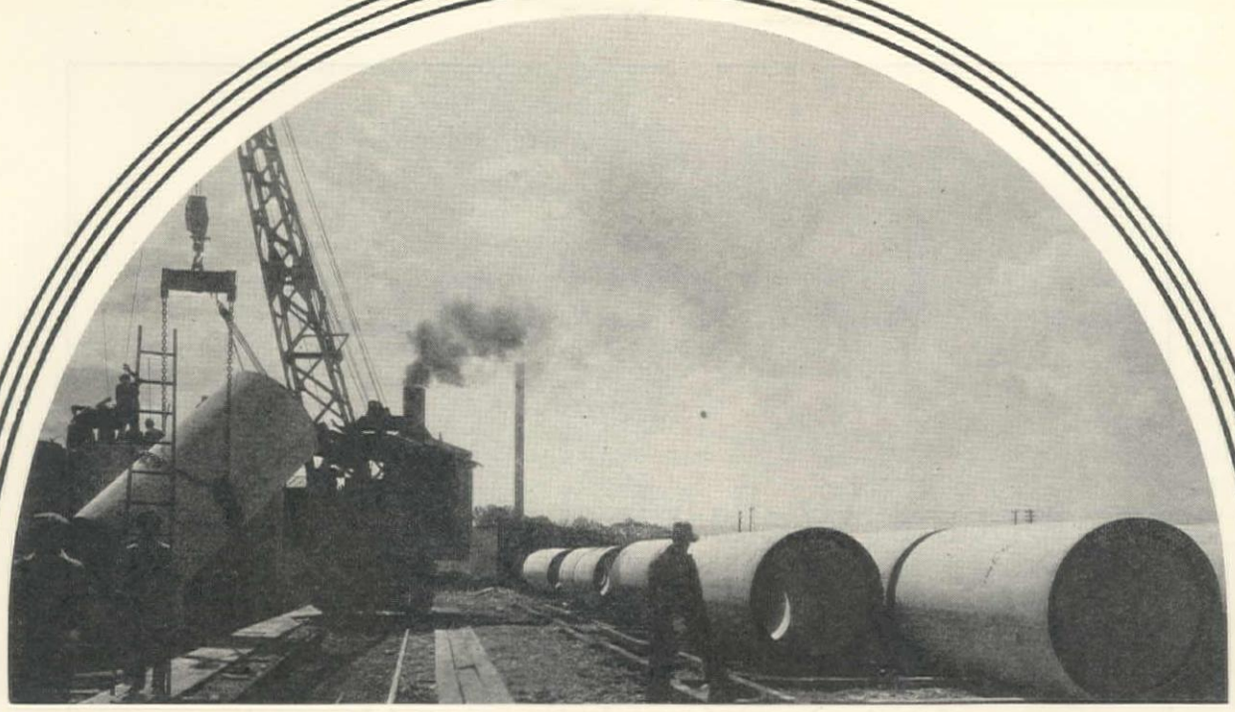
THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

2985 Nineteenth Street, SAN FRANCISCO 100 Broadway, NEW YORK

ASSOCIATED COMPANIES: I. P. Morris & De LaVergne, Inc., Philadelphia; Dominion Engineering Works, Ltd., Montreal. PACIFIC COAST REPRESENTATIVES for Larner Engineering Co., Philadelphia

PELTON



Ready for Service!

WHEN the concrete in a length of Lock Joint Pressure Pipe is thoroughly cured, the pipe is then turned from a vertical position (as shown at the left) to a horizontal position on skids (as shown at the right).

Then it is finished, ready for the trench, and truly ready for service! And that readiness for service will be permanently characteristic of it. In every sense it will be found fully prepared to give every iota of service planned for it and expected of it, without diminution of carrying capacity, since it will not be affected by the tuberculating encrustations which would so seriously increase the friction losses in metal pipe during a like passage of time.

The view is in our yard near Denver where we have been building a pressure pipe line for the water supply system of that city.

LOCK JOINT PIPE CO. :: Ampere, New Jersey

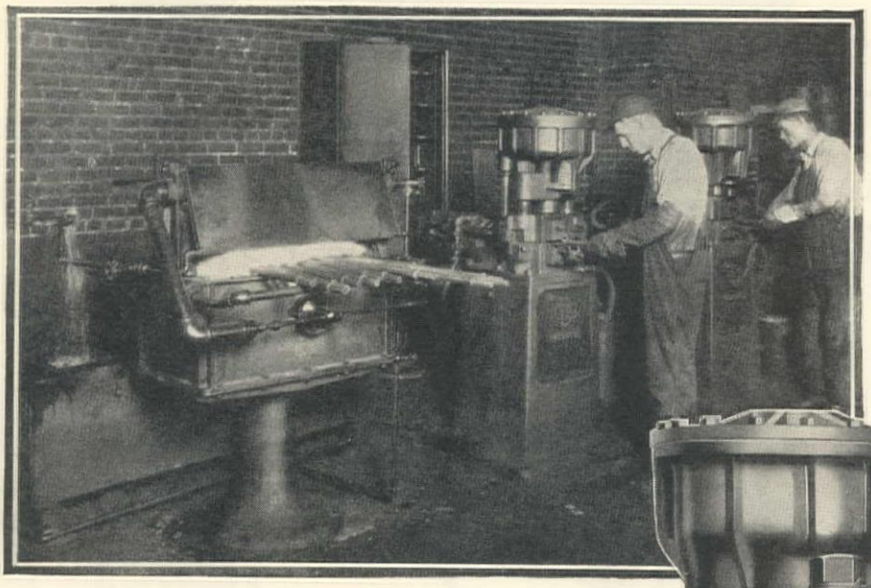
Established 1905

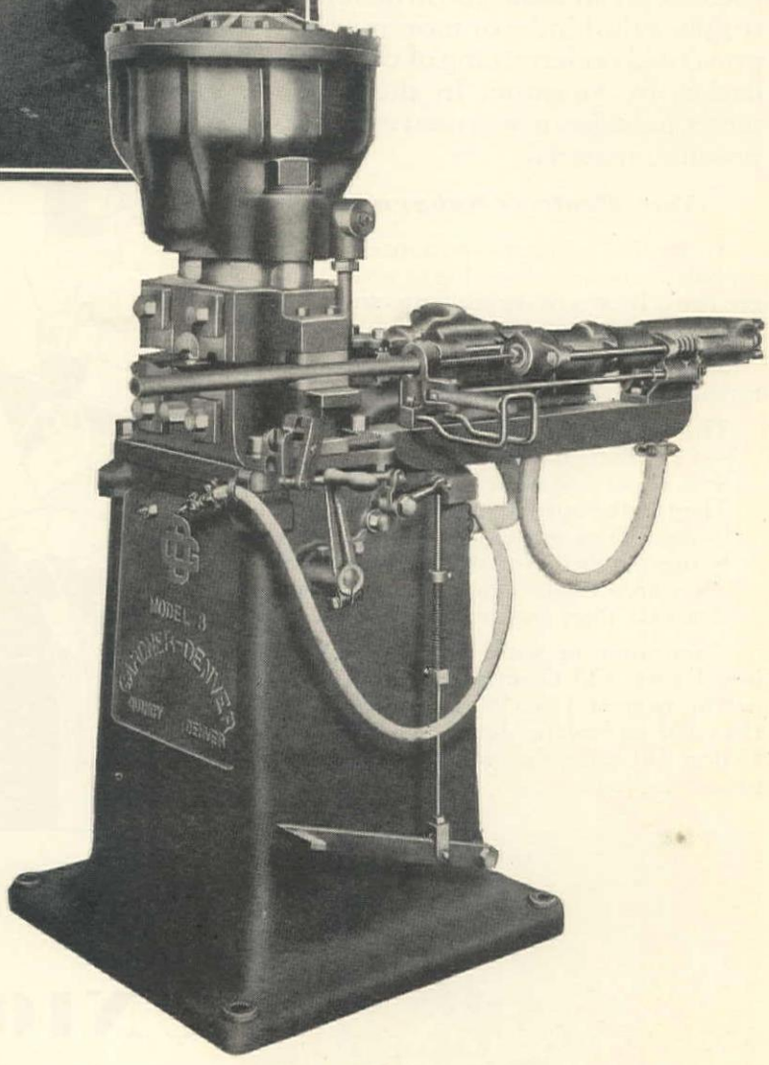
Pressure, Sewer, Subaqueous, Culvert

LOCK JOINT
Reinforced Concrete
PRESSURE PIPE

For Sharp Drill Steel

Model DS-8 Sharpener





FOR many years the Model DS-8 has met all requirements of discriminating users of Drill Steel Sharpeners the world over. Although continually improved as time has gone by, no major or radical change has been necessary to keep this machine abreast of the times. The purchase of a Model DS-8 is equivalent to the purchase of perfect drill bits and shanks in large daily quantities at very low cost for operation and maintenance.

Combined with a Model HP-20 Bit and Shank Punch and supplemented by a Model DF-1 Oil Forge, the Model DS-8 makes an ideal installation where a large quantity of drill steel is required.

Write for Bulletin

GARDNER-DENVER COMPANY
ROCK DRILL DIVISION
DENVER, COLORADO
Sales Offices Throughout the World

GARDNER-DENVER

Asphalt helped preserve the Pyramids

Now it protects the highways of the west.

BUILT as tombs for a dynasty of rulers that began about 5000 B. C., the famous pyramids present one of the most interesting archeological subjects that have come to us from prehistoric times.

Asphalt, examination shows, was used freely in their construction. It supplied the binder or mortar which prevented undermining of the foundation by moisture. In the inside secret passages, it was used as waterproofing material.

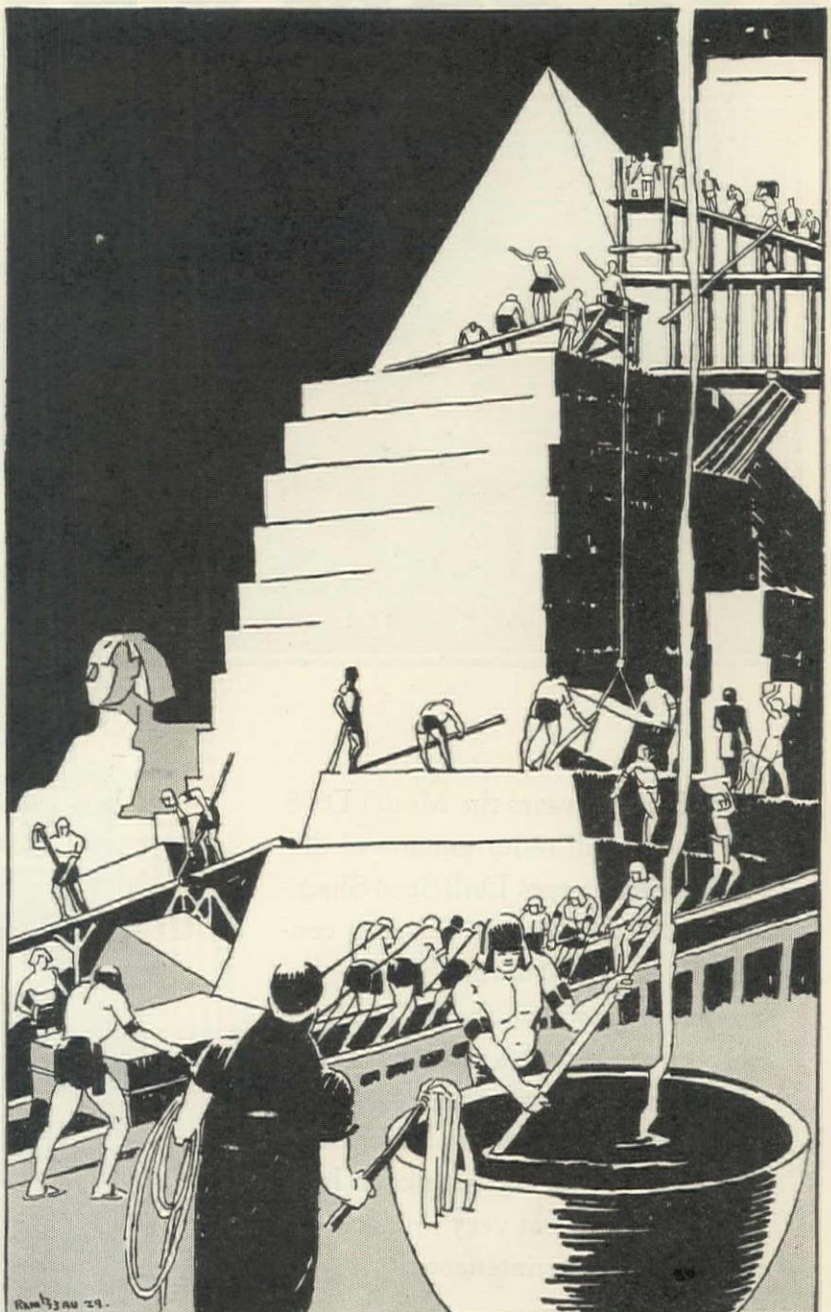
Now Protects Subgrade.

Today, its "moisture resistance" makes asphalt extremely desirable as a road ingredient. It effectively seals the subgrade from undermining by water.

Too asphaltic pavements provide these further advantages:

They absorb expansion and contraction —a protection against surface buckling. They resist the wear of heavy traffic. They can be opened to traffic soon after laying. They are easily replaced after being cut into for watermains, etc. They are noiseless, dustless, and easily cleaned. They are easily resurfaced.

Communicate with Asphaltic Division, Union Oil Company, Los Angeles, or the nearest UNION distribution station for complete details concerning Union D Grade, the superior, "moisture proof" asphalt.



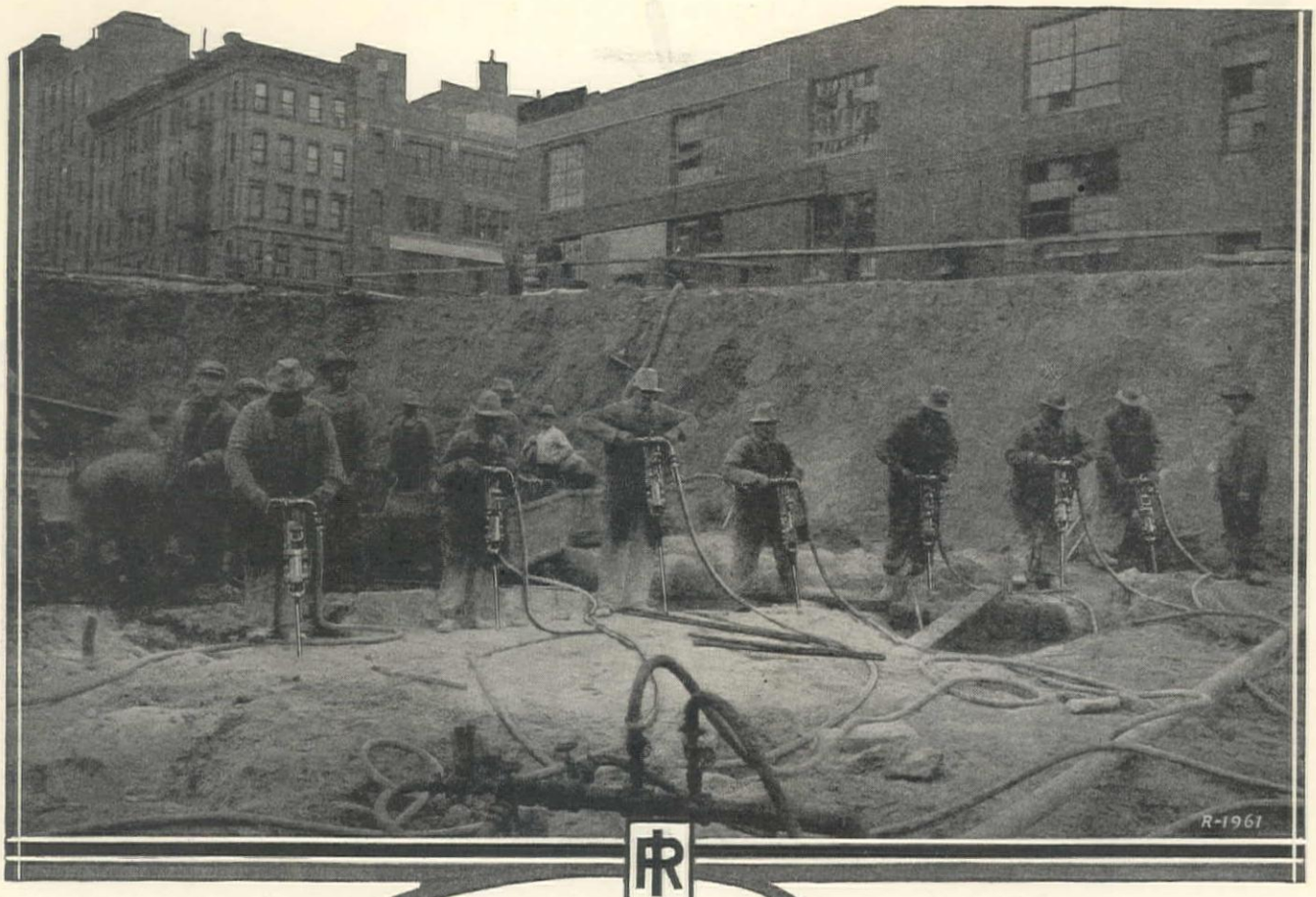
Left: Natives standing on one of the pyramids give idea of its enormous height.

Above: Artist's conception of scene at building of pyramids. Note cauldron of Asphalt.

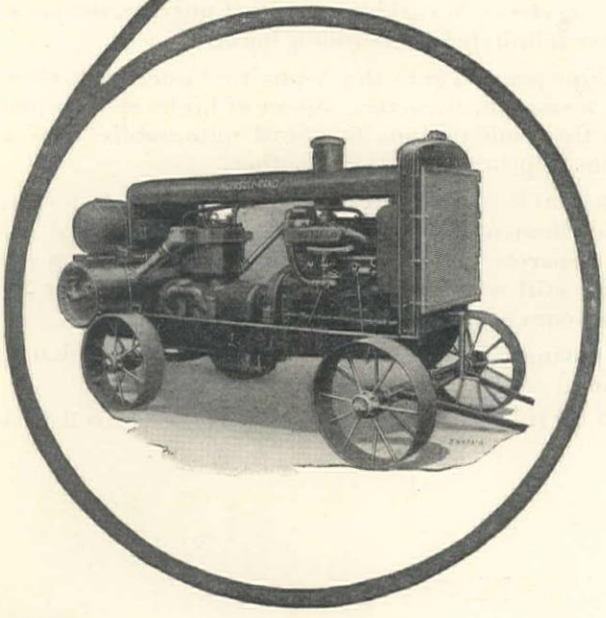
UNION D GRADE

ASPHALT

UNION OIL COMPANY



Below: An I-R Portable Compressor —one of six sizes.



"Jackhamers"

for your foundation work

In New York City, foundation work is usually *rock* work. The drills, therefore, comprise an important part of the contractor's equipment.

Ingersoll-Rand "Jackhamer" Drills and Portable Compressors will be seen on most of the foundation jobs in the metropolitan area. They make an ideal combination for every type of rock work. Even on the big jobs where 12 or 15 drills are employed, a small battery of portable compressors is sufficient to operate them all simultaneously.

I-R equipment for the contractor also includes drill steel sharpeners and oil furnaces. These, too, can be operated by the portable compressors while the drills are running at full capacity.

INGERSOLL-RAND COMPANY of CAL.

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Ingersoll-Rand

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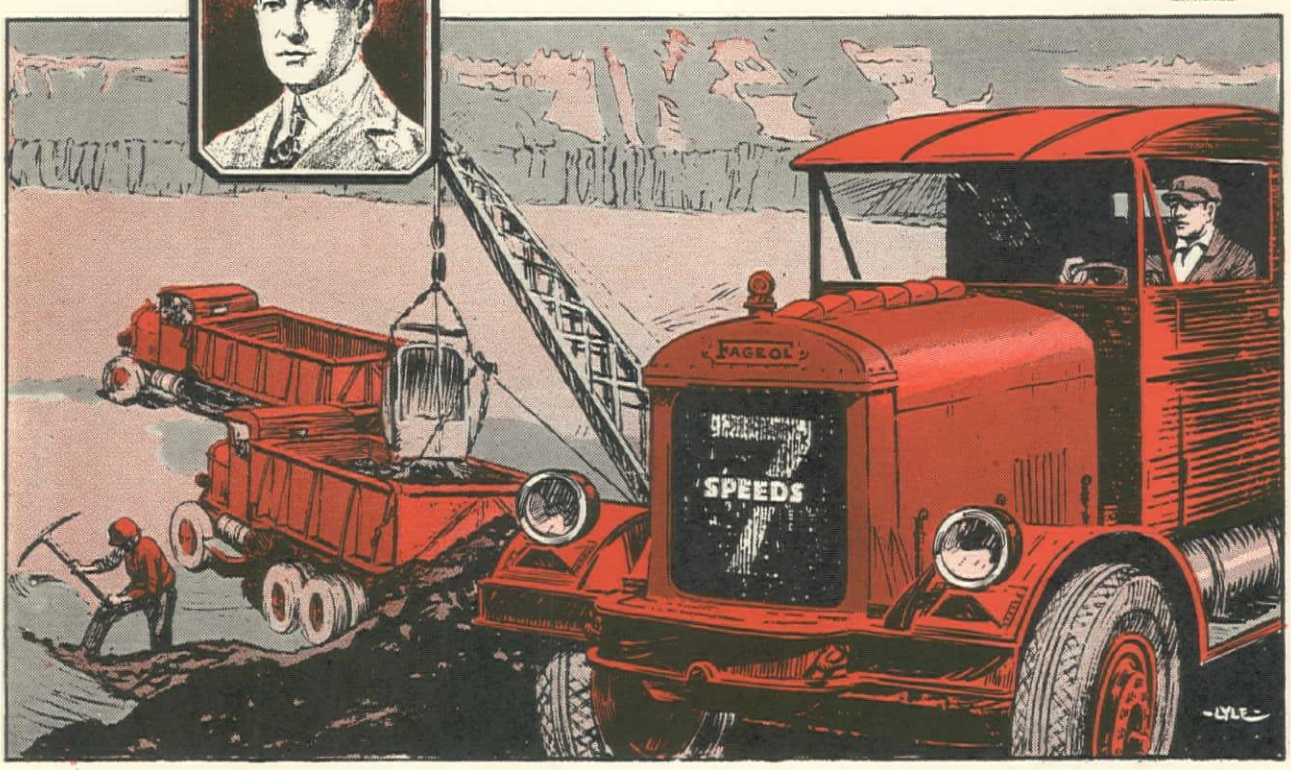
L. H. BILL
President and General Manager
FAGEOL MOTORS COMPANY

The Fageol Principle
"We will never build to a standard lower than the highest. When we can buy better parts than we can make, we will buy them. When we can make better parts than we can buy, we will make them. Utilizing superior engineering judgment, we will produce the best equipment or we will produce nothing."
L. H. BILL



THE FAITH *that has* MOVED MOUNTAINS

Time moves fast in this new empire. The Fageol factory, Fageol truck and Fageol safety coach have long been a reality.

L. H. Bill, the founder of the Fageol Motors Company, had faith in the West. He saw a western truck, built by a western organization... moving along highways yet unbuilt. He visioned the spread of great factories where the California sun warmed a virgin soil. ✣ The distant hum of a future commerce was moving on to the Pacific... mountains of earth were to be stirred, lifted, and moved for the foundations of the great West to be.

"Bill" built products carry the sign of "Fageol" throughout the eleven western states... speeding along the highways and crawling over uncharted roads, gliding into the lands of the orchard and hurrying through the hot sand dunes... darting in and out of congested city traffic and wading across quiet rivers.

And these "Bill-Built" trucks and safety coaches never falter. They are truly "western"...hardy as was a forty-niner...each with the Bill Principle built through and through.

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TRUCKS AND SAFETY COACHES
BILL-BUILT

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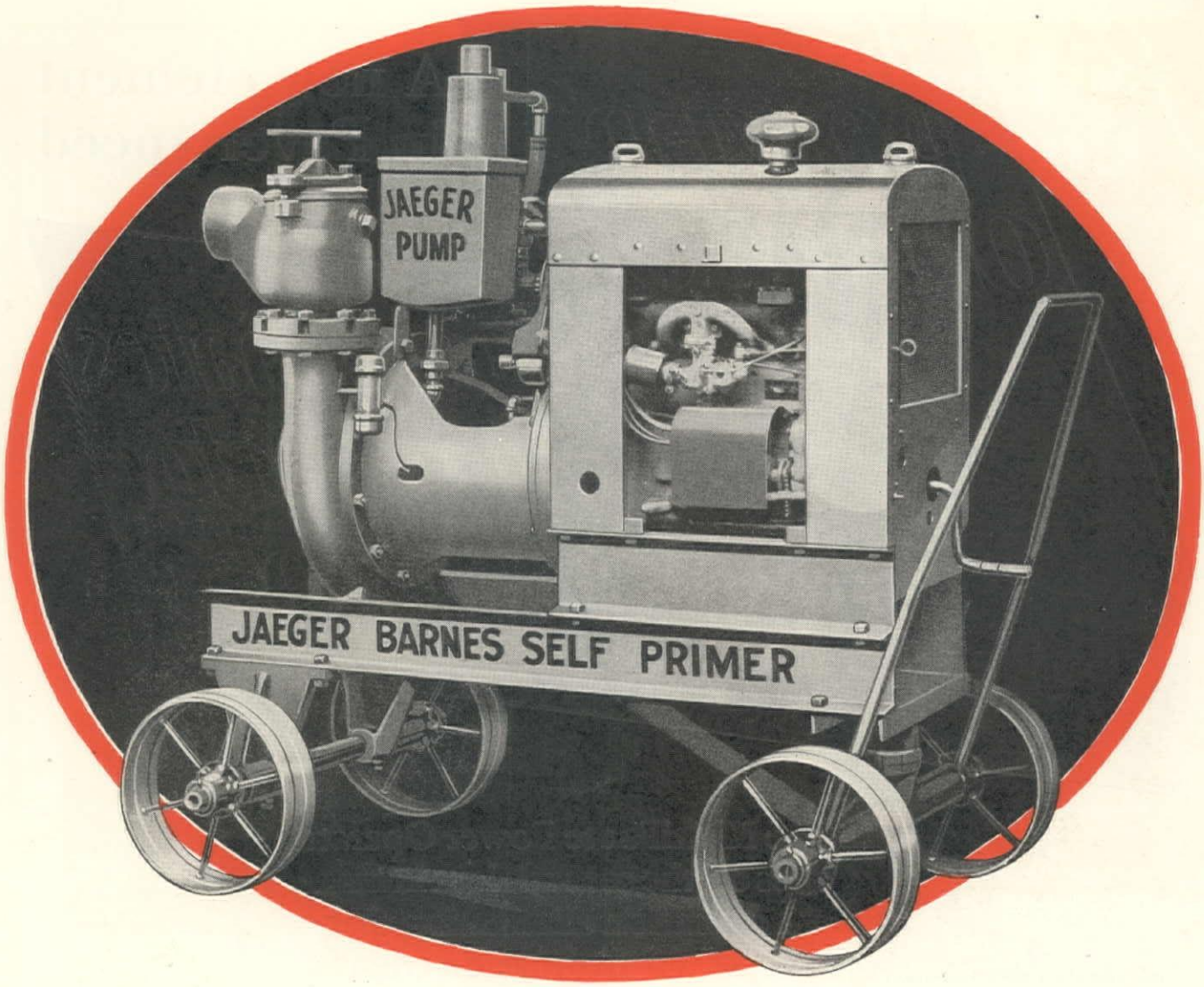
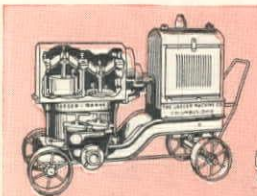


Always Ready to Pump

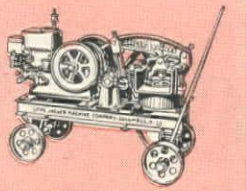
Priming and Foot Valves are Abolished with this 100% SELF-PRIMING Line of Centrifugals

All advantages of other types... plus 3 times their capacity! Lift of 27 ft....5 to 10 ft. more than ordinary centrifugals! Muddy water won't clog it! Absolutely automatic...maintains continuous high vacuum! Primer *increases* lift and volume! Simplest vacuum pump ever designed...just *one* moving part! All working parts run in oil bath! Sizes for biggest and smallest jobs... with gasoline or electric motors.

Get new 1930 prices on Jaeger-Barnes line of TRIPLEX ROAD PUMPS DIAPHRAGM, PLUNGER and CENTRIFUGAL PUMPS!

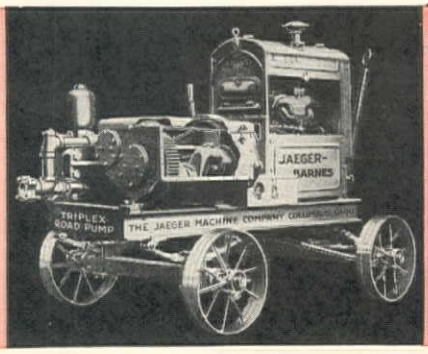


PLUNGER PUMPS



DIAPHRAGM PUMPS

TRIPLEX ROAD PUMPS



JAEGER MIXERS-PUMPS HOISTS—Carried in Stock

CARRIED IN STOCK BY
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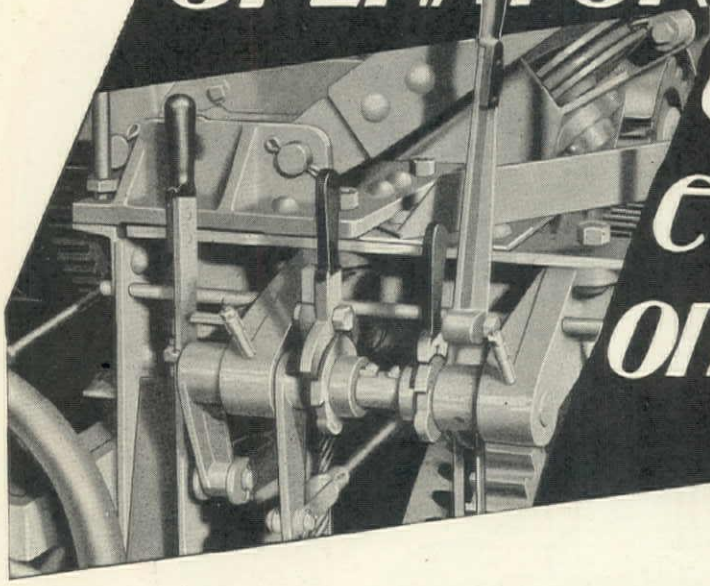
Smith Booth Usher Co., Los Angeles
The C. H. Jones Co., Salt Lake City
Clyde Equipment Co., Portland—Seattle
General Machinery Co., Spokane
Neil B. McGinnis, Phoenix, Ariz.

the POWER OPERATOR coordinates every factor on the job

A new element in Paver speed



The MultiFoote Power Operator clips off the seconds lost in manual operation eliminating that loss of co-ordination that makes the mechanical mixing cycle impractical.

Write the nearest general agent.

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World's largest exclusive builders of road pavers

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SAN FRANCISCO
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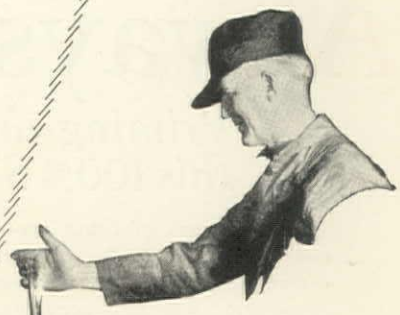
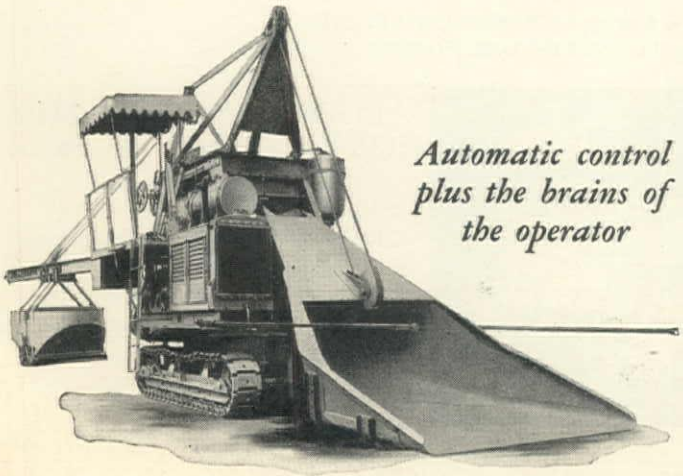




Automatic control plus the brains of the operator

See the 1929

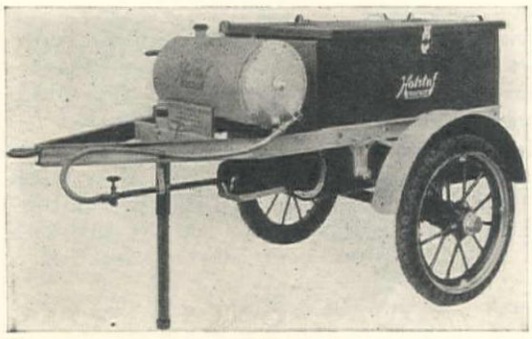
MULTIFOOTE
The Paver with Timken Bearings

HOTSTUF

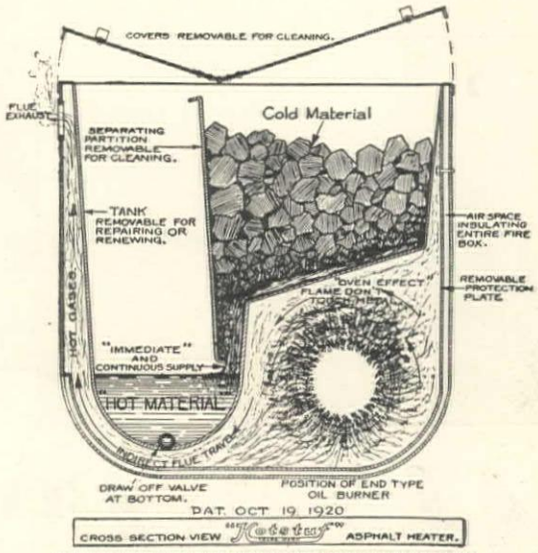
OIL BURNING ASPHALT HEATER *with* PATENTED ELEVATED MELTED CHAMBER

Eight Exclusive Features

1. Cold material is melted in separate **Elevated Melting Chamber.**
2. **Greater Heat Absorption.**
   Intense heat is circulated directly under the **Elevated Chamber** and then indirectly down and under lower storage chamber.
3. **Oven Effect.**
   This indirect heat circulation produces an oven effect—holding the intense heat long enough to penetrate and utilize 30 to 50 per cent more heat units than is possible with the usual design.
4. **Distinct Hot and Cold Chambers.**
   The **Elevated Melting Chamber** is separated from the lower storage chamber by a solid removable partition plate with an opening at the bottom. Therefore it distinctly separates the cold material from the **Hotstuff** and makes it possible to reload with cold material without cooling the **Hotstuff.**



MODEL "T"



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6. **Temperature Control.**
   This process of melting and the perfect temperature control eliminates all danger of overheating and of destroying the life of the material.
7. **Longer Life.**
   Due to the position of the Burner, the flame does not come in direct contact with the metal, thereby practically eliminating the danger of burning out the inner tank.
8. **Heat Insulation.**
   The entire bottom and walls of the fire-box are insulated by separate lining plates forming a one-inch air space.

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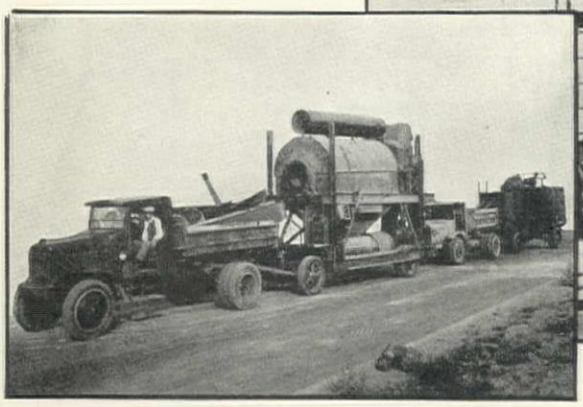

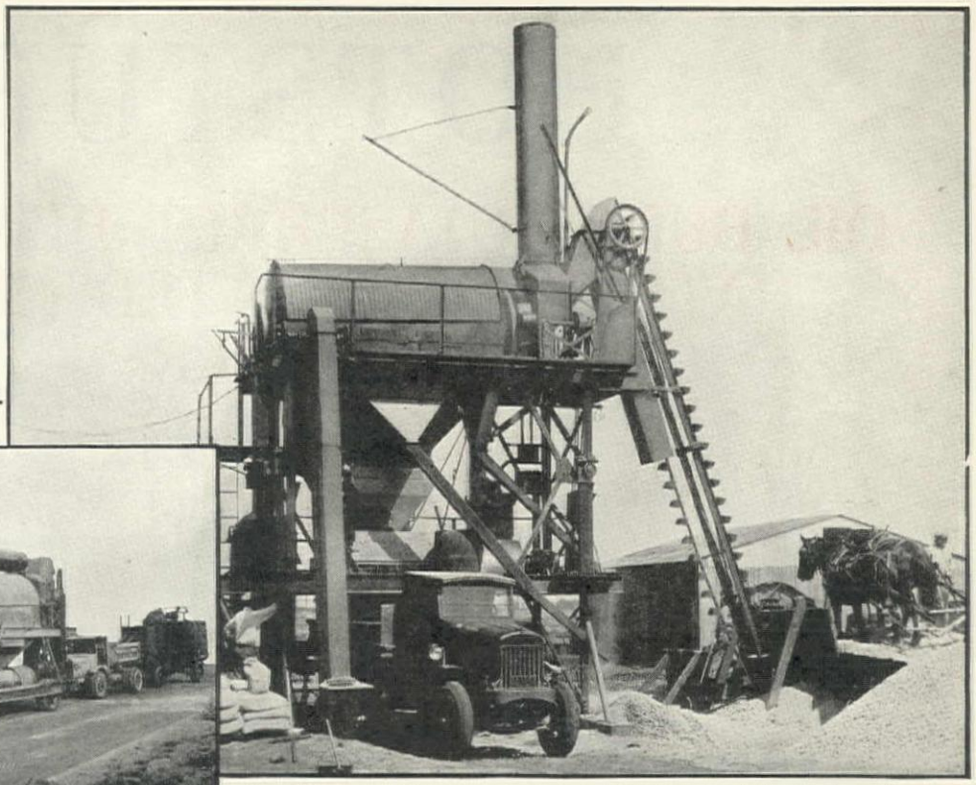

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1000-Pound Standard Paving Plant

ON WHEELS

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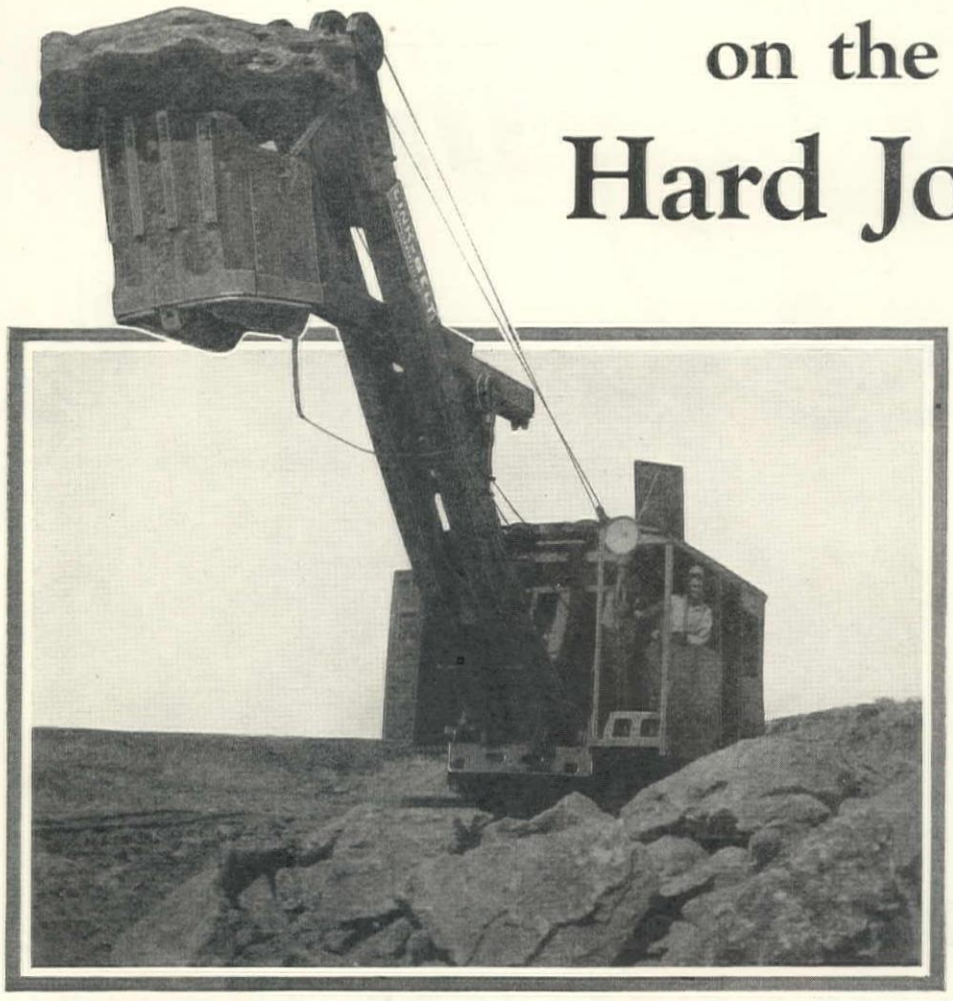

ON the hard jobs, such as this one, Link-Belt Shovels — Cranes — Draglines prove their dependability.

