WCN-84-1930

WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

PUBLISHED SEMI-MONTHLY
VOLUME V NUMBER 8

SAN FRANCISCO, APRIL 25, 1930

25 CENTS A COPY
$3.00 PER YEAR

DIESEL-POWERED 2-YD. SHOVEL, 16-YD. DUMP WAGON, AND 60-HP. TRACTOR IN HEAVY CUT ON NORTH APPROACH TO SUISUN BAY BRIDGE OF SOUTHERN PACIFIC CO. NEAR BENICIA, CALIFORNIA; R. G. LE TOURNEAU, CONTRACTOR

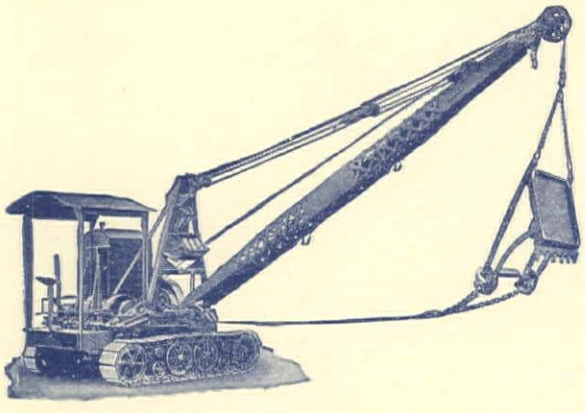
FAST FASTER FASTEST

3 Bucket Line Speeds

Easy to shift From one to another

P & H Conveyor is quickly adjusted to any practical angle and can load into wagons regardless of how close they stand to the machine.

The P & H is the only large Trencher with 3 Bucket Line Speeds without sprocket change.



The sturdy P&H Backfiller is designed and built like P & H Excavators. All the main machinery, including motor, is mounted on a single solid steel casting.

JUST by shifting a lever—from either side of the machine—the operator selects the bucket speed as the soil conditions require.

If he is running in high speed and suddenly encounters shale, hard pan, or heavy gumbo soil, the P & H operator shifts the transmission lever over and immediately has 50 per cent more power available at slower bucket speeds. The work of excavating goes on without interruption—without trouble.

Because of this exclusive P & H feature—the all-round power and strength—your cost per mile of trench is less with a P & H.

Bulletin 20-X will give you complete information—sent gladly on request.

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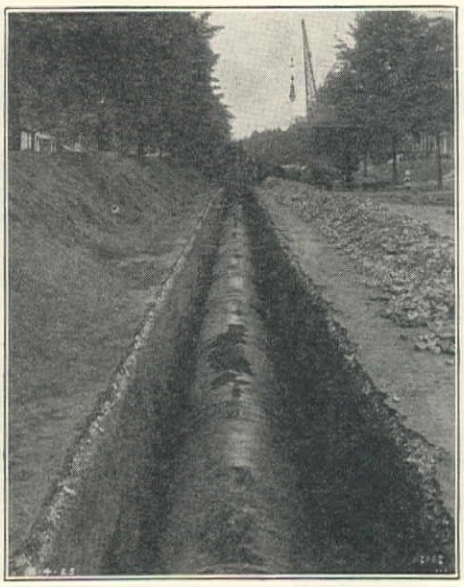
ROBERT M. TAYLOR, *Pacific Coast Manager*
Service Stations, Complete Repair Part Stocks and Excavators at San Francisco, Los Angeles and Seattle, Wash.

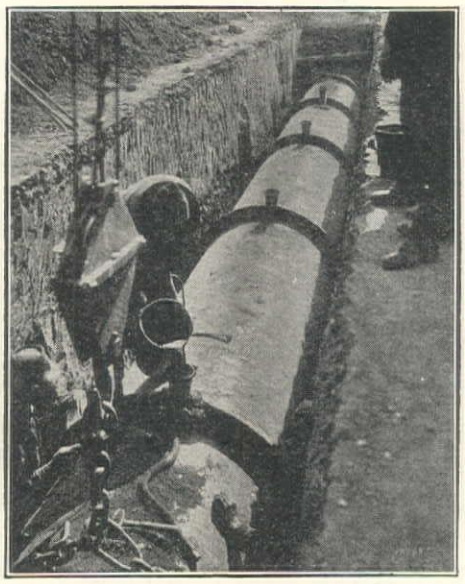
P&H TRENCHERS

LEADITE

Trade Mark Registered U.S. Pat. Office



—Laying 48-in. c. i. pipe with LEADITE



—Pouring 48-in. c. i. pipe joints with LEADITE

Louisville, Ky., has used LEADITE for jointing 165.82 Miles of Water Mains

In fact, since 1923, the Louisville Water Co., Louisville, Kentucky, has used LEADITE "exclusively" for jointing cast iron water mains varying in sizes up to and including 48", working pressures from 90 lb. per sq. inch down.

The reason why the Louisville Water Company has used LEADITE exclusively since 1923 is probably best explained in a recent letter from Mr. John Chambers, Chief Engineer and Superintendent, which reads in part as follows:

"These water mains have been in service six years and less and the joints are tight. Some of the lines were tested by the Pitometer Company of New York and no appreciable leakage was found."

"I consider LEADITE perfectly satisfactory as a joint material for cast iron bell and spigot pipe. The best that I can say for the material is that the Louisville Water Company intends to continue its use."

The Pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
Saves at least 75%

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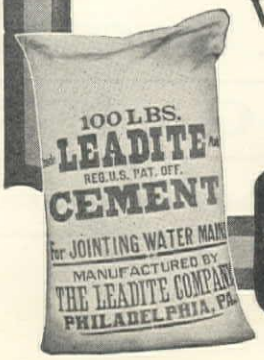
THE LEADITE COMPANY—LAND TITLE BLDG., PHILADELPHIA, PA.



No Caulking

When writing to WATER WORKS SUPPLY COMPANY, *please mention Western Construction News*

If you want profit today . . . use today's methods

THE pick and shovel were fine tools in the days of '49. But 1930 buyers demand *Service . . Speed . . Economy . . Efficiency.* Specifications are rigid. Competition keen. Margins close. How long will any business survive or prosper that tries to meet these conditions with methods of '49? If you want profit *today*, use *today's* methods - - the very latest and best cost-cutting equipment. *Air* power costs only a fraction as much as *hand* power. And RIX "6" *Super-charged* air power is over 20% more efficient than other air power. The reasons why, and a complete description of this marvelous, modern money-saver is contained in Bulletin 3-C. Write for it *now* before you forget.

RIX COMPANY, INC.

San Francisco - - 400 4th Street
Los Angeles - 684 Santa Fe Ave.
Seattle - - - 1729 First Ave. So.
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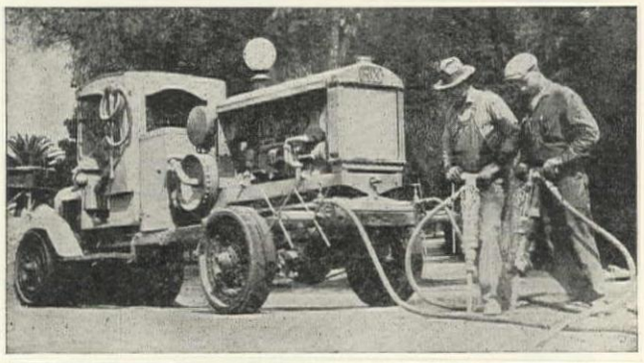
The *Pioneer* RIX line includes compressors of *all* sizes for *all* purposes. Rix Co. are also agents for COCHISE Drills, and exclusive distributors for THOR Pnuematic Tools in Los Angeles and Seattle territories.

USE RIX "Super-charged" AIR



RIX "6" Compressor, with *Super-charger*, owned and operated by the City of Pasadena Water Department.

RIX "6" PORTABLE AIR COMPRESSORS

COMPRESSED AIR MACHINERY — RIX — SAN FRANCISCO LOS ANGELES

. . . . SINCE 1877

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DEVOTED TO CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

VOLUME V APRIL 25, 1930 NUMBER 8

CONTENTS

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Every bag of HYDRO-TITE *is exactly like the bag you used before— the quality never varies*

THE everlasting minerals that are so scientifically compounded to make Hydro-Tite are carefully selected for uniformity. They are then so mixed that each bag in every ton is identical with every bag made before.

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Gas + Airs have proved their dependability beyond a doubt—proved that no other gasoline machine can equal their output . . . Three separate engines—a gas engine for the hoist, and two air-engines, one for the crowd and one for the swing, give this gasoline machine the flexibility and accurate control of a steam machine.

Full 100% power of the gas engine is available when needed for hoisting through hard materials. The direct-connected crowd and swing air-engines give speed and smoothness unheard of with clutch-type machines.

And now an equally successful development — Diesel + Airs. These two amazing machines are revolutionizing excavating costs. Only Bucyrus-Erie builds Gas + Airs and Diesel + Airs. Write for bulletin.

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BUCYRUS ERIE

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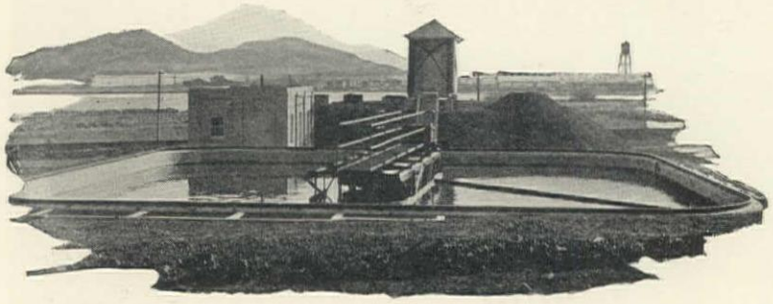
Where Skimming the Sewage is Important



Dorr Traction Clarifiers can be equipped to remove both settleable and floating solids from the flow.

Grease and floating solids can be quite a problem in the treatment of municipal or industrial sewage. But not when Dorr Traction Clarifiers are on the job.

These modern sedimentation units can be fitted with a skimming attachment which takes care of scum and floating material in the same way that the raking mechanism does of the settled sludge. And that means in a way that is automatic and entirely dependable.

The illustration shows a Traction Clarifier with skimming attachment in the separate sludge digestion plant which was designed for the City of Klamath Falls, Ore., by Mr. C. C. Kennedy, San Francisco. In the background is the Dorr gas-collection type Digester, used for digestion of the sludge.

Our booklet "Modern Sanitary Engineering Practice" tells the story of Dorr Equipment and its uses in sewage treatment plants. If you are interested in any phase of sanitary engineering work you will want to have a copy. Our nearest office will gladly send you one.

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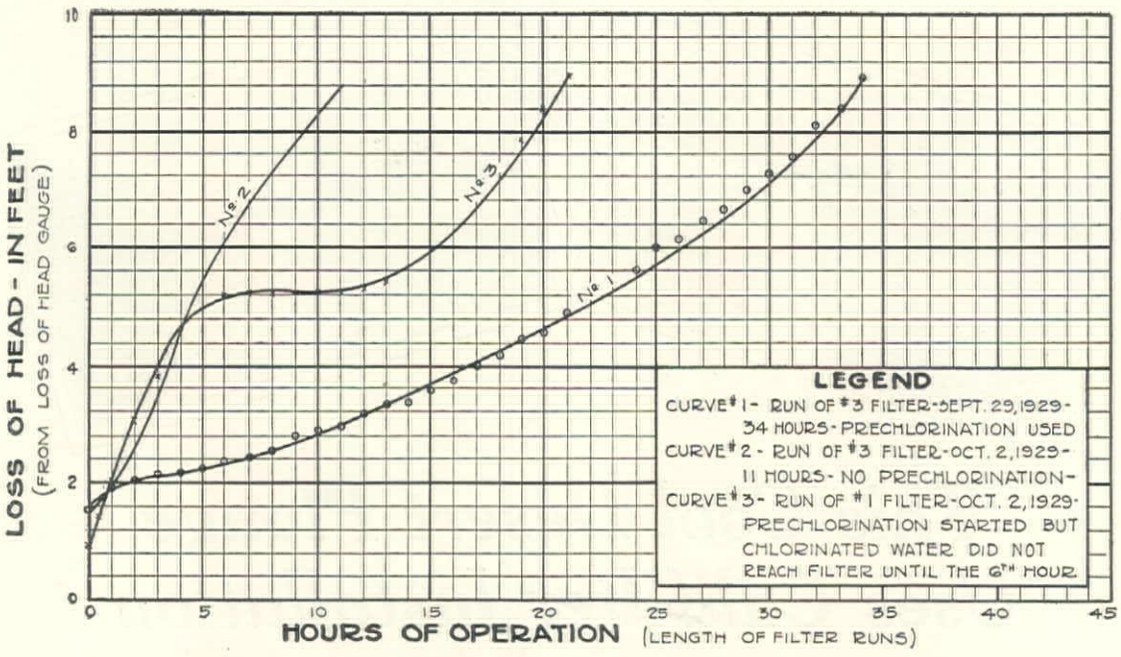
They TRIPLED their FILTER RUN by PRECHLORINATION



EFFECT OF PRECHLORINATION ON FILTER RUNS

Filtration Plant, Barberton Water Dept., Barberton, Ohio

Prechlorination has saved both time and money at the Barberton, Ohio, Filtration Plant. The above diagram proves that conclusively.