This Link-Belt K-42, 1¼-yard gasoline shovel is working in the quarry of James Stone Co., Richland, Texas, where the rock lies in solid formation and is dynamited to allow for loading into quarry dump cars.

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Both the operator and the owners are very enthusiastic over the outstanding performance of this machine under the difficult conditions. Mr. M. C. Davis, the operator, has been running Link-Belt Shovels for over four years.

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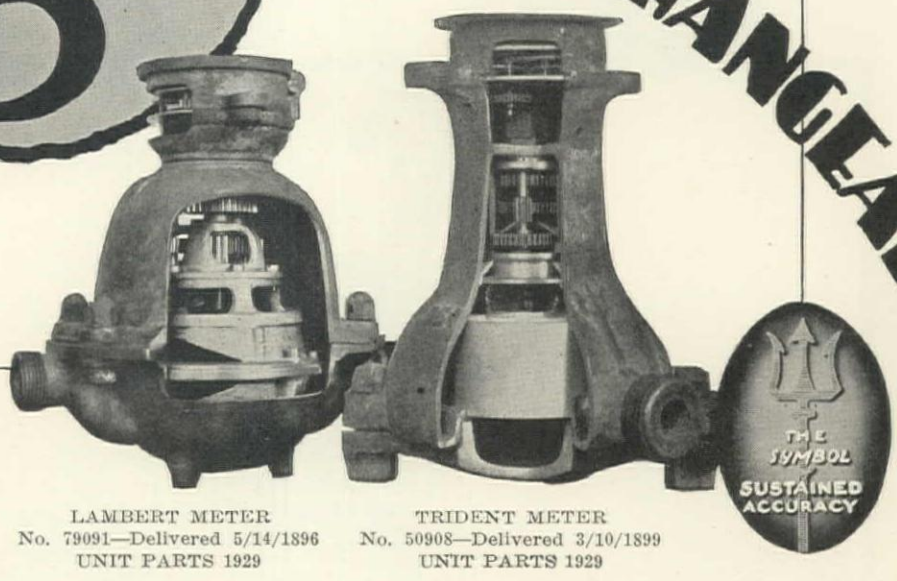

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VOLUME IV | DECEMBER 25, 1929 | NUMBER 24

The Publishers of Western Construction News Wish You a Merrie Christmas and a Prosperous New Year

Although the annual national Road Show at Atlantic City, New Jersey, January 13 to 18, is a long way from the Pacific coast and the far west, some from this territory will attend. For that reason we are describing (elsewhere in this issue) the advantages of Atlantic City as a convention center. These road shows afford the engineers and contractors—especially the highway constructors—the opportunity to learn at first hand by visual inspection the latest developments in equipment and materials.

The Annual Road Show

As these road shows are so worthwhile, the manufacturers and equipment distributors should hold another all-western road show on the Pacific coast soon again.

Road building is one of the most far-reaching and constructive agencies in national progress, with a 1929 expenditure of $1,339,403,000. The economist, Babson, reports a 40% increase in the number of automobiles on the roads within the past 5 years and only a 13% increase in road building. In 1929 over 5,000,000 automobiles, trucks, and motorcycles will be produced in the United States—a production increase of nearly 100% in the past 5 years. This tremendous growth in traffic will continue, as the automobile has become an American habit and can not be laid aside or its use curtailed. An actual traffic blockade threatens our cities unless engineering construction is tremendously increased. Such construction must necessarily change the whole character of cities and revolutionize existing transportation facilities.

Increase Road Building

Activity in road building is especially important if President Hoover's plea for construction in the face of the recent business slump is to be fully met.

In its last meeting at San Antonio, the American Association of State Highway Officials passed a resolution recommending that Congress increase the federal aid appropriation to $125,000,000. These officials stress the importance of completing the main federal aid project as originally planned. In that plan, state and interstate routes were to be completed first, so as to save motor vehicle revenues from the maintenance expense on low-class inadequate roads. By constructing the trunk line highways first, capital would be conserved and put to the safest possible use.

With the rapid increase in use of public highways comes a like increase in motor vehicle operating waste where the highways have not yet been brought to modern standards in construction. Thus, the rate of road building, especially on heavily traveled routes, should be intensified. An obligation exists to the motorists who have acquiesced in gasoline tax levies upon the assurance that the nation's main traffic channels would be pressed to completion. These motorists are justified in believing that the original program would yield a system with a capacity of 75-85% of the country's traffic, and that such a system would be operative before the federal aid principle is stretched beyond its present and intended scope. The system warrants completion, it warrants increased appropriation to meet conditions caused by traffic—conditions which could not be anticipated when the funds were originally provided.

The annual index, Volume IV, will be found in the back of this issue. We have endeavored to make it concise but also comprehensive. It is cross-indexed, there is a separate list of authors, and the unit bids are independently indexed. We trust our subscribers will have no difficulty in finding anything they may look for.

Annual Index

Several of our subscribers have suggested that we compile a five-year index at the end of 1930, and that they would be willing to pay a reasonable price for copies of it. As this represents a considerable outlay, we should like, in the meantime, to receive some ex-

pressions of opinion from our subscribers as to the value of such an index.

Powder and Power Shovels

Some contractors are still prone to 'fight shy' of powder—either because they are afraid of it, look upon it as a nuisance, know very little about its possibilities, or erroneously believe it a profit-eater. As a matter of fact, powder is one of the contractor's most useful tools, with a wide range of application and, when judiciously used, can frequently turn a loss into a profit.

Probably the most profitable use for powder is in power-shovel operation. But, the contractor is too apt to rely upon the power of the shovel to loosen the material instead of using powder to supply this power. The manufacturers have gradually increased the power of shovels, primarily to accelerate their speed and smoothness of operation. It might be better if the term 'power shovel' were changed to 'speed shovel', for the economic efficiency of the shovel is in its output and not in its ability to tear loose hard material.

Contractors might profitably study the data compiled by the Bureau of Public Roads and published in 'Public Roads' (February, March, and April, 1928, issues). The results of this nation-wide survey show conclusively that powder, when judiciously applied, is a profitable tool for the contractor.

Keep Politics Out of Engineering-Construction

It is certainly unfortunate that the engineer—especially the civil engineer—must continually be on his guard against the insidious machinations of the politician, instead of being free to devote his entire thought and energy to the problem at hand. Three instances of political interference in engineering-construction have recently occurred in California.

A month or so ago a member of the board of supervisors of the city and county of San Francisco introduced a resolution to make it mandatory that every employee on the Hetch-Hetchy water supply project be a bona-fide citizen of San Francisco, and that all present employees who were not such when first hired, be discharged. M. M. O'Shaughnessy, city engineer, is having a hard enough fight to complete the last 27 miles of tunnels on this huge project in time to save San Francisco from a disastrous water famine, without having his hands tied by such shameful legislation. For instance, how many of the capable tunnel miners are citizens of San Francisco or any other city? O'Shaughnessy has been able to have this resolution temporarily tabled, but he must ever be on his guard against this and similar political intrigue.

For years there has been 'political' rivalry between the power and light department and the department of waterworks and supply, of the city of Los Angeles, to the detriment of both; the former endeavoring to absorb the latter. Following the failure of the St. Francis dam and Mulholland's subsequent retirement, the better element in the board of public works prevailed, consolidated the two departments, and appointed H. A. Van Norman director and general manager—an appointment that met with unanimous approval except by the municipal power ownership group. But, it was too much to expect that this group would let well enough alone, and they recently were able to again divorce the two departments, relegating Van Norman to the position of chief engineer of the water department only, giving E. F. Scattergood, chief engineer of the power and light department, higher rank and authority than before, and ousting some valuable talent who were not amenable to politics.

Following President Hoover's recent appeal to industry and all states and municipalities to speed up construction, Mayor Porter, of Los Angeles, promptly responded by telegram that he would do all in his power to have city work done by force account, thus "Eliminating the middleman and the contractor and their profit and overhead which represent as a rule 25% of the value of such work"; also, "The saving of such profits works no serious hardship on contractors and middlemen already rich"; and "In the emergency before us I feel that every unnecessary profit should be eliminated and thus bring about lasting prosperity".

It is almost inconceivable that the mayor of a large city like Los Angeles would make such a ridiculous statement, and the better business element and the A.G.C. will probably show the mayor the error of his way of thinking. But, the danger is there nevertheless, for there are only too many ready to support him.

The present administration in California under Governor Young has worked hard, and successfully, to free all engineering-construction from politics. For this reason alone, engineers and contractors should return the present administration at the election in November, 1930, for it would be most unfortunate if the politicians should again disrupt the wheels of progress.

When will we be able to completely divorce engineering-construction from politics? The engineers could themselves effect this if they would stand pat as a group. But, there are always some misguided black sheep in the fold, who are selfishly shortsighted.

Sewage as a Source of Water Supply

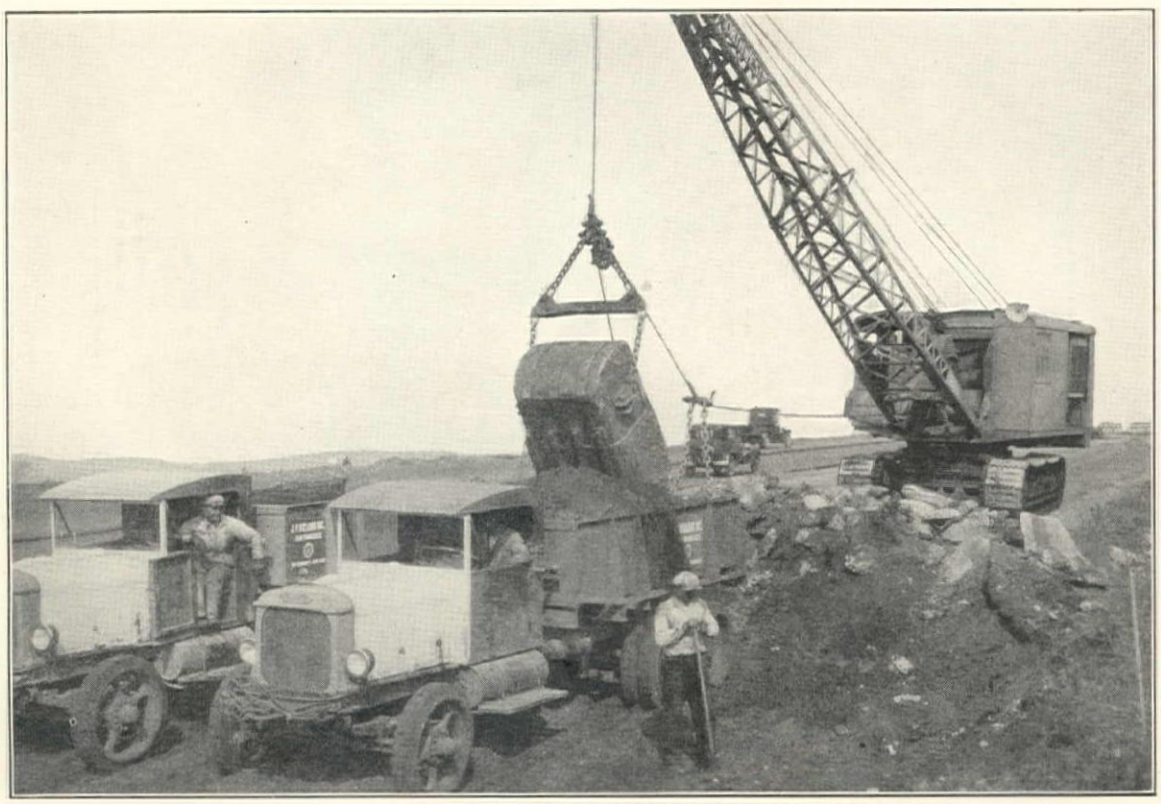
Four years ago we were criticized for suggesting that the city and metropolitan district of Los Angeles might well reclaim part of its sewage for replenishment of its rapidly depleting underground water supply. Therefore, it is interesting to note that the Standard Oil Co. is preparing to reclaim over six million gallons of the sewage effluent from the Hyperion outfall sewer, to be used for boiler feed; and that the reclamation of more of this sewage—now going to waste in the ocean—is being considered.

Water is a vital factor in the prosperity of the Los Angeles metropolitan district, and is going to be costly when brought from such a distance as the Colorado river—and filtered and softened in addition. Undoubtedly, considerable of the 100 million gallons of sewage (this quantity will be doubled in a few years) could be economically and satisfactorily reclaimed for many industrial uses, if not for drinking water; although the latter is not beyond the realm of possibility.

Junipero Serra Boulevard and Nineteenth Avenue Extension, San Francisco

Eaton & Smith, San Francisco, are making good progress on two contracts included in the San Francisco boulevard program (see September 10th, 1929, issue, p. 450-454). These contracts are the Junipero Serra blvd., contract price $368,396, and the 19th ave. extension, contract price $252,770. Excellent weather conditions and carefully selected equipment have speeded the work. Junipero Serra blvd. will be finished early in 1930, and 19th ave. ext. is to be completed during the present month. Construction on Junipero Serra blvd. began in April, 1929, and on 19th ave. ext. in March, 1929.

Junipero Serra blvd. is 1.80 miles long on the section within the city and county of San Francisco. The Eaton & Smith contract extends from the intersection of Portola and Sloat blvd. to the San Mateo county line. The pavement is 100 ft. wide and there are two 12½-ft. sidewalks.



NORTHWEST 1¼-YD. DRAGLINE LOADING INTO FAGEOL 6-WHEEL BATCH TRUCK, JUNIPERO SERRA BLVD.

The contract quantities and unit prices follow:

Excavation—86,000 cu.yd. at $0.31.

Embankment—110,000 cu.yd. at $0.01.

Paving (8-in. concrete base and 3-in. asphalt surface)—880,000 sq.ft. at $0.30.

Paving (6-in. concrete base and 2-in. asphalt surface)—45,000 sq.ft. at $0.22.

Oiled macadam paving—100,000 sq.ft. at $0.03.

Paving (macadam with 1½-in. asphalt surface)—100,000 sq.ft. at $0.09.

Standard curb—18,000 lin.ft. at $0.50.

Special curb—3300 lin.ft. of 6-in. at $0.40.

Armored coping—280 lin.ft. at $1.25.

Unarmored standard curb—2000 lin.ft. at $0.85.

Redwood headers—3400 lin.ft. of 2 by 10-in. at $0.01.

Artificial stone sidewalk—95,000 sq.ft. at $0.11.

Vitrified culvert—100 lin.ft. of 8-in. at $0.50.

Vitrified culvert—2300 lin.ft. of 10-in. at $0.60.

Vitrified sewer—30 lin.ft. of 6-in. at $1.00.

Vitrified pipe sewer—370 lin.ft. of 8-in. at $0.50.

Vitrified sewer—4500 lin.ft. of 12-in. at $0.56.

Vitrified sewer—1100 lin.ft. of 15-in. at $1.00.

Vitrified sewer—2100 lin.ft. of 21-in. at $1.50.

Vitrified sewer embedded in concrete—120 lin.ft. of 12-in. at $3.00.

8-in. Y branches—6 at $1.50.

12-in. Y branches—40 at $2.00.

15-in. Y branches—16 at $2.50.

21-in. Y branches—30 at $4.00.

Brick manholes—35 at $60.

Single brick catchbasins—45 at $70.

Multiple brick catchbasins—9 at $100.

Class 'B' concrete—60 cu.yd. at $20.

Reinforcing steel—6000 lb. at $0.04.

Vitrified brick invert for 4 by 4¾-ft. sewer—94 lin.ft. at $1.50.

Lawn—95,000 sq.ft. at $0.05.

Ice plant—100,000 sq.ft. at $0.01.

Veronica shrubs—850 at $0.50.

Wooden fence—3000 lin.ft. at $0.50.

Open tile drain—1050 lin.ft. at $0.25.

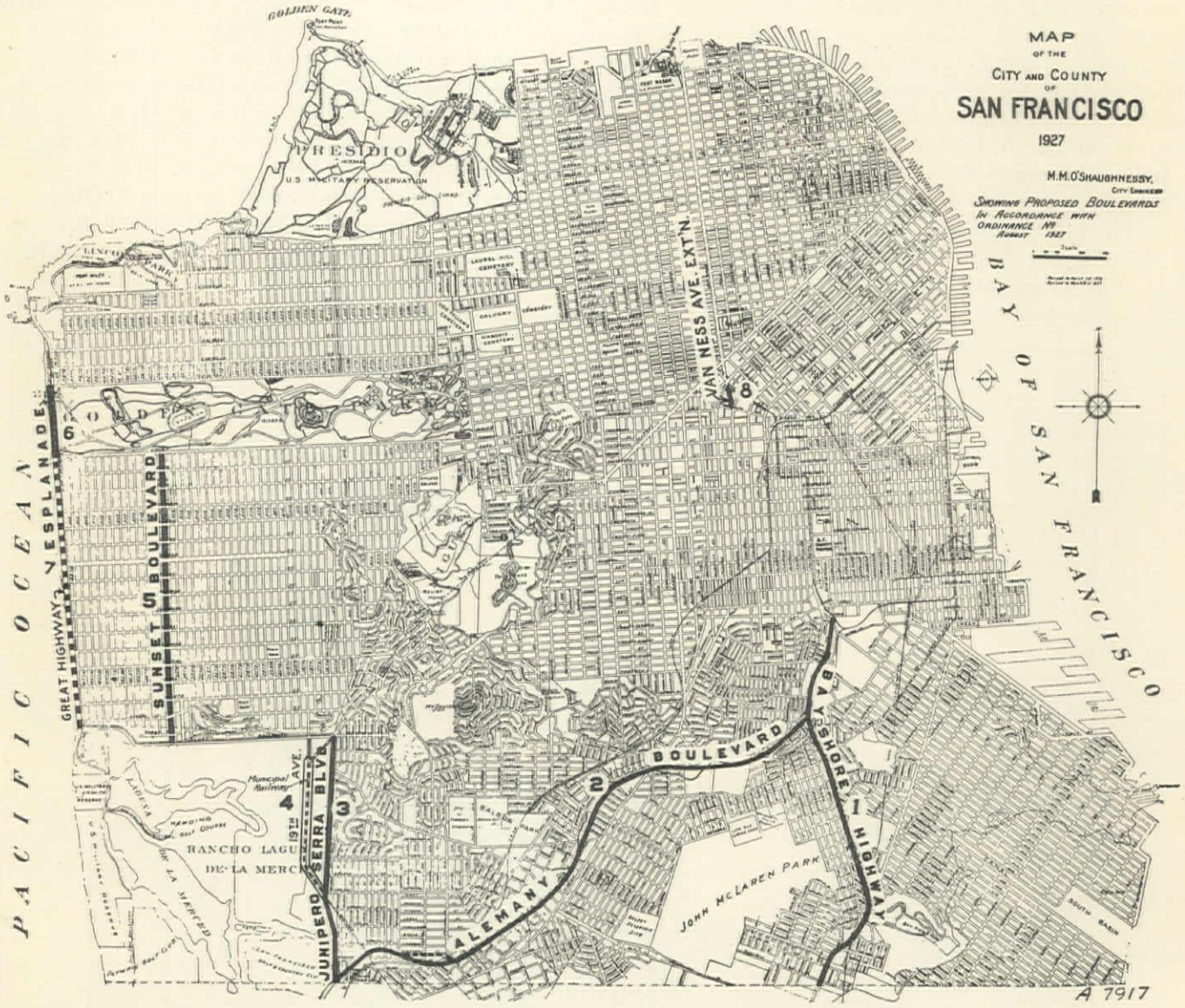
Broken rock ballast—90 cu.yd. at $3.00.

Track drains—2 at $100.

'Keep to right' reflector signs—3 at $90.

Standard black pipe conduit—21,400 lin.ft. of 1½-in. at $0.50.

Standard black pipe conduit—6150 lin.ft. of 2-in. at $0.60.



MAP SHOWING LOCATION OF JUNIPERO SERRA BLVD. (NO. 3) AND 19TH AVE. EXTENSION (NO. 4), SAN FRANCISCO

Concrete pull boxes—28 at $25.

Traffic signal foundations—13 at $20.

Rebuild gates of Golf Club entrance—$100.

Other bidders were: Fay Improvement Co., San Francisco—$374,039; California Construction Co., San Francisco—$392,448; L. J. Cohn, San Francisco, $399,502; Chas. L. Harney, San Francisco—$407,936; Federal Construction Co., San Francisco—$418,446; Youdall Construction Co., San Francisco—$419,023; Healy-Tibbitts Construction Co., San Francisco, $419,675; California Hacienda Co., San Francisco—$441,355.

The 19th ave. ext. is 1.25 miles long. From Sloat blvd. to the Municipal railway right-of-way the paved width is 80 ft. and the right-of-way width 100 ft. Beyond, and to its end at Worchester ave., the right-of-way width is 140 ft. The central 32 ft. of this right-of-way is used by the Municipal railway. There is one 44-ft. roadway on each side of the central strip and a 10-ft. sidewalk against each property line.

The contract quantities and unit prices follow:

Excavation—43,000 cu.yd. at $0.35.

Embankment—98,000 cu.yd. at $0.14.

Paving (8-in. concrete base and 3-in. asphalt surface)—466,000 sq.ft. at $0.32.

Concrete curb—11,300 lin.ft. at $0.60.

Class 'C' coping—8000 lin.ft. at $1.00.

Armored coping—700 lin.ft. at $1.30.

Sidewalk—57,000 sq.ft. at $0.12.

Concrete underpass—400 cu.yd. at $20.

Reinforcing steel—30,000 lb. at $0.04.

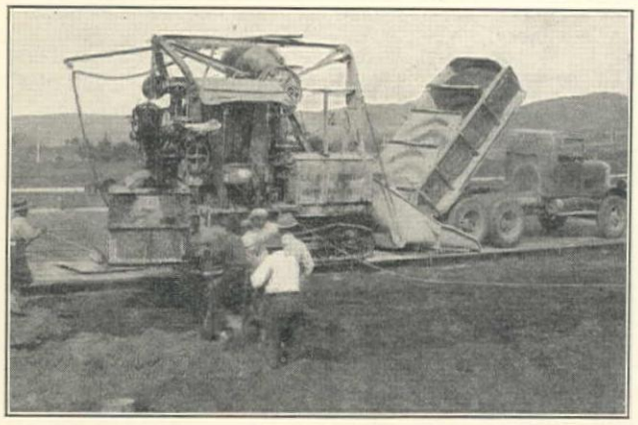
Oil macadam—109,300 sq.ft. at $0.05.

Redwood headers—900 lin.ft. at $0.15.

Ice plant—65,000 sq.ft. at $0.0125.

Cast-iron culvert—40 lin.ft. of 6-in. at $1.00.

Cast-iron sewer—60 lin.ft. of 12-in. at $2.00.
Vitrified sewer—550 lin.ft. of 18-in. at $1.80.
Vitrified sewer—1200 lin.ft. of 15-in. at $1.30.
Vitrified sewer—9400 lin.ft. of 12-in. at $0.56.
Vitrified sewer—360 lin.ft. of 10-in. at $0.56.
Vitrified sewer—1800 lin.ft. of 6-in. at $0.50.
Vitrified sewer embedded in concrete—210 lin.ft. of 15-in. at $2.50.



Fageol 6-Wheel, 4-Batch Truck Dumping Into Skip of Koehring 27-E Paver, Eaton & Sm.th Contract, Junipero Serra Blvd.

Tile drain—9000 lin.ft. of 6-in. at $0.22.
Cast-iron gratings—2 at $25.
Manholes—47 at $80.
Catchbasins—46 at $80.
12-in. Y branches—316 at $1.00.
15-in. Y branches—34 at $1.00.
Corrugated culvert—306 lin.ft. of 36-in. at $12.
Broken rock—1160 cu.yd. at $2.75.
Triple track drains—2 at $120.
Black pipe conduit—15,500 lin.ft. of 1½-in. at $0.55.
Black pipe conduit—1370 lin.ft. of 2-in. at $0.65.
Concrete junction boxes—8 at $35.
Concrete signal foundations—4 at $30.
Wood track liner—4 M f.b.m. at $50.
'Keep to right' signs—2 at $100.
Paving (8-in. macadam and 1½-in. asphalt surface)—109,300 sq.ft. at $0.09.

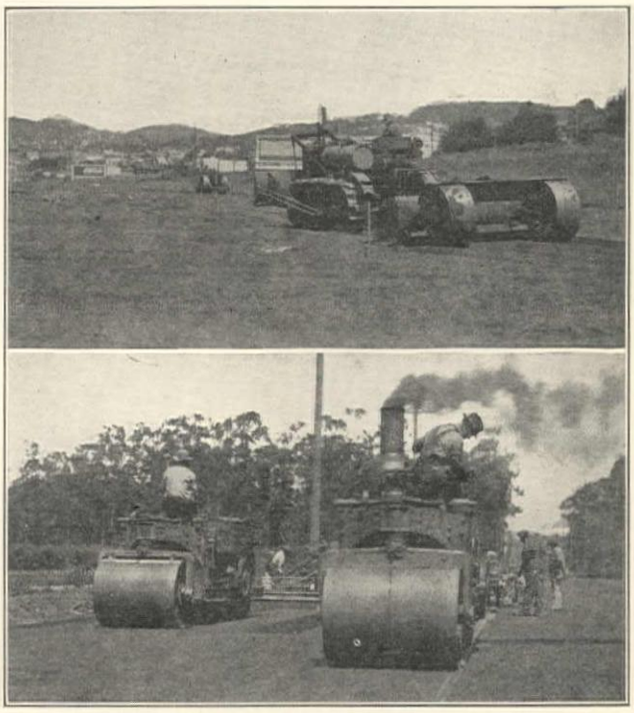
Other bidders were: Fay Improvement Co., San Francisco—$258,941; Healy-Tibbitts Construction Co., San Francisco—$259,104; L. J. Cohn, San Francisco—$260,678; California Construction Co., San Francisco—$268,601; C. L. Harney, San Francisco—$270,671; Pacific States Construction Co., San Francisco—$283,859; Municipal Construction Co., San Francisco—$288,687; Hanrahan Co., San Francisco—$289,459; Federal Construction Co., San Francisco—$292,706; MacDonald & Kahn, San Francisco—$311,490.

Construction—As shown on the map, the two jobs were parallel and close together and it was possible to run them as one project. Large gulches on the 19th ave. ext. required so much fill that material was hauled not only from the 19th ave. contract but also from the Bernal cut (a MacDonald & Kahn contract) and other places.

As the combined job is one of the largest highway projects built at one time in San Francisco, the most important factors in its construction were speed, economy, and accuracy. Some of the time, money, and labor saving devices include: elimination of planking on the grade, adding cement at the bunkers instead of at the paver, and spreading asphalt by spreader boxes instead of by truck or manual labor.

Junipero Serra blvd. passes through soft sand, with many fills. With ordinary 4-wheel, solid-tired trucks the job could not have been reached without the use of planking—a slow and expensive process. To eliminate the need of planks, Eaton & Smith investigated the motor truck field and made tests of various equipment, including comparisons of operating costs. Fageol model 10-66, 6-wheel, pneumatic-tired trucks met the requirements of the work and 12 of these trucks are being used on the two contracts. The trucks have been in continual operation for 8 months. The rear wheel arrangement acts much the same as a tractor and makes it possible to move in and out of the most difficult places with ease.

By adding cement at the aggregate bunkers, the necessity for hauling sacks is eliminated and accuracy in batching is obtained. The dump bodies are divided



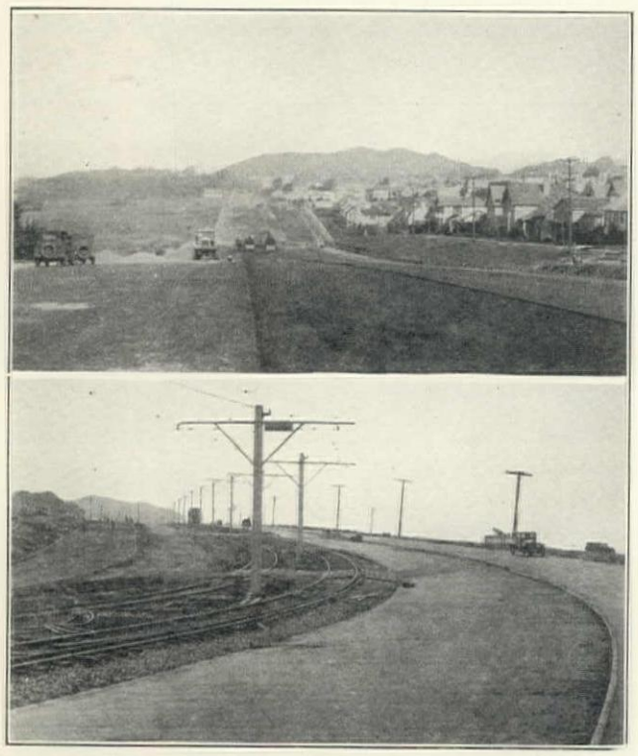
(Upper) Caterpillar '60' Tractor and McMillan Bulldozer Grading Junipero Serra Blvd. (Lower) Buffalo-Springfield Steam and Gas Rollers on 19th Ave. Extension

into four sections, each containing one batch of aggregates and cement. The trucks are backed under the bunkers and each section half filled with coarse and fine aggregate. Cement is then added and the remaining half of the batch is dumped on top of the cement. The trucks haul and dump direct into a Koehring 27-E paver. This paver ran for over 100 days without shutdown for repairs.

Fageols, equipped with regular dump bodies, haul the asphalt to the job and also pull the spreader boxes. These spreader boxes accurately and economically spread the asphalt to the desired thickness. Finishing machines are run over the asphalt to level the surface. Iron spikes attached to these machines rake and slightly roughen the surface. After the steam roller has been used, a non-skid surface is obtained for the finished road.

Pavement on Fills—On all big fills in the city and

county of San Francisco, permanent pavement has been found unsatisfactory because of settlement. A temporary pavement is required by specifications for these fills. This will later form the base for a permanent pavement, after the grade has stood for several years. A typical temporary pavement, used until recently, is composed of an 8-in. waterbound macadam base and 1½ in. of asphaltic concrete or 1½ in. of oil macadam surface course. On a moving or settling fill the asphaltic concrete surface course has a tendency to break up as soon as opened to traffic. This is particularly true where the surface is laid on a hill and is subjected to the down-grade braking effect of motor traffic. An emulsified asphalt (Bitumuls) has proved more satisfactory, because of increased flexibility, and has been adopted for the surface on temporary pavement on San Francisco boulevards. This surface was first tried out on the Bayshore blvd., Sec. A.



(Upper) Junipero Serra Blvd. Looking North from Halloway Ave. Completed Pavement on Left, Rolling Binder Into Base Course on Center Strip. (Lower) Three Stages in Paving 19th Ave. Extension, with Street Railway in Center

Eaton & Smith bid to put in either the oil macadam or asphaltic concrete surface and later agreed to lay 2-in. Bitumuls for the surface course on the temporary paving. They sublet this work to J. P. Holland, of San Francisco, who has laid most of the emulsified asphalt surface on the San Francisco boulevard projects.

Other equipment on the work includes one 1¼-yd. Northwest dragline, four Caterpillar '60' tractors with McMillan scrapers, one 12-ton Acme 3-wheel roller, one 20-ft. and one 22-ft. Carr subgrader; one 20-ft. and one 22-ft. Ord concrete and asphalt finisher, Acme and Buffalo-Springfield 10-ton rollers, one P&H ditcher, Blaw-Knox steel headers. The Hunt process of curing was used on the concrete.

Personnel—M. M. O'Shaughnessy is the city engineer and Clyde E. Healy is the assistant city engineer in charge of all improvements within San Francisco. The resident engineers are George F. Mitchell (Junipero Serra) and J. H. Hanly (19th ave. ext.). C. M. Taylor is the supervising engineer on all boulevard projects.

ATLANTIC CITY AND THE 1930 ROAD SHOW

Much interest is being shown in the coming Road Show, to be held at Atlantic City, January 13-18, 1930. This convention city, 75 years old and with a normal population of 66,000, is easily reached from any section by auto, rail, or air.

Train Transportation—Atlantic City is 60 miles from Philadelphia and 143 miles from New York, being distant by rail one and three hours, respectively. From the south, the rail trip is best made by way of Philadelphia, stopping over at Philadelphia or with a direct connection at West Philadelphia. From the north the trip is made by way of New York City, using through train service. From the west the trip may be made via Philadelphia or New York. If the Pennsylvania is used from the west, the most direct route is by change at North Philadelphia; if the New York Central is used, the change can be made at New York—leaving from Pennsylvania terminal; or the Reading can be taken from Jersey City—reached by ferry from New York.

Visitors Promenading on the 7-mile Boardwalk, Atlantic City

Auditorium and Convention Hall—The convention hall, built by the municipality for $15,000,000, occupies an entire block, 7 acres, between Mississippi and Georgia ave., fronting on the boardwalk. The main auditorium seats 41,000 and the building itself will hold more than the entire permanent population of the city. There are many smaller meeting rooms, the smallest seating 150; the ballroom seats 5000. The main auditorium would hold a 13-story building, 500 ft. long by 200 ft. wide, with more than a hundred feet to spare on all sides. Despite its size, the acoustics of the auditorium are excellent. The convention hall has a gross exhibit area of 280,000 sq.ft., with 10,000 sq.ft. additional for separate exhibits.

Land Drainage and Protection on the Sugarland Industries Development

Large Scale Irrigation in the Brazos Valley of Texas

By I. G. WIRTZ, *Engineer*

The many thousands of travelers along the Old Spanish Trail, westward from Houston, each year are probably amazed at the industrial scope of Sugarland, Texas, where is found one of the largest sugar refineries in the south. Numerous other industries also add to the wealth of the state as well as supplying the essentials of life to many. Industrial Sugarland has each year broadened its scope until now its trade territory is considered our entire southland and the middlewest as far north as the Canadian border.

Perhaps to the management of Industrial Sugarland there is no more interesting feature of their work than the development of the vast irrigation system now in progress, which will embrace 50,000 acres of the richest Texas land. The main canal will be 50 miles long, and runs northwest from Sugarland to the Brazos river, which is the source of water supply.

The nucleus of the project is the 14,000-acre plantation of the industries. However, it has taken much work and funds to make of the tract suitable irrigation lands. In 1918 there were found in this property hundreds of acres of marsh land, numerous lakes and streams. These have been filled and drained until now the entire property is subject to use. In addition, the property was subject to overflow waters from the Brazos river.

It was during 1918 that a 12-mile levee was started to give protection required to the lowlands, which have been subjected to floods from the Brazos. In constructing the levee, a channel was cut on the inside so as to intercept rainfall waters. Also, the drainage of the plantation was laid out so as to convey the entire flow to the southeast corner of the levee where the only discharge opening is provided. Still, the problem to be solved was to prevent the high waters from the Brazos entering the plantation at this point. For this purpose a battery of five Calco automatic drainage gates, 72-in. diam., each attached to 80 ft. of 72-in. No. 10 gauge Armco pipe was installed. During May, 1929, a rise in the river was sufficient to test the operation of the gates. At this time the river put a head of 4 ft. against the gates and their operation was satisfactory. Had the gates not functioned, tremendous losses would have been caused by inundation.

FIVE 72-IN. CALCO AUTOMATIC DRAINAGE GATES, EACH ATTACHED TO 80-FT. OF 10-GA. CORRUGATED PIPE, DRAINING AND PROTECTING SUGARLAND PROPERTIES

South Texas can watch with interest the progress of the irrigation system, as its success should be the forerunner of many similar projects. Along such streams as the Brazos are untold acres of land producing intermittent crops, but which under proper handling become the richest of farm lands. The answer is flood prevention, drainage and irrigation—in some instances only one of these, in others all three.

Alvarado Pumping Plant

To raise an initial payment of $50,000 for purchase of the Alvarado pumping plant from the East Bay Municipal Utility District, the Alameda county water district must resort to direct taxation. The purchase price is $290,000, with $50,000 down payment by January 1.

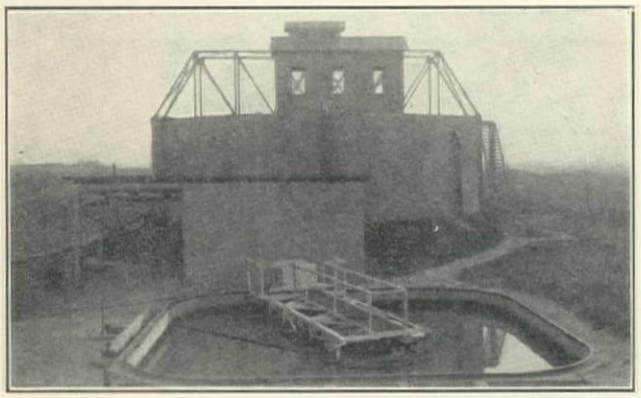
Gilroy Sewage Treatment Plant

By RAY BURGESS

Superintendent of Public Works, Gilroy, California

Gilroy, California, has a population of 4000. Its fruit packing houses can tomatoes, peaches, spinach, and apricots, and contribute a large volume of industrial waste to the sewage system. The peach cannery handles 125 tons of fruit daily during the season and yields 0.6 cu.ft. of sludge per ton of raw fruit. This sludge yield per ton is equivalent to that produced by 120 people, as the accumulation of sludge from domestic sewage is at the rate of 5 cu.ft. per 1000 per day.

Plant Description—Domestic sewage and industrial wastes are disposed of by separate sludge digestion



Dorr-Equipped Separate Sludge Digestion Plant, Gilroy, California

in a plant which has been operating since January, 1928. The influent passes first through a coarse bar screen (1½-in. openings) and then to a 30-ft. Dorr traction clarifier, equipped for skimming. The effluent is disposed of by broad irrigation on a 200-acre sewer farm. Sludge from the clarifier is pumped twice daily —for a half-hour period in the morning and evening— to a 50-ft. diam. Dorr digester. Scum and floating material in the clarifier is automatically collected and is likewise pumped to the digester.

Gilroy has the first separate sludge digestion plant in California which handles cannery waste. The effluent is satisfactory for broad irrigation, and digestion proceeds without foaming or odor nuisance.

Plant Features—The novel features of this plant are the satisfactory digestion of cannery waste; automatic skimming of scum, grease, and floating solids; elimination of obnoxious odors; and disposal of effluent by filtration through natural sand beds to an underdrain collecting system. Enough filter beds are available so that they may be used in rotation or alternately.

Separate sludge digestion gives flexibility and better control than would other processes at Gilroy, and was adopted because of the large amount of sludge from cannery waste, with a probable future increase in load. The digester volume requirements of the system were considerably in excess of the requirements of the sedimentation step—hence the need for flexibility. If future increases in population or fruit packing operations should occur, this heavier load can be met by expediting the rate of digestion with a gas-collecting and heating system within the digester.

Sludge Digestion Survey—A sludge digestion survey was made by C. G. Gillespie and Frank DeMartini, of the Bureau of Sanitary Engineering, State Department of Public Health, on January 28, 1929. In this survey the samples were taken by pitcher pump through the sample inlet near the center of the tank, toward the overflow. The digestion appeared to be good, there was no odor, gassing was slight, and little scum was evident during the survey. The results of the test are shown in the accompanying table.

Cost of Effluent Disposal—The sewer farm has a total acreage of 196.64 and the land cost $37,090. Sixty acres of the farm is underlaid with 44,000 ft. of 4-in. tile, average depth 4.5 ft. The tiling cost $0.11 per ft., or a total of $4840.

Cost of Separate Sludge Digestion—The plant cost $28,235 complete, including Dorr digester, pump, and clarifier. Operating costs for the one-year period ending September, 1929, follow:

Electricity (at rate of 3¢ per kw.h. first 450 and 2.2¢ per kw.h over 450)	$ 373.92
Operator (part-time work)	696.00
Oil, grease, and supplies	19.20
Total	$1,089.12
Average cost per month	90.76

Revenues for the operating year were $1547.

Line	Sample of	Depth below water surface (ft.)	Physical appearance	Temperature (Deg. C)	pH	H_2S	Sol. %	Org. %	B.O.D. 1% Org.	Fats % of Org.
1	Raw sludge	.....	Gray	11.5	....	....	2.1	78.7	5230	12.6
2	Influent	.....	Not unusual	11.0	7.0	0	....	.....	.....	.....
3	Effluent	.....	Well clarified	10.5	7.1	0	....	.....	.....	.....
4	Liquor	.....	Cloudy, no odor	....	6.4	0	....	.....	.....	.....
5	Sludge	19.08	Brownish, dark	....	....	?	4.34	51.44	1680	8.2
6	Sludge	21.08	Homogenous	....	....	?	4.4	55.2	1690	9.6
7	Sludge	24.75	.....	9.5	....	....	4.7	59.4	1460	10.4

Remarks: Temperature is low and liquor somewhat acid. No H_2S; sludge watery; organic matter in sludge somewhat high compared to other sludges. Percentage of fats is low.

Sepulveda Tunnel Under Mulholland Highway, Los Angeles

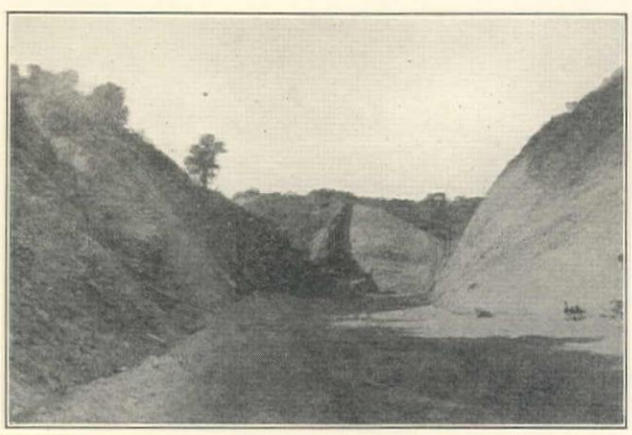
Constructing 655 Ft. of Vehicular Tunnel and 7.65 Miles of Boulevard Between San Fernando Valley and the Coastal Regions

By JOHN C. SHAW,* *City Engineer*

The Santa Monica mountains form a great natural barrier between the San Fernando valley and the beach areas surrounding Santa Monica, Ocean Park, and Venice.

Even in prehistoric times, Indian tribes found it necessary to travel through the Cahuenga pass, necessitating a wide detour—a fact proved by a trail that was ancient when the first Spanish settlers made their homes in Southern California.

Three regimes have seen highways built that follow



South Portal and Approach Roadway to Sepulveda Blvd. Tunnel, with Camp Building in Right Background

the old trail. Recently, a great increase in the population of this section, together with an unprecedented congestion of traffic on its primary highways, resulted in the proposal to build a road directly across the Santa Monica range, with a view of providing a direct route between San Fernando valley and the coastal regions. Such a highway, according to its proponents, would also relieve congestion in the central business district of Hollywood by diverting a portion of the traffic that formerly went to the beaches by way of Cahuenga pass.

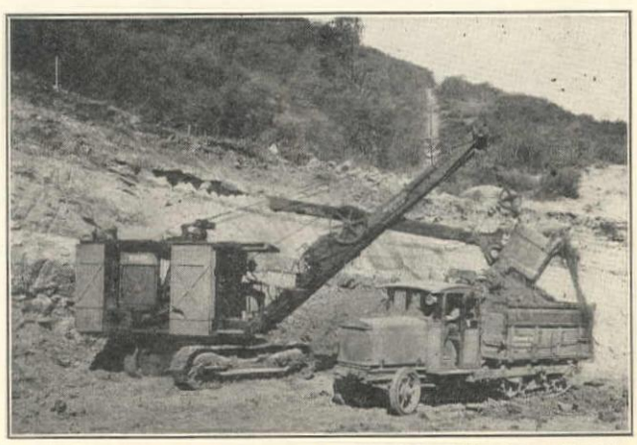
Survey of Routes—The city council instructed the city engineer to make surveys which would determine the most feasible route. Accordingly, two projects were considered. The first included the Sepulveda blvd. tunnel under Mulholland highway, and the grading of 7.65 miles of Sepulveda blvd. This proposed highway had a width of 62 ft., a maximum center line grade of 4.5%, a minimum radius of curvature of 187 ft., and a summit elevation of 1193.6 ft. Its total estimated cost, excluding engineering, was $654,830.

The alternate route followed several ridges instead of the valleys in that section between Petit ave. and Mulholland highway, crossed under the highway 30 ft. below the present grade, and descended the west branch of Sepulveda canyon. Its total length was 5.6 miles, with a width of 62 ft., a maximum grade of 5%, a minimum radius of curvature of 400 ft., and a summit elevation of 1305 ft. Its total estimated cost

Republic Truck on Dump from Sepulveda Blvd. Tunnel

was $487,730, which was $167,100 less than the first route considered.

Economic Selection of Route—A forecast of the probable future volume of traffic was based on an accurate count of all vehicles passing along Lankershim blvd. at Weddington st. An assumption that the new Sepulveda blvd. would carry a volume equal to one-half of that counted, gave a yearly tonnage of 4,915,500. In view of the probable development of



Bucyrus-Erie Gas+Air Shovel Loading Republic—Linn Truck Tractor on Approach to North Portal, Sepulveda Tunnel

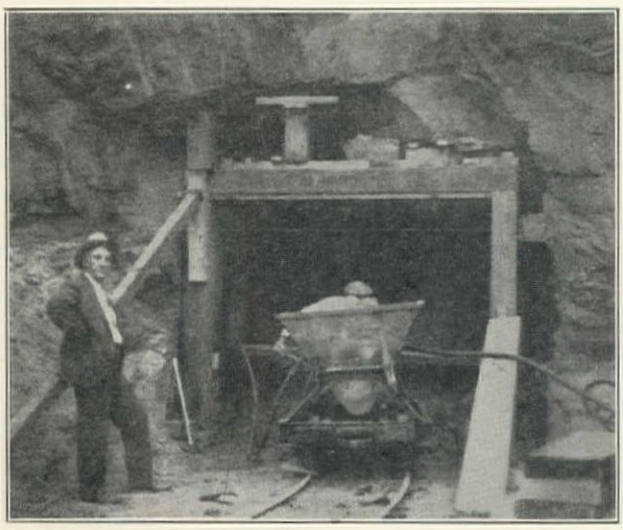
adjacent lands, and the fact that heavy Sunday traffic was omitted from the count, this estimate is regarded as conservative.

In 1928, the Motor Transit Co., of Los Angeles, of which F. D. Howell* is vice-president and general manager, made a statistical study of the cost of operation of a fleet of 170 motor buses, one factor of which

*Member, American Society of Civil Engineers.

is the effect on cost of the vertical height passed over. These statistics yielded an average cost of 11¢ per 1000 ft.-tons for gasoline only, neglecting all other factors. Applying this factor to the case in hand, it was shown that the cost of gasoline alone in one year of 300 working days, to raise the assumed Sepulveda blvd. traffic over the 111.41 ft. difference in elevation, would be $60,200. Capitalizing this at 5%, the excess value of the first line over the second was shown to be $1,204,000. Or, if the annual saving is capitalized at 7%, the excess value becomes $860,000. Since the excess cost of the tunnel route over the crest route was estimated at $167,000, the former route was thus demonstrated to be much the better of the two. The assumptions made as to volume of traffic are conservative, and there are indications that within a few years it will become much heavier than at present, which will result in an annual saving far in excess of the figures given.

Design of Tunnel—Plans and specifications for the tunnel were prepared by the city engineer, the work of design being performed under the supervision of Merrill Butler, engineer of bridges and structures. The length of the tunnel from face to face of the portal walls is 655 ft. The roadway is 36½ ft. wide between curbs, and there is to be a 4-ft. sidewalk on one side and an 18-in. wheel guard on the other, making a total width of 42 ft. between tunnel walls. The height, roadway to crown of arch, is 26½ ft. The



J. G. Donovan at the East Drift for Sepulveda Blvd. Tunnel. Only Two Sets of Timbers in Place

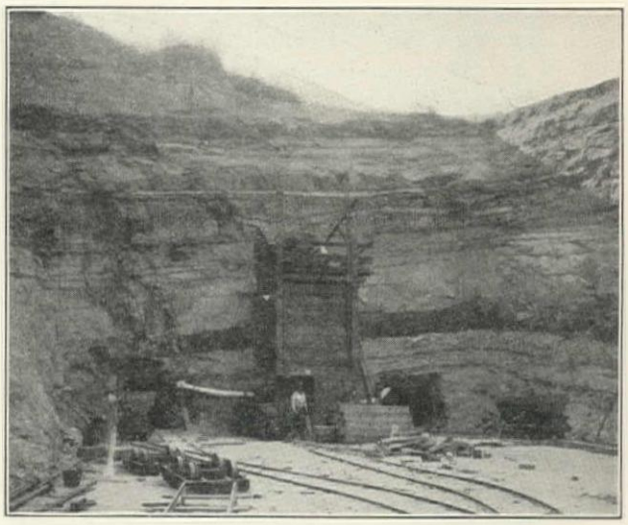
elevation of the roadway near the center of the tunnel is 1180 ft., and the surface of Mulholland highway over this point is at elevation 1320 ft., or 140 ft. above the roadway of the tunnel.

The specifications call for white glazed tile to a height of 7 ft. above curb grade; the remainder of the walls to be smoothly plastered.

The portals and wing walls have been carried out in a modern paneled design with conventional ram's horn ornaments and bronze lanterns. The interior of the tunnel will be brilliantly illuminated at night by 26 electric lamps of 400 c.p., set in recesses of the crown of the arch, 25 ft. on centers. All architectural features have been approved by the Municipal Art Commission.

Construction—The contract was awarded August 29, 1929, to J. G. Donovan & Son, Los Angeles, for $536,930. (The unit bid summary was published on p. 40 of the March 10th, 1929, issue.) Time allowed for completion was 400 days, or until October 3, 1930. The total estimated volume of excavation required, including the tunnel, the grading for Sepulveda blvd., all ditches and channel changes, with an allowance of 15,000 cu.yd. for possible earth slides, is 568,284 cu.yd., or a daily average of 1420.7 cu.yd. The Donovan contract includes 599 lin.ft. of cross-section No. 1, with tunnel excavation, at $280; and 501,297 cu.yd. of roadway excavation at $0.44.

Excavation was begun at the north portal September 1 and this work, together with the south portal excavation, was pushed as rapidly as possible and



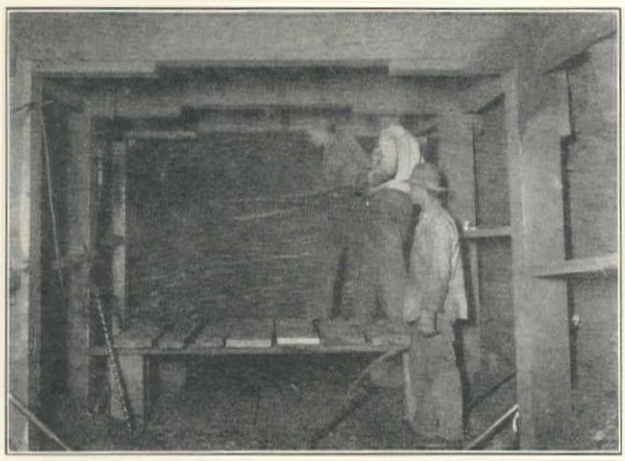
North Portal of Sepulveda Blvd. Tunnel

completed on October 15. The three shovels used on portal excavation were then moved to different points along the boulevard grade and two other shovels were added to the grading equipment.

Tunneling started at the north portal on October 16. The first operation is that of driving three drifts through the hill. One of these is at the crown, and two are at the footings of the sidewalls. The drifts are 8 by 10-ft. in section and are timbered with 8 by 8-ft. square sets every 5 ft., and 2 by 12-in. lagging on the roof. The side wall material is of such nature that it will stand without lagging. For the first 10 days, drifting was handled by two shifts of 8 hours each, work being carried on from both ends. The original plan of driving was then abandoned and three shifts of 8 hours each were put on the north portal. Two of the drifts were completed December 5 and the third on December 6, well within schedule. Three daily shifts made an average progress of 5 lin.ft. per shift, working with air drills under forced ventilation. No grading has as yet been done inside the tunnel.

Excavation for the footings of the concrete lining is being carried forward (December 11) and the concrete plant is being installed. After the completion of the drifts, the concrete footings for the side walls will be placed; then a portion of the tunnel, following the periphery of the side walls, will be excavated, leaving a central core. This method will serve two purposes. First, it will enable the contractor to brace

the forms from the core, and thus save a large quantity of heavy timber. Second, it will make possible the removal of a major portion of material—taken from the tunnel by means of a gasoline shovel—after the concrete lining has been placed, thus greatly reducing the cost from that of straight tunnel excavation. These savings were figured by the contractor



Crew Drilling in Upper Drift of Sepulveda Tunnel, 432 ft. from North Portal

before making his bid, and were passed on to the public.

The total estimated volume of concrete in the tunnel and approach wall is 8523 cu.yd. and the estimated quantity of steel is 192,000 lb. Concrete for the side walls will be mixed at a central plant outside the tunnel, from where it will be transported into the tunnel through pipes by compressed air, and placed by means of concrete guns.

The excavation of the central core will follow the completion of the side walls, after which will come the final operation, that of plastering and tiling.

The construction equipment includes: two ¾-yd. type 'B' Erie steam shovels; two Bucyrus-Erie gas+air shovels; one 1¼-yd. model '6' Northwest shovel; four 4½-yd. LaFrance Republic dump trucks; four 8-yd. Republic-Linn truck tractors; one type 'MO' Whitcomb gasoline locomotive; twenty mine cars; one 'Caterpillar 30' with bulldozer; one 310-c.f.m. Ingersoll-Rand portable compressor; one 220-c.f.m. Chicago Pneumatic portable compressor; Ingersoll-Rand jackhammers and clay diggers; and miscellaneous small tools.

The concrete plant will consist of 300-ton capacity storage bunkers, equipped with Rucker weighing hoppers furnished by the Bodinson Manufacturing Co., Los Angeles; a 28-S Koehring mixer; and two Ransome pneumatic concrete guns. Compressed air for operating the guns will be furnished by a 1200-c.f.m. Chicago-Pneumatic compressor, supplemented by a type 'XB', 300-c.f.m. Ingersoll-Rand compressor. Blaw-Knox collapsible forms will be used in the lining.

To supply water for flooding the fills on Sepulveda blvd., it was necessary to lay 7000 ft. of 6-in. main along Mulholland highway and to install a 400-g.p.m. pump and 100,000 gal. of storage tank capacity.

Work of design and construction has been done under my general supervision. T. M. McDaniel is the general superintendent for J. G. Donovan & Son, and is in direct charge of the work. D. M. True is office engineer for the city.

Steep Concrete Roof Slab Constructed of Gunite

By E. R. HUBER*
Assistant Engineer, W. L. Huber, San Francisco

The building for the Christian Science Benevolent Association now being constructed in Arden Wood, San Francisco, is not only of Class A construction throughout but certain methods of construction which are being used differ from those ordinarily employed. This is particularly true of the steep roof slab.

The building is planned with a central unit, flanked at either end by wings extending at angles of 45 deg. The area of a typical floor is 24,000 sq.ft., the extreme over-all dimensions being 350 by 175 ft. The steep hillside affords a difference in elevation of two stories across the site. All foundations rest on solid rock. Some 1280 tons of steel are included in the frame. All walls and floors are of reinforced concrete and are carefully secured to the frame, thus affording maximum bracing as well as security from dislodgment in the event of a severe earthquake.

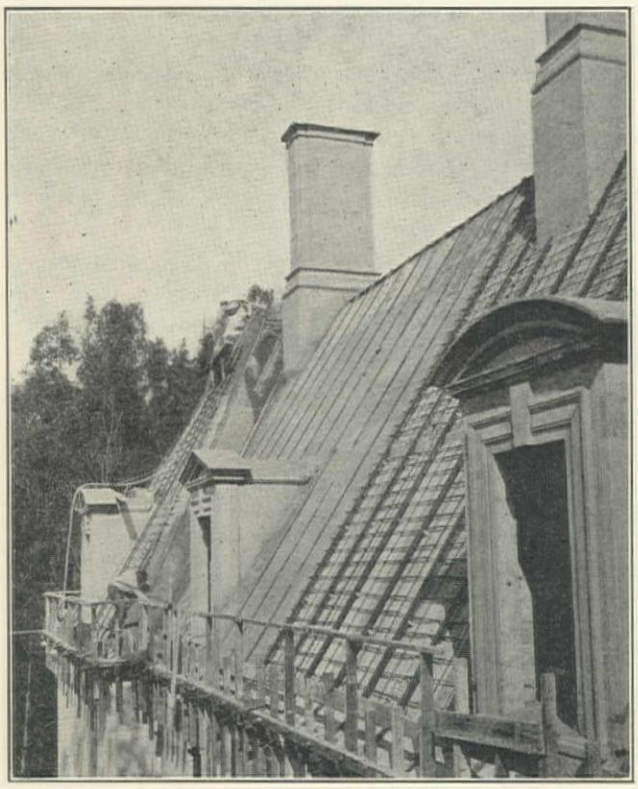
A special feature of the architectural design is the steep roof. The slope is three vertical on two horizontal. The slab is of concrete, 3 in. thick, and reinforced with steel bars. The contractor originally planned to place the slab concrete between top and bottom forms in a manner similar to that in which concrete was deposited in the walls. As the work progressed, it became evident that difficulty would be encountered in placing the slab without serious rock pockets and excessive cost. After careful investigation, it was decided that in the interest of economy and a sounder structure the construction of this slab could best be accomplished by using gunite.

The under form for the slab was constructed between structural steel roof beams, and over this reinforcing was placed. Metal clips, bent to hold creosoted redwood nailing strips, were attached to the forms. Because the under sides of these nailing strips were held 3 in. from the slab form, they served at once for screeds and for guides in constructing the gunite slab to the required thickness. After the slabs had been constructed and properly cured, the under form

*Associate Member, American Society of Civil Engineers.

was removed and thereafter the exposed portions of steel roof members, which had previously been wrapped with electrically-welded fabric, were fireproofed with an irregular layer of gunite, of 2 in. minimum thickness.

All gunite was composed of one part cement to four and one-half parts of graded sand, and was required by the specifications to have a strength of at least 2000 lb. per sq.in. at 28 days. An average strength of 4020 lb. per sq.in. was actually attained. Some difficulty was experienced in securing fair test specimens. By blowing gunite directly into moulds for standard test specimens, the sand rebound was trapped and thus pockets of free sand were included, making a weak sample whose strength differed from that of the roof slab. Finally, a section of slab was built up



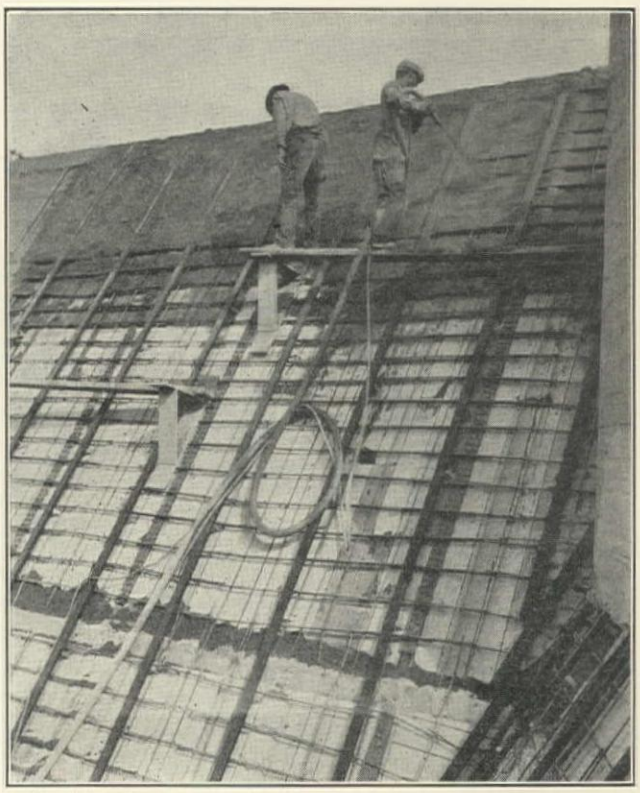
Guniting Roof on Wing of Christian Science Benevolent Association Building, Arden Wood, San Francisco, October 2, 1929

under conditions similar to that of the standard slab. From this slab test specimens were cored, of proper ratio of height to diameter. Although these specimens were of smaller size than those ordinarily used in making compressive tests of concrete, it is believed that they afford a true measure of the compressive strength of the material as placed in the roof slab.

Two cement guns, size N2, were used, operating at an air pressure of 45 lb. per sq.in. at the compressor. In general, 50 ft. of 1¼-in. hose was used between the guns and the nozzles, but this was often increased to 100 ft., and in a few instances to 150 ft. In order to obtain the proper amount of water at the nozzle, a high-pressure water pump was installed at the ground floor and the water pressure brought up to 120 lb. per sq.in. at the pump.

After the material was in place on the roof, an attempt was made to screed it off, but it was found that this opened cracks and caused the gunite to slip. By steel troweling, a smooth surface was obtained and in this way the danger of cracks lessened. The maximum run for a single day of 8 hours was 1400 sq.ft. of slab per cement gun, although the average was considerably less.

The building has been designed and is being con-



Guniting Crew on Steep Roof of Building in Arden Wood

structed under the supervision of Henry H. Gutterson, architect. Walter L. Huber, civil engineer, has designed and had general supervision of construction of all structural features. George Wagner is the general contractor. All gunite work has been done by the Cement Gun Co. under a subcontract.

Bureau of Reclamation

U. S. Bureau of Reclamation engineering projects added 149,995 acres to the total irrigated land in the United States at the close of the fiscal year of 1929. This total acreage—now 2,677,100—bears crops valued at $143,573,070, or an increased value of $10,365,860 over the preceding fiscal year.

Although the engineering policies of the Bureau are sound, Elwood Mead, commissioner of reclamation, believes the economic phases to be unsound. He has called for an economic survey of the field of reclamation, to be completed during the fiscal year of 1930, which should be of material value in determining future policies on existing and proposed projects.

The Bureau has applied to the division of hydraulics, state of Washington, for a one-year extension of its permit to withdraw all waters in the Yakima watershed. Within this period the Bureau can determine the amount of water needed by irrigation projects now under construction in the watershed.

Measurement of Water for Rice Irrigation

By A. A. BLAKESLEY
Chief Engineer, Merced Irrigation District, Merced, California

In fairness to the large majority of water users not engaged in rice culture, it was apparent during 1927, the first year of extensive rice development in the Merced irrigation district, that some system of tolls was necessary.

Observations and measurements during this first year of unrestricted use of water for rice irrigation showed that eight to ten acre-feet per acre for the season was the common duty of water. The alfalfa and sweet potato growers, next heaviest water users, were averaging four acre-feet.

It was decided to charge for all water used in excess of four acre-feet per acre per season at the following rates:

4th to 5th ac.ft.	$1.00
5th to 6th ac.ft.	1.50
6th to 7th ac.ft.	2.00
7th to 8th ac.ft.	2.50
8th ac.ft. and over	3.00

As was anticipated, this system resulted in a much lower duty of water, and growers who formerly used eight acre-feet now get along nicely with six or seven.

Great Western Meter Installation on 6 sq.ft. Orifice from Main Canal to Large Lateral, Merced Irrigation District

This toll plan, involving considerable expense to the rice men, necessitated some accurate, simple, and mutually satisfactory means of measuring the volume of water applied through the season. The Great Western meter was chosen, after consideration of several devices and methods, as being the most practical for our particular needs. At the close of two seasons of continuous operation, inspection revealed no appreciable wear or deterioration on 45 units.

During the past two years, rice water tolls have totaled $30,000 on 5200 acres, netting $23,500 after deducting the entire cost of meters, installation, operation, and maintenance.

This type of meter is easily and cheaply installed in existing standard wooden structures; one good rough carpenter being able to set two a day. The principal operation requires a submerged orifice, the top of which is installed below the bottom of the service ditch, and a bypass through which a small percentage of the total volume of water passes and turns the mechanism of the meter, which has been calibrated to register directly in acre-feet for a particular orifice area.

This device is both adaptable and flexible and a meter which has been calibrated for a certain orifice opening may be used on a different one by applying the proper constant to the number of acre-feet indicated on the dials. For example: A meter designed for a 4-sq.ft. orifice may be transferred to a gate with a 2-sq.ft. orifice and the number of acre-feet registered, and then divided by two for the correct measurement. The accuracy of these meters has been checked in the field by a weir, through a wide variety of heads ranging from 0.05 to 2.00 ft. on the same meter.

After installation, the only attention required is a daily visit to clean accumulated debris from the bypass screen. Since the number of acre-feet that have passed through the orifice is indicated directly, no mathematical calculations are necessary. The same non-technical attendant may, therefore, also record and regulate the necessary volume of water. At the close of the season, the meters are easily removed, and, being sturdy and compact, can be handled and transported with the minimum of care.

After two years' trial, we have found this type and make of meter admirably adapted to our needs and singularly acceptable to the water user, the magnitude of whose annual toll justifies a careful measurement.

Stewart Mountain Dam, Arizona

J. L. Savage, chief designing engineer of the U. S. Bureau of Reclamation, Denver, inspected the foundation and abutments of Stewart mountain dam for the Salt River Valley Water Users Association, Arizona, on October 29, and pronounced the damsite satisfactory. The design of the dam had previously been approved by the Bureau and inspection of the site was made at the Association's request.

This dam, a $2,300,000 irrigation and power project, will be completed in January, as construction is now 3 months ahead of schedule. To date over 85,000 of the 116,000 cu.yd. of concrete has been placed and considerable machinery has been installed. The dam is 1200 ft. long and the spillway is 180 ft. above bedrock. The reservoir has a surface area of 1300 acres and will impound 71,000 ac.ft.; the spillway capacity is 150,000 c.f.s. The power plant will generate 16,000 hp. under 116-ft. head.

General Zoning Principles*

By H. H. JAQUETH

Resident Engineer, Sacramento (California) Planning Commission, for Bartholomew and Associates

Zoning is accomplished by regulatory measure of a legislative body under the police power and its purposes and requirements involve, at least, general principles which have been established largely as a result of research, practical experience, and legal decisions.

To ascertain what these principles are to include, there should first be a simple, understandable definition of zoning, such as that made by the Advisory Committee on Zoning for the U. S. Department of Commerce. This committee, composed of probably the country's most noted talent in such matters, defines zoning as "the application of common sense and fairness to the public regulations, governing the use of private real estate. It is a painstaking, honest effort to provide each district or neighborhood, as nearly as practicable, with just such protection and just such liberty as are sensible in that particular district. Zoning gives everyone, who lives or does business in a community, a chance for the reasonable enjoyment of his rights. At the same time, it protects him from unreasonable injury by neighbors, who would seek private gain at his expense. Zoning regulations vary in different districts according to the determined uses of the land for residence, business, or manufacturing, and according to the advisable heights and ground areas. But these differing regulations are the same for all districts of the same type".

If zoning is the application of common sense and fairness, it most certainly must be reasonable. Almost without exception, legal decisions refer to reasonableness or unreasonableness, as the basis for the decision. Therefore, the first principle, and one which should be held in close conjunction with all others, is that the regulations must be reasonable.

Use Districts—Further along in the committee's definition, it is stated that the regulations shall govern "with just such protection and just such liberty, as are sensible in that particular district". The segregation of a community into different use districts and height and area districts is perhaps a simple undertaking, but to cause the regulation to be reasonable is quite another problem and requires a complete understanding of not only the principles of zoning but of the results of their application. Such regulations and segregations should be made in accordance with the comprehensive plan and designed to: lessen congestion in the streets; secure safety from fire panic and other dangers; promote health and general welfare; prevent the overcrowding of land; avoid undue concentration of population; and facilitate the adequate provision of transportation, water, sewage, schools, parks, and other public requirements. Extreme caution must be exercised in proportioning various districts into their proper areas and the framing of regulations which are designed to fulfill the requirements, that those particular districts may possess just such protection and just such liberty, as are sensible. It does not seem that a definite principle as to the exact proportionate ratio of each district to another within a community can be set forth further than that these proportions are dependent upon requirements of the community, and must be determined after thorough study of the prevailing customs, habits, and conditions. However, it is an essential principle that the private real estate of the entire community shall be included within classified districts.

Height, Area, and Bulk—A zone ordinance governing the use of private real estate in a fair and sensible manner must include regulations pertaining to the height of buildings and the areas surrounding them. At once a distinction must be made in accordance with the principles of land economies, as well as recognizing regulations to govern the health, morals, or general welfare of the community. Economic development is an important factor, but is not the primary justification of zoning in the eyes of the court. Especially in residential districts, the need for certain provisions regulating the size and location of yards and open spaces around buildings is usually appreciated, probably as a result of habit and aesthetic considerations. Only too common is the apartment house built upon the street line, largely gaining income by virtue of its neighbor's yard spaces. Occasionally, there arises a question regarding height regulations. In almost every community there seems to be a sentiment among a few that the city can manifest its progressiveness and prosperity only by erecting towering skyscrapers. This is an idea that has prevailed for many years but, fortunately, there is now available the benefit of experience of other cities which have erred in this sentiment.

In the smaller cities, where one or two skyscrapers have been erected, the value of surrounding property has been raised far above its earning power. This results from the law of supply and demand, in hopes that the time is not far distant when additional high buildings will be necessary, causing an uneconomic and unwholesome development within the community. Hence, if the principles will provide regulations that may be applied sensibly and with fairness, they should include measures governing the size and location of yards and the height to which buildings may be built.

Non-Conforming Uses—No matter how early in the life of an organized community zoning regulations are established, uses of property exist which do not properly fit into those general harmonious schemes of de-

*From a paper given before the planning section of the League of California Municipalities in Oakland, October 9, 1929.

velopment which the zone regulations are designed to protect. In order that the ordinance may not be retroactive with its requirements, such uses must be permitted to continue to serve in the capacity for which they were originally intended. Diversified methods of procedure have been devised and included as regulations for the purpose of gradually eliminating such non-conforming uses and have met with various degrees of success. The necessity for incorporating provisions for non-conforming uses in a set of zoning regulations requires that it be accepted as a principle about which to establish provisions for methods of accomplishment.

Board of Adjustment—According to the definition, zoning is "the application of common sense and fairness to the public regulations governing the use of private real estate". The regulations themselves provide methods of applying such portions of common sense and fairness as is possible by means of a written instrument. Municipalities are composed of a multitude of varying conditions, street arrangements, habits and customs of building design, and of other differences. The zoning regulations must take care of all conditions. Boundaries of use districts may not exactly coincide with property ownership lines; existing buildings may not provide yard spaces similar to those required in the regulations; and in the event improvements are desired, provisions for permitting variances must be included, with the regulations that each citizen obtain a reasonable enjoyment of his rights.

Hence, we find that another principle is established and provisions become necessary for a 'Board of Adjustment' or 'Board of Appeals,' as it is sometimes designated. A clear understanding should be had of the relative powers of the common council and of the board of adjustments. The council has power to change the various districts of the zoning ordinance and to amend the ordinance as it so desires. Thus, it may enlarge or diminish a residence area or a business area, it may place additional requirements upon height and area of districts; but in all of these provisions it must treat similar districts in a similar way. It can not grant special permission to an individual to erect a structure contrary to the provisions of the district in which that structure is to be located.

The board of adjustment should not have power to make any change in the zoning ordinance but should have the power to make certain variations to individuals in a certain district, if by so doing, it will relieve an unnecessary hardship and provide a means for the reasonable enjoyment of a property owner's rights.

Summary of Principles—A brief summary of the general principles follows:

1—Regulations must be reasonable.

2—Segregation of use districts.

3—Provisions for height, area, and bulk districts.

4—Non-conforming uses.

5—Board of adjustment or appeals.

Other general principles might be added under the caption 'Changes to the ordinance and methods of enforcement'. Legislative bodies possess powers to change and enforce all ordinances under their jurisdiction, so these need not be included as principles relating to zoning only. However, the methods of accomplishing changes and the enforcement of the regulations should be given careful consideration.

REGISTRATION OF CIVIL ENGINEERS IN CALIFORNIA

The State Board of Registration for Civil Engineers consisting of Donald M. Baker (Los Angeles), president; Henry J. Brunnier (San Francisco), vice-president; and Albert J. Givan (Sacramento), secretary together with Pecos H. Calahan (Los Angeles), assistant secretary, held its third meeting in San Francisco, December 12, 13, and 14, 1929. This board has completed the By-Laws, Rules, and Regulations, as prescribed by the Statute, and also a 'Procedure' and set of 'Forms'.

The board adopted the following definition for the term 'Civil Engineering'—which is very concise and clear:

> For the purposes of the administration of the Act the Board defines Civil Engineering as that branch of professional engineering which deals with the economics of, the use and design of, the materials of construction and the determination of their physical qualities; the supervision of the construction of engineering structures; and the investigation of the laws, phenomena, and forces of nature; in connection with fixed works for:
>
> Irrigation
> Drainage
> Water Power
> Water Supply
> Flood Control
> Inland Waterways
> Harbors
> Municipal Improvements
> Railroads
> Highways
> Tunnels
> Airports and Airways
> Purification of Water
> Sewerage
> Refuse Disposal
> Foundations
> Framed and Homogeneous Structures
> Bridges
> Buildings.
>
> Furthermore, it includes:
>
> City and Regional Planning
> Valuations and Appraisals
> Surveying, other than Land Surveying as defined in the General Laws of California, Chapter 247, Statutes of 1907.

Pecos H. Calahan has been collecting lists of engineers, from which will be compiled a list to be used in mailing an application blank and questionnaire. Every engineer is urged to promptly fill out and return the questionnaire, whether he files an application for registration or not. This will assist and simplify the work of the registration board.

As civil engineers have until July 1, 1930, to be registered, the board requests that engineers wait until they receive the application blank, rather than burden the secretary with unnecessary communications at this time. If a civil engineer does not receive this blank by March 1, 1930, he should then write to James F. Collins, director of the Department of Professional and Vocational Standards, Public Works bdg., Sacramento.

Associated General Contractors

Eleventh Annual Convention and Christmas Entertainment of Northern California Chapter, San Francisco, December 13 and 14

The Northern California Chapter of the Associated General Contractors of America again outdid itself in its entertainment of engineers and public officials. The dinner-dance de luxe in the Palm Court of the Palace Hotel was as near perfection in every detail as could be conceived. The decorations were elaborate but artistic; the dinner was a masterpiece in culinary art and service; the entertainment—interspersed between dances—was on a scale and of a quality far above that seen at any cafe; and the handsome prizes were well chosen. Every detail had been so carefully planned that the entire entertainment 'clicked' like a perfectly oiled machine—the credit for which is due Earle Lloyd, manager of the Northern California Chapter, and his assistants.

The attendance was 850—contractors, engineers, and public officials, equipment distributors, and their wives—nearly 200 more than at the 1928 party. Among the guests were C. C. Young, governor of California; B. B. Meek, director of the State Department of Public Works; James Rolph, Jr., mayor, and M. M. O'Shaughnessy, city engineer of San Francisco; Governor Balzar and state highway officials from Nevada; nearly all the engineers of the State Division of Highways and U. S. Bureau of Public Roads, engineers from some of the neighboring states, and city and county engineers.

Some idea of the magnificence of the dinner-dance can be gained from the total cost—nearly $12,000.00. The Palace Hotel was literally given over to the Associated General Contractors.

On Friday evening preceding, the Associated General Contractors entertained their friends with a theatre party to witness Charlotte Greenwood in 'She Couldn't Say No'.

The Convention Sessions were held in the Roof Lounge of the Clift Hotel, on Friday afternoon and Saturday morning. Departing from previous custom, only subjects of general interest were discussed. E. S. Berney, vice-president, presided at the Friday morning session. Mayor Rolph in his address of welcome gave the members a vivid picture of San Francisco's progress—past, present, and future—to which Paul B. Fay responded. Harry Lesser, president, in his annual report, referred to the large state highway program, and the long construction season which enabled most contracts to be completed; that the pendulum had begun to swing upward from the cycle of low unit prices; the prominent part taken by the national A. G. C. officials in President Hoover's business stimulus conferences; the successful legislative campaign in securing the passage of the bills for pre-qualification of bidders and licensing of all contractors in California; the large increase in membership of the Chapter and other Pacific Coast Chapters; the progress made by the A. G. C. staff in improving standards and specifications, ethics and practice of trade groups, etc.; and the unfortunate loss by death of D. A. Garber, national general manager.

ELEVENTH ANNUAL CONVENTION OF NORTHERN CALIFORNIA CHAPTER OF ASSOCIATED GENERAL CONTRACTORS

Lesser was followed by a review and discussion of the construction activities of the Pacific Coast.

At the Saturday morning session, Harry Lesser presided. Charles H. Purcell, state highway engineer of California, gave his observations on the new state re-

quirements for prequalification of bidders; that, judging from the statements so far filed by 130 contractors, these men must learn better bookkeeping; they are apparently making a profit; and are good investors of their profits. He gave additional details. The discussion was led by L. I. Hewes, regional director of the U. S. Bureau of Public Roads, who was instrumental about two or three years ago in having the Bureau informally adopt prequalification. Dr. Hewes stated that all the engineers of the Bureau were enthusiastic over the results so far achieved; that prequalification was helping to stabilize the industry, and was taking out some of the gamble for both owner and contractor without reducing good competition. J. S. Bright, construction engineer, Bureau of Public Roads, followed with detailed statistics on the subject. On 73 Bureau contracts last year there were 276 proposed bidders, of which 262 were qualified to bid; the remaining 14 accepting peacefully their rejection.

Bert B. Meek, director of the Department of Public Works of California, expressed his gratification at the way the policies of the present administration had been received and results achieved; that apparently contractors and their associates were satisfied with the way the Division of Highways contracts were being handled, and predicted still greater improvement through this cooperation. Meek outlined in some detail the program of the highway department and policies regarding permanent alignment and grades, temporary and permanent surfacing, etc.

James F. Collins, director of the recently created State Department of Professional and Vocational Standards, predicted far reaching results for his department, and that his aim would be to bring about closer harmony between the engineers, architects, and contractors.