Prechlorination is real economy at nearly every water works plant, because:

It lengthens filter runs.
Saves wash water—also filtered water to waste.
Reduces labor.
Controls micro-organisms in basins.
Gives protection against heavy bacterial loads to filters.
Improves coagulation.

"The Only Safe Water is Sterilized Water"

Prechlorination with W. & T. chlorinators is proving a profitable investment in many plants. Write us for technical bulletins on **prechlorination.**

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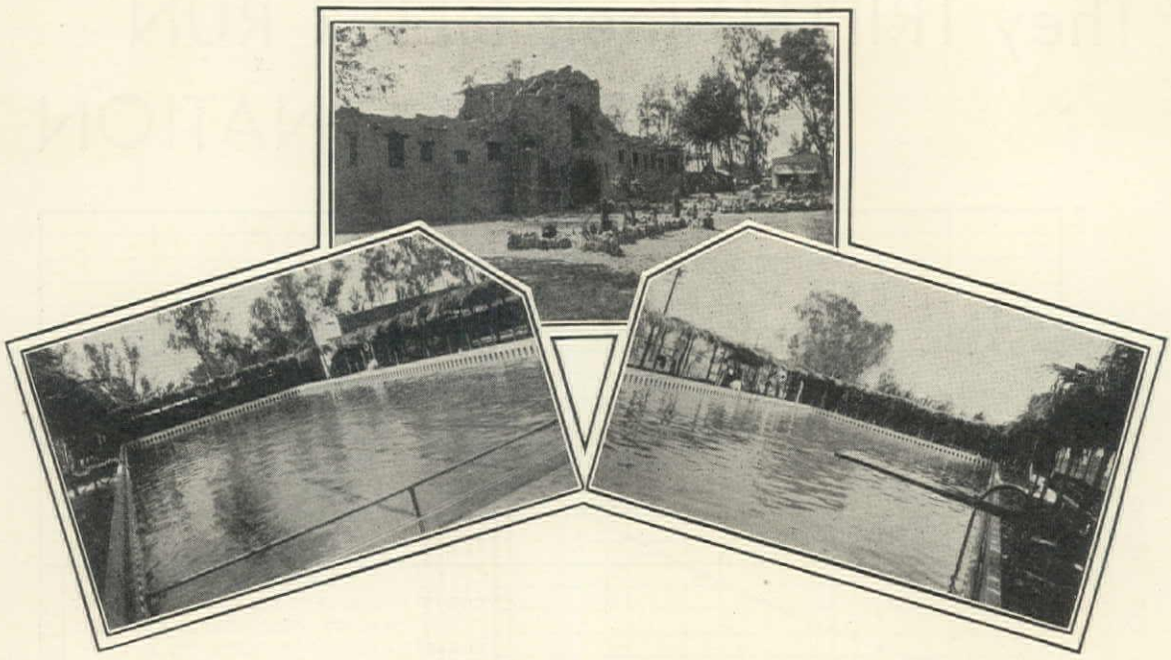


This Cool Desert Plunge Uses Califilter Installation

KENYON'S Desert Plunge in El Centro, California, twenty miles south of Salton Sea in the center of the Imperial Valley, combines the appropriateness of Indian architecture with the convenience and efficiency of modern pool equipment. It is of championship size, 105 feet long by 45 feet wide, depth 3 to 9 feet, and has a wading pool for children. Construction is reinforced concrete throughout.

Two horizontal California Pressure Filters each 6 x 11 feet, give a complete circulation of the 172,000 gallon plunge every six hours, and have in conjunction with them a cooling system to maintain the water at a comfortable temperature.

The Kenyon Desert Plunge at El Centro demonstrates the recognition of progressive communities in every locality of the desirability of up-to-date swimming facilities. That Califilters were chosen to serve the plunge is a demonstration of their applicability to every kind of pool installation.

Califilter Booklets Nos. 30 and 40 contain detailed information on pressure filters for swimming pools. We shall be glad to supply copies for your reference files.

CALIFORNIA FILTER COMPANY, Inc.

981 Folsom Street

SEATTLE **SAN FRANCISCO** **LOS ANGELES**

ARMCO INGOT IRON

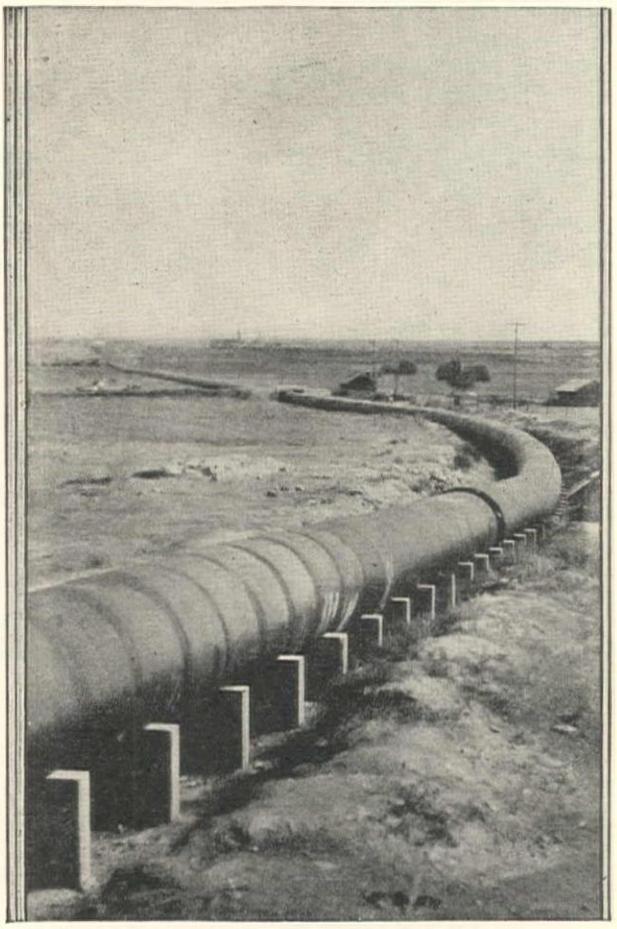
insures long dependable service for your pipe lines

EARLY repairs and replacements, interrupted water service, excessive rust-tax—these costly and annoying experiences are postponed when the pipe line is constructed of rust-resisting Armco INGOT IRON.

Back of Armco INGOT IRON is the longest record of *actual service* of any low-cost, rust-resisting sheets and plates. This exacting test of twenty-three years proves your investment.

Besides durability, there are these unusual *plus-values*—consistent uniformity, workability, and weldability.

An Armco Engineer will gladly assist you with your pipe materials problem. He is no farther away than your telephone. Call the office nearest you.



A view of the Armco INGOT IRON syphon line installed recently at Gooding, Idaho, by the Bigwood Canal Company. The pipe is 78" in diameter, and 3,600 feet long, constructed of 3/16" pure iron plates. Armco INGOT IRON was chosen because of its impressive service record, as well as for its exceptional ductility and weldability.

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ARMCO

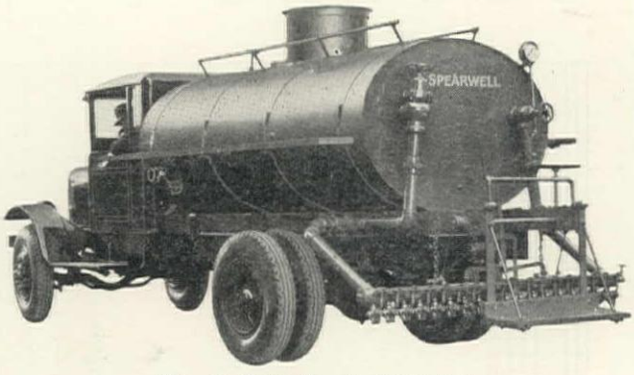
Back of this familiar symbol is nearly thirty years' experience in the manufacture of special analysis iron and steel sheets and plates. When you seek a rust-resisting, low-cost metal be sure to see this triangle and the words, "Armco INGOT IRON." It is your assurance of dependable, economical service.

"BE SURE IT'S MADE OF ARMCO INGOT IRON"

When writing to The American Rolling Mill Co., *please mention Western Construction News*

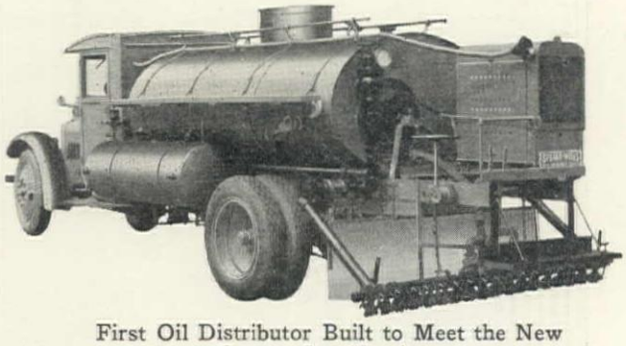
SPEARWELL
Road Oiling Equipment

A few of our recent installations

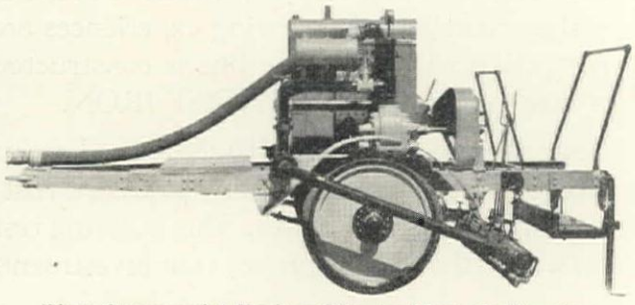


Standard California Distributor

The Best Retort Made



First Oil Distributor Built to Meet the New Oregon Specifications



First Commercial Trailer Oiler to Meet California Fuel Oil Conditions

SPECIALISTS IN ROAD OILING EQUIPMENT

Our Distributors are regularly spreading HOT OIL, FUEL OIL, CUT BACK EMULSIFIED ASPHALT, HOT OIL WITH SOAP WATER EMULSIFYING BOOT AND TANKS

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50,000-gallon elevated tank at Los Angeles plant of Fibreboard Products, Inc. It supplies water for paper machine showers, beaters and for boiler room use.

Serve your most important water needs

THE average elevated tank supplying water for general service at a manufacturing plant has a single connection to the mains at the base of the tank riser. It provides a uniform water pressure throughout the piping system for all uses.

On some installations, however, unique piping arrangements have been made to serve particular needs. For instance, a tank at one of the Fibreboard Products plants is piped to furnish water for several uses in the order of their importance.

Water is first delivered from wells to a cistern. It is then pumped into the central column or riser pipe which extends to within a foot of the top of the tank. A direct pipe line from this column to the paper machine showers maintains a constant and uniform pressure on the showers, regardless of the water level in the main part of the tank.