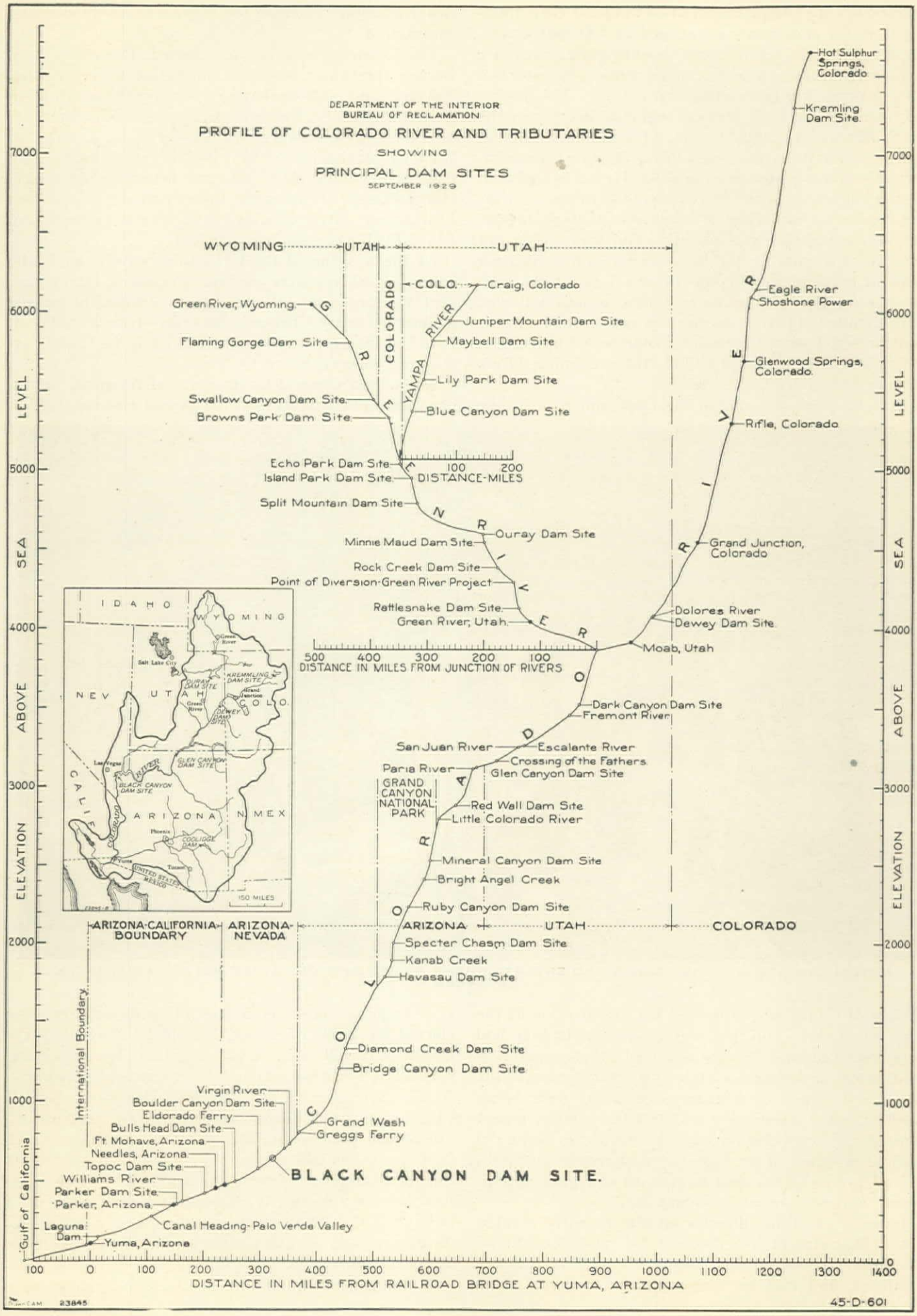
The following officers were elected: President, E. S. Berney (president, Nevada Contracting Co., of Fallon, Nevada, and state senator); vice-president, Adolph Teichert, Jr. (A. Teichert & Sons, of Sacramento); directors—J. E. Bowersmith (Bowersmith, Tuttle, and John of Oakland); C. W. Wood (Stockton); Lynn Atkinson (Oakland); John F. Knapp (Stockton); Harry Lesser (California Construction Co., of San Francisco). Earle G. Lloyd is secretary-manager, and Floyd O. Booe, associate manager.

At the meeting of the California State Branch, the following officers were elected: President, Harry Lesser; vice-president, W. E. Lyons (president of the Alameda County Chapter); secretary-treasurer, W. A. Keating (Sacramento); manager, Earle G. Lloyd; associate-manager, Floyd O. Booe.

Associated General Contractors of America, Southern California Chapter—At the annual meeting, held in Los Angeles December 5, the following officers were elected for 1930: President, Harold R. Crowell, Weymouth Crowell Co., Los Angeles; vice-president, Charles U. Heuser, Glendale; secretary-treasurer—J. C. Bannister, Los Angeles; directors—Newell Chardee, Clinton Construction Co., Los Angeles; C. W. Driver, MacDonald & Driver, Los Angeles; Peter L. Ferry, Glendale; Harvey R. Field, Sumner Sollitt Co., Los Angeles; George Hess, Thos. Haverty Co., Los Angeles; George W. Kemper, Culver City; James A. Lynch, Lynch Construction Co., Los Angeles; C. A. Spicer, Los Angeles; George R. Wells, Wells & Bressler, Santa Ana.

ANNUAL CHRISTMAS DINNER DANCE AND ENTERTAINMENT, PALM COURT OF PALACE HOTEL, SAN FRANCISCO, DECEMBER 14

(Photographs by Morton & Co., San Francisco.)


DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
PROFILE OF COLORADO RIVER AND TRIBUTARIES
SHOWING
PRINCIPAL DAM SITES
SEPTEMBER 1929
WYOMING
UTAH
UTAH
COLO.
COLORADO RIVER
GREEN RIVER
YAMPA RIVER
Hot Sulphur Springs, Colorado
Kremling Dam Site
Craig, Colorado
Green River, Wyoming
Juniper Mountain Dam Site
Flaming Gorge Dam Site
Maybell Dam Site
Eagle River
Shoshone Power
Lily Park Dam Site
Glenwood Springs, Colorado
Swallow Canyon Dam Site
Blue Canyon Dam Site
Browns Park Dam Site
Rifle, Colorado
Echo Park Dam Site
Island Park Dam Site
DISTANCE-MILES
Split Mountain Dam Site
Ouray Dam Site
Minnie Maud Dam Site
Grand Junction, Colorado
Rock Creek Dam Site
Point of Diversion-Green River Project
Rattlesnake Dam Site
Green River, Utah
Dolores River
Dewey Dam Site
Moab, Utah
DISTANCE IN MILES FROM JUNCTION OF RIVERS
Dark Canyon Dam Site
Fremont River
San Juan River
Escalante River
Paria River
Crossing of the Fathers
Glen Canyon Dam Site
GRAND CANYON NATIONAL PARK
Red Wall Dam Site
Little Colorado River
Mineral Canyon Dam Site
Bright Angel Creek
Ruby Canyon Dam Site
ARIZONA-CALIFORNIA BOUNDARY
ARIZONA-NEVADA
ARIZONA
UTAH
COLORADO
Specter Chasm Dam Site
Kanab Creek
Havasau Dam Site
Diamond Creek Dam Site
Bridge Canyon Dam Site
International Boundary
Virgin River
Boulder Canyon Dam Site
Eldorado Ferry
Bulls Head Dam Site
Ft Mohave, Arizona
Needles, Arizona
Topoc Dam Site
Williams River
Parker Dam Site
Parker, Arizona
Laguna Dam
Canal Heading-Palo Verde Valley
Yuma, Arizona
Gulf of California
BLACK CANYON DAM SITE.
ELEVATION ABOVE SEA LEVEL
DISTANCE IN MILES FROM RAILROAD BRIDGE AT YUMA, ARIZONA
IDAHO
WYOMING
NEVADA
UTAH
COLO.
ARIZONA
N. MEX
CALIF.
150 MILES
23845
45-D-601

BUILDING CODE FOR DAMS

Author's Reply to Discussion of the Tentative Suggestions in the September 10th, 1929, Issue, Pages 461 to 465

The Editor: Los Angeles, California, December 5, 1929.

I have read with much interest the comments made by several engineers (November 10th issue, p. 574-576) with regard to certain provisions of my suggested Building Code for Dams as published in your September 10th, 1929, issue.

Jorgensen's Discussion—Lars Jorgensen raises a well-supported objection (p. 576) against the statement made in paragraph 2 (h) of the code, that "for gravity dams the factor of safety against sliding and incipient overturning is usually not more than two". It would be probably more correct to say that the factor of safety "is generally less than two".

His suggestion (p. 576) that gravity dams should be analyzed not only for the highest section but also for the shorter sections on the side slopes, is well taken. In case of curved gravity dams, and of gravity tangents of arch dams, it often happens that the foundation areas at the ends of these dams have a fairly steep slope downhill, thus resulting in a high sliding factor for such portions of the dam. This should be investigated, in addition to the points mentioned by Jorgensen.

In my opinion, the effect of water soaking of the upstream face of arch dams upon the deflection of the vertical cantilever is very uncertain. A sudden flood may put an arch dam under full pressure within a few days. For instance, the reservoirs of the Pacoima and Santa Anita arch dams of the Los Angeles County Flood Control District are subject to being filled by floods within one or two days. The depth to which the water could penetrate the concrete of these dams in such a short period of time is probably relatively small, so that it would be on the side of danger to rely in the design on the possible benefits of the water soaking effect. On the other hand, the reservoirs behind some arch dams may remain full for a considerable length of time, thus permitting the concrete to be moistened practically all the way through. The force of capillarity, which amounts to several thousand atmospheres, is mainly responsible for drawing water into the pores in the concrete. As compared to this enormous capillary force, the pressure of the water in the reservoir is negligible except in 'open channels', such as poor construction joints or gravel pockets in the concrete. In a well constructed dam, such open channels should not occur, or at least they may be found only in isolated spots. I believe that it is preferable not to rely in the design of arch dams on the possible beneficial effect of uneven water soaking of concrete, and for this reason any reference to it was omitted in the code.

Floris' Discussion—A. Floris discusses at some length (p. 574-576) several provisions of the suggested code. He proposes that in the design of gravity dams, uplift (p. 574) should be assumed in an amount of two-thirds of the full hydrostatic head at the upstream face, diminishing to zero at the downstream face of the dam. Floris further favors the use of relatively high sliding factors, especially for buttressed dams. I am in sympathy with those provisions in cases where the foundation conditions are favorable. In other cases, I prefer the more conservative assumptions as given in the code.

With regard to inclined contraction joints (p. 574), Floris agrees that in high concrete dams of the buttressed or gravity type, shrinkage cracks will occur unless the concrete is given the opportunity to contract along predetermined lines. Fortunately, the theory of the principal inclined stresses furnishes a safe basis for the location of inclined joints in buttresses and in the vertical slices of gravity dams. It is true that for the unloaded dam the direction of the principal stresses and of the planes of zero shear is somewhat different from that for the dam fully loaded. However, for reservoir empty the stresses are usually small, especially in buttressed dams of the multiple arch and Ambursen type. An investigation has shown that it is practicable to locate the inclined joints in such a way that no dangerous stresses in the inclined columns, or in the dam as a whole, will occur at intermediate stages of the reservoir level. The stability of the individual inclined columns contained between the inclined joints may be investigated in an elementary way by means of force and string polygons, drawn for the portions of the water load supported by each column. Floris points out that the German engineer, P. Ziegler, believes that "if a dam is stressed by the action of water pressure, there are formed inclined arches in its interior having one of the abutments at the upstream face of the dam". These inclined 'arches' are substantially identical with the inclined curved columns which I referred to. Thus, the same problem of subdividing a dam into inclined structural elements, as mentioned in my code, has been treated by Ziegler in a different way but with practically the same results.

A further substantiation of the theory of inclined column action in dams is furnished by the condition of several buttressed dams which have developed cracks in the buttresses. For instance, the Lake Hodges multiple arch dam near San Diego has cracks in practically every buttress. Some of these cracks have opened one-tenth of an inch. Fortunately, they developed apparently when the dam was partially loaded, so that they extend in an inclined direction approximately parallel to the direction of the principal stresses. Two engineering commissions, one appointed by the city of San Diego and one by the California state engineer, recently investigated and reported on the safety of this dam. Both commissions found that the cracks in the buttresses—on account of their favorable directions—did not render the dam unsafe. The reservoir has been filled several times since the completion of the dam in 1917, and the structure has furnished by these 'full-size tests' a good proof of the soundness of the assumption of inclined column action.

As regards the safety of laminated arch dams (p. 575), Floris apparently overlooked the fact that the arch nearest to the water face can not be overstressed without deflecting a corresponding amount, and thus put a portion of the load upon the downstream arches. Full water pressure may deflect a monolithic arch dam by, say, one inch at the crown. If the upstream arch of a laminated dam should have to support all the water pressure, as Floris seems to assume, its deflection in case of a dam with two laminae would evidently be two inches for full load. This large deflection is prevented by the downstream arch lamina, which will carry a portion of the load. In elastic structures, the load and the deflection due to this load are in direct proportion to each other. Consequently, in a laminated arch dam the water load is divided about evenly between the individual arch laminae.

Constant Reader's Discussion—The inquiry by the engineer who signed 'Constant Reader', with regard to the construction of rock-fill dams (p. 576) may be answered in this way—that current good practice in constructing dams of the rock-fill type requires that the rock fragments must be reasonably durable and resistant to deterioration. Any other material or combination of materials, such as suggested by 'Constant Reader' would be likely to lead to uneven settlement of the fill, which might cause the concrete face or core wall to be ruptured and develop leaks. If sand and clay is available, it might be feasible to build a combined earth and rock-fill dam, the rock being deposited at the downstream side, and the sand and clay at the upstream side, preferably by the hydraulic or semi-hydraulic method.

Acknowledgment—I wish to express my appreciation to those who have submitted comments, in print or by correspondence, on the suggested building code for dams. I also wish to take this opportunity to thank the numerous engineers in this and in foreign countries who have so generously supplied information on existing governmental regulations for dams, and have aided in the formulation of modernized rules as incorporated in my suggested code. Thanks are also due to S. M. Cotten, M. Am. Soc. C.E., for aid in the compilation and formulation of the code.

FRED A. NOETZLI,
Consulting Hydraulic Engineer.

PERSONAL MENTION

Harold Gray, sanitary engineer, of Berkeley, has been retained to revise the sewage treatment plant at Brentwood, Contra Costa county, California.

A. M. Jensen, commissioner of public works, Fresno, California, has been named president of the League of Municipalities of the South San Joaquin valley.

R. J. Tipton, hydrographic engineer for the Denver office, Bureau of Reclamation, has resigned to take charge of engineering for the state of Colorado on the allocation of the waters of interstate streams.

Harald M. Westergaard has become senior mathematician with the Bureau of Reclamation, Denver office, on special studies pertaining to the mathematical treatment of arch dam designs, particularly for Boulder dam.

R. W. Shoemaker, superintendent of the electrical department of the Turlock Irrigation District, has resigned to accept a position with a New York holding company in Brazil, where he will have charge of a number of engineering projects.

Frank Adams, professor of irrigation investigation and practice at the University of California, has completed committee work on the survey of 21 backward government reclamation projects. A report will be rendered by the committee to the secretary of the interior.

Chester C. Fisher, construction engineer with the J. G. White Engineering Corp. on irrigation projects in Mexico, has resigned to become consulting engineer to the Soviet government on irrigation construction in Transcaucasia, with headquarters at Tiflis. Fisher was formerly an engineer for the Bureau of Reclamation.

Gus V. Wallach has been appointed city engineer and street superintendent of Ukiah, California, effective December 15. Wallach is an engineering graduate of Stanford University, served overseas during the war with the engineers, and was for three years with the state highway commission and for five years with the Standard Oil Co.

Pascual Ortiz Rubio, president-elect of Mexico, is a prominent hydraulic engineer. Rubio's public service has included: secretary of communications and public works; brigadier-general in the corps of engineers, Mexican army; and confidential representative on foreign missions to study hydraulic practice in Egypt, Italy, France, Spain and the United States.

OBITUARY

W. W. Briggs, vice-president and general manager of the Grays Harbor, Washington, Light & Power Co., died December 9 at Aberdeen, Washington. Briggs was district manager of the Westinghouse Electric & Manufacturing Co. at San Francisco from 1899 to 1913 and San Francisco manager of the Great Western Power Co. from 1913 to 1916.

Daniel A. Garber, 69, general manager of the Associated General Contractors of America since May, 1928, one of its founders, and the first president of the body, died December 4, at East Orange, New Jersey, after an illness of several months. He was for many years president of the North Eastern Construction Co., New York, Baltimore, and Charlotte, N. C. Garber is survived by his widow and one son.

Joseph M. Snow, 79, first state highway commissioner of Washington (1902-1905) and deputy county engineer of Spokane county, Washington, since 1917, died at his home of pneumonia on December 6. Snow had been a resident of Washington for 60 years. He was the first city engineer of Seattle, several times in the Territorial legislature, was county engineer of Ferry and later of Spokane county. He is survived by his widow.

Claire A. P. Duffie, 39, former treasurer and one of the organizers of the Berkeley Steel Tank & Pipe Co., died recently at an Oakland hospital of pneumonia. Duffie was a captain of anti-aircraft during the war and received the Croix de Guerre. His company was awarded the $16,000,000 contract for welded steel pipe for the Mokelumne aqueduct of the East Bay Municipal Utility District. Duffie had been retired for the past three years. He is survived by his widow and four children.

ASSOCIATIONS

American Society of Civil Engineers, Western Washington Section—At the regular November meeting, postponed until December 3, Arthur A. Murphy, president of the Seattle Chamber of Commerce, spoke on 'The Development of the Natural Resources of the State of Washington.'

American Society of Civil Engineers, Arizona Section—The officers elected for 1930 are: president—W. W. Lane, state engineer, Phoenix; first vice-president—W. E. Dickinson, district engineer, U. S. Geological Survey, Tucson; second vice-president—R. Gale Baker, designing engineer, Salt River Valley Water Users Association, Phoenix; and secretary-treasurer—E. V. Miller, engineer of plans, Arizona State Highway Department, Phoenix.

Professional Engineers of Oregon—Walter Haynes, dean of the college of engineering, Oregon Institute of Technology, has been elected president of the Professional Engineers of Oregon, succeeding J. C. Stevens. Other elected officers are: vice-president—Floyd W. Allen, consulting engineer; treasurer—Fred D. Weber, electrical engineer; directors—R. E. Cushman, H. H. Schoolfield, L. R. Lange, D. L. Buckingham, and L. R. Stockman. There are 212 registered professional engineers in the association.

American Society of Agricultural Engineers, Land Reclamation Division—This division of the Society will meet at the Hotel President, Kansas City, Mo., on December 30-31. During the first day there will be four simultaneous, all-day sessions on: soil erosion control (G. E. Martin presiding), drainage (R. B. Roe presiding), irrigation (M. R. Lewis presiding), and land clearing (N. A. Kessler presiding). Nine separate papers will be presented in the general session on December 31, at which Ivan D. Wood will preside. Raymond Olney is secretary of the Society, with headquarters at St. Joseph, Michigan. Several western engineers are on the program and an attendance of 200 is anticipated at the meeting.

Highway Engineering Conference, University of Colorado—The fourth annual conference will be held at the University of Colorado, Boulder, on January 16-17, 1930. In preparing the program attention has been given to topics which are particularly vital to highway engineers in the Rocky Mountain region. Subjects to be discussed include: 'oiled gravel roads, maintenance, snow removal, provision for traffic during construction, traffic surveys, recent developments in highway research, and highway financing'. Past conferences have proven successful and have been well received by those who have attended. C. L. Eckel is professor of civil engineering and head of the department of civil engineering at the University of Colorado.

American Water Works Association, Rocky Mountain Section—The 1930 annual meeting of this section, embracing Idaho, Utah, Arizona, Wyoming, Colorado, New Mexico, and western Nebraska, will be held at Denver on February 13 and 14. The program committee, consisting of Burton Lowther, chairman, Denver; Paul S. Fox, Santa Fe, New Mexico; and H. L. Warner, Denver, is arranging for technical waterworks papers, inspection trips, and entertainment. The program will be released about February 1, at which time invitations will be mailed. This is an important meeting for superintendents of municipal water systems, waterworks engineers, consulting engineers, and equipment men in the territory represented and should be generously supported.

Dana E. Kepner, manager, Denver office, Pacific States Cast Iron Pipe Co., is secretary-treasurer of the section.

Association of Western State Engineers—The second annual meeting was held at Reno, Nevada, December 9-11, 1929. Subjects covered by the various committees included: 'Whether the federal government or the several states should have the right to control the unappropriated unnavigable waters within the state boundaries; relation of the federal government to the states relative to the control of water within the states, with special reference to the care that has been exercised by Congress to preserve the states' sovereignity; to help stabilize the commercial phases of the use of water by encouraging the perfecting of the laws relating thereto and by other proper means; proposed state laws governing dam construction; the United States reclamation policy; proper state control and protection of individual appropriators of underground water; ownership of return flow and its relation to the relative rights of the stream system; range control in the western states; national legislation of common interest to our irrigated states; irrigation and drainage district laws, with special reference to standardization.' The following states are represented in the association: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Wyoming, Washington.

American Welding Society, San Francisco Section—A regular monthly meeting of this section was held at the Oakland Central High School on December 13, with an attendance of 70. The meeting was preceded by a dinner at the Athens Athletic Club, Oakland, attended by 25 members and guests.

George T. Kerr, foreman of the welding and repair department, Hall, Scott Motor Car Co., Berkeley, gave an illustrated talk on the application of welding to die work. C. R. Owens, arc welding specialist for the General Electric Co., San Francisco, described the history and application of the atomic hydrogen arc, a late development in the field. Following a live discussion, the meeting adjourned and a demonstration of atomic hydrogen welding apparatus was given by the welding class of Oakland Central High School.

M. Rhine, manager of the industrial department, General Electric Co., San Francisco, is chairman and H. W. Saunders, sales representative, Air Reduction Sales Co., Emeryville, California, is secretary-treasurer of the section. Kenneth V. Laird, Berkeley, had charge of the program for the December meeting.

The American Welding Society is an organization of individuals, companies, and corporations interested in welding by any process.

SCHOOL OF CITIZENSHIP AND PUBLIC ADMINISTRATION

The University of Southern California is carrying on special college courses for water, power, and police department training. These are being given in the School of Citizenship and Public Administration in the Los Angeles civic center. Most of the 16 classes—including finance, mathematics, science, English, and sociology—meet at 5:40 p. m. in the City Hall, a time and place convenient for those city and county employees who wish additional education to fit them for advancement. Enrollments are taken in the Wilson bdg. at First and Spring st., Los Angeles civic center. There are now 267 students enrolled, with promise that the work will get into better stride for the winter quarter beginning January 6, 1930.

The evening courses embrace the following: for draftsmen, junior engineers, and surveyors—courses dealing with mathematics, surveying and highways; for executives—organization and management; for engineers working under special improvement acts—special assessments and property valuation; for secretaries, counter clerks, inspectors, and others who work in contact with the general public—a course in public relations; for members of highway commissions, highway engineers, and interested citizens—a course in regional planning. Fifty policemen are studying 'evidence', psychology, and courses of like value.

In addition to the evening courses, the School of Citizenship and Public Administration also offers a full-time course of resident enrollment leading to the degree of Bachelor of Science in Public Administration.

BOOK REVIEWS

SUSPENSION BRIDGES

By D. B. STEINMAN, PH. D.

The second edition, revised, of 'A Practical Treatise on Suspension Bridges—Their Design, Construction, and Erection' (a 1929 Wiley book of 292 pages) sets forth in detail some essential information on this difficult subject. The chapter and appendix headings are: stresses in suspension bridges; types and details of construction; typical design computations; erection of suspension bridges; design charts for suspension bridges; the Florianapolis bridge; the Ohio river suspension bridge at Portsmouth; the deflection theory; chronological table of suspension bridges. Price $5.00.

FOUNDATIONS OF BRIDGES AND BUILDINGS

By HENRY S. JACOBY AND ROLAND P. DAVIS

The authors have attempted to systematically treat the entire subject of foundations for bridges and buildings, as represented by American engineering practice. The first edition of this McGraw-Hill book was published in 1914 and in 1925 the text was revised to include the significant features of those changes in professional practice relating to foundations.

The text contains 660 pages and is divided as follows: timber piles and drivers; driving timber piles; bearing power of piles; concrete piles; metal and sheet piles; cofferdams; box and open caissons; pneumatic caissons for bridges; pneumatic caissons for buildings; pier foundations in open wells; ordinary bridge piers; cylinder and pivot piers; bridge abutments; spread foundations; underpinning buildings; explorations and unit loads; pneumatic caisson practice; references to engineering literature. Price $6.00.

PRINCIPLES OF HIGHWAY ENGINEERING

By CARROLL CARSON WILEY, C. E.

The author of this 1928 McGraw-Hill book has selected material which will set forth or illustrate the various principles and practices of highway engineering in the manner best suited for beginning college courses or to supplement advanced courses in design and administration. The information is, however, conveniently arranged and of reference value to the practicing highway engineer who wishes an up-to-date text to supplement his earlier library.

There are 490 pages, including 32 tables, in 'Principles of Highway Engineering'. The chapter headings follow: introduction; non-bituminous materials; bituminous materials; concrete; drainage; earthwork; earth roads; gravel and macadam roads; concrete pavements and pavement bases; block pavements; bituminous surfaces; accessories; resurfacing and repairs; horizontal alignment; vertical alignment; width and capacity; surveys, plans, estimates; comparison of roadways; finance; operation. Price $4.00.

REPORT WRITING

By CARL G. GUAM, M. E., AND HAROLD F. GRAVES, M. A.

Reports play a large part in public and corporate affairs; they are the means whereby an engineer can most effectively sell his services. Certain principles of composition and rhetoric are applicable to the special field of the report. These are well brought out by Gaum and Graves in 'Report Writing', a 1929 Prentice-Hall book.

Divisions of the book are: the demand for reports; letters and reports; fundamental forms of composition; some matters of style; preparing the manuscript; periodic reports; progress reports; examination reports; recommendation reports; specimens of periodic reports; specimens of progress reports; specimens of examination reports; specimens of recommendation reports; specimen form for reports; bibliography of books and publications useful to the report writer; bibliography of business and technical periodicals (partial only); bibliography of published reports; list of abbreviations permissible in technical reports; list of inseparable compounds, hyphenated words, and separable compounds. Price $5.00.

Construction Review

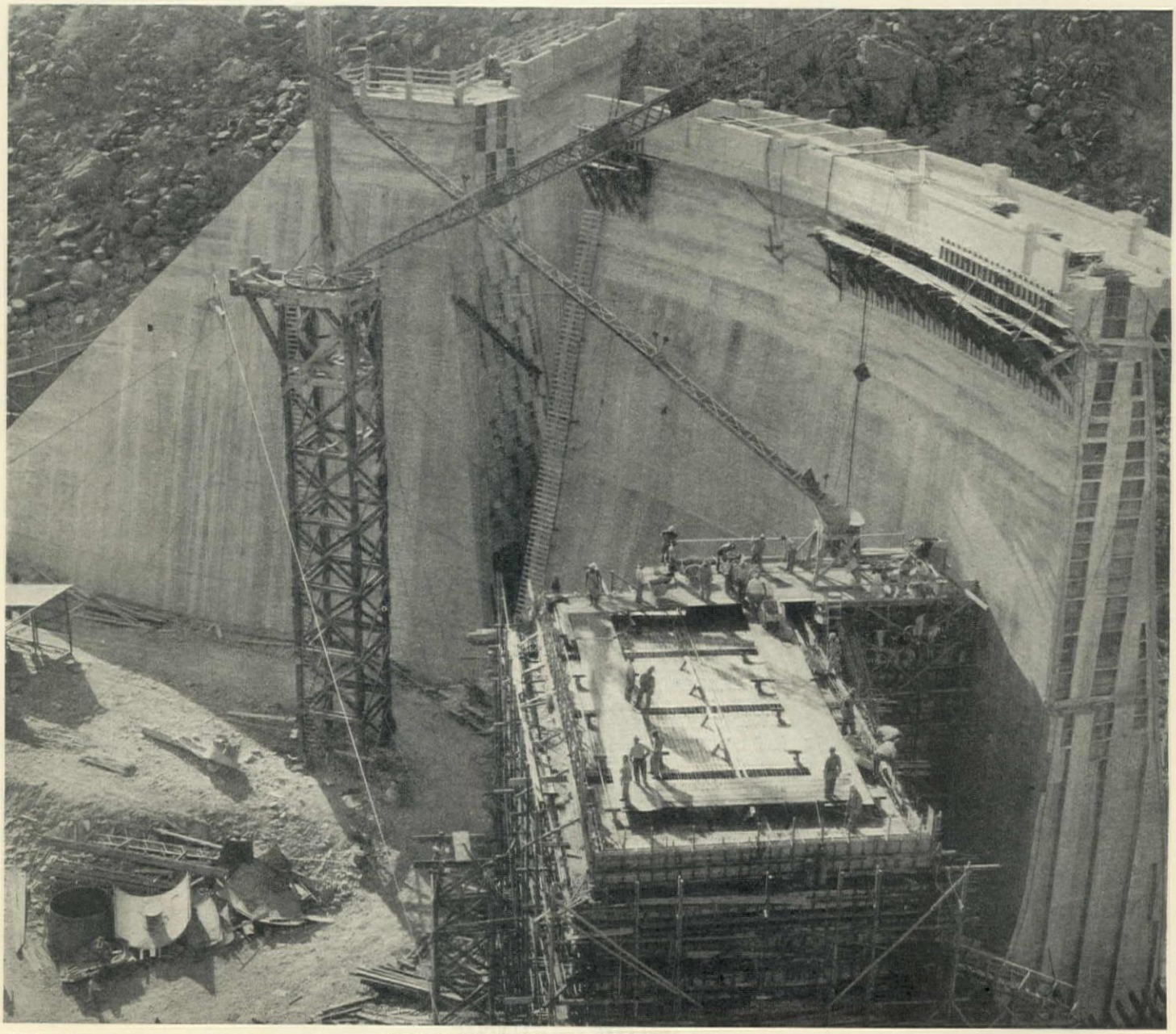
IRRIGATION, RECLAMATION, AND POWER DEVELOPMENT

By S. J. SANDERS
Editor, Daily Construction News Service

Progress being made on important projects as follows:

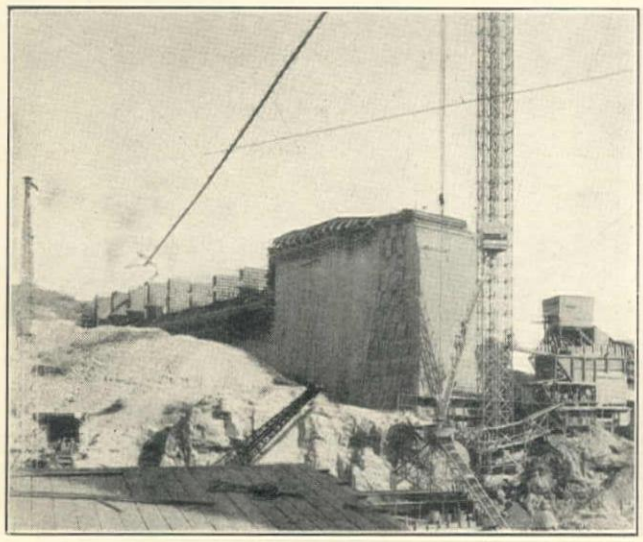
SALT RIVER VALLEY WATER USERS ASSOCIATION, PHOENIX, ARIZONA

Stewart Mountain Dam and Power-House—Construction of the Stewart Mountain project will be completed about March, 1930, by the forces of the Salt River Valley Water Users Association. To date over 85,000 cu.yd. of concrete poured out of a total of 117,000 cu.yd. to be placed. The abutments, gravity section, base of arch below river level, and one-fourth of length of arch above stream have been poured. The walls and roof of the power-house are in place. The dam is 10 miles below the present Mormon Flat dam, also a power plant and electrification of the Salt River valley farms. The dam is to be 170 ft. high above bedrock and 1200 ft. long, and is of unusual design, consisting of a central variable-radius arch



STEWART MOUNTAIN DAM FOR SALT RIVER VALLEY WATER USERS ASSOCIATION, ARIZONA, SHOWING WEST ABUTMENT, WEST GRAVITY SECTION, COMPLETED PORTION OF ARCH, AND POWER-HOUSE. WOOD TOWER AND STEEL DERRICK REHANDLE THE CONCRETE CHUTED FROM MIXING PLANT

thrusting against artificial abutments, which are connected to the side of the hills by gravity sections. The greater part of the length of the gravity section on the left side of the river serves for a spillway. Major items of equipment are: two 3-yd. Bucyrus gasoline draglines, one with 82-ft. boom carrying a 2-yd. bucket and the other with 60-ft. boom carrying a 3-yd. bucket; one 2-yd. Lidgerwood electric dragline; one 1-yd. P&H gasoline excavator used either as a shovel or dragline; 1 P&H ¾-yd. gasoline dragline;



East Abutment, East Gravity Section and Spillway, Stewart Mountain Dam for Salt River Valley Water Users Association, Phoenix, Arizona

two 340-ft. Insley steel towers, used as double tower and operated from the same hoist; 700 ft. of 20-in. Insley concrete chute with four 40-ft. counterbalances, two used singly and two double; one 105-ft. boom Insley steel guy derrick, mounted on an 80-ft. wooden tower; one 12-ft. Insley steel guy derrick for pile driver; one No. 1 Vulcan steam hammer; two compressors, one single and one double stage; two 1-yd. Smith mixers (main mixing plant); one ½-yd. Smith mixer (odd jobs); 3000 ft. of industrial railroad track, dump cars, etc.; three skylines, 1500 ft. 2½-in. plough-steel cable, 1600 ft. 2-in. plough-steel cable, 1300 ft. 2-in. plough-steel cable; three 1-in. cableways, parallel to skylines, for raising chutes, picking up and moving equipment and material; three 24-in. belt-conveyors for conveying aggregates from screen to stock pile and thence to mixers; one 16-in. belt conveyor for conveying cement from shed to mixers. Cement shed located on hillside and cement unloaded directly from trucks into chutes; three 11x12 frame American hoists with separate slewing engines; two cableway hoists and other miscellaneous hoists; Ransome pneumatic grout-placing machine; Leynor X-70 drifters for 30-ft. grout holes; 72x24 revolving screen; 12x16 Blake jaw crusher; complete machine shop and boiler shop; five Kimball 16-in. screw pumps with 150-hp. motors; miscellaneous pumps for mixer supply, cooling, etc.

C. C. Cragin is chief engineer and superintendent of construction.

KITTITAS DIVISION, YAKIMA PROJECT, WASHINGTON

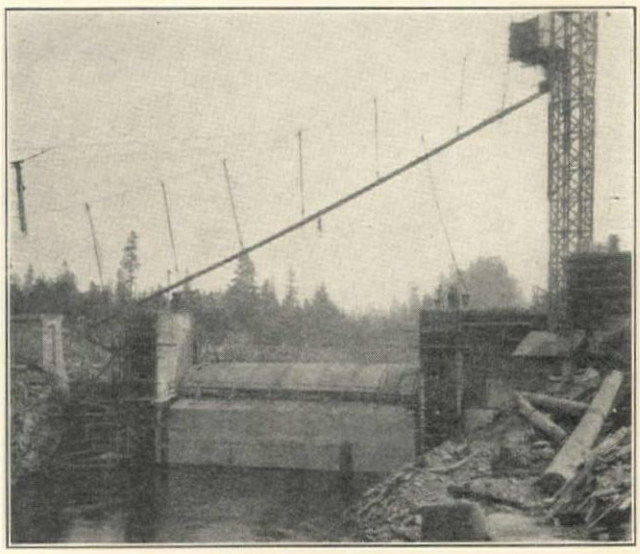
Progress as follows for Kittitas Division of Yakima project for Bureau of Reclamation, Ellensburg, Wash.:

North Branch Canal—Division 1, Schedules 1 and 2—General Construction Co., of Seattle, has completed its contract for 11 miles in these two sections of canal. A 2½-yd. Marion steam dragline and No. 104 Northwest dragline was used for the canal excavation.

The contract price for Schedule 1 was $225,539, involving 95,000 cu.yd. of Class 1 excavation at 15¢; 234,000 cu.yd. of Class 2 excavation, at 36¢; 2000 cu.yd. Class 3 excavation, $1.25; 70,000 sq.yd. trim canal for lining, at 25¢; and 5800 cu.yd. of concrete canal lining, at $11.50 yd. The contract price for Schedule 2 was $128,230, principal quantities were 168,000 cu.yd. of Class 1 excavation, at 15¢; 141,000 cu.yd. of Class 2 canal excavation, at 30¢; and 17,000 cu.yd. Class 2 excavation for culverts, at 65¢.

North Branch Canal—Division 1, Schedule 3—Rumsey & Jordan, of Seattle, have completed their contract for constructing three tunnels which have a diameter of 11 ft. 7 in. and a total length of 4987 ft., as well as 53,000 cu.yd. of structure excavation, and 15,000 cu.yd. of canal excavation. The contract price is $284,884. Unit prices are: Tunnel excavation, $36.00 per ft., and tunnel lining, $10.00 cu.yd. (7580 cu.yd.)

North Branch Canal—Division 1, Schedule 4—The Utah Construction Co., Ogden, Utah, completed its contract for constructing four monolithic-concrete siphons of 11 ft. 2 in. diam., with a maximum head of 153 ft. on the Hayward siphon. The Dry Creek, Little Dry Creek, and Sheep Dip siphons have been completed, and the Hayward siphon is being finished.



Easton Dam for Yakima Project, Bureau of Reclamation, Ellensburg, Washington

An Erie gas+air shovel was used for the excavation.

The contract price was $144,935, covering 19,050 cu.yd. of Class 1 structure excavation, at 40¢; 33,150 cu.yd. of Class 2 structure excavation, at 60¢; 35,800 cu.yd. of backfill, at 30¢; 5505 cu.yd. of concrete, at $15.00; and 1,170,000 lb. placing reinforcing steel, at 2¢.

South Branch Canal—Schedules 1, 2 and 3—Morrison-Knudsen Co., of Boise, Idaho, have completed over 95% of their contract for constructing this 14-mile canal. Pipe is being laid on a 270-ft. head precast, 60-in. concrete pipe siphon at Taneum Creek.

Major items of equipment include one 30B diesel Bucyrus dragline, one P&H gas 700 dragline, one

Byers Bear-Cat shovel, two Sullivan compressors, and two Ingersoll-Rand compressors. The contract price was $172,463, involving in the main: 114,000 cu.yd. of No. 1 canal excavation at 14¢ yd.; 123,000 cu.yd. of No. 2 canal excavation at 32¢ yd.; 47,000 cu.yd. of No. 3 canal excavation at $1.25 yd.; and 1165 cu.yd. of concrete canal lining at $15.00. F. T. Crowe is superintendent.

Easton Dam—Hans Pederson, of Seattle (bondsman for C. E. Graff, who held the original contract for this dam) has completed contract for constructing the gravity type Easton Dam, 65 ft. high, and 250 ft. long, with central spillway and automatic floating type drum gate.

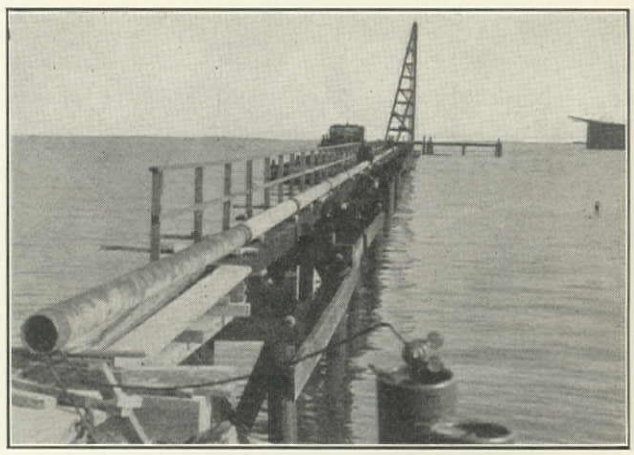
The contract price at $231,947, involved in the main: 17,400 cu.yd. of Class 2 canal excavation at $1.00 yd.; 17,500 cu.yd. of Class 3 canal excavation at $2.00 yd.; 2900 cu.yd. of tunnel excavation at $7.75 yd.; 2100 cu.yd. of concrete (below elevation 2135 ft.) at $2.90 yd.; 2600 cu.yd. of concrete (above elevation 2135 ft.) in spillway section at $4.80 yd.; 820 cu.yd. of concrete in piers at $8.75 yd.; and 1050 cu.yd. of concrete canal lining at $8.85 yd.

North Branch Canal—Yakima Tunnel—Chas. and Geo. K. Thompson, of Los Angeles, have completed 15% of their contract for constructing the 9-ft. 3-in. Yakima river tunnel. Work is being carried on in three shifts with three drills operating, and sinking has been at the rate of 4 to 5 ft. per day. The tunnel

Hayward Canyon Siphon, North Branch Canal, Yakima Project for Bureau of Reclamation, Ellensburg, Washington

is to be 3600 ft. long and the project will be completed about November 1, 1930. Major items of equipment include a 625 cu.ft. Worthington compressor, Ingersoll-Rand drills, electric hoist, and gasoline locomotive. The working force consists of 40 men. The contract price is $345,878. Main items are 12,700 cu.yd. of Class 2 canal excavation at 45¢; 4900 cu.yd. of excavation (incline shaft) at $11.50; 9700 cu.yd. of tunnel excavation at $12.70; and 5500 cu.yd. of concrete tunnel lining at $13.50.

North Branch Canal, Division 2, Schedules 1, 2, and 3—Barnard-Curtiss Co., of Minneapolis, Minn., have just started construction on their contract on these three schedules. Schedule No. 1 runs from Station 570—24.2 to Station 899.54 and will cost $185,339, and calls for in the main of 192,000 cu.yd. excavation of canals, Class 1 at 10¢; 244,000 cu.yd. excavation of canals, Class 2 at 27½¢; 2500 cu.yd. of tunnel excavation at $6.25; and 775 cu.yd. concrete in tunnel lining at $13.50. Schedule No. 2 runs from Station



Intake Line for Circulating Water Supply, Great Western Power Co. Steam Plant at San Francisco

899—54 to Station 1230—14.68 and the contract price was $90,658, involving in the main 222,000 cu.yd. excavation of canals Class 1 at 11½¢; and 1150 cu.yd. of concrete in structures at $20. Schedule No. 3 involves canal work from Station 1230—14.68 to Station 1453—00, will cost $49,964, and includes 51,000 cu.yd. of canal excavation Class 1 at 12¢; and 90,000 cu.yd. canal excavation, Class 2 at 36¢.

Walker R. Young is construction engineer for the Bureau of Reclamation.

STEAM PLANT, GREAT WESTERN POWER COMPANY, SAN FRANCISCO

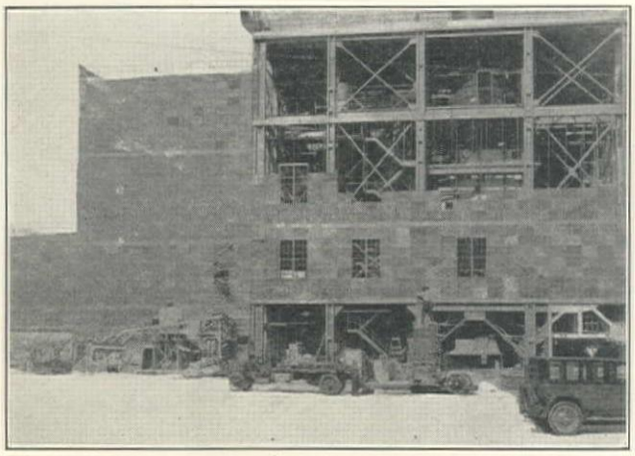
Good progress has been made on the Great Western Power Co. of California's steam plant at Evans and Ingalls Aves., San Francisco.

Except for clean-up work such as flooring, painting, and yard surfacing, the plant is practically complete. The machinery and piping and electrical work is complete enough for operation and much of the auxiliary equipment has been in operation for several weeks. The No. 1 furnace was dried out first and the boiler has been under steam for the past two weeks. All work will be completed about the first of the year.

The Western Pipe & Steel Co., of San Francisco, manufactured the 37,500-bbl. oil storage tank and the 50,000-gal. water tower. Excavation of the salt water channel was done by the Union Dredging Co. Construction equipment consisted of a Link Belt crawler type crane; Johnson weighing batcher; Oshkosh 1-yd. mixer; Ingersoll-Rand pneumatic tools; Insley heavy duty concrete mast and chutes; and machine shop equipment from the Charles F. Bulotti Co. The major items of permanent equipment are as follows:

Exciters, furnished by Allis-Chalmers Co.; turbines and generators, furnished by General Electric Co.; main switchboard, furnished by General Electric Co.; motors, furnished by Westinghouse Electric & Mfg. Co.; condensor, furnished by Ingersoll-Rand; boilers, furnished by Hedges-Walsh-Weidner Co.; furnaces, furnished by M. H. Detrick Co.; pumps, furnished by

Byron-Jackson Co., and Cameron Co.; crane, 110-T., furnished by Shaw-Crane Co.; transformers, furnished by Westinghouse Electric & Mfg. Co.; outdoor switching equipment, furnished by Pacific Electric Mfg. Co.; superheaters, furnished by Foster-Wheeler Co.; fans,



Great Western Power Co. Steam Plant, San Francisco

furnished by American Blower Co. and Sturtevant Blower Co.; tanks, supplied by Boiler Tank & Pipe Co.

H. K. Fox is superintendent of construction for the Great Western Power Co.

POWER PLANT, MERCED FALLS, CALIFORNIA —SAN JOAQUIN LIGHT & POWER CORP.

Construction has been started by the forces of the San Joaquin Light & Power Corp., of Fresno, Harold K. Fox, superintendent of construction, on the Merced Falls plant for the company.

The old power-house has been dismantled and enlargement of the dam started. Equipment has been purchased for the plant; the generator from the Westinghouse Co. and the propeller type water wheel from S. Morgan Smith Co. This wheel will have automatically adjusted blades to obtain maximum efficiency for all operating conditions. The construction schedule calls for putting this plant on the lines June 1, 1930.

B. C. ELECTRIC RAILWAY COMPANY, VANCOUVER, B. C.

Ruskin Development—The work is proceeding on schedule on the Ruskin Development of the British Columbia Electric Railway Co., Ltd., at Ruskin, B. C. The general contractors, Stuart Cameron & Co., Ltd., with which is associated Armstrong Morrison & Co., Ltd., arrived on the location March 1 of this year and actual work on the project was begun April 1.

Excavation for the foundations of the dam above river level is 65% completed. The excavation for the draft tube pits in the power-house have been brought down to within two or three feet of grade.

The work on the penstock tunnels is proceding well. The top headings of Tunnel No. 1 has been driven 146 ft. from the portal, that of Tunnel No. 2, 153 ft. The intake heading of Tunnel No. 1 has proceeded full bore for 35 ft., where driving was discontinued until concrete linings to support the seamed rock formation were poured. This is now completed and the driving is being resumed. The excavation of the tunnel intake is completed.

At the present date the following quantities of excavation have been accomplished: excavation above water level for power-house, 8237 cu.yd. rock, 17,929 cu.yd. earth; excavation below water level for power-house, 3514 cu.yd. rock; excavation for flume outside of dam section and for bridge piers, 65,200 cu.yd. rock, 6339 cu.yd. earth; excavation for foundations for dam above water level, 17,453 cu.yd. rock, 1009 cu.yd. earth; excavation for tunnel intake, 8500 cu.yd. rock, 62 cu.yd. earth.

A secondary cofferdam has been constructed around the power-house site to facilitate work there. The construction of the draft tube forms has been started.

The diversion flume for carrying the Stave river during construction, has been completed both in the timber section and in the concrete section which, when plugged, will become part of the dam. The flume, 36 ft. wide by 12 ft. deep, will carry up to 8000 c.f.s.,

Intake Section of Penstock Tunnel with Concrete Plant Above, Ruskin Project, B. C. Electric Railway Co., Ltd.

which is the maximum tail-water from the Stave Falls plant farther up the river. It is carrying about three-fourths of the river water at present while work on the cofferdams is being completed.

The steel for bridges leading to the power-house is purchased and is at present being fabricated as is the steel frame for the power-house itself.

The generators, turbines, and other hydraulic and electrical equipment have also been purchased and their design and construction is going forward.

The grading for the railway spur to the power-house is completed and the concrete piers for supporting the plate girder span carrying the spur across the diversion flume, are in place.

The reconstruction of the upper four miles of the Stave Falls Railway, made necessary by the rise in water after the completion of the dam, is nearly finished; ballasting, surfacing, and electrification is going forward.

The contractor has a force of about 400 men on the job. Major items of equipment are: two 1-yd. Marion gasoline shovels; one 1¼-yd. Marion steam shovel;

five American hoist derricks; three steam dinky locomotives; three 528-ft. Ingersoll-Rand air compressors; two pile drivers; one concrete plant consisting of conveyor belt with Heltzel batching equipment, and two 1½-yd. Smith mixers; two cableways patterned after those first designed by F. B. C. Lockwood, of Portland; one of 25-ton capacity using 2¾-in. rope, one of 15-ton capacity using 1¾-in. rope.

The value of the contracts already let on this project is $2,250,000.

The contract price of the dam was $882,987 and involves: cofferdam at $150,228; 40,000 cu.yd. of rock excavation, Group 1, at $2.13; 25,000 cu.yd. of rock excavation, Group 2, at $2.05; 22,000 cu.yd. of rock excavation, Group 3, at $5.37; 9500 cu.yd. of 'B' concrete at $4.89; 82,000 cu.yd. of 'C' concrete at $3.16.

Bridge River Project—Work on the Bridge River project of the British Columbia Electric Railway Co., Ltd., is confined at present to tunnel excavation and gravel plant and cofferdam construction for the tunnel intake tower. Pacific Engineers and Henry & McFee, Ltd., are the contractors.

The tunnel, which pierces Mission Mountain, will bring water from the Bridge river to a power station on Seton lake, 150 miles northeast of Vancouver, B. C. The tunnel will be 13,400 ft. long; the head developed will be 1200 ft.

Of the 13,400 ft. of tunnel bore, 5628 ft. has been completed at the Seton lake heading and 4473 ft. at the Bridge river heading, leaving slightly over 3000 ft. to be completed. The bore is about 75% completed.

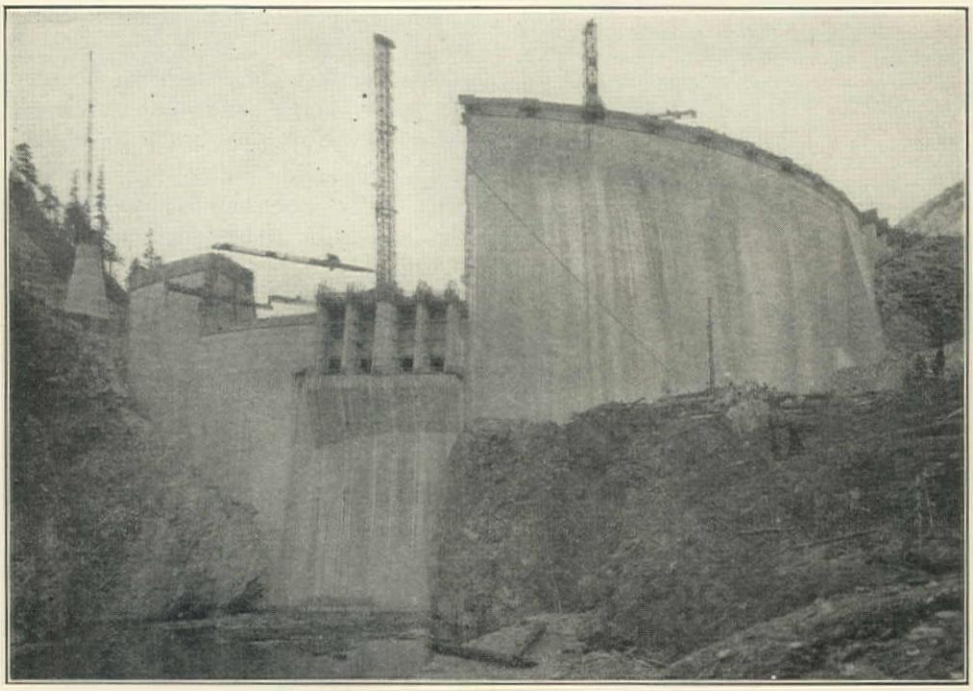
Preparations for the concrete lining of the tunnel and the construction of the intake tower have been begun under the direction of Wattis & Samuels, subcontractors for this part of the work. A U-shaped cofferdam 350 ft. long of timber sheet piling, has been completed at the intake and work is proceeding on the construction of a gravel plant. A stock of aggregate will be obtained from the river bar before the freeze-up, if possible. Active concrete work will not be started before April, 1930.

Freezing has started at the Bridge River portal and ice is forming along the banks of the river.

The size of the bore has been recently enlarged from 12½ ft. to 16½ ft., and all but a small portion of the tunnel is now at the larger size. The temporary power plant supplying power for the work consists of two 6-cylinder, 610-hp. Campbell diesel electric units and one similar 565-hp., 5-cylinder unit, supplied by McIntosh & Seymour Corp.

The value of the tunnel contract is $1,700,388, while the original contract price was $1,249,530 (based on 12-ft. tunnel), involving 12,600 lin.ft. of excavation (main tunnel) at $43.60; and 11,800 cu.yd. of concrete lining (main tunnel) at $25.88.

E. E. Carpenter is chief engineer of the B. C. Electric Railway Co., Ltd.



DIABLO DAM FOR CITY OF SEATTLE, WINSTON BROTHERS, CONTRACTORS

DIABLO DAM AND TUNNEL, SEATTLE, WASHINGTON

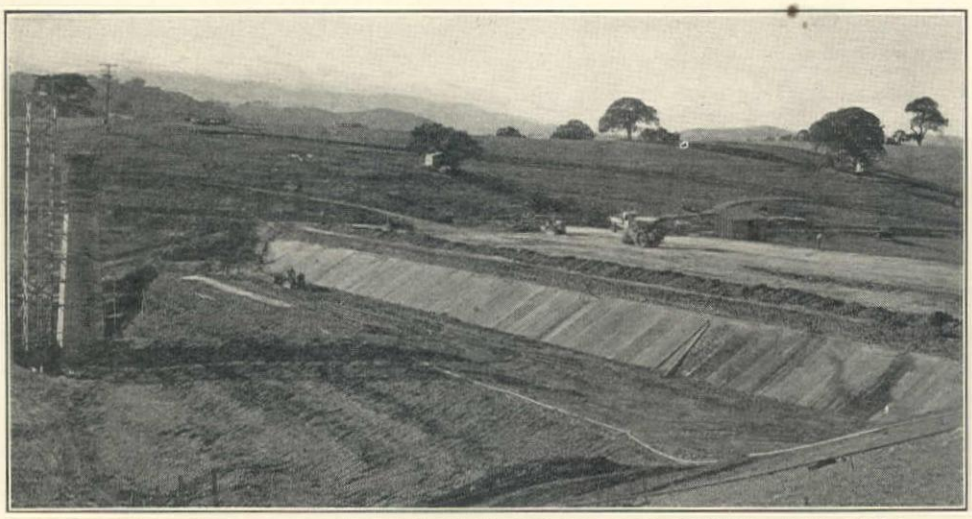
Diablo Dam—Winston Bros., of Minneapolis, Minn., have placed 243,000 cu.yd. of concrete and excavated 197,020 cu.yd. of solid rock in connection with their contract for constructing constant-angle type concrete dam, a unit of the Skagit river power development project for the city of Seattle, Washington. Project will be completed in about six months.

All concrete for the dam is proportioned by weighing, a careful check being made of the grading of aggregates. The city delivers bulk cement to the dam site. Concrete is placed by belt conveyors, except for a small amount in the river channel, and satisfactory concrete is being secured. At a contract price, $2,362,738, items included are: care and diversion of the river, $190,000; 63,000 yd. of solid rock excavation (below elevation 900 ft.) at $3.50; 7000 cu.yd. of solid rock excavation (tunnels and shafts) at $6.75; 12,000 cu.yd. of earth and loose rock excavation at $3.50;

210,000 cu.yd. of Class 'A' concrete at $6.97; 20,000 cu.yd. of Class 'B' concrete at $7.40; and 12,000 cu.yd. of Class 'C' concrete at $9.25.

Diablo Tunnel—Rumsey & Jordan, of Seattle, who hold the contract for the construction of the power tunnel, have advanced the heading over 200 ft. from the entrance. This tunnel is to be 2000 ft. in length, 19½ ft. inside diameter, concrete lined. Tunnel will cost $544,894.

W. D. Barkhuff is city engineer of Seattle; J. D. Ross is superintendent of lighting; and T. H. Carver is water supply engineer.



CONSTRUCTING FELT LAKE DAM FOR STANFORD UNIVERSITY, CALIFORNIA.
H. C. VENSANO COMPANY, CONTRACTORS

FELT LAKE DAM, STANFORD UNIVERSITY, CALIFORNIA

H. C. Vensano Co., of San Francisco, have completed their contract for constructing the Felt Lake dam for Stanford University, 5 miles southwesterly from Menlo Park, San Mateo county, California. The dam is earth-fill type with concrete cutoff wall (placed in a sloping position) and rock riprap on upstream face. The dam was built by the use of an Osgood 1-yd. power shovel, and Pierce Arrow and White trucks. Included in the contract was one mile of inflow ditch which was excavated by a Northwest hoe-trench excavation, and lined by gunite under a subcontract with the Cement Gun Construction Co., of San Francisco. The dam is 70 ft. high and contains 110,000 cu.yd. of earth fill and was built to provide additional water supply for Stanford University. F. C. Herrmann, of San Francisco, was consulting engineer.

CUSHMAN PROJECT No. 2, CITY OF TACOMA, WASHINGTON

Dam—L. H. Hoffman, of Portland, will complete his contract about June 1, 1930, for constructing Cushman Dam No. 2. The side wall and river excavation is practically completed, and the concrete plant and bunkers has been installed and part of the chutes are in place. Concrete placing will start at once. The spillway excavation has not yet started, the drum gates are being assembled at shop, and the 8-ft. outlet pipes and 78-in. valves are ready to install. Spoil being removed from excavation by skips and stiffleg derrick and distributed down one side of river bed by gasoline locomotive and cars. The crib diversion dam and the 12-ft. x 20-ft. flume to handle the discharge of the power-house has been built. Excavation 60 ft. from riverbed to bedrock is practically finished.

Contract price, $440,547, involving in the main 32,000 cu.yd. of Class 'A' concrete at $4.60; 2000 cu.yd. of Class 'B' concrete at $6.70; and 3200 cu.yd. of Class 'C' concrete at $9.00.

Tunnel—Youdall Construction Co. are driving the Cushman Tunnel No. 2 from six faces, and to date over 3500 ft. has been driven. One of the headings is in rock, one is in solid hardpan, and the balance are in stratified hardpan and compacted gravel. Progress is 12 ft. to 18 ft. per day of three eight-hour shifts. Concrete lining has not yet started. Most of the concrete for lining will be dropped through a 50-ft. shaft just above the lower adit, and pneumatic placing equipment will be used. Forms will be complete cylinder, and it is intended to place full circular section at one pour, eliminating longitudinal joints. The tunnel will cost $1,739,933, and is to be 17-ft. diameter, including 12,800 lin.ft. of tunnel excavation at $61.60; and 12,800 lin.ft. of concrete tunnel lining at $26.

Penstocks and Surge Tank—Contract for power-house and penstock grading awarded to Halleran Bros., of Seattle, at $41,295, is practically finished. The Western Pipe & Steel Co., of San Francisco, hold the contract for furnishing and installing the steel penstocks, steel surge tank, and two butterfly valves. Fabrication of the penstocks and surge tanks is now under way. The Youdall Construction Co. will construct piers, anchors, and encasement as subcontractors. The contract with the Western Pipe & Steel Co. amounts to $453,593, and involves in the main 5200 cu.yd. of Class 'C' concrete at $10.80; 3,180,000 lb. of steel penstocks at 7.6¢; 675,000 lb. steel tank at 6.8¢; and two 10-ft. 6-in. butterfly valves at $39,198. J. L. Stannard is chief engineer of the Cushman project for the city of Tacoma, Washington.

LEABURG HYDROELECTRIC DEVELOPMENT, EUGENE, OREGON

A. Guthrie & Co., of Portland, Ore., have completed their contract for constructing Leaburg hydroelectric

power development for the city of Eugene, Oregon. For the canal work a Marion 125 steam shovel, one Bucyrus 50B power shovel and dragline, and one P&H 700 power shovel and dragline were used. Phillips & Davies, of Kenton, Ohio, supplied the broome gates; Willamette Steel & Iron Works, of Portland, supplied the roller gates; General Electric Co. supplied the switchboard and miscellaneous electrical equipment; Westinghouse Electric & Manufacturing Co. supplied the generator and transformers; and S. Morgan Smith Co. supplied the turbine. Work was done for the city of Eugene Water Board, and Stevens & Koon, of Portland, were the consulting engineers. Project consists of headworks to cost $364,970; fore-

Flume and Excavation for Cushman Dam No. 2, City of Tacoma, L. H. Hoffman, Contractor

bay penstocks and power-house to cost $302,188; and power-canal and tailrace to cost $362,070.

VALE PROJECT, OREGON

Tunnel, Dam, Etc.—Derbon Construction Co., of Seattle, will complete their contract about February 1, 1930, for this project, consisting of the excavation and concrete lining of three tunnels—No. 1, 2150 ft. long; No. 2, 5000 ft. long; and No. 3, 1312 ft. long—and the construction of the Harper diversion dam for the Vale main canal.

The Harper diversion dam is now completed and also the excavation of the three tunnels. The concrete lining has been completed on Tunnel No. 1 and Tunnel No. 3. Approximately 2000 ft. of lining remains to be placed on Tunnel No. 2. Concrete is being mixed in a concrete mixer which discharges into a Hackley concrete gun, which is transported into the tunnels by gasoline dinkey. Air is supplied to the Hackley gun from a Fairbanks-Morse compressor plant. Concrete is discharged from the gun into position back of Hackley steel forms.

W. H. Puckett & Co., subcontractors, completed the canal excavation, totaling 150,000 cu.yd. The diversion dam was constructed on the Malheur river near Namorf, Ore., and the canals consisted of 4000 lin.ft. of sidehill open canal excavation. For tunnel driving the following equipment was used: two 1170-ft. Ingersoll-Rand Imperial compressors, two 200-hp. Fairbanks-Morse diesel engines, and Gardner-Denver drills. For the dam and canal, W. H. Puckett Co. used a P&H 700 dragline.

The excavation for the tunnels was in lava, tuff, basalt, and diatomaceous earth, and the overbreakage was light for these classes of material; very little timbering was necessary. The excavated material was loaded into cars with several different types of loaders which were later abandoned for hand methods. This excavated material was hauled out of the tunnels with coke-burning dinkey locomotives. The tunnels are of horseshoe section, the radii of the segments being 10 ft. 6 in. A concrete lining, 10 in. average thickness, will be constructed.

Contract price, $443,421, involving in the main: 40,500 cu.yd. of tunnel excavation at $5.20; 55,000 cu.yd. of Class 1 canal excavation at 20¢; 70,000 cu.yd. of Class 2 canal excavation at 40¢; 1570 cu.yd. of concrete in diversion dam at $14.00; and 10,670 cu.yd. of concrete tunnel lining at $8.80 yd.

Main Canal—Good progress is being made by W. H. Puckett Co., of Boise, Idaho, in connection with their contract for constructing main canal from Station 1117-50 to Station 1980-80.

Main canal excavation is being carried on by a Page diesel dragline, 120-hp., 4½-cu.yd. bucket, 80-ft. boom. Width of canal on bottom is 16 ft.; cuts vary in depth from 6 to 55 ft. Much of the route traversed by the canal line is along steep sidehill. Some slopes are as steep as 2:1 and covered with loose rock. This loose rock is removed with the dragline and cast to the outer toe of the lower embankment in advance of the excavation of the canal prism. This removal of loose rock on a 2:1 slope where the lower cut averages 10 ft. requires a machine with a long reach for proper construction and also requires experience and skill in its operation. The contractor is handling the work efficiently and the weather has been favorable—no frost in the ground and no snow has fallen. 350,000 cu.yd. has been excavated to date, approximately 60% of which required blasting.

The project will be completed about January 1, 1931. Contract was awarded to W. H. Puckett Co. in three schedules as follows: Schedule No. 1 at a price of $179,417, involving 110,000 cu.yd. of canal excavation, Class 1, at 10¢; 235,000 cu.yd. of canal excavation, Class 2, at 24¢; 82,000 cu.yd. canal excavation, Class 3, at 65¢; 1100 cu.yd. of concrete in structures at $17; and 820 cu.yd. of concrete in tunnel lining at $10; Schedule No. 2, contract price $219,875, including 237,000 cu.yd. of canal excavation, Class 1, at 10¢; 338,000 cu.yd. of canal excavation, Class 2, at 25¢; 127,000 cu.yd. of canal excavation, Class 3, at 75¢; and 450 cu.yd. of concrete in structure at $17; and Schedule No. 3 at a cost of $96,177, involving in the main 68,000 cu.yd. of canal excavation, Class 1, at 10¢; 197,000 cu.yd. canal excavation, Class 2, at 25¢; and 1100 cu.yd. concrete in structures at $16.50.

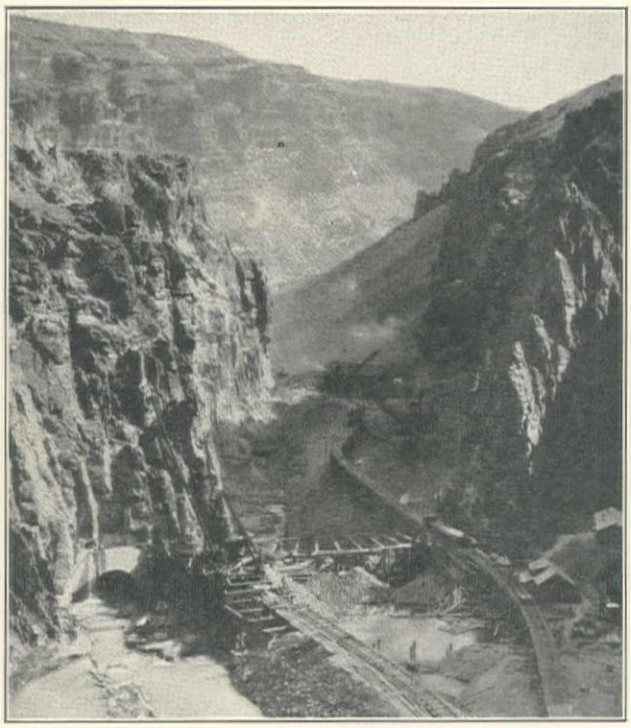
H. W. Bashore is constructing engineer for the Bureau of Reclamation on the Vale project.

OWYHEE DAM, OREGON

Good progress is being made by the General Construction Co., of Seattle, on its contract for constructing concrete arched gravity dam, 400 ft. high and 700 ft. long, on the Owyhee river, 30 miles southwest of Nyssa, Oregon, for the U. S. Bureau of Reclamation.

The river was diverted through tunnel August 7, 1929. Side wall excavation and keyway trench are now 90% complete, bottom excavation of loose and solid rock 60% complete. Excavation in fault zone under dam is just commencing. Cofferdams are 95% complete. Cableway installation is complete, and washing, screening, and mixing plant is now being constructed. Concrete pouring in the dam will start June, 1930. The project will be completed about December, 1932.

The plant tracks are standard gauge 75-lb. rail. Equipment consists of Plymouth gas locomotives, 16-yd. Western dump cars, one Marion 80-ft. boom 2½-yd. steam dragline, one Bucyrus 72-ft. boom 2-yd.



Outlet End of Tunnel and Downstream Cofferdam, Owyhee Dam, Oregon, General Construction Co., Contractors

steam dragline, and two Model 104 Northwest shovels used on excavation. Byron Jackson deep well pumps for unwatering cofferdam, a 25-ton Lidgerwood traveling tower cableway, 1306 ft. between towers, main cable Leschens 3-in. diameter 'Red Strand'.

For concrete work two 4-yd. tilting type Davis mixers will be used. Aggregates will be hauled from Dunaway pit 24 miles from the dam, on a standard-gauge railroad which was constructed by the company previous to the awarding of the dam contract. Washing and screening plant will be at the dam with belt-conveyor system to mixing plant. Bulk cement will be used, handled into tanks by elevators. All concrete materials will be weighed, cobbles up to 8 in. will be used.

Work will continue throughout the winter.

The contract price is $3,198,779, and involves: 135,000 cu.yd. of earth and loose rock excavation (dam base) at $1.85; 70,000 cu.yd. of solid rock excavation (dam base) at $4.00; 21,000 cu.yd. of tunnel excavation at $6.00; 490,000 cu.yd. of concrete in dam at $3.50; 18,000 cu.yd. of concrete (fault zone below dam) at $5.00; and 7750 cu.yd. of concrete in spillway tunnel at $9.00 yd.

The following are directing the work: For the United States Government, F. A. Banks, construction engineer, C. A. Betts, office engineer, Bert Hall assistant engineer. For the General Construction Co., Ben Cook, superintendent, G. H. Bailey and R. E. Woodward, assistant superintendents, and Claude W. Wood, engineer.

DEADWOOD DAM, BOISE, IDAHO

Utah Construction Co. of Ogden, Utah, who hold the contract for constructing the Deadwood dam for the Bureau of Reclamation, have sublet the contract to the Morrison-Knudsen Co., of Boise, Idaho, who are making good progress on the project. The Deadwood dam is concrete arch type with upstream radius, 160 ft. high and 700 ft. long on crest, 25 miles east of Cascade, Idaho. The camp and plant has been installed, eight miles of construction road has been built, and the excavation for the dam is 75% finished. The diversion of the river through flume is nearing completion. Project will probably be shut down from January 1 to April 1, 1930. Contractor is using four Coleman trucks, two Mack trucks, two Chevrolet trucks, five portable compressors, one P&H 700 power shovel and dragline, one sawmill and planer, one 175-kw. diesel engine and generator set, one 2-yd. Smith concrete mixer, crushers, belt-conveyor, one 5-ton cableway, drills, pumps, teams, grading tools, sleds, snow plows, etc. Work was awarded at $953,485, and involves: clearing reservoir site $280,000; care and diversion of river $24,000; 12,650 cu.yd. rock excavation (base of dam) at $5.00; 25,000 cu.yd. roadway excavation at 50¢; 50,000 cu.yd. of concrete in dam at $9.00; 11,000 tons quarried and crushed fine aggregate at $1.00; and 55,000 tons quarried and crushed coarse aggregate at 40¢. R. J. Newell is superintendent for the Bureau of Reclamation on the above project.

MAIN CANAL, MINIDOKA GRAVITY EXTENSION DIVISION, BURLEY, IDAHO

Schedule No. 1, Spec. 476—Derbon Construction Co., of Seattle, are the contractors.

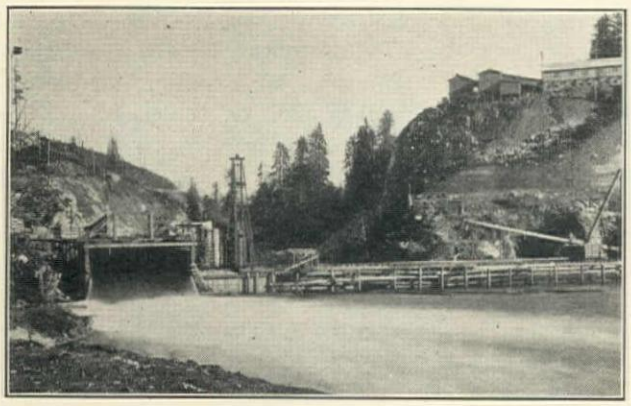
The machine excavation is completed and the trimming on slopes is completed except 500 lin.ft. The rock protection on the soft stratum near grade is completed except 700 lin.ft. The concrete lining on the floor and guniting of rock protection and seams in the natural rock are completed except 1800 lin.ft.

This contract covers the construction of 8000 lin.ft. of canal 25 to 34 ft. base, and 20 to 45 ft. depth of cut through Snake river basalt. Some soil covering to 6 ft. deep on top and one stretch of 600 ft., all earth. Most of the rock is badly seamed and a layer of fine sand with some clay was found from grade to 10 ft. above, capped by basalt, through 3000 lin.ft. of the stretch. Some strata of volcanic cinders were en-

countered and some narrow pockets of clay. Side slopes of 1½ to 1 were built, with a berm of 5 ft. on top of the rock and ¼ to 1 side slopes from the surface of the rock to grade.

The floor is lined throughout with 6-in. plain concrete; the seamed rock gunited to 1 ft. above water surface; the cinder and earth pockets protected from erosion by rock riprap walls laid from grade on ½ to 1 slopes 1 ft. thick and gunited to prevent leakage. The earth seam capped by rock is protected from erosion by a dry rubble wall built under the cap rock, 18 in. wide at the top and on ¼ to 1 side slopes to below the floor and gunited on the face.

The earth stripping was done first; the rock drilled and blasted in horizontal lifts 10 to 15 ft. deep and



Downstream Cofferdam on Ruskin Project for B. C. Electric Railway Co., Ltd.

excavated with draglines. The side trimming on each lift was made at the time the succeeding lift was blasted. The last lift was loaded by the shovel into skips and hoisted by the 50-B dragline. The concrete floor was poured continuously, using the paving mixer in the bottom and chuting the materials into the mixer from the berm at the edge of the cut. The work to date has involved the following quantities: Class 1 excavation, 119,600 cu.yd. at 13½¢; class 2 excavation, 32,700 cu.yd. at 35¢; class 3 excavation, 209,100 cu.yd. at $1.10; placing 12-in. riprap, 5500 sq.yd.; placing dry rubble wall, 2600 cu.yd.; placing plain concrete floor, 3575 cu.yd.; guniting seams and paving, 1500 cu.yd.

Contract awarded at $285,935.

The main equipment used on the work is one 14-B Diesel electric Bucyrus dragline; one 50-B Diesel Bucyrus dragline; one 700 P&H Bucyrus dragline; one 60 Marion railroad steam shovel; one 750-cu.ft. Chicago pneumatic compressor, electric driven; two 210-cu.ft. Ingersoll-Rand portable compressors; one Denver Gardner drill sharpener; one Ransome paving mixer; one cement gun; two R-72 Ingersoll-Rand drills on bar; six R-12 Ingersoll-Rand Jackhamers.

Schedule No. 2, Spec. 476—Winston Bros., of Minneapolis, Minn., completed their contract on November 5 for this section. The contract price was $72,369, including canal excavation, class 1, 540,986 cu.yd.; canal excavation, class 2, 106,316 cu.yd.; canal excavation, class 3, 16,085 cu.yd.

This contract included 10,000 lin.ft. of canal with 50-ft. base width and 1¼ to 1 side slopes. Depth of cut from 12 to 35 ft. The excavation was made with one 3-T Monighan Diesel dragline. The drilling was done with Jackhamers driven by Sullivan portable compressor.

Schedules 1, 5, and 6, Spec. 489—John Phillips Co., of San Francisco, are the contractors.

On schedule 1 the excavation is complete except 2000 lin.ft. with an average cut of 12 ft., or 52,000 cu.yd. This schedule, 21,800 ft. long, has a base width of 40 ft., side slopes 1½ to 1, and a normal bank height of 13 ft. with crown widths of 14 ft. on one side and 10 ft. on the other. Seven thousand lin. ft. is in cut varying from 10 to 38 ft. and the remainder is near a balancing cut of 6 ft.

Forty-two hundred lin.ft., involving 300,000 cu.yd. was sublet to Mittry Bros., who did the work with a 175-B Bucyrus electric equipped dragline using a 5-cu.yd. bucket. The remainder of the schedule the company excavated with a 50-B Bucyrus dragline. Some necessary haul was made with teams and wagons loaded by fresnoes through a trap, and some with 2-yd. dump trucks loaded by the dragline. This excavation was completed December 10.

On schedules 5 and 6, 36,000 lin.ft. in length, this company has completed the earth stripping and building of embankments on the schedules, involving 408,000 cu.yd. of canal excavation and borrow. On schedule 6, 20,000 cu.yd. of rock have been excavated.

The section of the canal is 50-ft. base, with 1½ to 1 side slopes; normal bank height of 12 ft. with 14 ft. crown on the left and 12 ft. crown on the right. The canal in general is on an economic cut of 5 ft., but some short cuts up to 12 to 17 ft. are encountered. Rock was encountered above grade through about 40% of the stretch, and the sharp ridges are usually rock.

All the excavation has been made with one 50-B Bucyrus dragline. Drilling is being done with Jackhamers driven by portable compressors. The drill sharpener is also driven by a portable.

Work on these schedules will be completed about April 1st, if no time is lost on account of winter weather.

The principal equipment of schedule No. 1 is one 50-B Bucyrus Diesel dragline, and on schedules 5 and 6 one 50-B Bucyrus Diesel dragline; two 310 cu.ft. Ingersoll-Rand portable compressors; one 110 cu.ft. Ingersoll-Rand portable compressor; 12 R-12 Ingersoll-Rand Jackhamers.

Schedule No. 1 was awarded at $91,582; schedule No. 5 at $73,620, and schedule No. 6 at $73,817. (Unit Bids published in our issue of May 25, 1929).

Schedules 2, 3, 4, and 9, Spec. 489—Mittry Bros. Construction Co., of Los Angeles, are the contractors.

On schedule 2, Mittry Bros. have used one ¾-yd. Koehring dragline stripping rock and making embankments. One 1-yd. Koehring shovel loaded three 4-yd. trucks hauling to build embankments from borrow pits.

Drilling on rock has been done on this schedule using R-72 Ingersoll-Rand, Leyner type, drills mounted on wagons and driven from a central compressor plant.

No excavation of rock has been made. The quantities to date are: Canal excavation, class 1, 85,700

cu.yd.; canal excavation, class 3 (drilled and blasted), 19,500 cu.yd.; overhaul, 75,700 sta.yd.

It is planned to use the 175-B Bucyrus dragline now engaged on a sub-contract on John Phillips Co.'s work to excavate the rock. No work has been done on schedules 3 4, and 9.

CONSTRUCTING LYONS DAM FOR P.G.& E.CO., SOUTH FORK OF STANISLAUS RIVER, CALIFORNIA

The work is practically completed on structures on schedule 8 366 cu.yd. of concrete having been placed to date.

The principal equipment in use is as follows: One ¾-yd. Koehring convertible dragline; one 1 yd. Koehring convertible dragline; one 750 cu.ft. capacity stationary compressor, electric driven; two R-72 drills using 1¼ in. steel mounted on wagons; one drill sharpener; one 60 Best tractor and 4-yd. fresno; one 10S Rex mixer on wagon.

Time of completion is uncertain. Work is 8% completed. Schedule No. 2 was awarded at $164,002; schedule 3 at $129,476; schedule 4 at $118,841, and schedule No. 9 at $20,465. (See Unit Bid Summary in our issue of May 25, 1929).

E. B. Darlington is superintendent for the Bureau of reclamation, U. S. Department of the Interior, with headquarters at Burley, Idaho.

LYONS DAM

Construction on the Lyons dam, 20 miles east of Sonora, on the south fork of Stanislaus river, California, is progressing rapidly. This dam, of the constant angle arch type, will be 120 ft. high, 500 ft. long on the crest, 25 ft. thick at the bottom, and 6 ft. wide at the top. The top section will contain four automatic flood gates, each 20 ft. wide by 6 ft. high. Lyons dam is 200 ft. downstream from a log crib dam built forty years ago. It will back water for two miles, raising the reservoir elevation to the full practical height at this site. The storage capacity will be 5800 acre-feet. There are 150 men now employed on the work. The dam, which will cost the Pacific Gas & Electric Co. $430,000, will provide a more constant and dependable water supply for the Tuolumne district.

NOTICE TO CALIFORNIA CONTRACTORS

Contractors' License Act

Senate Bill 712, Chapter 791-29: An act providing for the registration of contractors and defining the term contractor; providing the method of obtaining licenses to engage in the business of contracting, and fixing the fees for such licenses; providing the method of suspension and cancellation of such licenses; and prescribing the punishment for violation of the provisions of this act.

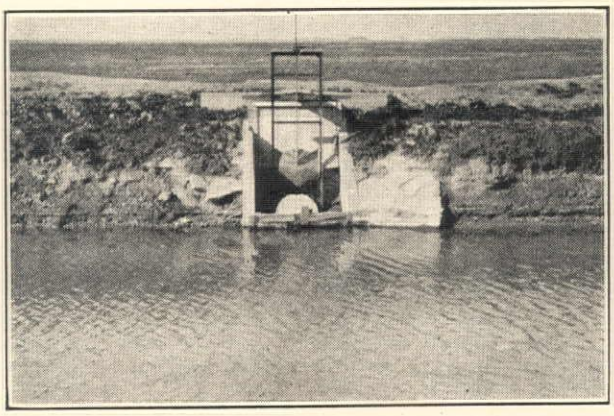
The registration of contractors and the issuance of licenses is under the control of the department of professional and vocational standards, room 220, State Capitol, Sacramento.

Any person, firm, copartnership, corporation, association, or other organization, who for compensation other than wages, undertakes with another any construction, alterations, or repairs where the amount involved is more than $200 on any one undertaking, is termed a contractor under the provisions of this act and must be licensed. This act applies to private as well as public work.

Prequalification of Bidders' Act

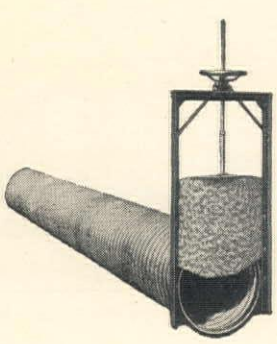
Senate Bill 754, Chapter 644-29: Under the provision of this act, the department of public works is empowered to require answers to a standard form of questionnaire before giving out plans and specifications for duly advertised public work. Such questionnaire covers a complete statement of the person's financial ability and experience in performing public work.

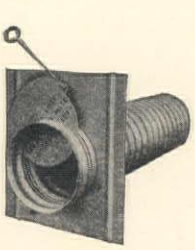
Calco Gates for Water Control



CALCO SLIDE HEADGATE

CALCO LATERAL HEADGATES





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YOU can control the outlets from canals and ditches, rivers and reservoirs by the spin of a wheel.