Another outlet pipe takes water from a point approximately half way up the tank and supplies the beaters. This part of the process is intermittent, and, therefore, the level of water in the tank may vary from the top to the halfway point, depending upon the number of beaters being supplied at one time. It has no effect on the supply to the paper machine showers or the water in the lower part of the tank, which is reserved for boiler room use.

The outlet pipe to the beater room is also a return line to the cistern. In case of fire, water can be quickly diverted to the cistern to aid the wells in keeping an adequate supply in front of fire pumps.

We will be glad to quote you on elevated tanks, flat-bottom storage tanks or steel plate equipment erected complete with our own Pacific Coast crews.

Ask for a copy of this Booklet

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1013 Rialto Building, San Francisco

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HORTON TANKS

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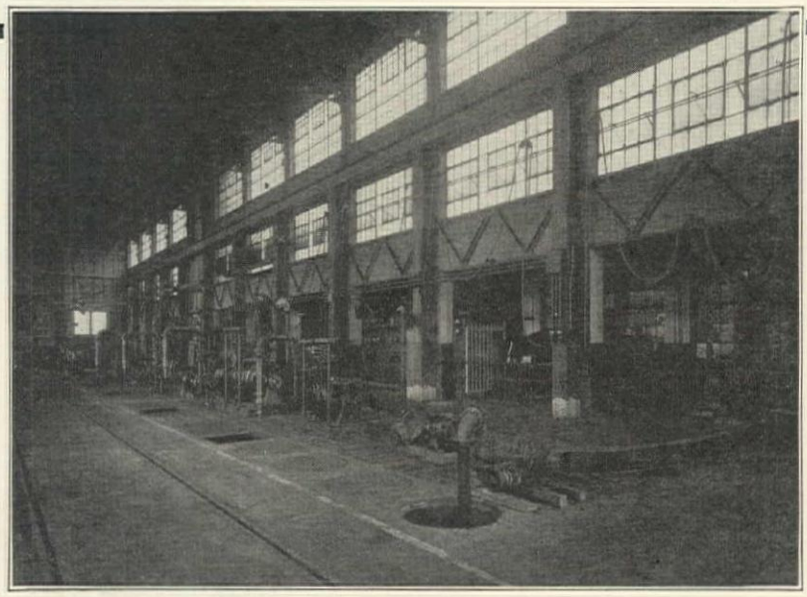
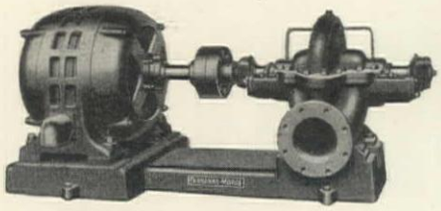
EVERY F-M Pump is factory tested



Hydraulic laboratory of the 30-acre Fairbanks-Morse pump factory, housing complete facilities for testing every type of pump—from the smallest centrifugal, up to 48-inch pumps.



Typical of the wide range of F-M "Unit Built" motor and pump combinations. Both pump and motor are ball bearing equipped.

1930
begins the
SECOND CENTURY
of building
FAIRBANKS SCALES

THE thoroughness of Fairbanks–Morse manufacturing methods assures that any F–M Pump which you install will be up to specifications. But double assurance of satisfactory service is afforded by the exhaustive tests that *every* F–M Pump is required to pass before leaving the factory.

Every Fairbanks–Morse Pump is tested carefully in one of the largest and most completely equipped hydraulic laboratories in the world. And this is but the final step in a series of equally exacting manufacturing operations which produce pumping equipment that will serve you better and longer.

From the comprehensive Fairbanks–Morse line, dependable equipment may be selected for solving practically all pumping problems. Bulletins covering F–M Pumps to meet your requirements will be sent promptly upon request.

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FAIRBANKS-MORSE
PUMPS & MOTORS

PA 31.2

Meet "George"

"Let George do it"—that's an old way of passing the buck when there's a tough nut to crack. Mighty handy fellow to have around, George is, when something goes wrong.

We're called in so many times when there's an equipment problem to solve—we're so often called on for fast service if a part gives up the ghost out in the field, that we've gotten to thinking of ourselves as George.

Well, why not? We have a complete line of construction equipment and parts always ready for delivery—we have a service and repair department that's second to none and we've twenty years experience in construction problems and the most practical way to meet them.

We make a pretty good George. If you have a problem that's connected in any way with construction equipment,

Call HEmlock 3700 and

"Let George Do It"

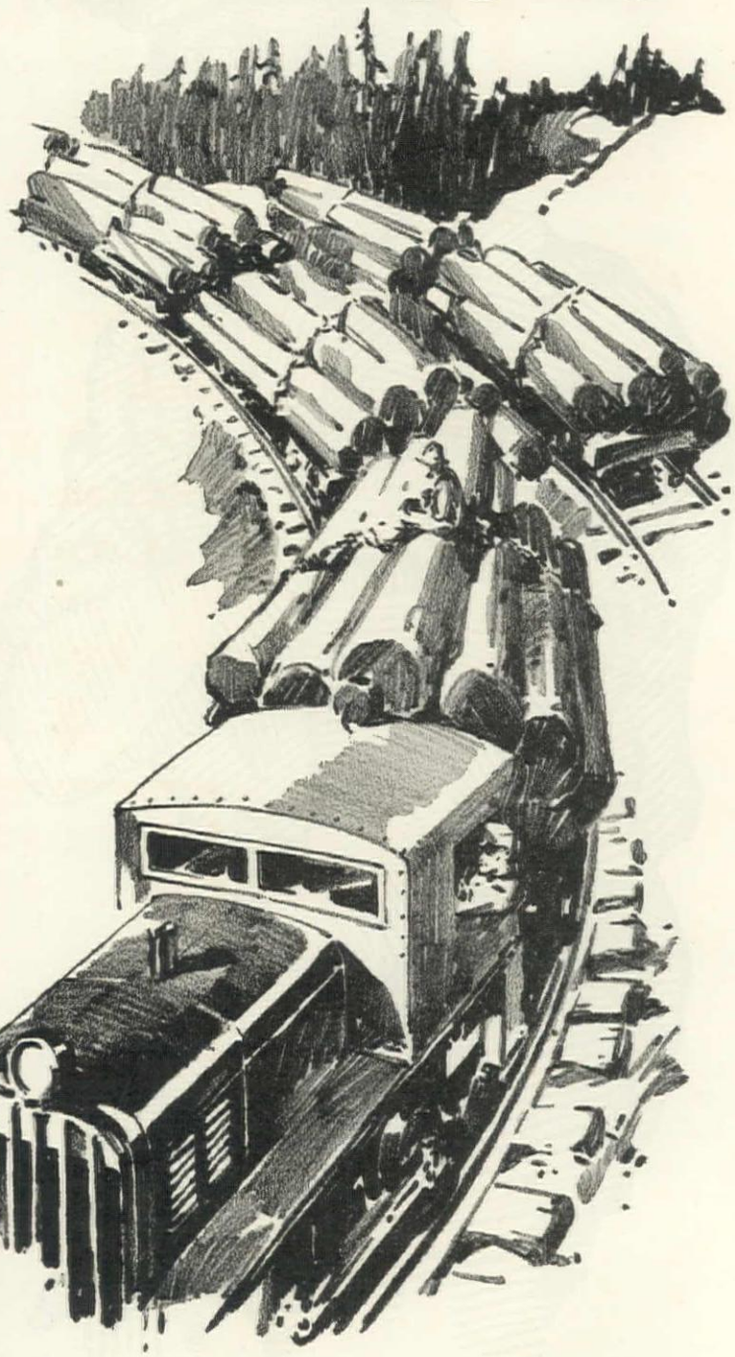
EDWARD R. BACON COMPANY, Construction Equipment
17th and Folsom Streets, San Francisco, Phone Hemlock 3700

We have branches at Fresno, Sacramento, San Jose, Oakland Reno, Honolulu

Hercules Power an Aid to Modern Logging

STEEL rails are replacing waterways in modern logging. Millions of feet of timber are hauled out each year by sturdy Hercules-Powered Vulcan locomotives. Many other industries, too, have found Hercules-Equipped locomotives invaluable. In quarries, in lime and gravel plants, on construction work and in private freight yards, locomotives powered by Hercules move materials quickly and at lowest cost.

Whether powering heavy locomotives and giant shovels or operating portable pumps and compressors, Hercules Engines are reliable and economical in service. Built in a complete range of sizes, from 13 to 115 H.P., they are standard equipment on a wide variety of heavy-duty industrial machinery.



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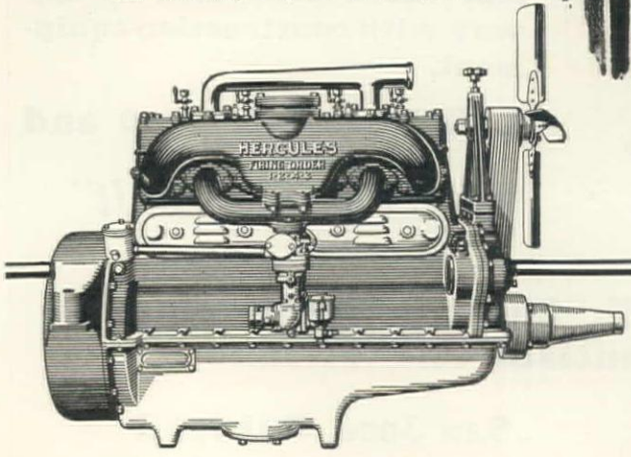
MID-CONTINENT BRANCH: TULSA, OKLA.

Western Representatives: Edward R. Bacon Co., San Francisco, Calif.; Smith Booth Usher Co., Los Angeles, Calif.; General Machinery Co., Spokane, Wash.; H. W. Moore Equipment Co., Denver, Col.; Nickerson Machinery Co., Salt Lake City, Utah.



HERCULES ENGINES

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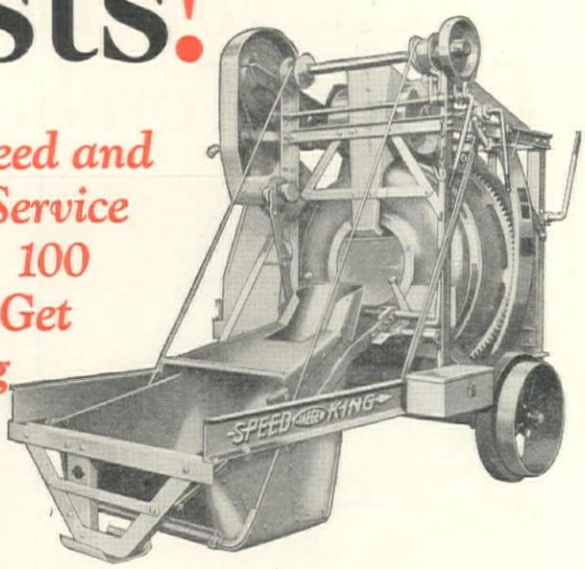
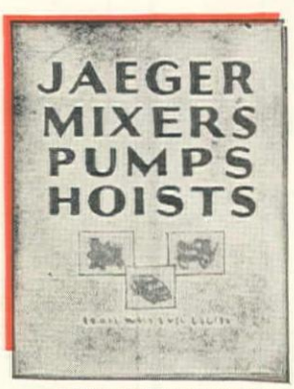
Jaeger Mixers, Pumps and Hoists!

New 1930 Speed and Handling...Service from Over 100 Stations...Get Catalog and Prices



Speedy, More Rugged TILTING MIXERS

AGAIN we've stepped up Jaeger mixers in the features that mean speed and easy handling—Improved re-mixing action that handles dry, sticky concrete with a quick, clean discharge — New, self-cleaning Skip Shaker to speed up the loading (Jaeger one-bag tilter now takes 5 seconds in, 5 seconds out, per batch).