Calco Gates are easily operated, they do not break or call for frequent repairs—saving time and water. Once in place they require little further attention.

These gates are made in various sizes for every need. Full details and prices furnished on request.

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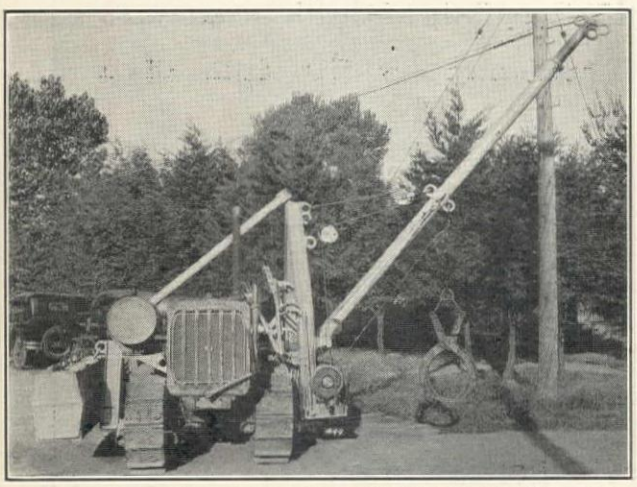
New Equipment and Trade Notes

W-K-M BOOM

The versatility of the W-K-M boom, one of the latest products of the W-K-M Co., of Houston, Texas, manufacturers and distributors of equipment for attachment to 'Caterpillar' tractors, appeals to those who are interested in a light, compact machine for handling, hauling, and digging. The equipment is applicable to 'Caterpillar' models 20, 30 standard, 30 hillside special, and 60. Field installation is simple and two men can attach the unit for the first time in four hours. The unit fits all models specified and it is not necessary that a new tractor be purchased along with the boom.

One of the outstanding features of the W-K-M boom is that its application in no way hampers the use of the tractor on drawbar work. In addition, besides being able to handle large loads with ease, it can be operated in conjunction with a clamshell bucket, dragline bucket, throwout bucket, lifting magnet, etc.

It can do most of the work which is commonly performed by machines expressly manufactured for these purposes. The unit incorporates most of the characteristics commonly found



W-K-M Boom Mounted on 'Caterpillar' 30 Standard Tractor

in all cranes, except that it utilizes the power generated by the tractor. A lateral boom swing of 160-deg. is obtained through the use of two small swing drums. In addition, a low and high speed winch are also provided, either drum of which can be quickly changed to obtain the same speed in both winches.

The method of attachment is simple. No drilling or cutting of any kind is required. Four clamps are provided, two being attached to the track roller assembly on each side of the tractor. The winch and boom mechanism are mounted on a heavy channel shelf which is attached to the clamps on the left-hand side of the tractor by means of pins. A counterweight shelf, provided for attachment to the right-hand side of the tractor, is fastened in the same manner. This permits quick assembly or disassembly.

Power is obtained from the rear of the tractor with a specially designed power takeoff unit and is passed to the main shaft through heavy chains. This main shaft is of high-grade steel, accurately machined, and is provided with large size keyways to prevent shearing or rolling of keys. The main bearings are of babbitt, while the countershaft and drum bearings are of bronze.

Clutches are of the internal expanding type, 17½ in. diameter. The shoes are faced with composition lining which can be renewed easily without removing or disturbing other parts on the shaft.

Only the best grade of steel castings is used throughout. 'A' frames are provided on each side of the tractor, connected by a cross brace, thereby eliminating all strain on the track roller frames and final drive bearings. To overcome the strain on the equipment through the track oscillations, ball and socket joints have been provided wherever necessary.

The boom is collapsible and has a normal length of 13 ft., with an extended length of 25 ft. The diameter of the outside pipe is 5 in. and of the inside pipe 4 in. These dimensions hold for the 'Caterpillar' 30 but for the model 60 the boom extension is 35 ft.

WEHR POWER GRADER DELIVERED BY TRUCK

The Tractor & Equipment Co., Passaic, New Jersey, uses a truck to deliver many of its new Wehr one-man power graders to points of operation. A special platform body is built upon the truck chassis and the grader is then run out from a loading platform, anchored in place, and carried to its destination.

Because of its massive construction, overload capacity, and quick and easy operating action, the Wehr grader is said to

Transporting Wehr One-Man Grader by Truck

produce record mileages and finished roads. With a Trackson crawler attachment, the grader is able to obtain secure footing on all types of ground surface. The central position of the operator permits close attention to blade work and skillful manipulation of the grader for close-in work.

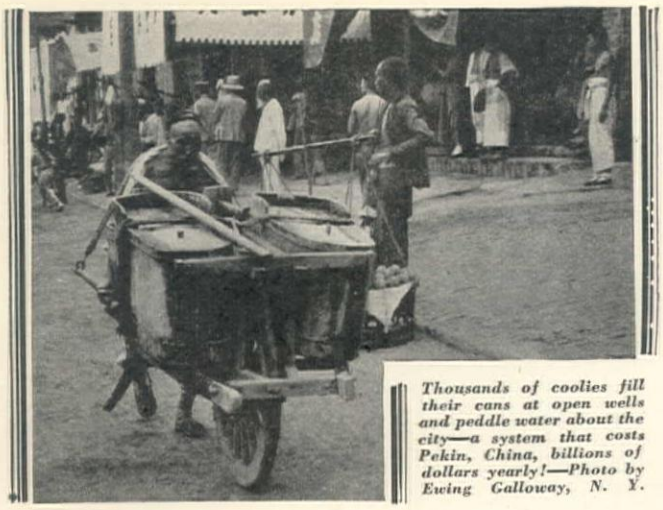
BARNES AND JAEGAR HAVE NOT MERGED

The rumor that The Barnes Manufacturing Co., Mansfield, Ohio, manufacturers of hand and power pumps, contractors' portable pumping units, and sanitary porcelain enameled ware, has merged with the Jaegar Machine Co., of Columbus, is unfounded. Barnes will manufacture certain pumps for Jaegar, to be known as Jaegar-Barnes pumps. However, no interlocking directorate exists or is planned; Barnes distributors will continue as heretofore.

AUSTIN MACHINERY CORP. ROAD SHOW EXHIBIT

The Austin Machinery Corp., Muskegon, Michigan, has been allotted space No. 222, on the main aisle of the main floor, for its exhibit at the Road Show in Atlantic City.

A model 105 'Little Wonder' public service ditcher and a backfiller will comprise the exhibit. There are many new features, of proven efficiency, incorporated in these machines, which should be of interest to contractors and engineers. The machines will be found to be especially adapted for use in drainage ditch work on the new types of highways—now being planned—where tile drain is used.



Thousands of coolies fill their cans at open wells and peddle water about the city—a system that costs Pekin, China, billions of dollars yearly!—Photo by Ewing Galloway, N. Y.

ACIPCO MONO-CAST PIPE

would put thousands of coolies out of work

PEKIN, capitol city of China, still gets its water supply through a "push-cart system" as shown in the photograph above.

Walking steadily 12 hours a day, one of these push-cart coolies can trundle 50 gallons of water over a distance of approximately 30 miles. In the same number of hours, a 30-mile line of 8-inch cement-lined MONO-CAST centrifugal cast iron pipe will deliver 140,660 gallons of water.

"How unfortunate," you say, "that the Chinese are so far behind the times!"

"How true," we agree, "but the Chinese are just beginning to hear about up-to-date pumping systems equipped with everlasting MONO-CAST pipe—the best investment any city can make!"

We cordially invite both you and the Chinese to inquire further about MONO-CAST before you let your next pipe contract. Write our nearest District Office.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM, ALABAMA

District Offices in Principal Cities

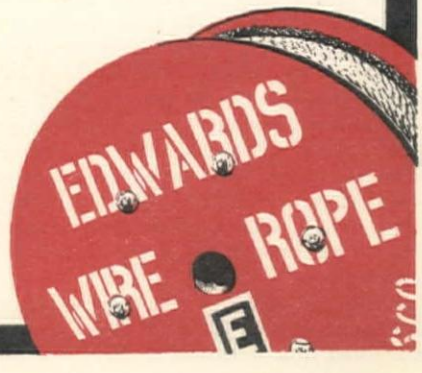
One million reels of Edwards wire rope for 1930 would be a lot of rope, but not too much for

O. M. P.

(Old Man Performance)

to make perform with the performance that counts.

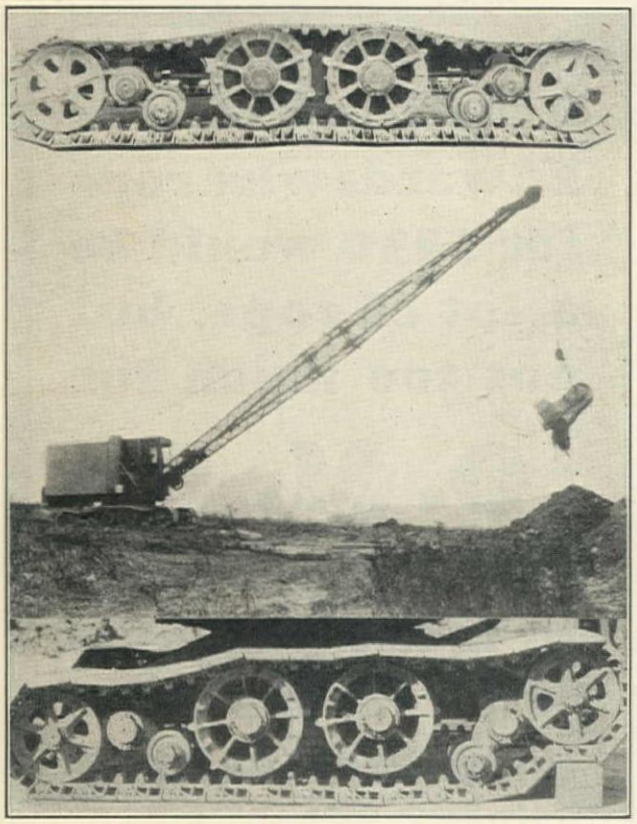
E. H. EDWARDS COMPANY
Standard Oil Building - San Francisco
912 Nicolai Street - - - - Portland
1252 Sixth Avenue South - - Seattle
620 E. 61st Street - - - Los Angeles



THEW ANNOUNCES '64' AND '68' TREAD CENTER-DRIVE CRAWLER

New, improved center-drive crawlers are announced by the Thew Shovel Co., Lorain, Ohio, for its ¾-yd. Lorain-45, 1-yd. Lorain-55, and 1¼-yd. Lorain-75 cranes, clams, drags, and backdiggers. The most radical development is represented by the new '64' and '68' tread crawlers. The numerical designation of the crawlers comes from the number of treads in the self-laying tracks. Basically they are the standard '52' and '56' tread crawlers—plus. Instead of the standard single-end rollers, equalizer rocker arms, carrying both a large end roller and a small intermediate load-carrying roller, are mounted on the end axles. This places the large end rollers in advance of the end axle and increases the overall length from 12 to 29% on the various units. The resulting greater supporting area also gives reductions of ground pressures that average 15 to 25%.

In addition to the materially reduced ground pressures, the action of the equalizer rocker arm is such that the tendency to 'dig in' is eliminated. Any tipping load thrown onto the



Thew Lorain-75 1¼-yd. Improved Center-Drive Crawler

end axle is transmitted down through the rocker arm and its two rollers and is distributed by them over an increased area of several treads. This effects uniform lowered ground pressures and eliminates the concentrated pressures that cause digging-in at the ends.

The distribution of the end axle to its rollers is such that the smaller or rear roller carries the greatest load, the effect on the front end roller being to climb or nose-out of soft materials. The equalizer rocker arm action in this respect is well illustrated by the traveling action of the crawler. The up-and-down action of the equalizer rocker arm (prevented from reversing by an automatic stop) enables the crawler tread to adjust itself to the contour of the ground without bridging across depressions. With the equalizer arms at the ends, the propulsion of the unit must come from the center, thus all the crawler units are propelled by the patented Thew center driver.

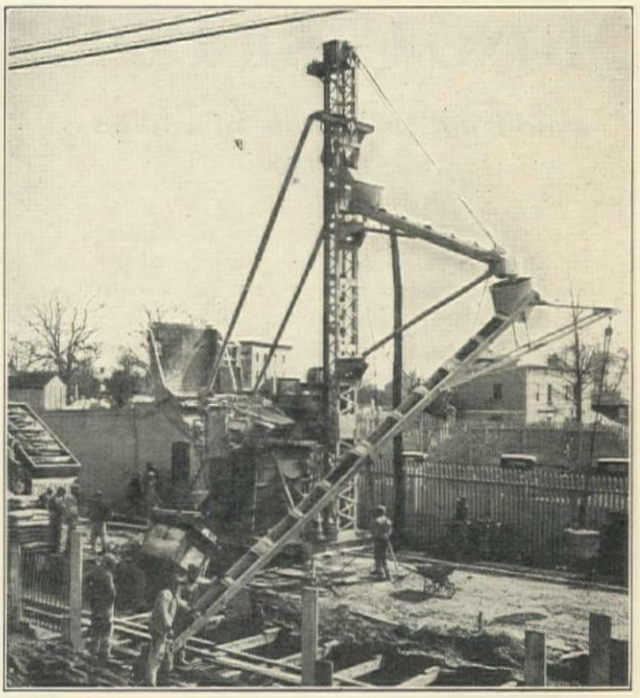
When the equalizer rocker arms are replaced with standard single-end rollers, '52' or '56' tread crawlers result. For shovel use when it is desirable to keep the shorter standard end of the crawler faced into the bank, equalizer rocker arms may be added at the rear of the crawler only.

The standard '52' and '56' crawlers are improved throughout. These improvements are in general typified by the new Lorain-75 crawler which is 12% longer, 2300 lb. heavier, and has a stronger car-body casting, has 7 by 7-in. end axles, 12% increased tractive effort, and the steering clutches mounted on splined shafts.

RANSOME 27-E PAVER WITH FOLDING MAST PLANT

The Ransome Concrete Machinery Co. has produced a 27-E paver with a folding mast plant that is proving a desirable portable mixing and placing unit. It is especially useful in grade elimination work or in constructing retaining walls and foundations which are long, some distance apart, and extend to several feet above the ground. For regular road work the complete mast attachment can be taken off and a standard boom and bucket installed.

In this unit the hinged mast can be folded down to travel under telephone wires, bridges, and similar obstacles. The



Ransome 27-E Paver with Folding Mast Plant

paver loading skip is used to raise or lower the mast, making the operation simple and easy. After the mast is raised to a vertical position, the pipe struts are detached from the skip and fastened to the paver frame, making the unit entirely self-supporting, without the use of guys. A set of folding jacks is used only when the unit is operating.

Concrete is raised in a 1-yd. hoist bucket, the hoist being attached to the paver and driven from the paver power plant. Control levers for the hoist and brake are placed so that one man, standing on the regular operator's platform, can handle both the mixer and mast bucket. The concrete is best distributed by a boom chute plant, equipped with a counterweight chute. The lower end of this chute can be easily and quickly shifted along the forms. If chuting is not desired, the concrete can be discharged into a floor hopper and carted.

GOUDIE JOINS PIONEER RUBBER MILLS

William R. Goudie, well-known in mechanical rubber circles on the Pacific Coast, has recently taken a position with the Pioneer Rubber Mills as manager of industrial sales. He will make his headquarters at the general offices at San Francisco.

CATERPILLAR REDUCES PRICES

The Caterpillar Tractor Co., Peoria and San Leandro, announced price reductions on every major item of machinery it makes—for farming, road building, logging and construction—on December 11. These reductions are in line with the company's policy of passing on to the public the benefit of increased efficiency resulting from the growing volume of production since the Best and Holt interests were merged five years ago. In this period six price reductions have been made. For example: the Caterpillar '60' sold for $6000 in 1925 and now lists at $4175.

The reductions on road graders and combined harvesters range from $100 to $520 per unit. On road graders and maintainers, now manufactured at the Minneapolis plant, the reduction reaches $300 for the model 20 motor patrol.

Within the next 90 days the company will employ an additional 2000 to 3000 men in its enlarged combine and tractor factories and foundry at Peoria, which are nearing completion. This will make a total payroll of 6000 to 7000 at this plant, in addition to the 1200 employed at plants at Minneapolis and San Leandro.

STERLING MOTOR TRUCK SALES INCREASE

According to H. C. Keenan, vice-president in charge of distribution, Sterling Motor Truck Co. sales for the fiscal year ending October 31, 1929, show an increase of 50% over last year.

This has been a record year in Sterling history and is due to the distributing expansion program established a few years ago, and also to the increasing demand for Sterling products. Nearly every factory branch showed an increase over last year, and with several new branches anticipated for next year, the company looks forward to another record-breaking year in 1930. Orders booked during November are equivalent to the biggest month and it is felt that sales will continue high during the winter months. With the usual heavy spring and summer sales, Sterling is believed due for another successful year.

The Sterling Motor Truck Co., Milwaukee, is one of the oldest truck concerns in the industry, and manufactures a complete line of motor trucks, including chain, worm and bevel drives in commercial and dump units, and in capacity sizes from one to twelve tons. Distribution is obtained through 35 factory branches, together with dealers in many large American and foreign cities. Truck sales have shown a remarkable increase each succeeding year for the past several years.

THE CHAIN BELT ROAD SHOW EXHIBIT

Plans have been completed whereby the Chain Belt Co. and its affiliated companies will present one of the largest exhibits of machinery and machinery parts ever displayed at the Road Show.

The construction equipment division of the company will exhibit independently, and will display the latest models of Rex mixers, with all improvements which will be incorporated in the 1930 machines. The 1930 Rex 27-E paver, with important improvements, will be shown for the first time. In addition, the complete line of Rex pumps, including diaphragm, centrifugal, road, and plunger types; Rex plaster mixers, Rex saw rigs, and Rex contractors' elevators will be shown.

The chain division of the company, with the Stearns Conveyor Co., a division of Chain Belt Co., will unite with the Federal Malleable Co., Interstate Drop Forge Co., and Sivyer Steel Casting Co. in adjoining exhibits. Rex chains and transmissions, Rex-Stearns belt conveyors, Sivyer alloy steel castings, Federal malleable iron castings, and Interstate drop forgings will be included in the display.

All of the exhibits will be arranged in conjunction with one another in booths Nos. 221 and 226.

BLAW-KNOX AND A. W. FRENCH ROAD SHOW EXHIBITS

At the Atlantic City Road Show, January 13-18, 1930, the Blaw-Knox Co., of Pittsburgh, will exhibit: (1) a 51-ton, all-steel, portable, 2-compartment, self-cleaning batcherplant, equipped with a duplex weighing batcher; (2) a 100-ton, 3-compartment, self-cleaning bin, equipped with a triple weighing batcher; (3) a cement weighing batcher, erected on an operating platform; (4) an agitator truck body in operation on a motor truck; (5) the 'Dreadnaught' road form; (6) 'Universal' steel street forms, showing the system of forming sidewalks, curbs, integral curbs, curb and gutter, radius forms, etc.; (7) a 1-yd. inundator and water-measuring equipment; (8) electroforged steel grating for stair treads, platforms, and elevated walk ways; (9) 'Floorgard', a steel reinforcement for armoring floors, and 'Pavegard', a steel reinforcement for armoring streets; (10) a complete line of clamshell buckets and dragline buckets; and (11) turntable models.

The A. W. French Co. division of Blaw-Knox will exhibit the following as an integral part of the Blaw-Knox display: (1) an Ord finishing machine in operation, together with an asphalt fluffing attachment for this machine; (2) the 'Nu Method' finished grader for planing the subgrade, excess material being discharged by belt conveyor to the side of the road; and (3) a Ball wagon grader for jobs which involve the moving and spreading of dirt.

A KLEIBER TRUCK FOR EVERY HEAVY HAULING PROBLEM

The Kleiber Motor Co., 1480 Folsom st., San Francisco, has been manufacturing trucks for the past 13 years. The company's motto: 'There is a Kleiber truck for every heavy hauling problem' is evidenced by the wide distribution of the product over the Pacific coast, and in Hawaii and the Antipodes.

As the company manufactures only upon order, the buyer of a Kleiber can have a truck of 1 to 6-ton capacity and have it planned and finished to fit his particular needs—the type of body construction is especially adaptable. In the Kleiber truck, Continental 'Red Seal' motors are used, with Bosch high-tension magnetos, Stromberg truck-type carburetors, Timken front axle and roller bearings, Brown-Lipe heavy-duty transmissions, Betts chrome vanadium springs, Timken worm-drive rear axle.

The company operates with full cash investment through paid-up stock and requires no bonds or other mortgage on the future. Write for the 1930 catalog.

FOOTE BROS. ANNOUNCES CALIFORNIA DISTRIBUTOR

An important and interesting development in the organization of this old-established institution is the appointment of the W. H. Worden Co. as exclusive distributors in northern California and the state of Nevada.

The Foote Bros. Gear & Machine Co. are manufacturers of the famous Bates Steel Mule tractors as well as the outstanding line of Stockland road graders, a combination which is hard to beat for ruggedness, simplicity, and dependability.

The W. H. Worden Co. has been established for 16 years and has a reputation for aggressive service rendered in the field.

A competent, experienced department of this local institution will handle the road machinery division. On arrival of the stock of tractors, graders and parts now en route from the Foote Bros. factory, this organization will be prepared to extend service. County agents will in due course be established by the Worden Co., thus extending the plan for service to users of Bates tractors and Stockland graders.

The new address of the W. H. Worden Co. is 355 Fremont st., San Francisco, where enlarged headquarters have recently been acquired.

UNIT BID SUMMARY

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

STREET AND ROAD WORK

LONG BEACH, CALIF.—CITY—APPIAN WAY—CONCRETE

Griffith Co., L. A. Railway Bdg., Los Angeles, $277,635 low bid to City for improving Appian Way. Bids received from:

(1) Griffith Co., Los Angeles $277,635
(2) Dalmatin & Nikcevich, Los Angeles 287,856
(3) Drainage Const. Co. 304,456
(4) Geo. H. Oswald, Los Angeles 300,476
(5) P. J. Akmadzich, Los Angeles 333,869
(6) R. A. Wattson, Los Angeles 297,827
(7) Basich Bros. Const. Co., Los Angeles $350,337
(8) Kovacevich & Price, Los Angeles 296,016
(9) Sully Miller Const. Co. 291,005
(10) P. F. Janich, Los Angeles 305,444
(11) Wells & Bressler, Santa Ana 325,339

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
542,030 sq.ft. 6-in. concrete paving	.16	.165	.183	.165	.17	.176	.16	.154	.161	.1575	.187
67,660 ft. 6-in. conc. pave. and 3-in. dis. rock base	.19	.187	.205	.20	.20	.21	.19	.185	.189	.1775	.23
205,202 ft. 5-in. concrete paving	.13	.147	.163	.1375	.16	.155	.13	.134	.164	.145	.17
35,320 lin.ft. concrete curb	.40	.42	.45	.40	.50	.50	.40	.40	.40	.3975	.40
2,103 lin.ft. conc. curb armor	.40	1.00	.50	.56	1.25	.80	.50	.40	.35	.40	.40
163,325 sq.ft. concrete sidewalk	.12	.14	.13	.125	.13	.148	.125	.13	.14	.132	.113
Lighting system	$13,495	$14,846	$14,600	$13,496	$16,000	$15,520	$20,000	$15,500	$14,500	$13,496	$15,600
Water mains and hydrants, etc.	$10,575	$11,207	$11,300	$11,000	$10,573	$11,110	$11,200	$10,990	$11,000	$10,573	$11,200
441 ½-in. water services	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
671 ft. 8-in. cement sewer	1.10	.80	1.30	1.00	1.00	.70	2.57	1.42	.80	.72	1.00
1,269 ft. 12-in. cement sewer	1.50	1.25	1.75	1.32	1.25	1.00	3.20	1.90	1.00	1.15	1.40
903 ft. 15-in. cement sewer	1.85	1.65	2.20	1.60	1.60	1.30	3.85	2.35	1.30	1.80	1.75
1,250 ft. 18-in. reinf. conc. sewer	2.90	3.00	3.45	3.00	2.70	2.38	5.15	3.55	2.30	3.18	3.20
397 ft. 21-in. reinf. conc. sewer	3.75	3.40	4.50	4.50	4.25	3.00	6.50	4.70	3.20	4.55	4.60
275 ft. 27-in. reinf. conc. sewer	5.00	4.40	5.95	5.08	5.25	4.30	7.70	6.10	4.25	6.96	6.00
1,727 ft. 30-in. reinf. conc. sewer	5.50	6.25	6.60	6.50	6.50	5.08	9.00	6.85	4.70	7.20	7.20
952 ft. 8-in. cement catchb. connections	1.00	.80	1.15	1.15	1.00	.75	2.55	1.42	.75	.78	1.00
6 'A' manholes	75.00	72.00	80.00	70.00	90.00	60.00	$125	85.00	70.00	60.00	70.00
9 'C' manholes	70.00	72.00	75.00	62.00	$100	50.00	$130	85.00	60.00	65.00	80.00
4 'D' manholes	75.00	74.00	80.00	75.00	$100	65.00	$130	90.00	75.00	70.00	82.00
8 'E' manholes	75.00	74.00	80.00	82.00	$120	65.00	$125	$110	75.00	80.00	88.00
2 'G' manholes	60.00	78.00	70.00	79.00	60.00	50.00	$130	$110	45.00	96.00	93.00
2 special manholes	75.00	98.00	80.00	$112	$150	75.00	$125	$120	90.00	$100	$145
35 No. 2 catchbasins	60.00	58.00	65.00	60.00	75.00	50.00	65.00	55.00	65.00	40.00	88.00
4 No. 3 catchbasins	60.00	62.00	65.00	60.00	70.00	60.00	32.50	55.00	60.00	25.00	70.00
10,843 ft. 8-in. vitrified sewer	1.15	1.62	1.25	2.25	2.75	1.31	3.85	1.50	1.83	2.85	2.35
1,470 ft. 8-in. cast-iron sewer	2.00	2.80	2.25	2.60	3.00	2.19	4.50	2.60	3.50	3.00	2.60
196 ft. 24-in. vitr. sewer	4.00	4.00	4.75	3.50	5.00	3.75	6.40	5.20	4.50	4.50	3.70
53 'A' manholes for vitr. sewer	80.00	72.00	93.00	76.00	95.00	70.00	$200	90.00	80.00	80.00	88.00
11 lampholes	20.00	22.00	30.00	16.00	25.00	20.00	38.50	20.00	25.00	15.00	30.00
448 house sewer connections	8.00	8.00	8.50	8.40	11.00	5.00	32.00	9.50	6.00	13.55	17.00
Pumping system complete	$13,000	$14,900	$15,000	$14,000	$15,650	$17,500	$19,000	$16,500	$12,900	$15,000	$14,000
Grading, lump sum	$18,300	$7,860	$10,000	$19,000	$25,800	$13,285	$8,000	$20,000	$14,500	$18,000	$14,000

SACRAMENTO, CALIF.—STATE—CONCRETE PAVING AND GRADING—IMPERIAL COUNTY

Contract awarded to A. M. Peck, 2966 Allesandro St., L. A., $312,057, who bid to California Division of Highways, Sacramento, for 10.4 miles grading and concrete paving from Brawley to 4 miles west of Westmorland, IMPERIAL COUNTY. Bids from:

(1) A. M. Peck Co., Los Angeles $312,057
(2) Jahn & Bressi, Los Angeles 326,737
(3) Sander Pearson, Santa Monica 333,048
(4) Geo. Herz Co., San Bernardino 335,115
(5) Griffith Co., Los Angeles 338,519
(6) McCray Co., Los Angeles 341,908
(7) Basich Bros. Const. Co., Los Angeles 349,140
(8 J. F. Knapp, Oakland $349,477
(9) Wells & Bressler, Santa Ana 351,705
(10) E. Paul Ford, San Diego 353,319
(11) R. E. Hazard Contr. Co., San Diego 353,785
(12) T. M. Morgan Pav. Co., Gazelle 365,637
(13) Watson & Sutton, San Diego 395,195
(14) Average bid 346,500

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
51,400 cu.yd. road excavation (Location 1)	.40	.25	.25	.31	.33	.35	.34	.25	.45	.24	.20	.40	.30	.31
21,000 cu.yd. road excavation (Location 2)	.40	.35	.35	.51	.42	.50	.45	.70	.60	.45	.60	.50	.62	.50
175,000 sta.yd. overhaul	.01	.0075	.01	.01	.015	.01	.01	.01	.015	.0075	.01	.01	.01	.01
6,400 cu.yd. structure excavation	.85	.50	.70	.75	.85	.90	.75	1.00	.80	.50	.80	.60	.90	.76
45,000 sq.yd. subgrade for paving	.09	.08	.10	.075	.09	.06	.05	.09	.10	.05	.05	.06	.12	.078
700 cu.yd. gravel or stone surfacing	2.40	3.42	3.50	1.75	4.25	3.50	3.00	4.00	4.00	4.00	3.50	3.50	3.00	3.37
16,600 cu.yd. sand cushion	.65	.75	.95	1.00	1.00	.90	.80	1.10	1.00	.71	1.25	1.00	1.40	.96
23,450 cu.yd. 'A' concrete (paving)	9.00	10.45	10.00	10.30	9.78	10.00	10.86	10.25	10.20	11.15	11.00	10.65	11.69	10.41
542 cu.yd. 'A' concrete (structures)	20.00	20.00	23.00	18.00	22.00	22.50	22.00	20.00	20.00	23.00	25.00	20.00	25.00	21.55
634,800 lb. reinforcing steel	.045	.03	.043	.036	.045	.045	.04	.045	.04	.04	.03	.055	.045	.041
836 lin.ft. 8-in. corr. pipe	.50	.25	.40	.30	.45	.40	.23	.40	.50	.50	.50	.30	.50	.40
1,714 lin.ft. 12-in. corr. pipe	.50	.25	.50	.35	.55	.50	.27	.50	.50	.50	.50	.50	.50	.455
1,518 lin.ft. 18-in. corr. pipe	.50	.40	.50	.40	.55	.70	.30	.60	.60	.60	.50	.65	.50	.52
1,238 lin.ft. 24-in. corr. pipe	.60	.75	.60	.45	.55	.80	.40	.70	.70	.75	.60	.80	.75	.65
80 lin.ft. 36-in. corr. pipe	1.00	.75	1.00	.70	.60	1.00	.60	.90	1.50	.75	1.00	1.00	1.00	.91
40 lin.ft. 42-in. corr. pipe	1.50	1.00	1.00	.80	1.00	1.00	.70	1.00	2.00	1.50	1.00	1.50	1.00	1.15
1,585 lin.ft. corr. pipe clean and relay	.75	.50	.60	.30	1.00	.40	.50	.75	.60	.50	.40	.60	1.00	.61
3,200 lin.ft. 4-in. drain tile	.10	.12	.25	.15	.29	.25	.12	.20	.30	.25	.25	.30	.20	.21
343 tons gravel blanket	2.50	2.90	3.00	3.30	3.00	2.75	2.80	3.00	3.00	2.90	2.70	3.00	3.00	2.91
288 ft. solid timber guard rail	1.00	1.50	.85	1.00	1.60	1.25	1.35	1.00	1.00	.50	2.00	1.50	3.00	1.35
110 cu.yd. remove concrete	4.00	3.00	3.00	2.50	2.50	4.00	1.00	3.00	3.00	3.00	3.50	5.00	2.00	3.04
548 stations finishing roadway	5.00	6.00	6.00	3.00	7.00	7.00	3.00	4.00	3.50	8.00	3.00	8.00	8.50	5.53
60 monuments	3.00	2.50	3.00	3.00	3.00	3.00	1.50	2.50	3.00	3.00	3.00	3.50	3.00	2.84

SAN FRANCISCO, CALIF.—ARIZONA—GRADING—GOV'T—GRAND CANYON NATIONAL PARK

Hodgman & McVicar, 1714 Plymouth Road, Pasadena, who bid $73,942, recommended award of contract by Bureau of Public Roads, San Francisco, using corrugated culverts for 9.97 miles grading of Bright Angel Springs-North Entrance Project on the North Rim of the Grand Canyon National Park, located in Arizona. Bids on (A) Corrugated pipe and (B) Reinf. conc. culverts:

	(A)	(B)
(1) Hodgman & McVicar, Pasadena	$73,942	$ 81,340
(2) Lord & Bishop, Sacramento	98,176	99,591
(3) Morrison-Knudsen Co., Boise, Ida.	98,773	111,803
(4) Isbell Const. Co., Fresno	99,411	no bid
(5) C. R. Johnson, Portland	$100,071	$106,630
(6) B. B. Boyd, San Diego	118,795	no bid
(7) Lang Transp. Co., Los Angeles	119,197	no bid
(8) Engineer's estimate	96,964	106,211

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
17.5 acres clearing and grubbing	300.00	500.00	160.00	500.00	500.00	300.00	300.00	200.00
83,450 cu.yd. road excavat.	.60	.84	.90	.88	.88	1.13	1.12	.90
580 cu.yd. structure excavation	1.00	2.00	3.00	2.00	2.00	1.13	2.00	1.50
3,200 cu.yd. borrow	.60	.70	.70	1.00	.78	.80	.50	.75
17,700 sta.yd. overhaul	.08	.03	.05	.05	.06	.05	.08	.05
9.97 mi. finish earth graded road	200.00	300.00	400.00	250.00	275.00	200.00	500.00	400.00
150 cu.yd. dry rubble masonry	10.00	6.00	5.00	7.00	10.00	10.00	16.00	8.00
2,402 lin.ft. 18-in. corr. pipe	3.00	3.00	2.90	2.00	2.30	3.25	2.25	2.25
134 lin.ft. 24-in. corr. pipe	4.00	4.00	4.00	3.20	3.00	3.90	3.10	3.25
294 lin.ft. 30-in. corr. pipe	5.00	6.00	6.00	4.10	3.40	4.50	3.75	4.00
2,402 lin.ft. 18-in. rein. conc. pipe	5.00	3.50	7.25		4.30			4.80
134 ft. 24-in. reinf. conc. pipe	8.00	4.50	9.00		6.00			9.00
294 ft. 30-in. reinf. conc. pipe	12.00	6.50	12.50		8.00			12.00
Maintenance of detour	$2000	$2000	$2000	$2000	$2000	$200(	$2000	$2000

PORTLAND, ORE.—STATE—GRADING—LINCOLN COUNTY

Contract awarded to Wren & Greenough, P.O. Box 138, Portland, Ore., $162,882 for 2.85 miles grading Yachats-Lane County Line Section of the Roosevelt-Coast Highway. Bids on:

(1) Clearing and grubbing
(2) 65,000 cu.yd. common excavation
(3) 158,000 cu.yd. rock excavation
(4) 200,000 sta.yd. overhaul
(5) 55,000 yd.mi. truck haul
(6) 420 cu.yd. 'A' concrete
(7) 45,000 lb. reinf. steel
(8) 20 cu.yd. riprap
(9) 800 ft. 12-in. concrete pipe
(10) 350 ft. 18-in. concrete pipe
(11) 100 ft. 24-in. concrete pipe

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	TOTALS
Wren & Greenough, Portland	$ 7,000	.32	.64	.02	.25	27.00	.05	3.00	1.50	2.75	4.00	$162,882
Liesch & Tofte, Marshfield	5,382	.37	.82	.035	.30	24.86	.048	4.00	1.54	2.98	3.96	197,864
A. C. Greenwood, Portland	9,000	.35	.80	.02	.30	30.00	.10	4.00	2.25	4.00	6.00	199,630
Hauser Const. Co., Portland	10,000	.35	.88	.03	.20	25.00	.07	5.00	2.00	3.00	4.00	205,640
Meyers & Co., Portland	12,000	.45	.86	.01	.20	30.00	.07	6.00	1.35	3.00	4.25	208,555
P. L. Crooks & Co., Portland	15,000	.73	.73	.02	.20	25.00	.07	5.00	1.50	3.00	5.00	209,290
Joplin & Eldon, Portland	12,600	.71	.71	.03	.20	27.00	.08	4.00	1.40	3.00	4.50	211,070
Meyers & Goulter, Seattle	12,000	.40	.90	.03	.20	32.00	.09	15.00	1.50	3.00	4.00	217,640
Colonial Bdg. Co., Spokane	11,000	.35	.90	.02	.30	40.00	.08	5.00	2.50	3.00	5.00	220,500

PORTLAND, ORE.—STATE—GRADING AND SURFACING—BAKER COUNTY

Quinn-Robbins Co., Inc., Boise, Ida., $157,919 low bid to Oregon State Highway Comm. for 12.4 miles regrading and resurfacing Pleasant Valley-Durkee Section of the Old Oregon Trail BAKER COUNTY. Bids received from:

(1) Quinn-Robbins Co., Inc., Boise, Ida.	$157,919	(5) Wren & Greenough, Portland	$166,376
(2) Ryberg, McHugh & Cowley, Boise, Ida.	160,064	(6) Milne & Dussault, Portland	176,388
(3) Knute Lein, La Grande, Ore.	161,007	(7) H. G. Johnson, Easton, Wash.	193,266
(4) Joslin & McAilister, Spokane, Wash.	163,651		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
65,500 yd. common excavat.	.30	.32	.40	.30	.40	.45	.35
35,500 yd. rock excavation	.85	.90	.80	.97	.75	.70	1.00
92,000 sta.yd. overhaul	.04	.04	.03	.04	.03	.03	.03
14,000 yd.mi. truck haul	.20	.20	.25	.175	.30	.25	.30
340 ft. 12-in. corr. pipe	1.20	1.15	1.20	1.20	1.20	1.30	2.00
640 ft. 18-in. corr. pipe	1.65	1.50	2.00	2.00	2.00	2.20	2.50
240 ft. 24-in. corr. pipe	2.50	2.40	2.50	2.32	2.75	2.85	4.00
40 ft. 36-in. corr. pipe	4.60	4.50	5.00	4.92	5.75	5.50	6.00
25,700 cu.yd. base course surf.	1.22	1.25	1.20	1.34	1.47	1.50	1.50
6,100 cu.yd. top course surf.	1.22	1.25	1.20	1.34	1.47	1.50	1.50
4,400 cu.yd. 'A' mater. (stockp.)	1.22	1.25	1.20	1.34	1.30	1.40	1.70
3,800 cu.yd. 'B' mater. (stockp.)	1.22	1.25	1.20	1.34	1.30	1.40	1.65
11,800 cu.yd. 'D' mater. (stockp.)	1.22	1.20	1.20	1.34	1.25	1.40	1.65
6,000 cu.yd. rock shoulders	.40	.40	.50	.40	.35	.40	.65
5,000 cu.yd. earth filler	.30	.40	.25	.30	.25	.30	.50
65,000 yd.mi. haul broken stone (truck measure)	.18	.16	.18	.18	.16	.17	.18
44,000 yd.mi. haul broken stone (stockp. measure)	.17	.17	.18	.18	.16	.18	.20
15,000 yd.mi. haul rock shoulder	.18	.17	.18	.18	.20	.20	.20
10,000 yd.mi. filler haul	.18	.17	.18	.18	.18	.18	.25

SAN FRANCISCO, CALIF.—SURFACING—GOV'T—GRAND CANYON NATIONAL PARK

Award of contract recommended by the Bureau of Public Roads, 461 Market St., San Francisco, to Lord & Bishop, 433 32nd St., Sacramento, who bid $251,552 for surfacing project 3A1, A2, B, C, and D on Route 3, Bright Angel Point Cape Royal Highway, located in Grand Canyon National Park, Arizona, 25.85 miles to be improved. Bids received on:

(1) 2,000 cu.yd. excavation, borrow
(2) 5,000 sta.yd. overhaul
(3) 25.85 miles fine grading, subgrade and shoulders
(4) 30,700 tons crushed rock, base course.
(5) 34,550 tons oil treated crushed rock
(6) 1,000 tons supply oil treated crushed rock
(7) 2,300 ft. stone guard rail

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
Lord & Bishop, Sacramento	1.00	.05	400.00	2.75	4.25	4.25	1.50	$251,552
C. R. Johnson, Portland	.85	.05	400.00	3.20	4.30	4.30	1.00	265,695
Tieslau Bros., Berkeley	1.00	.05	500.00	3.00	4.50	4.40	1.00	269,450
J. C. Compton, McMinnville, Oregon	1.00	.06	200.00	3.00	5.20	5.20	.70	286,040
Isbell Const. Co., Fresno	1.00	.10	500.00	3.10	5.07	5.07	.50	291,983
Morrison-Knudsen Co.	.75	.05	325.00	3.00	6.50	5.85	1.00	334,976
Engineer's estimate	1.00	.03	500.00	2.60	4.35	4.35	1.00	251,837