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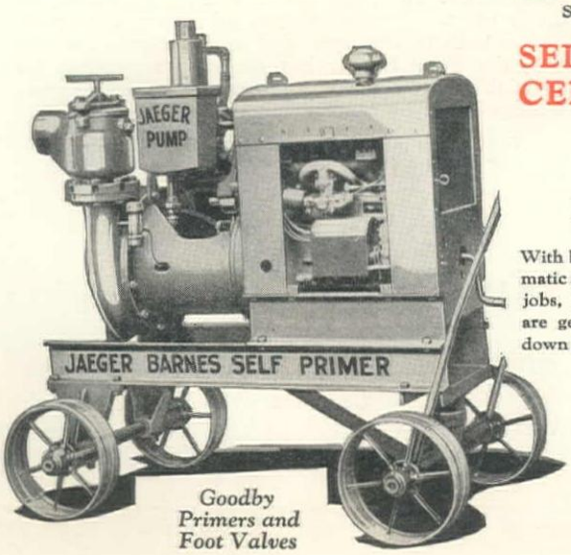
Husky Built and Faster NON-TILTS *up to 56S*

JAEGER 1930 mixers run on Timken and ball bearings throughout. Accurate water tank permits rigid control according to water-cement ratio law. All models—tilters up to 10S, non-tilts in 7, 10, 14, 21, 28 and 56S sizes—are engineered to make you money on 1930 jobs, saving seconds and minutes on operation, saving hours on complete equipment service from over 100 stations.

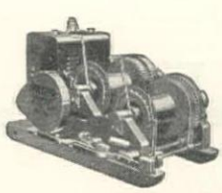


Goodby Primers and Foot Valves

SELF-PRIMING CENTRIFUGALS

Contractors and Road Pumps

With big volume and 100% automatic operation, on all dewatering jobs, Jaeger-Barnes Self-Primers are getting water handling costs down to where other pump types are out-of-date. Send for new catalog and prices on complete line—diaphragm, plunger, centrifugal and road pumps—all sizes for any pump job.



Timken Roller HOISTS *up to 50 H.P.*

Full range of sizes at unbeatable prices.

JAEGER MIXERS...PUMPS... HOISTS.... *Carried in Stock by*

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Clyde Equipment Co., Portland—Seattle
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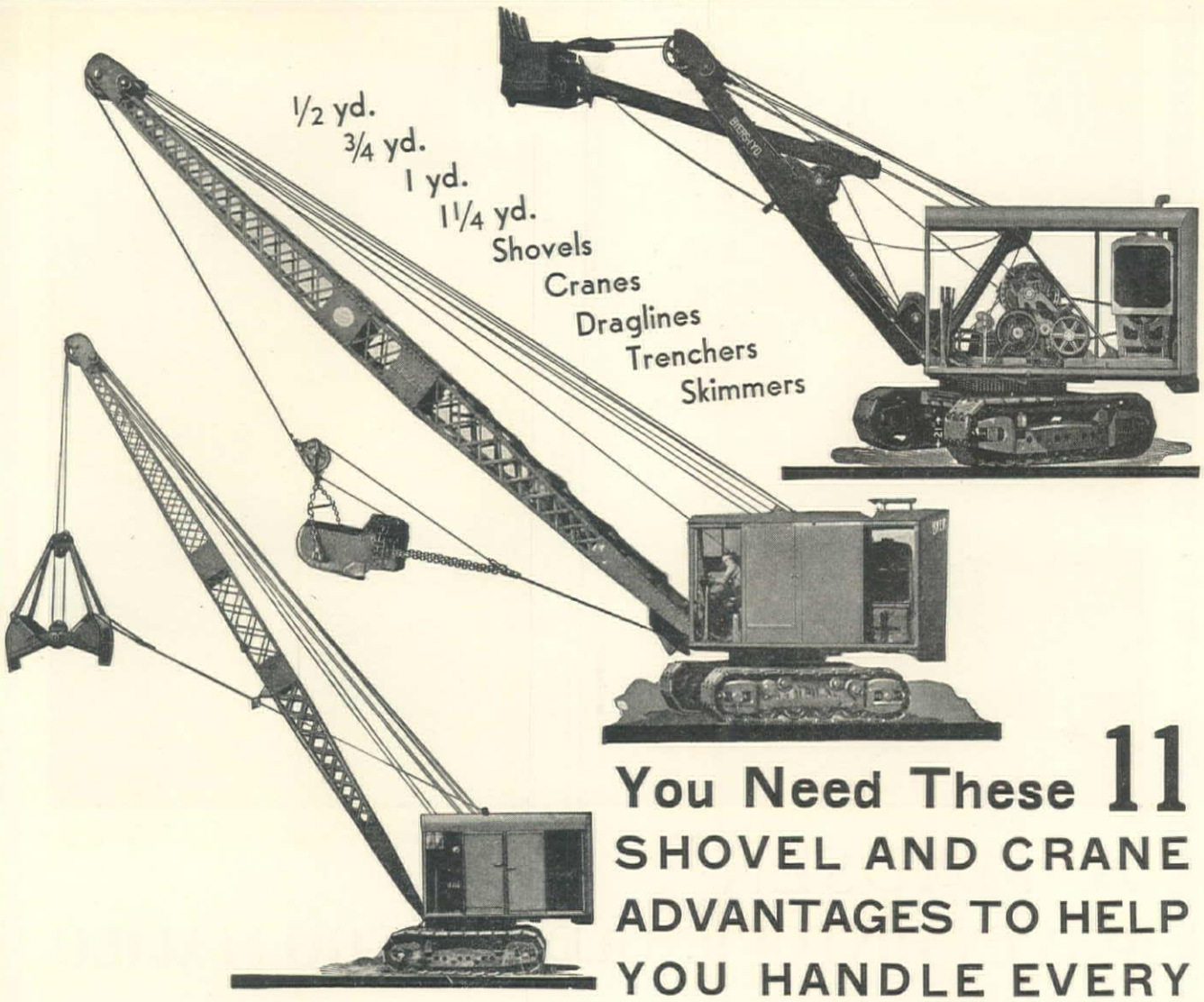

You Need These 11 SHOVEL AND CRANE ADVANTAGES TO HELP YOU HANDLE EVERY earth-moving and material-handling job ECONOMICALLY and PROFITABLY—

1 Direct Drive from motor through only one pinion to swing, drum and travel shafts.
2 Travel, steer, hoist, swing independently.
3 Travel power goes through only one shaft in simplified crawler.. Extra under-axle clearance.
4 Steer with cab in any position.
5 Steer from both crawlers.
6 Machine can be chocked from the cab.
7 Simplified, independent cable crowd on shovel. (No racks, pinions or chains.)
8 Patented cable saving shock absorbers.
9 Solid unit steel castings throughout.
10 Machinery well balanced behind center pin.
11 Ability to do unusual jobs exceptionally well.

Byers stands these eleven tests of fine design. Each guarantees the ability of Byers shovels and cranes to do ordinary or unusual jobs—large or small—on a basis of speedy and dependable production. Your machines should have every one of these particular features. Tear out and save this sheet for future reference. Use it for a standard of comparison just as Byers Machines are used to compare standards of operation and economy. The Byers Machine Company, Ravenna, Ohio, Sales and Service throughout the Country.

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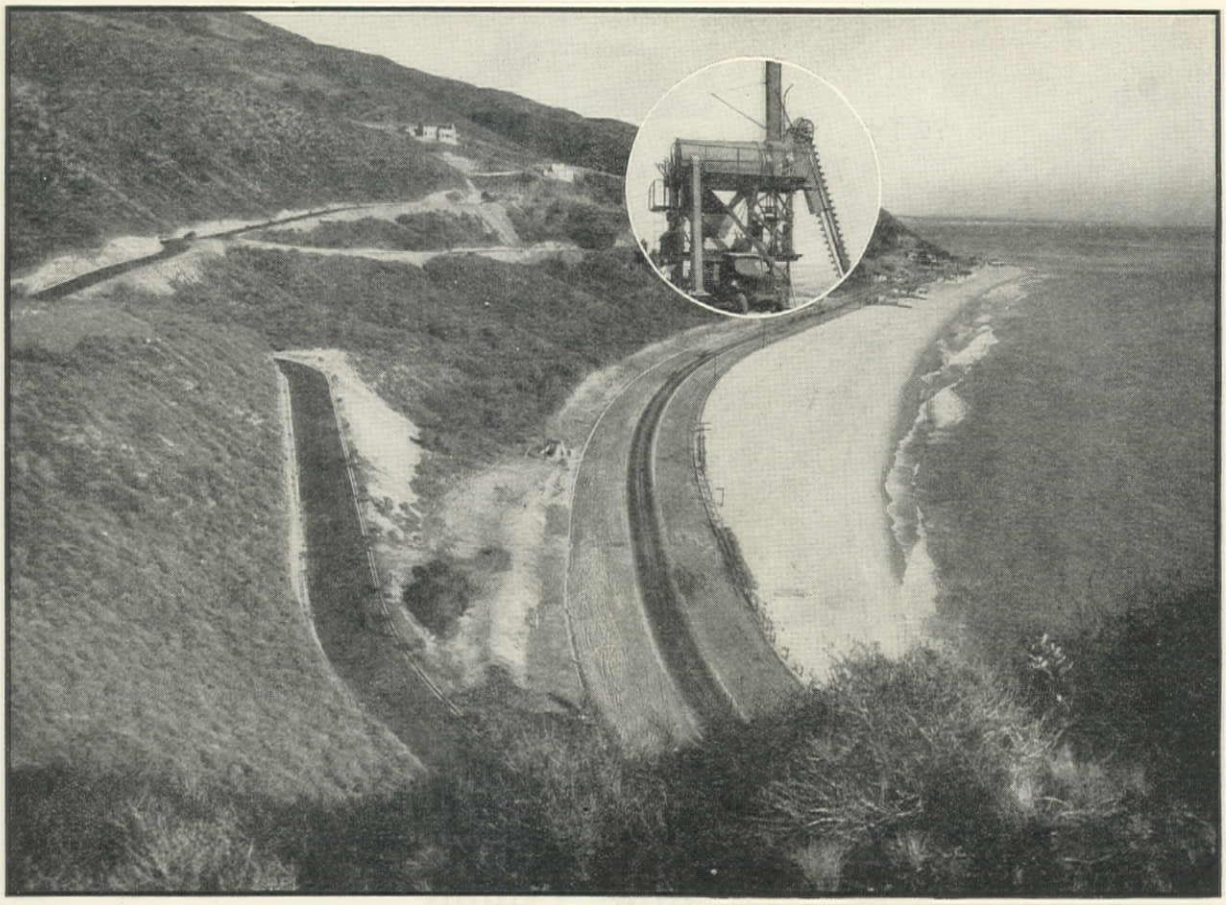

Rancho Malibu la Costa . . . 600-acre unit of famous Malibu Ranch which extends 23 miles along Pacific Ocean

A MADSEN
PAVES HISTORIC OLD RANCHO MALIBU

The Harold G. Ferguson Corporation of Los Angeles has just completed a $250,000 improvement program in Unit No. 1 of the 600-acre hillside section of the historic old Malibu Ranch known as Rancho Malibu la Costa. The program included the laying of 201,000 square feet of asphaltic concrete on permanent 26-foot roadways.

A total of approximately 6,750 tons of material was used. It was mixed on the job with a Madsen 1,000-lb. 2-Unit Mobile Paving Plant. Rancho Malibu la Costa is on the Roosevelt Highway, north of Santa Monica, about twenty miles from the paving contractor's home base in Los Angeles. The cost of dismantling the Madsen Mobile plant, moving it twenty miles, and setting up again, totaled $234. The total labor cost of material mixed averaged 25.84 cents per ton. The overall cost of finished material delivered into trucks averaged 29.38 cents per ton.

Commenting on this job, "*California Constructor*" says:

"Whether or not California is to have a real estate 'boom' in the near future, realtors will obtain better-satisfied customers if they make sure that new streets and improvements are well and permanently built."

Madsen Mobile Paving Plant economies will help good contractors to turn out good jobs at a good profit. May we send complete catalog and specifications?

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(Suburb of Los Angeles)

EDWARD R. BACON CO.