SACRAMENTO, CALIF.—STATE—GRADING—SAN BERNARDINO COUNTY

Lewis Construction Co., 308 S. Juanita St., Los Angeles, who bid $189,687, submitted low bid to California Division of Highways, Sacramento, for 6.7 miles grading in SAN BERNARDINO COUNTY from 4½ miles west of Running Springs Park to Squirrel Inn. Bids received from following concerns:

(1) Lewis Const. Co., Los Angeles $189,687
(2) J. G. Donovan & Sons, Los Angeles 202,920
(3) O. A. Lindberg, Newhall 213,510
(4) Isbell Const. Co., Fresno 225,299
(5) William C. Horn Co., Puente 228,649
(6) Triangle Rock & Gravel Co., San Bernardino 232,012
(7) Gist & Bell, Arcadia 238,465
(8) Mutual Income Properties, Inc. $244,303
(9) Nevada Contr. Co., Fallon, Nev. 244,647
(10) J. F. Knapp, Oakland 251,219
(11) Kern Contr. Co., Bakersfield 251,641
(12) W. H. Hauser, Oakland 253,513
(13) Yglesias Bros., San Diego 270,709
(14) Average bid 215,500

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
75 acres clearing and grubbing	$150	$200	$250	$100	$200	$100	$150	$175	$150	$200	$100	$300	$200	$175
271,000 cu.yd. roadway excavation	.39	.42	.45	.55	.48	.56	.57	.62	.61	.60	.64	.57	.68	.55
305,000 sta.yd. overhaul	.01	.01	.01	.015	.02	.01	.01	.015	.01	.02	.01	.01	.005	.012
5,000 cu.yd. structure excavation	1.50	1.25	1.50	1.50	2.00	1.60	1.50	1.25	1.50	1.50	1.00	1.50	2.00	1.51
225 cu.yd. 'A' concrete (structures)	25.00	35.00	30.00	32.00	30.00	25.00	30.00	27.50	30.00	30.00	35.00	30.00	30.00	29.90
18,000 lb. reinf. steel (struct.)	.06	.06	.06	.06	.07	.045	.05	.05	.05	.06	.06	.05	.05	.056
3,618 ft. 18-in. corr. pipe	1.00	1.00	1.00	.50	2.00	.65	1.00	.75	.50	.75	1.00	.50	.75	.88
174 ft. 24-in. corr. pipe	1.00	1.25	1.25	.75	2.50	1.00	1.00	1.00	.70	1.00	1.00	.75	1.00	1.09
1,244 each 6-in. reinf. conc. headers (crib)	3.50	3.60	3.55	3.40	3.75	4.15	4.00	3.20	3.40	3.50	3.92	4.35	3.77	3.69
2,264 10-in. reinf. conc. headers (cribbing)	5.00	5.30	4.65	4.59	5.25	5.40	5.00	4.30	4.75	4.75	4.99	6.00	5.19	5.01
2,637 6-in. reinf. conc. stretchers (cribbing)	3.00	3.10	3.20	2.81	3.25	3.50	3.40	2.60	2.90	2.75	3.31	3.50	3.00	3.10
1,913 8-in. reinf. conc. stretchers (cribbing)	4.00	3.80	3.55	3.44	4.00	3.90	3.80	3.00	3.45	3.25	3.69	4.00	3.50	3.64
2,005 10-in. reinf. conc. stretchers (cribbing	5.00	4.90	4.75	4.53	5.00	4.85	4.90	3.90	4.40	4.25	4.53	5.30	4.59	4.68
238 conc. filler blocks (cribbing)	1.00	.75	1.00	1.05	.85	1.00	1.00	.70	.85	.75	.80	.80	.72	0.87
1,500 bbl. fuel oil	3.00	3.25	3.50	3.25	3.00	3.35	2.00	3.25	3.50	5.00	3.39	3.00	3.50	3.30
1 mile new property fence	$500	$500	$600	$500	$400	$600	$500	$500	$500	$600	$500	$500	$528	$517
1 mile move and reset property fence	$500	$300	$400	$350	$250	$500	$250	$400	$250	$400	$300	$300	$528	$364
254 stat. finishing roadway	10.00	10.00	10.00	5.00	7.00	4.00	10.00	4.00	8.00	7.50	5.00	10.00	5.00	7.23
290 monuments	4.00	3.00	3.00	3.50	4.00	4.00	3.00	3.00	3.00	3.00	3.50	3.00	3.00	3.30

PHOENIX, ARIZONA—STATE—OIL PROCESSING—DOUGLAS—RODEO HIGHWAY

Southwest Paving Co., Washington Bdg., L. A., $57,452 low bid to Arizona Highway Comm. for 12.5 miles oil processing Douglas Rodeo Highway, 12.5 miles, Douglas north. Bids on following items:

SCHEDULE 1—NON-FEDERAL AID WORK

(1) 6,420 sq.yd. subgrade
(2) 1,605 gallons asphalt oil for blotter coat
(3) 655 tons plant mix oil treat. surf.
(4) 4,863 ton mile plant mix oil surf. haul
(5) .608 mi. spread and finish plant mix

SCHEDULE 2—FEDERAL AID WORK

(6) 123,072 sq.yd. subgrade
(7) 30,768 gallons asphalt oil for blotter coat
(8) 12,553 tons plant mix oil treat. surf.
(9) 40,316 ton mile plant mix oil surf. haul
(10) 11.654 mi. spread and finish plant mix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	TOTALS
Southwest Paving Co.	.02	.10	2.99	.16	$400	.02	.10	2.99	.16	$400	$57,452
E. B. Skeels	.005	.08	3.70	.125	$250	.005	.08	3.70	.125	$250	60,819
Tyron & Brain	.03	.09	3.40	.14	$500	.03	.09	3.40	.14	$500	64,161

BRIDGES AND CULVERTS

PORTLAND, ORE.—STATE—CONCRETE—ROGUE RIVER—JOSEPHINE COUNTY

Contract awarded to Northwest Contract Co., Portland, Ore., who bid $119,600 for constructing reinf. concrete bridge over Rogue River on the Pacific Highway at Grants Pass, JOSEPHINE COUNTY, work for Oregon State Highway Comm. Bids on:

(1) 8,000 lin.ft. foundation piling
(2) 2,300 cu.yd. excavation
(3) 100 cu.yd. excavation, below elev
(4) 1,900 cu.yd. 'A' concrete
(5) 600 cu.yd. 'B' concrete
(6) 650 cu.yd. 'D' concrete
(7) 360 cu.yd. seal concrete
(8) 411,000 lb. reinf. steel
(9) 1,186 ft. concrete handrail
(10) Lump sum remove bridge and maintain traffic

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	TOTALS
Northwest Contract Co., Portland	.35	8.50	7.00	20.00	17.00	19.00	10.00	.055	5.00	$3865	$119,600
John K. Holt, Salem, Ore.	1.00	5.00	6.00	22.00	20.00	20.00	18.00	.045	4.25	3000	119,915
Rigdon Bros., Woodburn, Ore.	.80	4.50	5.00	21.50	19.50	19.50	19.50	.045	5.00	6000	119,920
H. E. Doering, Portland	.35	5.50	10.00	22.00	20.00	22.00	20.00	.045	4.50	7500	123,082
O. N. Pierce Co., Portland	.40	4.00	8.00	23.00	23.00	23.00	10.00	.065	5.00	6000	127,895
Clackamas Const. Co., Oregon City	.60	6.00	12.00	27.00	20.00	20.00	15.00	.045	4.00	4000	128,739
Sam Boudrye, Clarkston, Wash.	.60	6.00	6 00	22.00	22.00	24.00	21.00	.06	4.00	5000	131,764
P. L. Crooks & Co., Portland	.80	10.00	15.00	32.00	20.00	32.00	20.00	.06	5.00	1000	163,290

RAILROAD CONSTRUCTION

SAN FRANCISCO, CALIF.—RECONSTRUCT TARAVAL ST. RR. TRACKS—CITY

Contract awarded to Meyer Rosenberg, 12 Oak Grove Ave., San Francisco, $34,975, who bid to Board of Public Works for reconstructing of the Taraval St. tracks from 20th Ave. to 33rd Ave. Bids received on following items:

(1) 76,000 sq.ft. remove existing paving
(2) 4,000 ft. remove exist. rail, double track
(3) 1,500 ties, hauling new ties from municipal yard to job
(4) 800 cu.yd. furnish and spread new ballast, exclusive of tamping
(5) 4,000 ft. double track girder rail, including placing new ties
(6) 73,000 sq.ft. asphalt paving on concrete base
(7) 8,000 sq.ft. asph. conform paving
(8) 4,000 sq.ft. conc. base for conf. paving

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	TOTALS
Meyer Rosenberg, San Francisco	.02	.60	.10	1.90	3.60	.185	.09	.19	$34,975
C. B. Eaton, San Francisco	.028	.25	.20	3.00	3.00	.22	.14	.16	35,648
L. Cohn, San Francisco	.03	1.00	.10	2.00	3.00	.215	.12	.20	37,485
Fay Improvement Co., San Francisco	.10	.58	.09	2.70	1.74	.23	.153	.15	37,789
Chas. L. Harney, San Francisco	.03	1.70	.10	2.95	2.20	.225	.09	.13	38,055
E. J. Treacy, San Francisco	.06	2.40	.20	4.00	5.00	.24	.11	.15	56,660

CONSTRUCTION NEWS SUMMARY

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

(See Construction News, this issue, for details.)

WORK CONTEMPLATED

Court House for Los Angeles County on Broadway and First St.; $8,000,000.
Club building at Seattle for Arctic Club; $750,000.

Pumps, wells, and reinforced concrete pipe-lines for Riverside County Water Works District No. 1; $690,000.

Addition to Relief Home on Seventh Ave. for City of San Francisco; $500,000.

Physics building at University of Washington, Seattle; $600,000.

Chollas Heights Reservoir and Morena Dam enlargement for City of San Diego, Calif.; $500,000.

Irrigation system for Arizona Water Conservation District, Wittmann, Ariz.; $3,157,000.

Railroad, 185 miles, from Crane to Crescent Lake, Ore., for Oregon & Washington RR & Navigation Co., Portland; $9,000,000.

High school at Fairfield, Calif., for Armijo Union High School District; $400,000.

Soap manufacturing plant at Long Beach, Calif., for Procter & Gamble; $5,000,000.

Junior high school buildings for City of San Francisco on 25th and Noe Sts.; $650,000.

Hotel at San Jose for San Jose Properties Co.; $750,000.

Concrete bridge over Salt River at Tempe, for Arizona Highway Commission; $300,000.

Centrifugal concrete pipe, vitrified pipe, cement pipe and cast-iron pipe system, sewage treatment plant, pumping plants in Mission Valley for County of San Diego, Calif.; $500,000.

BIDS BEING RECEIVED

Medical Arts building at Eugene, Ore.; $400,000; bids to Dec. 30.

Apartment, on Echo Park Ave. for Aimee Semple McPherson, to H. W. Baum Co., Los Angeles, $1,750,000.

Grading 7 miles Bayshore Highway in SAN MATEO COUNTY for California Division of Highways, 750,000 cu.yd. excavation; bids to January 8.

Grading 7 miles SISKIYOU COUNTY for California Division of Highways, 650,000 cu.yd. excavation; bids to January 8.

Warrenite paving, sewers, water mains, lighting system, piers, bridge, etc., at Lido Island for City of Newport Beach, Calif.; $1,000,000; bids to Jan. 6.

CONTRACTS AWARDED

Concrete paving in Imperial County from Brawley to Westmorland for California Division of Highways, to A. M. Peck, Los Angeles, $312,057.

Office building for Physicians-Dentists Corp. at Phoenix, Ariz., to Edwards, Wildey & Dixon, Los Angeles, $650,000.

STREET and ROAD WORK

WORK CONTEMPLATED

HUNTINGTON BEACH, CALIF.—City will call bids in January for Bitumels surfacing Main, 17th, Delaware Sts., etc.; $50,000. 12-16

LOS ANGELES, CALIF.—Plans by J. E. Rockhold for improvement of Poplar St. from Walnut St. to Southern Ave. and portions of Barton Ave., work involving 15,000 cu.yd. roadway excavation, 360,000 sq.ft. 4-in. disintegrated rock base with oil and rock surfacing, 18,500 lin.ft. concrete curb, 37,000 sq.ft. cement gutter; $56,000. 12-7

MILL VALLEY, CALIF.—Plans by City Engineer, F. Lascy, for concrete paving Circle Ave.; $7000. Bids after Dec. 19. 12-16

SAN DIEGO, CALIF.—Plans by H. W. Jorgensen, City Engineer, for improving Tamarack and Thorn Sts., involving 433,012 sq.ft. 6-in. asphalt paving, 59,936 cu.yd. excavation, 41,640 cu.yd. embankment, 7503 ft. 6-in., 37 ft. 8-in., 319 ft. 10-in. and 75 ft. 12-in. cast-iron pipe, 10 hydrants, concrete sewers. Bids after Dec. 23. 12-7

SAN RAFAEL, CALIF.—Following proposed street improvements for the City of San Rafael, Marin County: (1) Mission St. from San Rafael High School to easterly limits, $10,290; (2) Mission St. from DeHicry to B St., $8550; (3) Belle Ave. from Grand Ave. to Mission St., $20,000; (4) Belle Ave. from Irwin to Grand Ave., $20,000; (5) Belle Ave. from Grand Ave. to Mission, $20,000; (6) West End Ave. extension, $15,760; (7) Fourth St. extension, $21,000; (8) Center St. from J to K. St., $9900; (9) Palm, Acacia, Magnolia and Olive Aves., $39,400; (10) Watt St. improvement, $10,500; (11) C St. from Third to Wolfe Ave., to cost $39,600; (12) Sixth Ave. from E to Cottage, $6000; (13) Second St. from E to Tamalpais Ave., $38,000; (14) Elm Ave. from Linden Lane to Belle Ave., $8000. 12-7

SOUTH SAN FRANCISCO, CALIF.—Plans by Engineer, Geo. A. Kneese, bids soon by City, for improving Linden Ave., involving 28,090 sq.ft. 6-in. concrete base with 2-in. asphalt surface, 1700 tons asphalt, concrete and vitrified sewers, 86 electroliers. 12-17

BIDS BEING RECEIVED

PHOENIX, ARIZ.—Bids to 2 p.m., Jan. 6, by Arizona Highway Commission for: (1) 2 miles grading and bridge on Yuma-Wellton Highway east of Ligurta, involving 12,000 cu.yd. roadway excavation, 15,000 cu.yd. borrow, 1500 cu.yd. concrete, and 156,000 lb. reinforcing steel; and (2) oiling 18 miles Phoenix-Yuma and Yuma-Phoenix Highways, involving 200,000 sq.yd. preparing subgrade, 400,000 gal. applying oil, etc. 12-11

PHOENIX, ARIZ.—Bids to 2 p.m., Jan. 6, by Arizona Highway Commission for 6.5 miles surfacing, involving 21,773 cu.yd. surfacing material on Mesa-Florence Junction Highway. 12-16

LOS ANGELES, CALIF.—Bids to 2 p.m., Jan. 6, by Board of Supervisors for ½ mile of Santa Fe Ave. near Huntington Park, involving 4000 cu.yd. excavation, 82,600 sq.ft. 6-8-in. concrete paving, lighting system; $40,000. 12-13

MARCH FIELD, CALIF.—Bids to 10.30 a.m., Dec. 30, by Constructing Quartermaster, March Field, near Riverside, for roads, sidewalks, curbs, drainage, and grading. 12-16

NEWPORT BEACH, CALIF.—Bids to Jan. 6 by City Clerk for improveing Lido Island, involving 1000 sq.ft. Warrenite Bit. paving, 28,000 ft. vitrified sewer, 2571 ft. 8-in. cast-iron sewer, 5 pleasure piers, 27,000 ft. 4-in. to 12-in. cast-iron pipe, 43 hydrants, valves, steel bridge, lighting system; $1,000,000. 12-17

OAKLAND, CALIF.—Bids to 8 p.m., Dec. 27, by East Bay Municipal Utility District for (1) 40,000 sq.ft. asphalt street repairs; and (2) 2 miles of Upper San Leandro and Middle Bar Road, involving 14,500 cu.yd. roadway embankment, 500 cu.yd. surfacing, corrugated pipe, etc. 12-13

SACRAMENTO, CALIF.—Bids to 2 p.m., Jan. 8, by California Division of Highways for: (1) SAN MATEO COUNTY—7.3 miles Bayshore Highway from San Mateo to Redwood City, involving 423,000 cu.yd. borrow excavation, 320,000 cu.yd. hydraulic fill, 5235 cu.yd. structure excavation, 3295 cu.yd. concrete, 319,500 lb. reinforcing steel, 2600 tons riprap, rockfill, timber piling, pumping equipment, etc.; (2) SISKIYOU COUNTY—7 miles Yreka to Klamath River, involving 649,500 cu.yd. roadway excavation, 1,223,700 sta.yd. overhaul, 9560 cu.yd. gravel surfacing, 950 cu.yd. concrete, 105,400 lb. reinforcing steel, 1075 cu.yd. dry rubble walls, 1750 cu.yd. rubble masonry walls, 1345 ft. arched masonry parapet, corrugated pipe, etc.; (3) SANTA CLARA COUNTY—4.4 miles from San Francisquito Creek to San Antonio Ave., involving 10,000 cu.yd. roadway excavation, 15,500 cu.yd. imported borrow, 18,650 tons crusher run base, 18,450 tons asphalt, 8430 cu.yd. concrete paving, 1500 cu.yd. concrete structures, 243,000 lb. reinf. steel, etc.; and (4) SOLANO COUNTY—0.7 mile paving through Dixon, involving 1480 cu.yd. concrete paving, 39,000 lb. reinf. steel, etc. 12-11

SACRAMENTO, CALIF.—Bids to 2 p.m., Jan. 15, by California Division of Highways for: (1) KERN COUNTY—15.9 miles grading and bituminous macadam paving from west boundary to Junction Pumping Station, involving 148,600 cu.yd. roadway excavation, 49,200 tons crusher run base, 2200 bbl. fuel oil, 21,200 tons broken stone (Bit. macadam surface), 460,925 ton-miles haul, 1125 tons Emulsified asphalt, etc., and (2) IMPERIAL COUNTY—2.9 miles grading and concrete paving from 3 miles west of Coyote Wells to Meyers Creek Bridge, involving 37,800 cu.yd. roadway excavation, 6800 cu.yd. 'A' concrete paving, 174,300 lb. reinforcing steel. 12-18

SAN DIEGO, CALIF.—Bids to Dec. 30 by City for: (1) Elm St., involving 40,467 sq.ft. 6-in. concrete paving, 825 ft. 4-in. and 67 ft. 6-in. cast-iron pipe; and (2) 33rd and Kalmia Sts., involving 31,231 sq.ft. 6-in. asphalt paving, 566 ft. 6-in. concrete sewers, 362 ft. 6-in. and 131 ft. 4-in. cast-iron pipe, 1 hydrant. 12-14

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., Jan. 8, by Board of Public Works for: (1) Taraval St., between 20th Ave. and 33rd Ave., for stone sidewalks; $1200. (2) Bayshore Ave., between Tunnel Ave. and Wheeler Ave. for concrete curbs, side sewers, 6-in. concrete foundation and 1½-in. asphalt concrete wearing surface, 1 brick catchbasin with 10-in. vitrified pipe culvert, stone sidewalks; $2000. 12-18

SANTA CRUZ, CALIF.—Bids to Dec. 30 by City Clerk for improving Rathburn Ave., involving 5292 sq.ft. 5-in. concrete paving. 12-18

YREKA, CALIF.—Bids to 10 a.m., Jan. 7, by County Clerk for crushing 2500 cu.yd. rock for Klamath Road Dist. 12-13

PORTLAND, ORE.—Bids to 10 a.m., Jan. 3, by Bureau of Public Roads, New Postoffice Bdg., Portland, Ore., for improvement of Siuslaw National Forest Highway in LANE COUNTY, Oregon, involving: Section 7-C, 2.4 miles—21 acres clearing, 17 acres grubbing, 105,200 cu.yd. roadway excavation, 2.4 miles finishing, 115,000 sta.yd. overhaul, 700 lin.ft. right-of-way fence, 20 MBM bridge timber, 65 cu.yd. concrete, 7500 lb. reinforcing steel, 680 lin.ft. culverts, 450 lin.ft. piling. Section 7-D, 2.8 miles—20 acres clearing, 18 acres grubbing, 164,150 cu.yd. roadway excavation, 2.8 miles finishing, 11 MBM bridge timber, 120 cu.yd. concrete, 440 ft. culverts. Section 7-E, 2.5 miles—19 acres clearing, 16 acres grubbing, 133,300 cu.yd. roadway excavation, 4000 lin.ft. right-of-way fence, 8500 lin.ft. piling, 20,000 lb. reinforcing steel, etc. 12-6

BIDS RECEIVED

PHOENIX, ARIZ.—Southwest Paving Co., Washington Bdg., Los Angeles, $57,452, low for 12.5 miles oil processing Douglas-Rodeo Highway. (See Unit Bid Summary.) 12-5

LOS ANGELES, CALIF.—Griffith Co., L. A. Railway Bdg., Los Angeles, $45,912, low for improving Floral Drive, etc., 1.47 miles grading, curbs, concrete paving, reinforced concrete pipe. 12-18

NEWPORT BEACH, CALIF.—Fleming Construction Co., Box 108, Pomona, $35,859, low for improving Seville Ave., concrete paving, vitrified sewers, cast-iron pipe, gate valves, fire hydrants, lighting system. 12-18

OAKLAND, CALIF.—Low bids as follows by City: (1) Heafey-Moore Co., 344 High St., Oakland, $14,993, low for Hermosa Ave. and Broadway Terrace, paving with 3½-in. asphalt base with 1½-in. asphalt surface, vitrified sewers; (2) Heafey-Moore Co., Oakland, $1008, low for Holly St. paving with 3-in. asphalt base with 2-in. Durite surface; and (3) Hutchinson Co., 1450 Harrison St., Oakland, $54,211, low for Hillmont Drive from 73rd to Tully, 3½-in. asphalt base with 1½-in. asphalt surface, vitrified sewers. 12-9

SACRAMENTO, CALIF.—Jahn & Bressi, Corporation Bdg., Los Angeles, $253,126, low for 8.5 miles concrete paving and grading in LOS ANGELES COUNTY from Tunnel Station to Santa Clara River for California Division of Highways. 12-18

SACRAMENTO, CALIF.—Low bids as follows by California Division of Highways: (1) TEHAMA and PLUMAS COUNTIES—E. B. Bishop, Regis Hotel, Sacramento, $59,265, low for 21.7 miles grading and surfacing from Morgan Springs to Lake Almanor; and (2) Lewis Construction Co., 308 S. Juanita St., Los Angeles, $189,687, low for 6.7 miles grading, SAN BERNARDINO COUNTY from Running Springs Park to Squirrel Inn. (See Unit Bid Summary.) 12-12

DENVER, COLO.—Taggart Construction Co., Cody, Wyo., $44,340 for 2.2 miles grading Granite Creek-Shell Project, Section 'C' in BIG-HORN COUNTY, Wyoming, for Bureau of Public Roads, Denver.

CONTRACTS AWARDED

LONG BEACH, CALIF.—To Griffith Co., L. A. Railway Bdg., Los Angeles, $277,635 for improving Appian Way, concrete paving, vitrified and concrete sewers, cast-iron mains, lighting system, pumping plants, etc. (See Unit Bid Summary.) 12-16

LOS ANGELES, CALIF.—To Matich Bros., Elsinore, who bid $12,583 to the District Engineer, California Division of Highways, Los Angeles, for 0.2 mile grading and concrete paving from Dana Point to Serra, ORANGE COUNTY. 12-11

MARYSVILLE, CALIF.—To C. W. Fiedler, 2631 30th St., Sacramento, $5700 for sidewalks, etc., on B, F, G Sts., etc., for City. 12-11

OAKLAND, CALIF.—To Hutchinson Co., 1450 Harrison St., Oakland, $24,381 for improving Centerville Road from Thornton Ave. to Central Ave. for County, paving with 9-7-in. concrete base with 3-in. asphalt surface. 12-10

OAKLAND, CALIF.—To Ed. A. Peres, 475 10th St., Richmond, $5736 for 2400 bbl. asphalt road oiling on Airport for Port Comm. 12-10

SACRAMENTO, CALIF.—By the California Division of Highways to O. McReynolds, Madeline, Lassen County, $12,791 for hauling screenings from Gazelle to Yreka, SISKIYOU COUNTY. 12-9

SACRAMENTO, CALIF.—To A. M. Peck, 2966 Allesandro St., Los Angeles, $312,057 to California Division of Highways for 10.4 miles grading and concrete paving from Brawley to 4 miles west of Westmoreland, IMPERIAL COUNTY. (See Unit Bid Summary.) 12-11

SAN DIEGO, CALIF.—To Yglesias Bros., Spreckels Bdg., San Diego, $74,524, low for grading 5.58 miles Murphy Canyon Road for County. 12-18

SAN FRANCISCO, CALIF.—Award recommended by Bureau of Public Roads, S. F., to Lord & Bishop, 433 32nd St., Sacramento, $251,552 for surfacing Route 3, Bright Angel Point-Cape Royal Highway, Grand Canyon National Park, ARIZONA. (See Unit Bid Summary.) 12-10

SAN FRANCISCO, CALIF.—Award recommended by Bureau of Public Roads, S. F., to Hodgman & McVicar, 1714 Plymouth Road, Pasadena, $73,942 using corr. pipe for 9.97 miles grading Bright Angel Springs-North Entrance project, North Rim of the Grand Canyon National Park, ARIZONA. (See Unit Bid Summary.) 12-12

SANTA ANA, CALIF.—To Griffith Co., L. A. Railway Bdg., Los Angeles, $282,900 for grading, concrete paving, vitrified pipe, cast-iron mains, hydrants, reinforced concrete bridges, etc. for City. 12-18

SOUTH SAN FRANCISCO, CALIF.—To Union Paving Co., Call Bdg., San Francisco, $8023 for improving Third St. for City, macadam and asphalt paving. 12-17

STOCKTON, CALIF.—To W. H. Hauser, 3129 E. 7th St., Oakland, who bid $11,750 for grading, cattle pass, and bridge on 5.2 miles of mountain road to the Calaveras Dam, Calaveras County, work for the City. 12-10

VENTURA, CALIF.—To Southwest Paving Co., Washington Bdg., Los Angeles, $26,090 for widening and asphalt surfacing Telegraph Road east of Fillmore, for County.

BOISE, IDA.—To Chas. H. Helmer, Twin Falls, Ida., $6600 for crushed rock surfacing in stockpiles for portion of Buhl-Castleford Market Road from Buhl south, a distance of 3.63 miles.

PORTLAND, ORE.—Awards as follows by Oregon State Highway Comm.: BAKER COUNTY—To Quinn Robbins Co., Inc., Boise, Ida., $157,920 for 12.4 miles Pleasant Valley-Durkee Section of the Old Oregon Trail, involving 100,000 cu.yd. roadway excavation and 54,000 cu.yd. of broken stone; BENTON COUNTY—To Joplin & Eldon, Couch Bdg., Portland, Ore., $32,880 for 18.7 miles Lincoln Line-Alsea Mt. Section of the Alsea Highway, involving 13,000 cu.yd. of broken stone; LAKE COUNTY—To Wm. Endicott, Madras, Ore., $60,205 for 19.8 miles East Forest Boundary-Silver Lake Section of the Fremont Highway, involving 165,000 cu.yd. roadway excavation; LANE COUNTY—Newport Const. Co., Portland, Ore., $76,850 low for 21 miles Nimrod-Belknap Springs Section of the McKenzie Highway, involving 41,000 cu.yd. of broken stone and crushed gravel, bids rejected as too high; LINCOLN COUNTY—To Wren & Greenough, P.O. Box 138, Portland, Ore., who bid $162,882 for 2.85 miles grading of the Yachats Lane-County Line Section of the Roosevelt Coast Highway, involving 123,000 cu.yd. of roadway excavation; and LINN COUNTY—Harmon & Tiddle, Eugene, Ore., $57,253 low for 1.9 miles Ranger Station-Bryant Hill Section of the Santiam Highway, involving 79,000 cu.yd. of roadway excavation. (See Unit Bid Summary.) 12-14

OLYMPIA, WASH.—To Fred G. Redmond, Yakima, Wash., who bid $42,072 for resurfacing of Sunset Highway in DOUGLAS, GRANT and LINCOLN COUNTIES, work for the Washington State Highway Commission. 12-6

BRIDGES and CULVERTS

WORK CONTEMPLATED

PHOENIX, ARIZ.—Plans by Arizona State Highway Commission for reinforced concrete bridge over Salt River at Tempe to cost $300,000; bids soon. 12-18

FRESNO, CALIF.—Plans by Engineer, A. Segel, Griffith-McKenzie Bdg., Fresno, for subway under the Southern Pacific Co. railroad tracks on Belmort Ave., work for the City; $200,000; cost to be met jointly by the City and Southern Pacific Co. 12-9

LOS ANGELES, CALIF.—Plans by County Bridge Engineer, W. D. Armstrong, Hall of Records, Los Angeles, for the construction of the following bridges: (1) Wooden bridge over Big Dalton Wash, to be 50 ft. long to cost $4000. (2) Steel plate girder underpass under the Santa Fe RR at Ripley Ave., near the City of Inglewood, to be 78-ft. span, to cost $90,000. (3) Reinforced concrete girder bridge over Eaton Wash on Pomona Blvd., to have two 30-ft. spans and to cost about $35,000. (4) Reinforced concrete girder bridge to consist of two 42-ft. spans and to be constructed over Alhambra Wash on San Gabriel Blvd., to cost $45,000. (5) Constructing reinforced concrete bridge over Alhambra Wash on Garvey Ave., consisting of one 30-ft. span to cost $25,000. 12-7

BIDS BEING RECEIVED

VENTURA, CALIF.—Bids to 11 a.m., Jan. 7, by County Clerk for culvert, etc., work involving 300 cu.yd. concrete, 7700 lb. reinforcing steel. 12-7

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To E. G. Perham, 1128 Stearns Drive, Los Angeles, who bid $10,300 for the construction of a wooden pile trestle bridge over Ballona Creek, work for County, to be 650 ft. in length and is to be located on Sawtelle Blvd. 12-6

SACRAMENTO, CALIF.—To Whipple Engr. Co., 183 N. Madison St., Monrovia, $31,419 for reinf. conc. bridge over La Canada Canyon, 1½ miles from La Canada, LOS ANGELES COUNTY, for California Division of Highways. 12-11

SACRAMENTO, CALIF.—To R. B. McKenzie, Red Bluff, $18,653 for six timber bridges on the Redding to Alturas Lateral, SHASTA COUNTY. Work is for the California Division of Highways. 12-6

SACRAMENTO, CALIF.—To Butte Construction Co., 2014 Folsom St., San Francisco, $157,339 for steel, concrete, and timber bridge over Corte Madera Creek at Greenbrae, MARIN COUNTY. Work is for the California Division of Highways. (See Unit Bid Summary, December 25th issue.) 12-6

SAN FRANCISCO, CALIF.—To M. Bertolino, 32 Shotwell St., San Francisco, who bid $1340 to Board of Public Works for replanking the Evans St. Bridge. 12-13

SANTA BARBARA, CALIF.—Awards as follows by County: (1) To Drucker & Williamson, Santa Barbara, $2930 for concrete ret. walls in Toro Canyon; (2) To J. B. Arroqui, Santa Barbara, $1450 for conc. ret. wall on W. Foothill Road; and (3) To Geo. P. Rue, Santa Barbara, $1829 for reinf. conc. retaining wall on Deep Valley Road.

SANTA ROSA, CALIF.—To W. L. Proctor, Santa Rosa, $14,540 for reinf. conc. pile trestle over Green Valley Creek on Forestville to Guerneville Highway for County. 12-11

PORTLAND, ORE.—To Northwest Contracting Co., Portland, $119,600 for reinforced concrete bridge over Rogue River on Pacific Highway at Grants Pass, JOSEPHINE COUNTY, for State. (See Unit Bid Summary.) 12-16

SEWER CONSTRUCTION

WORK CONTEMPLATED

BRODERICK, CALIF.—Town is considering forming Sanitary Dist. Mrs. Ray Peak, Broderick, is Chairman of Comm. 12-14

CULVER CITY, CALIF.—Plans by Engineers, Koebig & Koebig, Rowan Bdg., Los Angeles, for pumping plant in District No. 3; $15,000. 12-17

LOS ANGELES, CALIF.—Plans by J. E. Rockhold, County Surveyor, and protests will be heard December 30, for construction of cement pipe sanitary sewers in Belvedere Gardens, Unit No. 3, including Eugena St., First St., Fourth St., Gratian St., McBride Ave., etc., work involving 16,600 ft. 8-in. cement pipe sewer, 2050 ft. 8-in. and 250 ft. 10-in. cement pipe main sewer, 6420 ft. 6-in. cement pipe sewer, 16 flushing manholes, 37 manholes; $48,000. 12-9

NAPA, CALIF.—Plans by City Engineer and protests will be heard December 23 with reference to 6-in. vitrified pipe sewer on Bailey St. and Fourth St. 1911 Act. 12-6

REDWOOD CITY, CALIF.—Plans by County Surveyor, Geo. A. Kneese, protests January 20, for 7 miles 6-in. to 30-in. vitrified and concrete sewer in Atherton and Fairoaks District; $200,000. 1921 Act. 12-17

SAN DIEGO, CALIF.—Plans by County, protests Dec. 30, for sewer system in Mission Valley, Camino Del Rio, etc. Work consists of sanitary sewer system consisting of vitrified, cement, cast-iron and centrifugal reinforced concrete pipe mains, etc; Sewage pumping station consisting of pump house, pumps, motors, switches, piping, electrical wiring, etc; and sewage treatment plant consisting of heater, pumps, motors, switchboard, switches, clarifier equipment, and tanks, digester equipment and tanks, chlorinating equipment, chlorine handling equipment, sludge beds, sludge handling equipment, hot water meters, gas meters, valves, piping and electrical equipment, etc.; $500,000. County will pay $50,000, balance under 1921 Act. E. L. Freeland is Engineer. 12-18

SAN JACINTO, CALIF.—Plans by Engineers, Koebig & Koebig, 821 Rowan Bdg., Los Angeles, and call for bids will be issued in about two or three weeks by the City of San Jacinto, Riverside County, with reference to the construction of sewer improvements for the City as follows: Construction of Imhoff tank, sewer farm and chlorination control. Construction of main line sewers and lateral sewers throughout the City, work involving 34,571 lin. ft. 8-in., 5473 lin.ft. 10-in., and 1345 lin.ft. 12-in. pipe sewer; Y branches, structures, flush tanks and manholes, etc.; $90,000. 12-6

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., Dec. 30, by Clerk of Board of Supervisors for reinforced concrete storm drain to be 350 ft. in length and 16 by 6 ft. diam., to be across Charter Oak Wash at Puente Ave. 12-2

BIDS RECEIVED

LOS ANGELES, CALIF.—M. Simunovich, 3305 W. 66th St., Los Angeles, $96,604, low for sewers, tunnels in Beverly Blvd. and Malibu Road Sewer District for City. 12-13

SACRAMENTO, CALIF.—F. N. Neilson, Orland, $22,504, low for six timber bridges east of Red Bluff, TEHAMA COUNTY, for California Division of Highways. 12-18

SAN JOSE, CALIF.—W. J. Tobin, Oakland, $5000, only bid to City for 51-ft. 45-in. reinforced concrete culvert under S. P. Coast RR track. Bid rejected.