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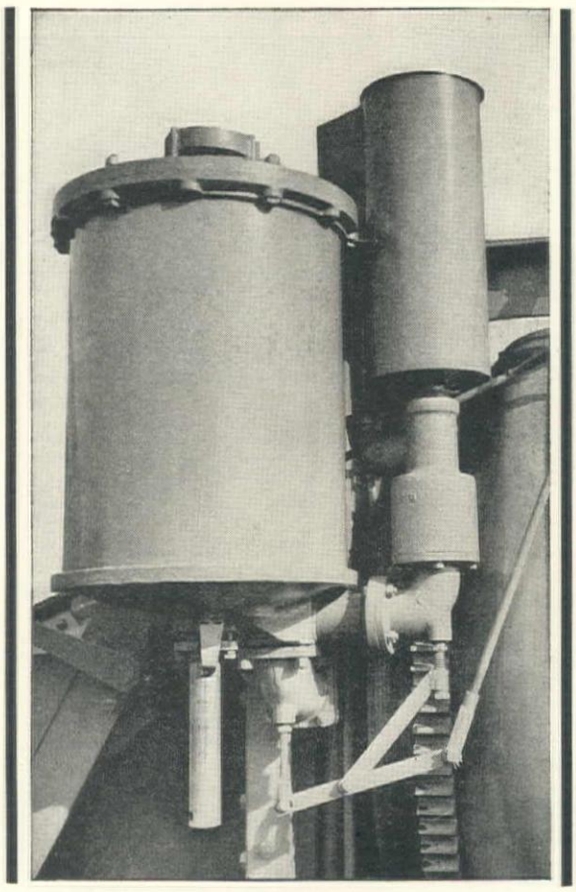
IN SAN FRANCISCO IT'S BACON

NO-PRESSURE WATER TANK



THE 1930 MULTI FOOTE PAVER

for Speed-Service-Success

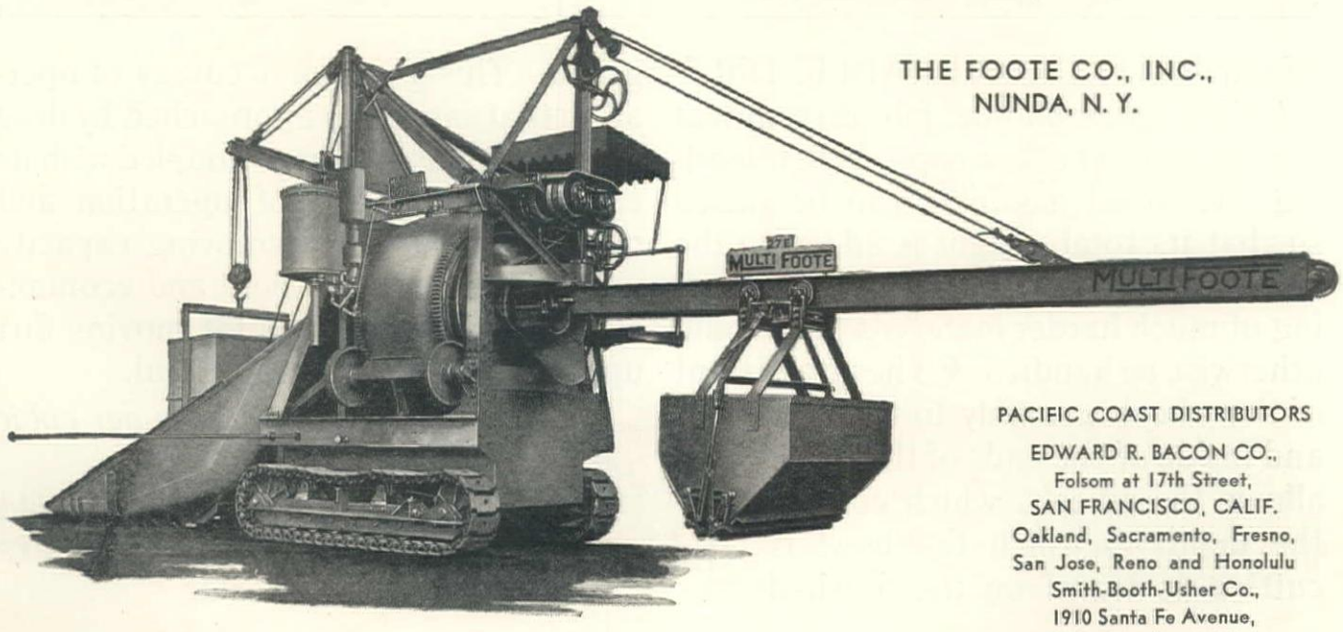
For 1930 Equipment Multi Foote has created a New, No-Pressure Water Tank.

The Measuring Tank, the accuracy of which is not affected by water pressure, condition of grade or air in the supply line, is filled from an open top Auxiliary Supply Tank controlled by a float valve.

This Equipment relieves the operating valves from that constant wear resulting from operating under pressure. Multi Foote offers to the paving contractor an advanced improvement which will be evident as each day's yardage is completed.

TIMKEN BEARINGS

HERCULES HEAVY DUTY GASOLINE MOTORS



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World's Largest Exclusive Builders of Road Pavers

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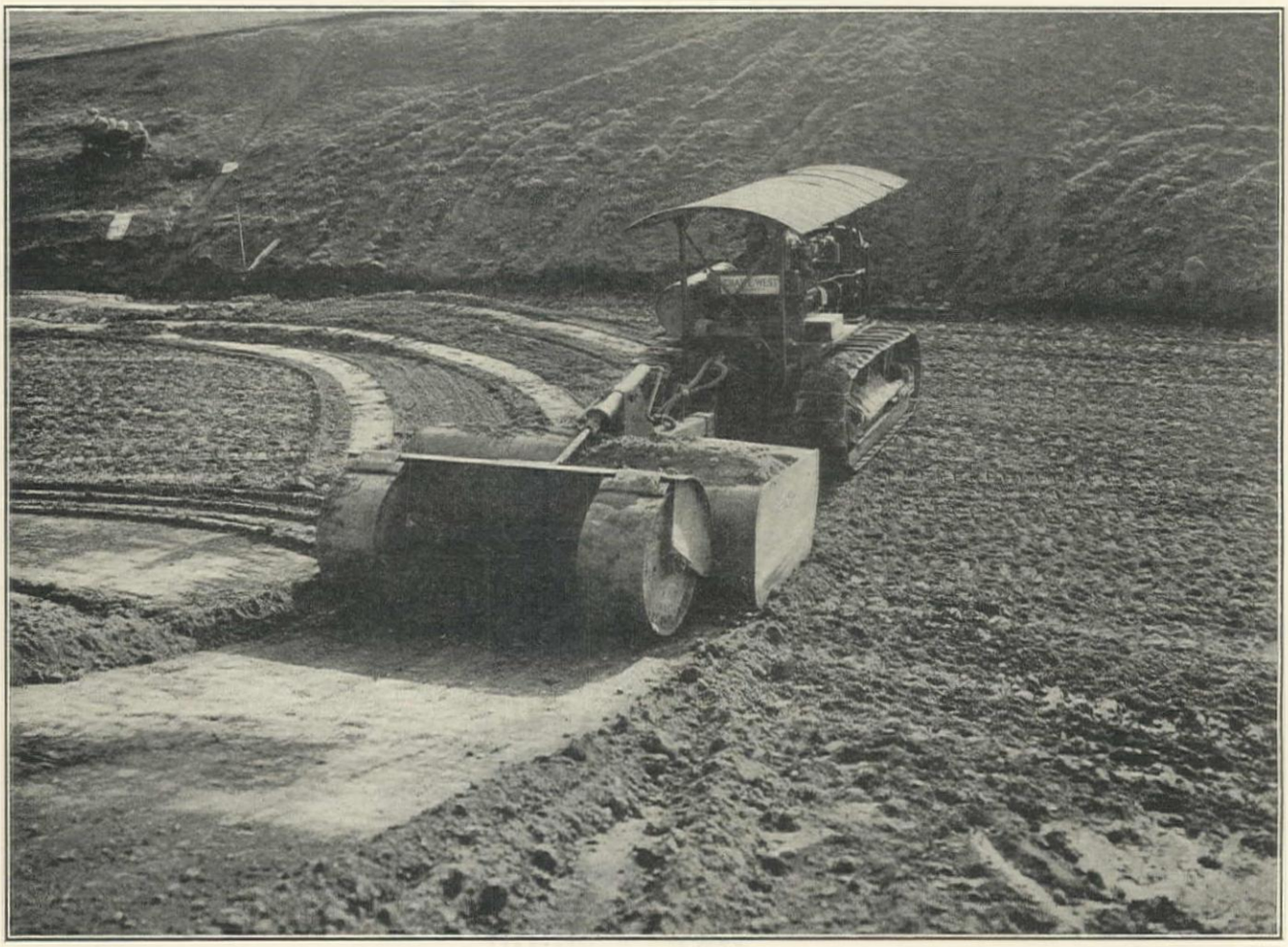
Full loads *with* Ateco Dirt Movers



When an ATECO HYDRAULIC DIRT-MOVER goes on the job, dirt moves ---a full load at every trip. When loading, the wheel assembly can be raised so that its total weight is added to the weight of the bowl, permitting the loading of much harder materials than could otherwise be handled. ¶ The attachment of the wheel assembly to the rear and inside of the ends of the bowl, allows the wheels, which control the depth to which the bowl is cutting, to travel on the finished grade. This gives an accuracy of operation that cannot be approached by drag scrapers. This exactness coupled with its ease and simplicity of operation and its tremendous dirt removing capacity makes it the most efficient and economical rig on the market for moving dirt up to an 800-foot average haul.

Costs as low as 6 cents per cubic yard are not unusual.

ATECO DIRTMOVERS are sold by "CATERPILLAR" dealers throughout the world.

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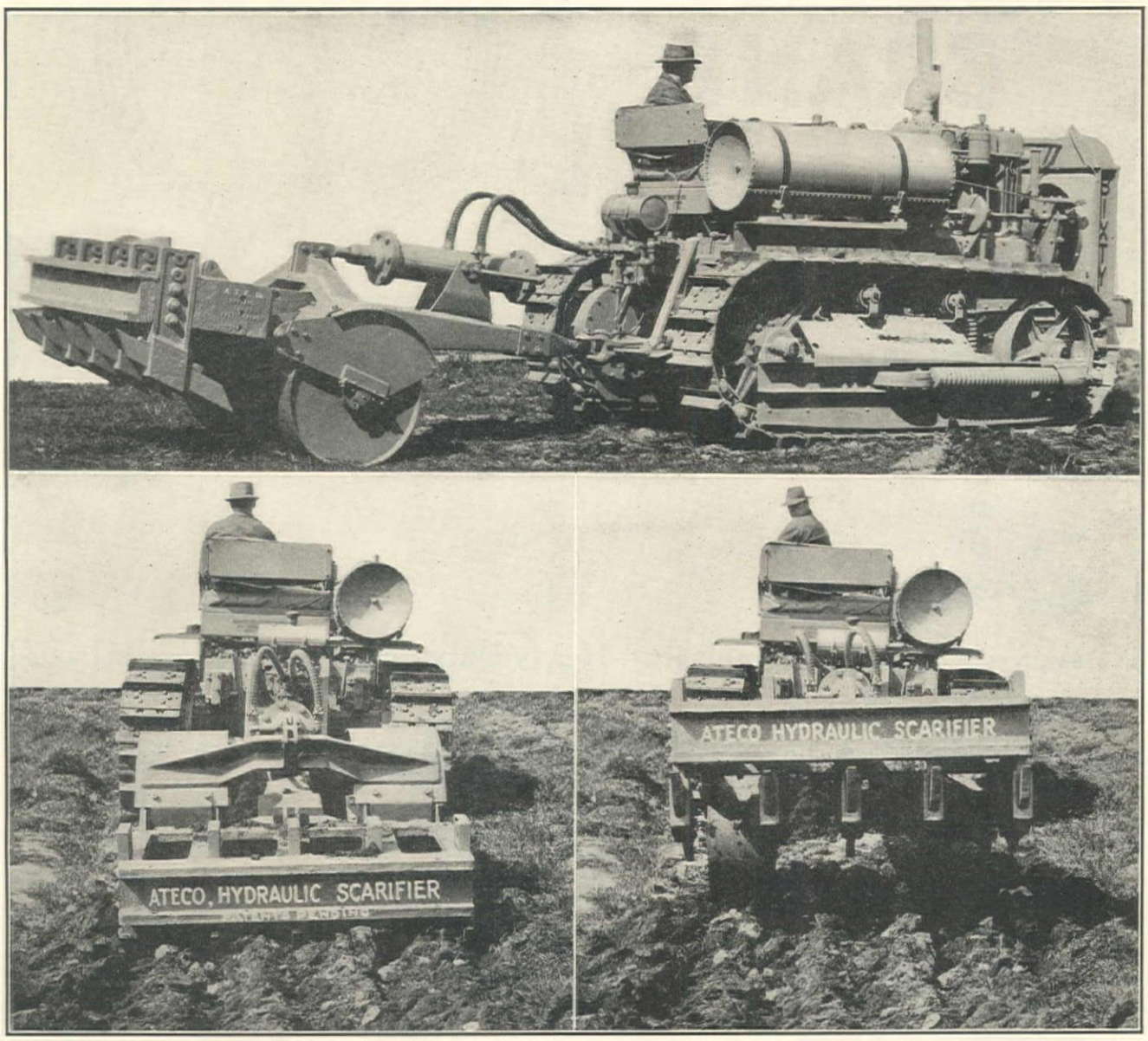
—A RIPPING COMBINATION—



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West Coast Tractor Company

1175 Howard Street, San Francisco

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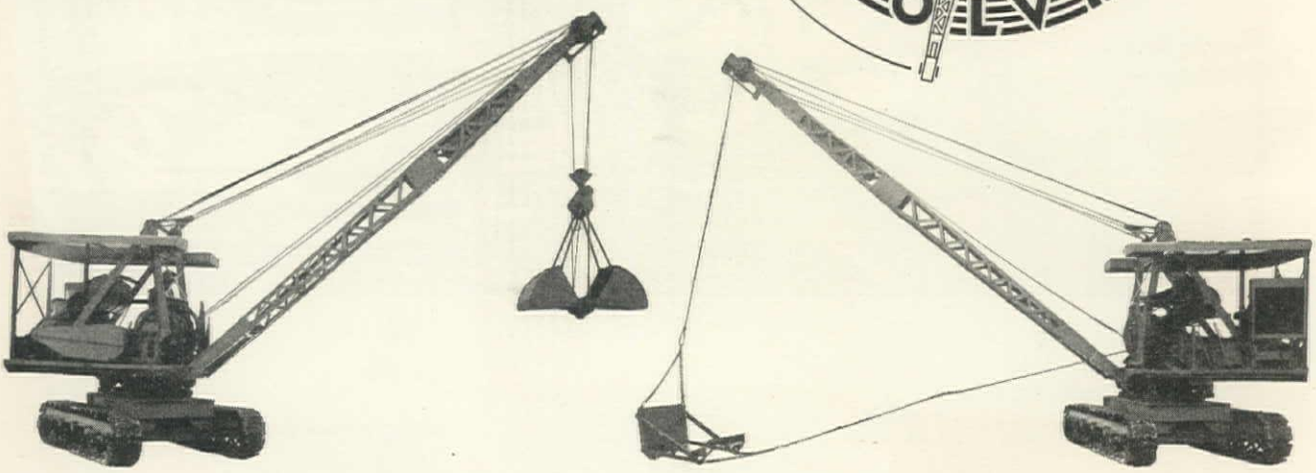
Built to OUT-PERFORM

IN EASE OF HANDLING - DEPENDABILITY - SPEED "ON-THE-JOB"

AUSTIN-BACKFILLER CRANE CLAMSHELL

FULL REVOLVING



Design of Unmatched Simplicity—Heavy Duty Construction—Fewer Parts

Efficient in all of its applications no matter if it be Crane, Dragline, Clamshell, or Backfiller work. Easy of operation with low maintenance and operating cost. The design is so simple that friction losses are almost negligible—heavier parts are used.
Main clutches are power operated—the operator maintains his pace throughout the day. All operations controlled from operator's position—independent steering for Multi-pedals—four swings per minute—more direct power application.
Machine weighs 22,000 pounds—fast and mobile.

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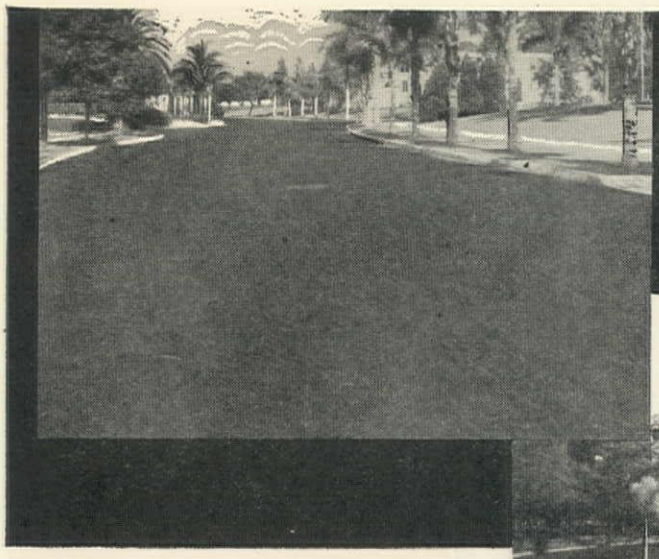

LONG LIVED PAVEMENTS

Asphaltic concrete 1½ in. thick over old macadam, laid by Hollywood Paving Company in Fremont Place, a residential showplace of Los Angeles. The illustrations show two views of the completed work.

Asphaltic concrete has proven its dependability for Boulevards and Highways. It provides an economical, resilient, non-skid, dustless surface that withstands the punishment of heavy traffic.

Gilmore *Roadamite* asphalts are manufactured solely for road construction and are especially refined for this use.

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GILMORE
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MONARCH OF ALL

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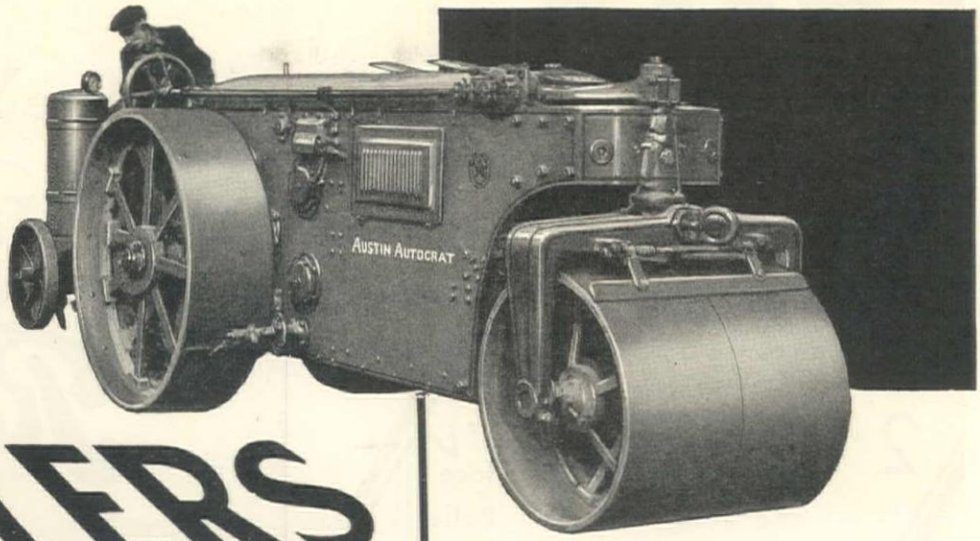
The Austin AUTOCRAT

The finest roller that ever worked a road or street.



ROLLERS

STEPPING out of the beaten path of roller design and construction, Austin has produced in the Autocrat and the Cadet, two rollers which take advantage of every modern engineering development. This modernity has resulted in an increased capacity for work in both machine and operator. The Autocrat includes the following features which will appeal to the man who knows rollers:

The Duplex Worm Gear Drive in the Autocrat gives the greatest efficiency in the transmission of power ever attained in a roller.

The Heavy Three-Speed Transmission permits the use of massive gears with extra large wearing surfaces that will give years of service.

Two Fourteen-Inch Twin-Disc Clutches, forward and reverse, give positive control and ability to reverse direction without changing gears or releasing a master clutch.

A Streamline Frame of Great Strength and Rigidity gives ample support to the massive parts of transmission and motor assemblies.

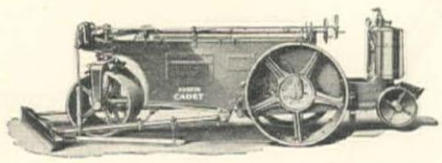
An Electric Starting System with generator and storage battery.

A Pneumatic Scarifier with Air Compressor Release to throw the compressor out of operation without trouble or loss of time.

Two Reliable Brakes, a foot service brake and a hand emergency brake.

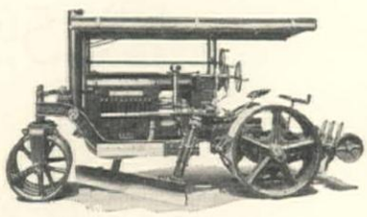
Stored Electricity for parking or headlights.

Leaning Wheel Graders, Straight Wheel Graders, Motor Graders, Elevating Graders, Crawler Dump Wagons, Scarifiers, Rock Crushers, Portable Conveyors, Rollers, Motor Sweepers, Street Sweepers, Sprinklers, Road Oilers, Hot Patch Portable Asphalt Plants, Plows and Scrapers. The Austin-Western Road Machinery Co., 435 Brannan street, San Francisco, California. Chicago office: 400 North Michigan avenue.



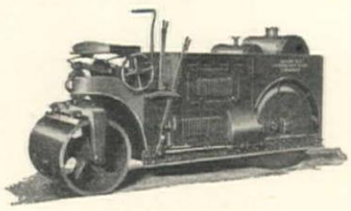
AUSTIN CADET

The Cadet is the Autocrat of all pup-sized rollers. Patterned after the famous Austin Autocrat, the Cadet is a completely factory built, 4-cylinder model, making possible three speeds forward and reverse. It is made in 5, 6 and 7-ton sizes, all of which can be fitted with the patented Austin front planing blade and pneumatic scarifier. A short wheel base—only 8 ft. 11¾ in.—provides ease of operation between forms for concrete roads.



THE "BULL PUP"

The "Bull Pup" is a four-cylinder roller for one-man operation. It is a 3-wheeled machine of 5 tons which can be increased to 6 tons by weights. Center blade and rear scarifier are shown attached.



THE TANDEM

A 7 or 8-ton tandem roller with 4-cylinder engine. Unusually handy in maneuvering and operation.

Austin-Western
ROAD MACHINERY

53190-404

CHECK these FEATURES

Before You Buy a —28-S You'll Find Them All in the NEW Ransome.

1. Lower Overhead Room—Total height is but 8'-0 7/8" to top of the batch hopper.

2. Drum Rollers—genuine car wheel metal with chilled face and flange. Timken Roller Bearings.

3. Drum—all steel construction—large radius corners. Mixing blades equipped with high-carbon steel renewable liners.

4. Discharge—8 to 10 seconds. And that is *speed!* Power discharge is standard.

5. Accurate and Rapid Water Control—One turn of the control wheel changes from the maximum to the minimum that can be discharged from the tank. This change can be made instantly and no locking device is needed on the wheel.

It is impossible to by-pass any water through the poppet valves used only on the Ransome 28-S.

6. Lubrication—Alemite throughout.

Bulletin 124 tells the whole story. Send for your copy today—or ask any Ransome distributor for one.