CONTRACTS AWARDED

HAYWARD, CALIF.—To John Pestana, 1232 35th St., Oakland, who bid $364 for constructing a 6-in. vitrified pipe sewer in Sayre St. for City. 12-6

LOS ANGELES, CALIF.—To M. Simunovich, 3305 W. 66th St., L. A., $96,604 for sewers, tunnels, etc., in Beverly Blvd. and Malibu Road Sewer Dist. for City. 12-18

LOS ANGELES, CALIF.—Awards as follows by City for sewage pumping plant in Municipal Improvement District No. 60 (Beverly Blvd. and Malibu Road Sewer District): (1) To Chas. H. Johnston, 947 N. Orange Drive, Hollywood, $14,300 for concrete pump pit; and (2) To Carpenter Bros., 457 N. Canon Drive, Beverly Hills, $8300 for furnishing and installing two duplicate sewage pumping units. 12-13

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

DOWNEY, CALIF.—Bonds voted by the Downey County Water Works District, Downey, Los Angeles County, in amount of $195,000 for water system improvements, involving 150,000-gal. tank on a 100-ft. tower, water mains, two wells and pumping plants. Plans and specifications prepared by Consulting Engineers, Burns-McDonnell-Smith Engineering Co., Western Pacific Bdg., Los Angeles. 12-2

RIVERSIDE, CALIF.—Bonds sold by County, $690,000, for improvements in County Water Dist. No. 1: Installation of 24 deep wells of which 22 are to be equipped with motors, pumps, casing, valves, etc.; 3300 lin.ft. 20-in., 7900 lin.ft. 16-in., 39,000 lin.ft. 14-in., 29,000 lin.ft. 12-in., and 3000 lin.ft. 10-in. reinforced concrete double-strength pipe and valves; 105,000 lin.ft. of high-pressure reinforced concrete pipe and valves; 210,000 lin.ft. of low-pressure concrete pipe. 12-13

SAN DIEGO, CALIF.—Plans by City Hydraulic Engineer, H. N. Savage, bids soon for enlarging Chollas Heights Reservoir and Morena Dam; $500,000. 12-10

SAN JUAN CAPISTRANO, CALIF.—December 31 has been set as the date for hearing petitions by County Supervisors on formation of a water district, under the county water district laws, to be known as the Orange County Water District No. 4. Work proposed will cost about $30,000. Plans include 250,000-gal. concrete reservoir, nine fire hydrants, 6-in. and 8-in. mains, pressure system, etc. Plans were prepared by W. K. Hilliard, County Surveyor, Santa Ana. 12-9

WATSONVILLE, CALIF.—Plans being made, bids will be called for in about two months, for construction of water system improvements as follows: Improving Ford St. wells, including two deep well pumping plants, pump house, piping, water measuring and recording device; $5000. Improving the main reservoir, grading, concrete work, wooden roof with concrete piers, installing venturi meter, etc.; $32,300. Filter plant at Corralitos, including grading, filter plant structures, underdrains and sand, piping and equipment, bypass, water measuring and recording devices; $69,900. Filtered water reservoir at Corralitos; $12,000. Elevated reservoir at Corralitos, including necessary excavation and structures, main pipe and pressure control; $7800. Cost of the above, $125,000. H. B. Kitchen is City Engineer, and Chas. Gilman Hyde, University of California, Berkeley, is the Consulting Engineer. 12-9

BIDS BEING RECEIVED

VANCOUVER, B. C.—Bids to 2 p.m., January 6, by James Stuart, City Purchasing Agent, for furnishing 20,000 lin.ft. of Class 'C' cast-iron pipe, 6-in. 12-14

LOS ANGELES, CALIF.—Bids to 2 p.m., Dec. 30, by the Board of Supervisors of Los Angeles County, Hall of Records, Los Angeles, for the construction of improvements at the County Farm at Hondo, work consisting of 16-in. cement pipe-line, valves, etc. 12-2

BIDS RECEIVED

MODESTO, CALIF.—U. S. Pipe & Fdy. Co., S. F., $6612 low bid to City for furnishing cast-iron pipe. 12-12

CONTRACTS AWARDED

NOGALES, ARIZ.—Awards as follows by City: (1) To Roy & Titcomb, Nogales, Ariz., $34,220 for diesel engine and pumping plant; and (2) To F. Lown, Nogales, Ariz., $5735 for pumping plant building. 12-11

LOS ANGELES, CALIF.—To Pittsburgh-Des Moines Steel Co., Rialto Bdg., San Francisco, who bid $23,500 to Los Angeles Water and Power Bureau, for furnishing and installing a 500,000-gal. steel tank near Terminal Way. 12-16

OAKLAND, CALIF.—To Industrial & Municipal Supply Co., 7 Front St., San Francisco, $985 for hydro-pneumatic pressure pumping system at Warehouse A for Oakland Port Commission. 12-17

OAKLAND, CALIF.—Awards as follows by East Bay Municipal Utility District: (1) To Steel Tank & Pipe Co., Berkeley, $6763 for steel pipe and specials, Lafayette and Walnut Creek Pumping Plants; and (2) To Daniel Contracting Co., 503 Market St., San Francisco, $6480 for 1440 cu.yd. rock in place over or adjacent to twin pipes of East Bay Aqueduct at crossings of San Joaquin, Middle and Old Rivers. 12-12

SAN DIEGO, CALIF.—To Miracle Const. Co., 4751 Monroe St., San Diego, $30,957 for cast-iron pipe system for City in La Mesa and Metropolitan Center. 12-11

SUNNYVALE, CALIF.—Awards as follows by City: (1) To Pacific States C. I. Pipe Co., Hunter Dulin Bdg., S. F., $1712 for cast-iron pipe and (2) $295 for gate valves. 12-18

EVERETT, WASH.—Awards as follows by City for Sultan River Water Project: (1) To Moran Construction Co., Seattle, $249 per acre, $53,290 for 210 acres clearing; (2) To Chasteen & Dorsey, Bellingham, Wash., $61,140 for 8000 ft. 36-in. concrete pipe-line; and (3) To Parker-Schramm Co., Couch Bdg., Portland, Ore., for earth dam and 247 ft. 4 by 6-ft. tunnel. Baar & Cunningham, Portland, are Engineers. 12-16

POWER DEVELOPMENT

CONTRACTS AWARDED

VANCOUVER, B. C.—Awards as follows by B. C. Electric Railway Co., Ltd., Vancouver, B. C., in connection with constructing Jordan River hydroelectric power project: (1) To English Electric Co., Toronto,

Canada, $90,000 for generator; (2) To Canadian Westinghouse Co., Ltd., Vancouver, $55,000 for transformers. 12-16

VANCOUVER, B. C.—Awards as follows by British Columbia Electric Railway Co., Vancouver, B. C., for the following in connection with the Jordan River hydroelectric project: (1) Contract awarded at $387,000 for the manufacturing and installing of 2 miles of steel penstock to be 62-in. diam. from the reservoir to the power house, awarded to Vancouver Engineering Works, Ltd., Vancouver, B. C. (2) Contract awarded to English Electric Co., Rugby, England, who bid approximately $70,000 for the furnishing and installing of a water wheel in the fourth unit of the Jordan River hydroelectric project. 12-9

RIVER AND HARBOR WORK

WORK CONTEMPLATED

HUNTINGTON PARK, CALIF.—City Engineer, M. Rosson, Long Beach, is preparing plans and specifications for the construction of repairs to the municipal pier to cost $60,000 and the construction of a $500-ft. extension to pier to cost $62,000. 12-6

HUNTINGTON BEACH, CALIF.—Plans by M. Rosson, City Engineer, for: (1) Gunite repairs for 1400 ft. of present concrete pier. (2) Construction of 500 ft. of new concrete pier, using centrifugal spun concrete piling, and concrete girders and beam for deck. Replacing of ornamental lighting system on old pier. Repair portion is 1400 ft. long and 25 ft. wide; and the new structure is 500 ft. long and 25 ft. wide. Election wil lbe held latter part of January or early in February; $122,000. 12-17

NEWPORT BEACH, CALIF.—Plans by R. L. Patterson, City Engr., bids open about Jan. 13, for 500,000 cu.yd. dredging entrance channel, and rock groins involving 18,000 tons of stone. Bonds voted, $200,000. 12-14

BIDS RECEIVED

OAKLAND, CALIF.—M. B. McGowan, Call Bdg., San Francisco, $18,126, low for creosoted timber bulkhead at Yacht Harbor, foot of 19th St., for Oakland Port Commission. 12-17

MACHINERY and SUPPLIES

BIDS BEING RECEIVED

INGLEWOOD, CALIF.—Bids to 8 p.m., Dec. 30, by City Clerk for furnishing one 5 to 6-ton, 3-wheel, 4-cylinder gasoline motor road roller. 12-16

LAKEPORT, CALIF.—Bids to 7:30 p.m., Jan. 6, by City Clerk for 1000 yards of river run gravel, not over 1¼-in. diam., on the road between the corner of 16th and High Sts. and the town limits. 12-17

ORANGE, CALIF.—Bids to 1 p.m., January 7, by City Clerk for furnishing to the Road Department one grader, to have 8-ft. blade, weighing about 4000 lb. 12-18

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Grinnell Co. of the Pacific, 520 Mateo St., Los Angeles, who bid $19.50 per ft. for furnishing the following quantities of cast-iron pipe to the Los Angeles Water and Power Bureau, under Adv. 1238: 12,000 lengths 2 in. by 5 ft. by 2-in. type A, bell and spigot; 3000 lengths 2 in. by 5 ft. by 1⅜ in., type B, not threaded. 12-9

OAKLAND, CALIF.—To Grinnell Co. of the Pacific, Fifth and Brannan Sts., San Francisco, $15,600 to Oakland Port Commission for automatic fire prevention sprinkler system in Transit Shed No. 2. 12-17

IRRIGATION and RECLAMATION

WORK CONTEMPLATED

WITTMANN, ARIZ.—Bonds, $3,157,000, were voted by the landowners of the Arizona Water Conservation District, Wittman, Ariz., for the acquisition and construction of works necessary to supply the District with water. Hazel L. Bradshaw, 406 Fleming Bdg., Phoenix, is Secretary. 12-16

BIDS BEING RECEIVED

SACRAMENTO, CALIF.—Bids to 3 p.m., Dec. 30, by Division of Water Resources, Room 410, State Office Bdg., Sacramento, for 635-ft. pile and timber bulkhead of treated lumber, on the left bank of the Sacramento River near the Libby, McNeill & Libby Cannery, about 1 mile below Isleton. 12-16

CONTRACTS AWARDED

BUTTONWILLOW, CALIF.—To G. A. Graham, Taft, who bid $48,752 to Buena Vista Water Storage District for: Kern River Diversion Weir, 8 ft. high, 20 ft. wide, 150 ft. long, rein. conc. floor and wingwall, timber superstructure; Main Canal Structure, headgate, and four weirs to be of rein. conc. and timber, six drops, reinforced concrete; Alejandro Canal Structures, headgates, two weirs and five drops, same as above. 12-13

SACRAMENTO, CALIF.—Awards as follows by U. S. Engineer's Office. (1) To R. G. LeTourneau, 122 Moss Ave., Stockton, $59,400 for 5700 ft. levee at Starr Bend, 10 miles below Marysville on Feather River; and (2) To R. G. LeTourneau, Stockton, $77,250 for 5300 ft. levee on Feather River, 2 miles from Nicolaus. 12-18

SACRAMENTO, CALIF.—To G. C. Rubke, Marysville, $6200 for river retard on the south bank of the Yuba River at Rubke Bend, 3 miles from the City of Marysville, Yuba County, work for the U. S. Engineer's Office, Sacramento. 12-2

SACRAMENTO, CALIF.—To T. J. Leveroni, Rio Vista, who bid $432 for 300 lin.ft. of levee on the right bank of the Sacramento River, work for the U. S. Engineer's Office, Sacramento. 12-2

SAN FRANCISCO, CALIF.—To Bechtel & Palmer, 206 Sansome St., San Francisco, for benching for 10 miles of flume on the Salt Springs project for the Pacific Gas & Electric Company, located on the dividing line of Calaveras and Amador Counties, 40 miles east of Jackson. Work involves 300,000 cu.yd. of excavation. 12-11

LIGHTING SYSTEMS

WORK CONTEMPLATED

HANFORD, CALIF.—Plans by A. Segel, Engr., Griffith-McKenzie Bdg., Fresno, protests by City Dec. 30, for 61 Union Metal Mfg. Co. electroliers, conduit system, and removing 36 electroliers on 7th, Douty, Irwin St., etc. 1911-15 Acts. 12-14

CONTRACTS AWARDED

SAN JOSE, CALIF.—To San Jose Paving Co., Fifth and Keyes Sts., San Jose, $6276 for 18 single-light standards, conduit system, etc., on San Carlos St., from Fourth St. to Seventh St., etc., for City. 12-10

RAILROAD CONSTRUCTION

WORK CONTEMPLATED

PORTLAND, ORE.—Oregon & Washington RR & Navigation Co. (Union Pacific System), Pittock Bdg., Portland, Ore., has been ordered by the Interstate Commerce Commission to construct a railroad to be 185 miles in length from Crane to Crescent Lake, Ore., where it will join the system of the Southern Pacific Co.; $9,000,000. The Interstate Commerce Commission orders the completion by 1931. 12-16

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—By the Board of Public Works for reconstructing of the Taraval St. tracks from 20th Ave. to 30th Ave., to M. Rosenberg, S. F., $34,975. (See Unit Bid Summary.) 12-12

MUNICIPAL DEVELOPMENTS

WORK CONTEMPLATED

PHOENIX, ARIZ.—At election Dec. 3, City of Phoenix, Ariz., defeated propositions as follows to issue bonds in amount of $4,823,000: (1) $2,786,000 for water improvements, including pipe-lines, water mains, meters, pumping plants, etc., and construction of a 10,000,000-gal. concrete lined reservoir; (2) $817,000 for construction of sewer mains and installation of sewage treatment plant; (3) $125,000 to pay outstanding indebtednesses; (4) $200,000 for repayment of the Verde loan; (5) $250,000 for park and playground improvements; (6) $125,000 for constructing municipal golf course; (7) $300,000 for the construction of a public library. W. J. Jamieson is the City Engineer of Phoenix, Ariz. 12-6

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SWIMMING POOLS

WORK CONTEMPLATED

TUCSON, ARIZ.—Plans by Geo. T. Grove, City Engr., for 2 swimming pools, filtration plants, wading pools, etc. Bonds voted, $100,000. 12-14

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., January 6, by Board of Supervisors for improvements at Morgan Park and Baldwin Park, by clearing, excavation, bath house, swimming pool, pool water filtration, purification, and cleaning equipment, piping, gas and water supply lines, waste dispersion system, street improvement, irrigation system, tennis courts, lighting system, wading pool, central paved area, 60-ft. steel tube flagpole, fire hydrants. $73,500. 12-13

BUILDING CONSTRUCTION

WORK CONTEMPLATED

FAIRFIELD, CALIF.—Plans by Coffmann, Sahlberg & Stafford, Architect, Forum Bdg., Sacramento, for high school for Armijo Union High School District; $400,000. 12-17

LONG BEACH, CALIF.—Plans by Stone & Webster, Laughlin Bdg., Los Angeles, for a large manufacturing plant on West Seventh St., on Channel No. 2, Long Beach Harbor, for Procter & Gamble, soap manufacturers. The plant will include two main buildings, 100 by 500 ft., and 100 by 700 ft. The project also includes a 500-ft. wharf and 12 steel storage tanks; $5,000,000. 12-16

LOS ANGELES, CALIF.—Plans by County Architect, Karl Muck, Hall of Records, Los Angeles, for a County Court House, estimated to cost $8,000,000. Court House will be erected on the block bounded by Broadway, Hill, First, and Temple Sts., and will be about 30 stories high. 12-9

MARTINEZ, CALIF.—Plans by W. H. Weeks, Architect, Hunter-Dulin Bdg., San Francisco, for a junior high school for Alhambra Union High School District; $250,000. 12-16

MERCED, CALIF.—Plans by Architects, Reid Bros., 105 Montgomery St., San Francisco, for concrete and steel theatre for the Merced Theatre Co. $175,000. 12-11

OAKLAND, CALIF.—Plans by Architects, Miller & Warnecke, Financial Center Bdg., Oakland, for 3-story Class 'C' dance hall and store building to be constructed on Hobart St. and Telegraph Ave., Oakland, for Sweets Ballroom; $100,000. 12-6

PALO ALTO, CALIF.—Plans by Reed & Corlett, Architects, Oakland Bank Bdg., Oakland, for reinforced concrete hospital for Palo Alto Hospital Assn.; $400,000. 12-17

SALINAS, CALIF.—Plans by Swartz & Ryland, Architects, Spazier Bdg., Monterey, and Brix Bdg., Fresno, for 'A' steel frame, terra cotta and brick bank building for Salinas National Bank. $250,000. 12-10

SALINAS, CALIF.—Plans by Reed & Corlett, Architects, Oakland Bank of Savings Bdg., Oakland, for a Detention Home, $40,000, and addition to the County Jail, $60,000, for County. 12-10

SAN FRANCISCO, CALIF.—Plans by S. L. Hyman and A. Appleton, Architects, 68 Post St., San Francisco, for addition to laundry building on Eighth and Folsom Sts. for Galland Laundry Co. $50,000. 12-10

SAN FRANCISCO, CALIF.—Plans by Willis Polk & Co., Architects, 277 Pine St., San Francisco, for a concrete office and laboratory building on Fell and Polk Sts. for The Viavi Co., San Francisco. T. Ronneberg, Crocker Bdg., is the Engineer. $50,000. 12-10

SAN FRANCISCO, CALIF.—Plans by L. H. Nishkian, 525 Market St., San Francisco, for concrete with steel trusses auto sales and service building on Broadway and Battery Sts. for A. A. Maggini Motor Car Co. $80,000. 12-10

SAN FRANCISCO, CALIF.—Plans by Supt. of Lighthouses, Custom House, San Francisco, for three-story flat slab reinforced concrete Warehouse 7 and three-story concrete shop building on Buena Vista Island for United States Government. $75,000. 12-13

SAN FRANCISCO, CALIF.—Plans by S. L. Hyman and A. Appleton, Architects, 68 Post St., San Francisco, for two additional wings to the Relief Home on Seventh Ave. for the City. $500,000. 12-13

SAN FRANCISCO, CALIF.—Plans by Wm. H. Crim, Jr., Architect, San Francisco, for junior high school buildings for City, steel and concrete on 25th and Noe Sts.; $650,000. 12-16

SAN JOSE, CALIF.—Plans by Coffman, Sahlberg & Stafford, Architects, Forum Bdg., Sacramento, for reinforced concrete hotel on Fourth and San Fernando Sts. for San Jose Properties; $750,000. 12-16

UKIAH, CALIF.—Plans by Geo. B. McDougall, State Architect, for two ward buildings at Mendocino County Hospital. $165,000. 12-10

VALLEJO, CALIF.—Plans by Standard Oil Co., San Francisco, for warehouses, wharves, and tank on Vallejo waterfront; $50,000. 12-17

SEATTLE, WASH.—Plans by John Graham, Architect, Dexter Horton Bdg., Seattle, for an L-shaped Physics Building for the University of Washington. $600,000. 12-10

SEATTLE, WASH.—Plans by R. B. Reamer, Architect, 457 Henry Bdg., Seattle, for a Class 'A' club building at Seattle, for the Arctic Club; $750,000. 12-9

BIDS BEING RECEIVED

RED BLUFF, CALIF.—Bids to 3 p.m., January 3, by Red Bluff Grammar School District, Red Bluff, for brick grammar school building. $100,000. Wm. H. Weeks, Hunter-Dulin Bdg., San Francisco, is the Architect. 12-10

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., Jan. 8, by Board of Public Works, City Hall, San Francisco, for public comfort stations at the Great Highway and Judah St., and the Great Highway and Taraval St.; $40,000. 12-9

SAN RAFAEL, CALIF.—Bids to 8 p.m., Jan. 14, by San Rafael Board of Education for reinforced concrete gymnasium at High School; $70,000. 12-16

DENVER, COLO.—Bids to 3 p.m., Jan. 7, by Treasury Department, Office of the Supervising Architect, Washington, D. C., for construction of a 5-story and basement, stone-faced, fireproof, U. S. Custom House building of about 24,000 sq.ft. ground area at Denver, Colo. 12-9

EUGENE, ORE.—Bids to Dec. 30, by Architect, C. A. Houghtaling, Inc., American Trust Bdg., Portland, for constructing Medical Arts Bdg. at Eugene to cost $400,000.

SEATTLE, WASH.—Bids to 3 p.m., January 21, by Treasury Department, Office of Supervising Architect, Washington, D. C., for construction of the United States Immigrant Station, Assay Office, etc., except elevators, at Seattle, Washington. 12-17

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Clinton Campbell, Phoenix, Ariz., $197,108 for State Office building at Phoenix for State of Arizona. Lescher & Mahoney, Phoenix, Ariz., are Architects. Building will be reinforced concrete.

PHOENIX, ARIZ.—To Edwards, Wildey & Dixon, Edwards-Wildey Bdg., L. A., $650,000 for 'A' office building on E. Monroe and Second Sts., Phoenix, for Physicians-Dentists Corp. Walker & Eisen, Los Angeles, are Architects.

ALAMEDA, CALIF.—To J. J. Grodem, 1208 San Antonio Ave., Alameda, $19,300 for bathhouse for the City to be constructed at Washington Park. 12-5

BERKELEY, CALIF.—Pacific Coast Engineering Co., foot of 14th St., Oakland, for 88 tons of structural steel to be used in construction of California Theatre Bdg., to be constructed at Berkeley. A. T. Lane of Los Angeles is the General Contractor. 12-6

LOS ANGELES, CALIF.—To H. W. Baum Co., Central Bdg., Los Angeles, for hotel and apartment building on Echo Park Ave., adjacent to Angelus Temple, for Aimee Semple McPherson. The building will be 13 stories and basement, 182 by 174 ft., of structural steel and reinforced concrete construction; $1,750,000. A. H. Stibolt and W. H. Wheeler, Western Pacific Bdg., Los Angeles, are the Architects. 12-9

OAKLAND, CALIF.—To J. B. Bishop, 587 Athol Ave., Oakland, who bid $12,031 to the State Architect for concrete sales building and office, and addition to warehouse, broom factory, etc., at the Industrial Home for the Adult Blind. 12-13

OAKLAND, CALIF.—To C. D. Vezey & Sons, 354 Hobart St., Oakland, for concrete and steel signal building, etc., for the Southern Pacific Co., to be in Oakland. 12-11

OAKLAND, CALIF.—To Jacobs & Pattiani, 337 17th St., Oakland, $65,440 for corporation yard buildings on Fifth Ave. and First St. for City. 12-11

RICHMOND, CALIF.—To Wm. Radtke, Gilroy, for concrete cannery at Richmond, for Fileco & Perrelli, Gilroy. Wm. Knowles, 1214 Webster St., Oakland, is the Architect. $250,000. 12-10

SAN RAFAEL, CALIF.—To Young & Horstmeyer, Sheldon Bdg., San Francisco, for concrete bakery building on Fourth St. for California Bakery Co. S. Heiman, 605 Market St., San Francisco, is the Architect; $15,000. 12-17

WATSONVILLE, CALIF.—To A. L. Short, Watsonville, $32,500 for concrete store and apartment building for A. P. Beck. Wm. H. Weeks, Hunter-Dulin Bdg., San Francisco, is the Architect. 12-17

WOODLAND, CALIF.—To Mathews Const. Co., Forum Bdg., Sacramento, $50,188 for 2-story brick school building for the Woodland Grammar School District. 12-11

HONOLULU, T. H.—To R. E. Woolley, Honolulu, $100,472 for concrete wholesale drug building for Langley & Michaels Co. H. H. Meyers, Kohl Bdg., San Francisco, is Architect. 12-17

OPPORTUNITY PAGE

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Orton Crane & Shovel Co.
Owen Bucket Co.
Sauerman Bros., Inc.
Speeder Machinery Corp., The
Thew Shovel Co., The
Universal Crane Co., The

(Continued on page 62)

OPPORTUNITY PAGE

CONTINUED

HELP WANTED

As listed by the Engineering Societies' Employment Service, 57 Post Street, San Francisco. Applicants will please apply direct to them.

ASSISTANT ENGINEER, 28-30 years old, college graduate in civil engineering or architecture and practical experience in building construction, preferably with contractor. Must be willing to work. Permanent opportunity with chance for advancement. Salary $150-200 month. Headquarters, San Francisco. R-2908-S.

JUNIOR ENGINEER, graduate, preferably mechanical, 25-30 years old, American, with some experience in drafting and design for industrial plants, for large engineering office. Salary $150-200 month. Location, San Francisco. R-2760-S.

CIVIL ENGINEER with at least 10 years' experience in maintenance of railroads, who has been working in the field. Apply only by letter. Location, Europe. W-57.

CIVIL ENGINEER for development of new railroads, capable of taking charge of all the works. Must have had charge of construction of new lines from the beginning to the end. Apply only by letter. Location, Europe. W-58.

CIVIL ENGINEER, for sales engineering and promotional work in concrete products and general concrete field. Chance to obtain wide experience in this field. Apply by letter giving age, education, experience and salary expected. Location, Pennsylvania. X-9463.

THE BUYERS' GUIDE—*Continued from Page 60*

Expansion Joints
Industrial & Municipal Supply Co.
U. S. Cast Iron Pipe & Fdy. Co.
Water Works Supply Co.

Explosives
Giant Powder Co., Cons., The
Hercules Powder Co.

Equipment—Rental
Atkinson Construction Co.
Contractors Mchy. Exchange
Hackley Equipment Co., P. B.
Tieslau Bros.

Filters
Water Works Supply Co.

Fire Hydrants
Greenberg's Sons, M.
Industrial & Municipal Supply Co.
Rensselaer Valve Co.
United Iron Works
Water Works Supply Co.

Floating Roofs
Chicago Bridge & Iron Works

Flood Lights
Oxweld Acetylene Co.

Floors, Mastic
Wailes Dove-Hermiston Corp.

Flumes, Concrete
Portland Cement Association

Flumes, Metal
California Corrugated Culvert Co.
Montague Pipe & Steel Co.

Fluxes
Oxweld Acetylene Co.

Forms, Steel
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Freight, Water
American-Hawaiian Steamship Co.

Frogs and Switches
Bacon Co., Edward R.
United Commercial Co.

Gas Holders
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Gates, Cast-Iron
California Corrugated Culvert Co.

Gates, Irrigation
Bishop-Jacobsen & Co.

Gates, Radial
California Corrugated Culvert Co.

Gates, Sheet Metal
California Corrugated Culvert Co.

Governors, Steam Engine
Gardner-Denver Co.
Young Machy. Co., A. L.

Governors, Turbine
Pelton Water Wheel Co., The

Gravel Plant Equipment
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Works
Young Mach. Co., A. L.

Gunite Lining
Cement Gun Const. Co.

Hammers, Steam Pile
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.

Hardware, Shelf and Heavy
Thomson-Diggs Company

Hoists, Hand and Power
Bacon Co., Edward R.
Clyde Iron Works Sales Co.
Gardner-Denver Co.
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.

Hoists, Hand and Power (Continued)
Ingersoll-Rand Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Sullivan Machinery Co.
Willamette-Ersted Co.
Young Machy. Co., A. L.

Hoppers, Steel
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.
Link-Belt Meese & Gottfried Co.
Madsen Iron Works

Hose (Steam, Air and Water)
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The

Hydro-Tite
Industrial & Municipal Supply Co.

Insurance, Casualty
Associated Indemnity Corp.
Commerce Casualty Co.
Detroit Fidelity & Surety Co.
Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.
Great American Indemnity Co.
Indemnity Insurance Co. of North America
Maryland Casualty Co.
New Amsterdam Casualty Co.
Rolph, James Jr., Landis & Ellis

Jacks, Lifting
Jenison Machinery Co.

Kettles, Tar and Asphalt
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Littleford Bros. Co.
Montague Pipe & Steel Co.
Peerless Mchy. & Mfg. Co.
Spears-Wells Machy. Co.
Young Machy. Co., A. L.

Leadite
Water Works Supply Co.

Lighting Standards
United Iron Works

Loaders, Power, Truck and Wagon
Industrial Brownhoist Corp.
Jaeger Machine Works, The
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Spears-Wells Machy. Co.
Young Machy. Co., A. L.

Locomotives (Electric, Gas and Steam)
Bacon Co., Edward R.
Garfield & Co.
Hackley Equipment Co., P. B.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Plymouth Locomotive Works
United Commercial Co.

Meters, Irrigation
Bishop-Jacobsen & Co.

Meters, Venturi
Water Works Supply Co.

Meters, Water
Industrial & Municipal Supply Co.
Neptune Meter Co.

Mixers, Chemical
Dorr Co., The

Mixers, Concrete
Bacon Co., Edward R.
Chain Belt Co.
Foote Company, Inc.
Garfield & Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Lakewood Engr. Co.
Young Machy. Co., A. L.

Mixers, Plaster
Chain Belt Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Young Machy. Co., A. L.

Motors, Gasoline
Continental Motors Corp.
Hercules Motors Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Paints, Acid Resisting
Wailes Dove-Hermiston Corp.

Paints, Metal Protective
General Paint Corp.
McEverlast, Inc.
Wailes Dove-Hermiston Corp.

Paints, Technical
American Bitumuls Co.
Wailes Dove-Hermiston Corp.

Paints, Waterproofing
McEverlast, Inc.
Wailes Dove-Hermiston Corp.

Pavers, Concrete
Chain Belt Co.
Foote Company, Inc.
Harron, Rickard & McCone Co.
Koehring Company
Smith Co., T. L.

Paving Breakers
Gardner-Denver Co.
Harron, Rickard & McCone Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.

Paving, Contractor
Warren Bros. Roads Co.

Paving Plants
Bacon Co., Edward R.
Jaeger Machine Works, The
Jenison Machinery Co.
Madsen Iron Works

Paving Tools
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Littleford Bros. Co.

Penstocks
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Pittsburgh-Des Moines Steel Co.
Water Works Supply Co.
Western Pipe & Steel Co.

Pile Drivers
Bacon Co., Edward R.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Ingersoll-Rand Co.
Jenison Machinery Co.
Northwest Engineering Co.
Orton Crane & Shovel Co.
Thew Shovel Co., The

Piles, Concrete
Raymond Concrete Pile Co.

Pipe, Cast-Iron
American Cast Iron Pipe Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
Pacific States Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.
Water Works Supply Co.

Pipe, Cement Lined
American Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe Clamps and Hangers
Kortick Mfg. Co.

Pipe Coatings
McEverlast, Inc.
Wailes Dove-Hermiston Corp.

Pipe, Concrete
American Concrete Pipe Co.
Lock Joint Pipe Co.
Portland Cement Association

Pipe, Culvert
American Concrete Pipe Co.
California Corrugated Culvert Co.
Gladding, McBean & Co.
Pacific Clay Products
Western Pipe & Steel Company

Pipe Fittings
American Cast Iron Pipe Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
Pacific Pipe Co.
Pacific States Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.
Weissbaum & Co., G.

Pipe Line Machinery
Bacon Co., Edward R.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Pipe, Lock-Bar
Western Pipe & Steel Co.

Pipe, Preservative
Columbia Wood & Metal Preservative Co.

Pipe, Pressure Line
American Concrete Pipe Co.
Lacy Manufacturing Co.
Lock Joint Pipe Co.
Western Pipe & Steel Company

Pipe, Riveted Steel
Lacy Mfg. Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Pipe, Sewer
American Concrete Pipe Co.
Gladding, McBean & Co.
Pacific Clay Products

Pipe, Standard
Claussen & Co., C. G.
Pacific Pipe Co.
Weissbaum & Co., G.

Pipe, Vitrified
Gladding, McBean & Co.
Kartschoke Clay Products Co.
Pacific Clay Products

Pipe, Welded Steel
California Corrugated Culvert Co.
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Steel Tank & Pipe Co.
Western Pipe & Steel Co.

Plows, Road
Bacon Co., Edward R.
Galion Iron Works & Mfg. Co.
Hackley Equipment Co., P. B.
Jenison Machinery Co.
Spears-Wells Machy. Co.

Pneumatic Tools
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Schramm, Inc.

Portable Lights
Oxweld Acetylene Co.

Powder
Giant Powder Co., Cons., The
Hercules Powder Co.

Power Units
Continental Motors Corp.
Harron, Rickard & McCone Co.
Hercules Motors Corp.
Jenison Machinery Co.

Preservative—Wood, Metal, etc.
Columbia Wood & Metal Preservative Co.

Pumps, Centrifugal
Byron Jackson Pump Mfg. Co.
Industrial & Municipal Supply Co.
Ingersoll-Rand Co.
Jaeger Machine Works, The
Pelton Water Wheel Co., The
Rix Company, Inc., The
United Iron Works
Woodin & Little

Pumps, Deep Well
American Well Works, The
Byron Jackson Pump Mfg. Co.
Industrial & Municipal Supply Co.
Jenison Machinery Co.
Pelton Water Wheel Co., The
Woodin & Little

(Continued on page 64)

OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

Grading and Surfacing

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8 p.m., Friday, December 27, 1929, for constructing the Upper San Leandro and Middle Bar Roads, Mokelumne River Project, California.

Specifications may be obtained upon application to the office of the District.

JOHN H. KIMBALL, Secretary.
Oakland, California, December 12, 1929.

NOTICE TO CONTRACTORS

Bituminous Surfacing

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8 p.m., December 27, 1929, for furnishing all material and performing all necessary work to repair approximately 40,000 square feet of the bituminous surfacing of street pavements where removed for the purpose of construction, maintenance, etc., of the distribution system, during the year 1930 only.

Specifications may be obtained upon application to the office of the District.

JOHN H. KIMBALL, Secretary.
Oakland, California, December 12, 1929.

NOTICE TO CONTRACTORS

Grading and Paving

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, until 2 o'clock p.m. on January 8, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made, of portions of State Highway, as follows:

Siskiyou County, between Yreka and the Klamath River (II-Sis-3-C), about seven (7.0) miles in length, to be graded and surfaced with untreated crushed gravel or stone.

Santa Clara County, between San Francisquito Creek and San Antonio Avenue (IV-SC-1-2-A), about four and four-tenths (4.4) miles in length, to be graded and paved with Portland cement concrete and asphalt concrete.

San Mateo County, between San Mateo and Redwood City (IV-S.M.-68-C), about seven and three-tenths (7.3) miles in length, to be graded.

Solano County, through Dixon (X-Sol-7-E), about seven-tenths (0.7) mile in length, to be graded and paved with Portland cement concrete.

Proposal forms will be issued to only those Contractors who have furnished verified statement of experience and financial condition in accordance with the provisions of Chapter 644, Statutes 1929, and whose statements so furnished are satisfactory to the Department of Public Works. Bids will not be accepted from a Contractor to whom a proposal form has not been issued by the Department of Public Works.

Plans may be seen, and forms of proposal bonds, contract and specifications may be obtained at the said office, and they may be seen at the offices of the District Engineers at Los Angeles and San Francisco, and at the office of the District Engineer of the district in which the work is situated. The District Engineers' offices are located at Eureka, Redding, Sacramento, San Francisco, San Luis Obispo, Fresno, Los Angeles, San Bernardino and Bishop.

A representative from the district office will be available to accompany prospective bidders for an inspection of the work herein contemplated, and Contractors are urged to investigate the location, character and quantity of work to be done, with a representative of the Division of Highways. It is requested that arrangements for joint field inspection be made as far in advance as possible. Detailed information concerning the proposed work may be obtained from the district office.

No bid will be received unless it is made on a blank form furnished by the State Highway Engineer. The special attention of prospective bidders is called to the "Proposal Requirements and Conditions" annexed to the blank form of proposal, for full directions as to bidding, etc.

The Department of Public Works reserves the right to reject any or all bids or to accept the bid deemed for the best interests of the State.

DEPARTMENT OF PUBLIC WORKS,
DIVISION OF HIGHWAYS.
C. H. PURCELL, State Highway Engineer.
Dated December 11, 1929.

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, California, until 2 o'clock p.m. on January 15, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made, of portions of State Highway, as follows:

Kern County, between Westerly Boundary and Junction Pumping Station (VI-Ker-33-A), about fifteen and five-tenths (15.5) miles in length, to be graded and surfaced with bituminous macadam.

Imperial County, between Myers Creek Bridge and 3 miles west of Coyote Wells (VIII-Imp-12-A), about two and nine-tenths (2.9) miles in length, to be graded and paved with Portland cement concrete.

Proposal forms will be issued to only those Contractors who have furnished verified statement of experience and financial condition in accordance with the provisions of Chapter 644, Statutes 1929, and whose statements so furnished are satisfactory to the Department of Public Works. Bids will not be accepted from a Contractor to whom a proposal form has not been issued by the Department of Public Works.

Plans may be seen, and forms of proposal, bonds, contract and specifications may be obtained at the said office, and they may be seen at the offices of the District Engineers at Los Angeles and San Francisco, and at the office of the District Engineer of the District in which the work is situated. The District Engineers' offices are located at Eureka, Redding, Sacramento, San Francisco, San Luis Obispo, Fresno, Los Angeles, San Bernardino and Bishop.

A representative from the district office will be available to accompany prospective bidders for an inspection of the work herein contemplated, and Contractors are urged to investigate the location, character and quantity of work to be done, with a representative of the Division of Highways. It is requested that arrangements for joint field inspection be made as far in advance as possible. Detailed information concerning the proposed work may be obtained from the district office.

No bid will be received unless it is made on a blank form furnished by the State Highway Engineer. The special attention of prospective bidders is called to the "Proposal Requirements and Conditions" annexed to the blank form of proposal, for full directions as to bidding, etc.

The Department of Public Works reserves the right to reject any or all bids or to accept the bid deemed for the best interests of the State.

DEPARTMENT OF PUBLIC WORKS,
DIVISION OF HIGHWAYS.
C. H. PURCELL, State Highway Engineer.
Dated December 18, 1929.

THE BUYERS' GUIDE—*Continued from Page 62*

Pumps, Dredging and Sand
Jenison Machinery Co.
United Iron Works

Pumps, Hydraulic
Jenison Machinery Co.

Pumps, Power
Gardner-Denver Co.
Jaeger Machine Works, The

Pumps, Road
Bacon Co., Edward R.
Chain Belt Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Woodin & Little

Pumps, Sewage
American Well Works, The
Dorr Co., The
Fairbanks, Morse & Co.
Industrial & Municipal Supply Co.

Pumps, Sewage Ejector
Industrial & Municipal Supply Co.
United Iron Works

Pumps, Sludge
Dorr Co., The

Pumps, Water Works
Fairbanks, Morse & Co.
Industrial & Municipal Supply Co.
Jenison Machinery Co.
Pelton Water Wheel Co., The

Rails
Bacon Co., Edward R.
Claussen & Co., C. G.
United Commercial Co.

Reinforcing Bars
Pacific Coast Steel Co.
Soulé Steel Co.

Reinforcing Wire Fabric
Soulé Steel Co.

Reservoirs, Steel
Chicago Bridge & Iron Works
Western Pipe & Steel Company

Riveting Machines
Ingersoll-Rand Co.
Rix Company, Inc., The

Road Finishers
Bacon Co., Edward R.
French & Co., A. W.
Jenison Machinery Co.
Lakewood Engr. Co.

Road Forms
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Road Graders and Scrapers
Bacon Co., Edward R.
Brown-Bevis Company
Caterpillar Tractor Co.
Galion Iron Works & Mfg. Co.
Jenison Machinery Co.
Spears-Wells Machinery Co.
West Coast Tractor Co.
Young Machinery Co.,A. L.

Road Oil
Gilmore Oil Co.
Seaside Oil Co.
Standard Oil Co.
Union Oil Co.

Road Oil, Emulsified
American Bitumuls Co.

Road Rollers
Bacon Co., Edward R.
Brown-Bevis Co., The
Galion Iron Works & Mfg. C.
Hackley Equipment Co., P. B.
Huber Manufacturing Co.
Jenison Machinery Co.
Spears-Wells Machinery Co.

Rules, Steel, Wood and Aluminum
Lufkin Rule Co., The

Saws, Portable
Harron, Rickard & McCone Co.
Ingersoll-Rand Co.
Jenison Machinery Co.
Young Machinery Co., A. L.

Scarifiers
Bacon Co., Edward R.
Jenison Machinery Co.
Le Tourneau Mfg. Co.
Spears-Wells Machinery Co.

Scrapers (Dragline, Fresno, Wheeled)
Bacon Co., Edward R.
Galion Iron Works & Mfg. C.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Killefer Manufacturing Co.
Sauerman Bros., Inc.

Screens, Sand and Gravel
Bacon Co., Edward R.
Bodinson Manufacturing Co.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Co.
Young Machinery Co., A. L.

Screens, Sewage
Dorr Co., The
Link-Belt Meese & Gottfried Co.

Screens, Vibrating
Harron, Rickard & McCone Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Co.

Second-Hand Equipment
Contractors Mchy. Exchange
Excavating Equipment Dealers, Inc.
Hackley Equipment Co., P. B.
Harron, Rickard & McCone Co.
Tieslau Bros.

Sewage Disposal Apparatus
Dorr Co., The
Industrial & Municipal Supply Co
Link-Belt Meese & Gottfried Co.
Wallace & Tiernan
Water Works Supply Co.

Sharpeners, Rock Drill Steel
Gardner-Denver Co.
Ingersoll-Rand Co.

Shovels (Electric, Gasoline, Steam)
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co.
Hackley Equipment Co., P. B.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co.
Orton Crane & Shovel Co.
Spears-Wells Machinery Co.
Speeder Machinery Corp., The
Thew Shovel Co., The
Tractor-Equipment, Incorporated
Young Machy. Co., A. L.

Shovels, Hand
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Sluice Gates
California Corrugated Culvert Co
Water Works Supply Co.

Spreaders, Gravel and Rock and Asphalt
Bacon Co., Edward R.
Galion Iron Works & Mfg. Co.
Jenison Machinery Co.

Standpipes
Chicago Bridge & Iron Works
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Steel Bands
Pacific Coast Steel Co.

Steel, Drill
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The

Steel Plates
Pacific Coast Steel Co.

Steel Plate Construction
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Steel, Structural
Pacific Coast Steel Co.
Western Iron Works
Western Pipe & Steel Co.

Street and Road Improvement Bonds
Pacific Co.

Street Sweepers, Sprinklers, Flushers
Jenison Machinery Co.

Steel Joists
Truscon Steel Co.

Steel Windows
Truscon Steel Co.

Subgraders
Bacon Co., Edward R.
Blaw-Knox Co.
Harron, Rickard & McCone Co.
Lakewood Engineering Co.

Tanks, Air Compressor
Ingersoll-Rand Co.
Lacy Manufacturing Co.
Peerless Mchy. & Mfg. Co.
Rix Company, Inc., The
Western Pipe & Steel Co.

Tanks, Corrugated
California Corrugated Culvert Co.
Western Pipe & Steel Co.

Tanks, Elevated Steel
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Tanks, Oil Storage
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Steel Tank & Pipe Co.
Western Pipe & Steel Co.

Tapes, Measuring, Steel and Fabric
Lufkin Rule Co., The

Testing Laboratories
Hunt, R. W., Co.

Tie Plates
Pacific Coast Steel Co.

Torches (Welding and Cutting)
Oxweld Acetylene Co.

Towers, Transmission
Pacific Coast Steel Co.
Water Works Supply Co.

Tractors
Allis-Chalmers Mfgs. Co. (Monarch Tractors Division)
Caterpillar Tractor Co.
Cleveland Tractor Co.
Tractor-Equipment, Incorporated
West Coast Tractor Co.

Tramways
American Steel & Wire Co.
Bacon Co., Edward R.
Leschen & Sons Rope Co., A.

Transmission Machinery, Power
Bodinson Mfg. Co.
Link-Belt Meese & Gottfried Co.
United Iron Works

Transportation, Water
American-Hawaiian Steamship Co.

Trench Excavators
Cleveland Trencher Co., The
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Thew Shovel Co., The

Truck Cranes
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Universal Crane Co., The

Trucks
Fageol Motors Co.
Kleiber Motor Co.

Tunnel Shovels
Bucyrus-Erie Co.
Jenison Machinery Co.
Marion Steam Shovel Co.

Turbines, Hydraulic
Pelton Water Wheel Co., The
Water Works Supply Co.

Turntables
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Unloaders, Car and Wagon
Bacon Co., Edward R.
Crear and Bates
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.

Valves
California Corrugated Culvert Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
Pacific Pipe Co.
Water Works Supply Co.

Valves, Gate
California Corrugated Culvert Co.
Claussen & Co., C. G.
Pelton Water Wheel Co., The
Water Works Supply Co.

Valves, Hose Gate
Greenberg's Sons, M.
United Iron Works

Valves, Hydraulic
California Corrugated Culvert Co.
Pelton Water Wheel Co.
Water Works Supply Co.

Washers, Sand and Gravel
Jenison Machinery Co.
Smith Engineering Co.

Water Purification
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Water Supply Installations
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Water Transportation
American-Hawaiian Steamship Co.

Water Wheels
Pelton Water Wheel Co. The
United Iron Works
Water Works Supply Co.

Water-Works Supplies
American Cast Iron Pipe Co.
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Welding Apparatus (see Torches)
Oxweld Acetylene Co.

Welding Equipment
Oxweld Acetylene Co.

Welding Rods and Wire
Oxweld Acetylene Co.

Well Casing
Montague Pipe & Steel Co.

Wheelbarrows
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Wire Rope
American Steel & Wire Co.
Edwards Co., E. H.
Jenison Machinery Co.
Leschen & Sons Rope Co., A.

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