Ransome Concrete Machinery Company

1850 — Service for 80 Years — 1930

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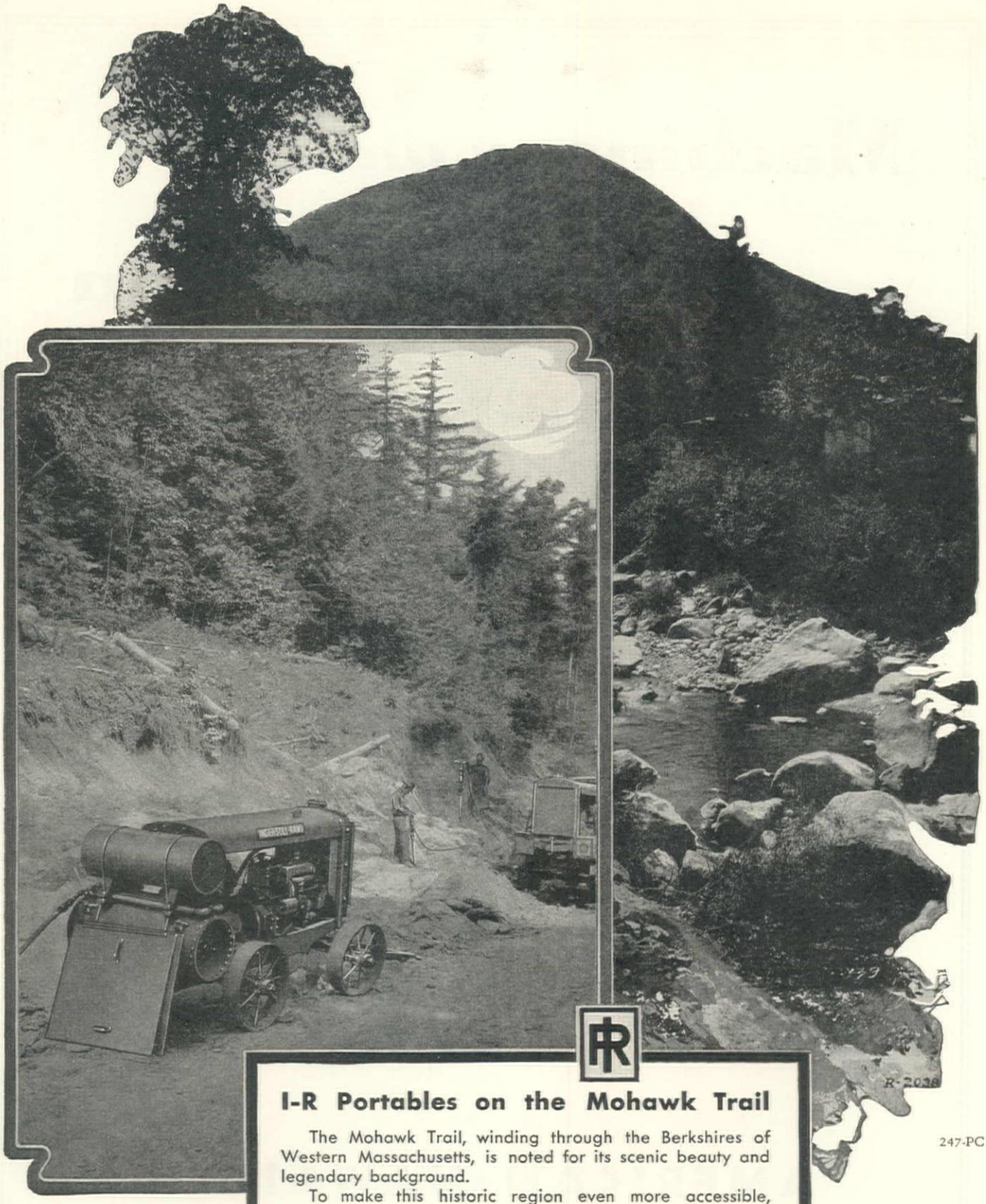

Widening the roadway along the Mohawk Trail. The machines pictured above are 5½ x 5 Portables and S-49 "Jackhamer" Drills.

247-PC

I-R Portables on the Mohawk Trail

The Mohawk Trail, winding through the Berkshires of Western Massachusetts, is noted for its scenic beauty and legendary background.

To make this historic region even more accessible, an extensive program of road work has been ordered. Ingersoll-Rand portable compressers and rock drills are being used, and their excellent performance is hurrying the work to a successful conclusion.

INGERSOLL-RAND CO., 11 Broadway, New York City
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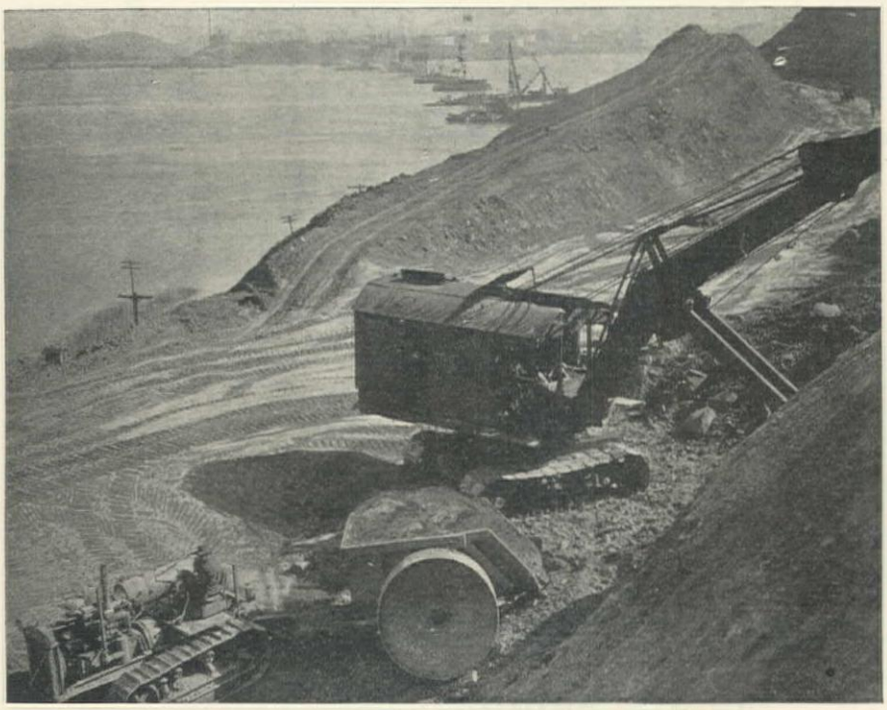
Ingersoll-Rand

BETTER QUICKER CHEAPER



Left: Making a 75-Foot Cut at North Approach of S. P. Bridge at Army Point.

BULL DOZER
Leveling Top of Embankment

LE TOURNEAU

•• EQUIPMENT ••

***IS AN* INVESTMENT,**
***NOT AN* EXPENSE**

Consider these Facts before you buy:

Your Labor Costs are Lower.
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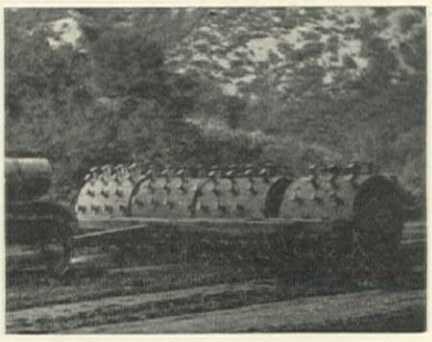
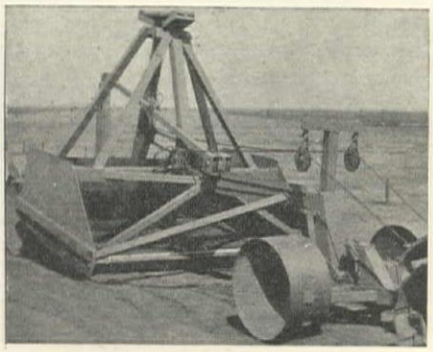
Greater Efficiency and Dependability
More Yards per Hour.
Save Time, Men and Money.
Service that Means Something.



SHEEP'S FOOT ROLLER
Packing Grade on California Highway



LE TOURNEAU 7-YARD SCRAPER

TIMKEN BEARING EQUIPPED

LE TOURNEAU MFG. CO.
STOCKTON, CALIF.

WAGONS SCRAPERS ROOTERS ROLLERS BULL DOZERS

When writing to LE TOURNEAU MANUFACTURING CO., *please mention Western Construction News*

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There are 23 Clow-National Offices scattered throughout the United States . . . one of which is near you. Our representative there will welcome an opportunity to serve you.

He offers you the most complete line of pipe system equipment . . . not only pipe and fittings, but special castings, valves, hydrants, valve boxes, manhole covers, cutting-in tees, half-circle pipe, joint materials, calking tools . . . everything you need for a pipe system.

Back of our representative, stand our three foundries and eight different distributing points . . . a great organization built up to give you the best service in piping material you ever saw.

Use "Pipe Economy" catalog when you order your pipe.

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Chicago, Kansas City, Dallas, Houston, Los Angeles, Birmingham, Coshocton, O., Newcomerstown, O., New York, Boston, Philadelphia, Detroit, Milwaukee, Pittsburg, Minneapolis, San Francisco, Salt Lake City.

Pipe Dreams

It is a little pipe news and nonsense, published Monthly by Clow-National for free distribution. It's worth reading. Send in your name and address.

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"Everything for a Pipe System"

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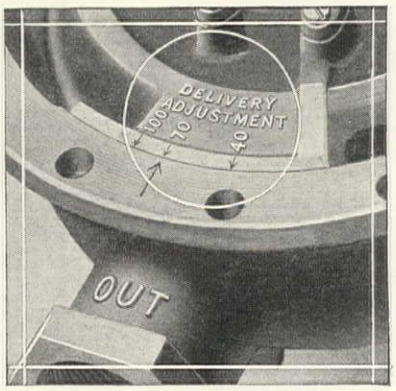
ACCURACY

TRIDENT *Style* 3 DISC METER

Trident Style 3 Disc Meters mean accurate registration *(more revenue)* where the rate of flow varies considerably. They will give the same degree of sustained accuracy at both extremes of volume as well as all intermediate points. One of the complete line of Neptune-built "Cash Registers of the Water Works Field."



Special "Delivery Adjustment" on Trident Style 3 meter (range 40 to 100 pounds) insures accurate operation at varying pressures.

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THOMSON METER CORPORATION
50 East 42nd Street **New York City**
Neptune Meter Co., Ltd., Toronto, Ontario

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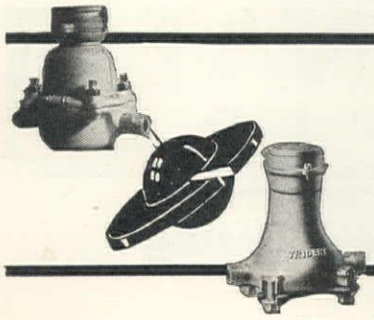
PORTLAND: 525 Johnson Street

PIONEERS IN METER PROGRESS—YESTERDAY, *TODAY*, TOMORROW



THE POSITIVE MOVEMENT

of the TRIDENT METER Disc (as also in the LAMBERT Meter) insures the all-range accuracy of Trident Style 3 Meters. Above meters have also Trident Oil-enclosed Gear Train and Heat-proof renewable rubber bushings in Register and Gear Train.

THE JOURNAL SUSTAINED ACCURACY

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VOLUME V | APRIL 25, 1930 | NUMBER 8

One of the most important problems which confronts the engineer today is the transportation of equipment, materials, and supplies to large projects in remote regions. Formerly, on long hauls a railroad was the economic method. Speed as well as economy must now be considered. With the rapid development of the motor truck and tractor, it frequently is preferable to build and maintain a good road—a secondary highway—in preference to a railroad. Modern motor trucks with four rear-drive wheels on cushion tires, and tractors with cushion-tired trailers can negotiate curves and grades which are impossible on a railroad. These transportation methods have the advantage of direct delivery from shipping point to point of use. The road built may later serve as a highway, whereas the railroad extension in most cases is useless after the job is completed.

Transportation Progress

Now comes another mode of transportation which probably will be a factor—the airplane. In New Guinea, a mining company is planning to build two large gold dredges in a region almost inaccessible. All equipment and material for these dredges will be designed in pieces not to exceed two tons in weight, and all transported by airplane.

The economics of transportation are undergoing such rapid changes that only the construction engineer actively engaged on large projects can plan this part of the work efficiently.

'Tis an ill wind indeed that blows nobody good. It begins to look as though this age-old proverb will be borne out in Oakland, California, where the odorous breezes arising from the exposé of graft and corruption and irregular practice in street paving are combining into a stiff wind behind the proponents of the city manager form of government. Oakland's adjacent sister cities—Berkeley and Alameda—have been for years successfully and cleanly operating under city managers, but the politicians of Oakland have succeeded in squelching the city manager idea whenever it has been broached heretofore.

City Manager Form of Government

This time, so many of the politicians have been indicted—and will be kept so busy for weeks to come—that the better business element has now a most opportune time to clean house and establish a business administration under an efficient city manager—another place for the engineer.

Wherever the city manager form of government is in force, there has been practically no graft and corruption. Many other cities of the far west might do well to try this form of government, which can put their operations on a strictly business basis.

We recently announced the establishment of a State-aid research laboratory for sewage and trade waste purification, under the auspices of the Bureau of Sanitary Engineering of the State of California—the outcome of a six-year campaign.

Reclaiming Sewage for Water Conservation

Of equal interest and of probably greater import is the recent appropriation of $100,000 by the Bureau of Water Works and Supply of the City of Los Angeles for the establishment of a similar laboratory in conjunction with a large experimental sewage purification plant under construction in the heart of Los Angeles in the San Fernando valley. This plant and research laboratory is under the joint supervision of Ray F. Goudey, sanitary engineer, and Carl Wilson, director of the biological laboratory, a combination which practically assures its success. We can safely predict that most of the sewage of Los Angeles will be purified and used to replenish the underground water resources of the San Fernando valley.

This project, together with the sewage purification plant soon to be built by the Standard Oil Co. for augmenting the water supply of its El Segundo refinery (likewise announced in the February 25th issue) are forward steps of great importance and should soon put California in the forefront in sewage purification, as well as being a big factor in the water conservation program of the State.

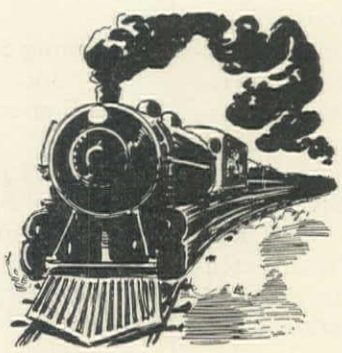
A well-known engineer points to natural gas as the third great epoch in California—'yellow' gold being the first, and hydroelectric power or 'white' gold the second. Probably we should include crude oil or 'black' gold as the third epoch, in which case we might term natural gas 'vapor' gold, and the fourth epoch.

Natural Gas Presages New Epoch

The fact remains that the discovery, or development, of natural gas in such apparently unlimited quantities in Central California, and the rapidity with which the utility companies are distributing and making it available, portends a new era, the possibilities and extent of which we cannot as yet gauge. Natural gas may help to bring big industries to the Pacific coast and the fifth era or epoch may be industrial.

Speed Along With the Times

A STEEL-CONSTRUCTED luxuriously-furnished train darts Westward through mountains, across prairies, preceded by a chorus of clanging crossing-bells and leaving behind a snaky trail of smoke.



At the same time, a leather-helmeted, begoggled man, seated in a contraption of wood-veneer, aluminum, wires, and demoniacal engines is whizzing Eastward across the Rockies, carrying the government air mail at a speed greater than one hundred miles per hour.

Simultaneously, a man in London takes down his 'phone receiver and within a few seconds his words have traversed the Atlantic to a resident of New York.

Gentlemen, we have to step fast nowadays. This is the age of speed —of quick action. And it is also the age of quick decisions.

As business men we must think quickly, and decide without delay on our problems of replacements, expansion, competition, service improvements, and operating economies. Moreover, our thoughts and decisions must be surrounded by safety—the knowledge of exactly what to do; and above all, of the concrete elements necessary to put action into our decision.

The advertising section of WESTERN CONSTRUCTION NEWS describes many products which will help you in the latter connection. It contains information about equipment, machines, methods, materials, etc.—and this information is a mental requisite of a contractor and construction engineer.

These advertisements in WESTERN CONSTRUCTION NEWS therefore should be read regularly. They will add to your administrating growth.

North Approach to Suisun Bay Bridge for Southern Pacific Co. near Benicia, California

Construction of the $12,000,000 Suisun bay bridge across the west end of Suisun bay, by the Southern Pacific Co. to replace its Port Costa-Benicia train ferry has involved heavy grading of several miles of approaches at each end.

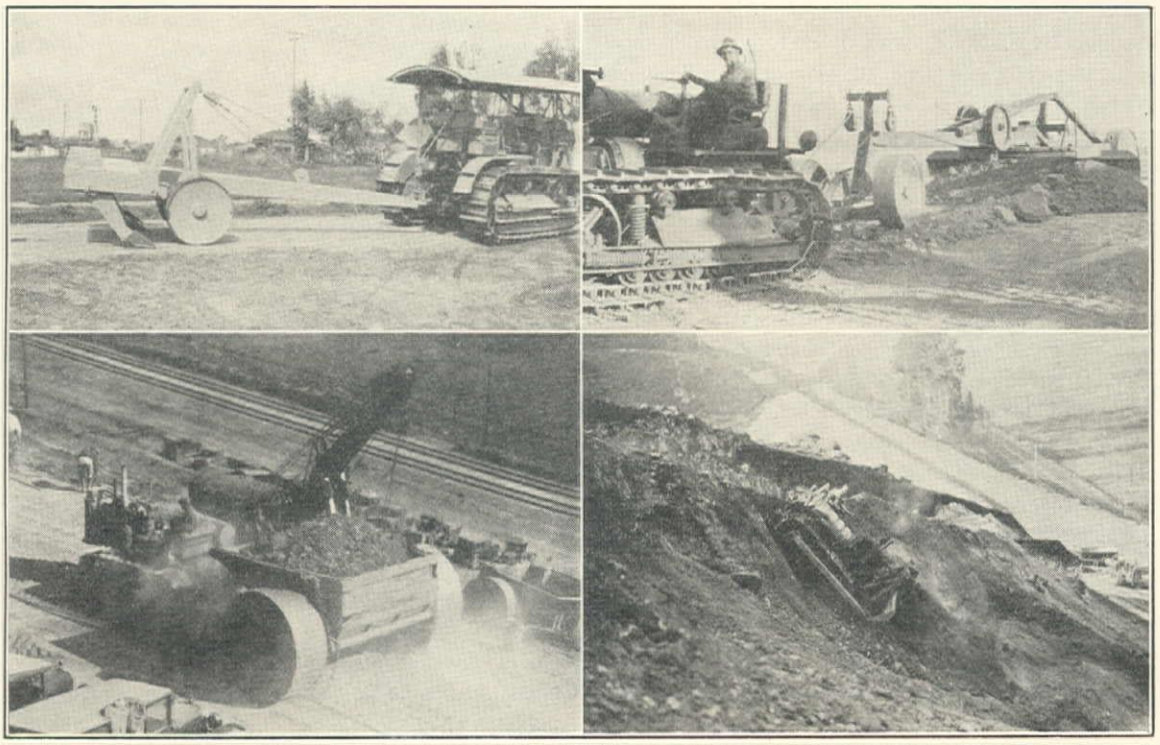
This entire project is noteworthy for its careful planning and for the speed and efficiency shown by each of the contractors on the several divisions of the work.

The north approach near the abutment is a sidehill cut into Army point at the east end of the U. S. Army's Benicia Arsenal, the new grade being 70 ft. directly above the present railroad tracks near tide level. From here the grade cuts through Army point for 1200 ft., the maximum sidehill excavation being 75.5 ft. deep. (See p. 202.) A short section connecting with the bridgehead is daylighted and widened, the toe of the steep slope of the fill reaching the present main-line tracks.

After leaving the cut, the roadbed is divided into two parts, a 'high line' and a 'low line'. The low or down-grade line (2%) connects with the present main line tracks 0.93 mile from the bridge. The high line, or westbound track curves around Suisun marsh on a 0.45% grade for a distance of 3.64 miles to a junction with the present mainline tracks near Goodyear, there being an 1860-ft. steel viaduct, 40 ft. high, across an arm of Suisun marsh, and a short fill across another arm.

Contractors on North Approach—The grading of the north approach, or approaches, involving 500,000 cu.yd. of excavation and embankment, was recently completed, the contractor being R. G. LeTourneau, equipment manufacturer and contractor of Stockton, California. LeTourneau, who has specialized during the last few years in grading equipment of unusual size and type, took this contract at a very low price in order to demonstrate the efficiency and speed of his equipment—both of which he satisfactorily accomplished.

He sublet the Goodyear end of the contract to E. H. Rider, of Stockton, who started work on July 9, 1929, using two LeTourneau 7-yd. scrapers, a LeTourneau 3-ton rooter, and 2 Caterpillar '60' tractors.

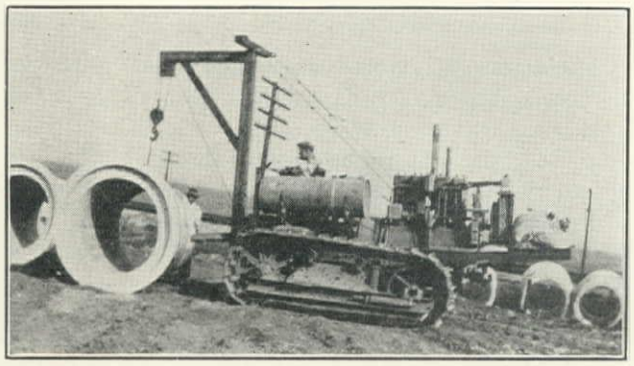


(UPPER LEFT) LE TOURNEAU ROOTER AND CATERPILLAR '60'. (UPPER RIGHT) LE TOURNEAU 13-FT. 10-TON BLADE HAULED BY CATERPILLAR '60'. (LOWER LEFT) BUCYRUS-ERIE 50-B, 2-YD. SHOVEL POWERED BY 100-HP. ATLAS-IMPERIAL DIESEL ENGINE LOADING LE TOURNEAU 16-YD. DUMP WAGONS. (LOWER RIGHT) CATERPILLAR '60' EQUIPPED WITH LE TOURNEAU BULLDOZER WORKING SLIDE ON 120% GRADE. ABOVE EQUIPMENT ON SUISUN BAY BRIDGE NORTH APPROACH

Equipment on Heavy Grading—LeTourneau started the heavy end of the job on July 22, 1929, with a new Bucyrus-Erie 50-B (2-yd.) shovel powered with a 100-hp. Atlas-Imperial diesel engine; together with six Caterpillar '60' tractors, five LeTourneau 16-yd. dump wagons (with 78-in. wheels and 30-in. tires), one LeTourneau bulldozer; one LeTourneau 7-yd. scraper, one LeTourneau rooter, one LeTourneau 13-ft., 10-ton blade, and one Lincoln gas-driven welding plant, one Westinghouse electric arc welding plant, one Westinghouse gas-driven welding and lighting plant (these plants for repairing and building equipment), one LeRoi pumping plant, one water tank, and one Sterling truck.

In other words, LeTourneau depended on one power

shovel and his own large-size equipment to move 500,000 cu.yd. between July 22 and December 7. Unusually heavy rains resulting in 42 days lost time, extended the completion date to April 1.



Caterpillar '60' Equipped with Le Tourneau Boom and Power Control Unit Handling Section of Cement Pipe Culvert

The Bucyrus-Erie shovel was operated two 11-hour shifts, averaging over 4000 cu.yd. per day and on one day excaveted over 6000 cu.yd., moving over 90,000 cu.yd. during the month of September. The fuel consumed was Shell oil of 34 gravity, costing 4½ cents; 5 gal. being consumed per hour.

Physical Features—The average haul was 2500 ft., which was all made with the LeTourneau 16-yd. dump wagons hauled by Caterpillar '60's'. In one place where the length of haul was excessive, LeTourneau elected to pay a rancher $3000 for the privilege of borrowing 200,000 cu.yd. from a low hill.

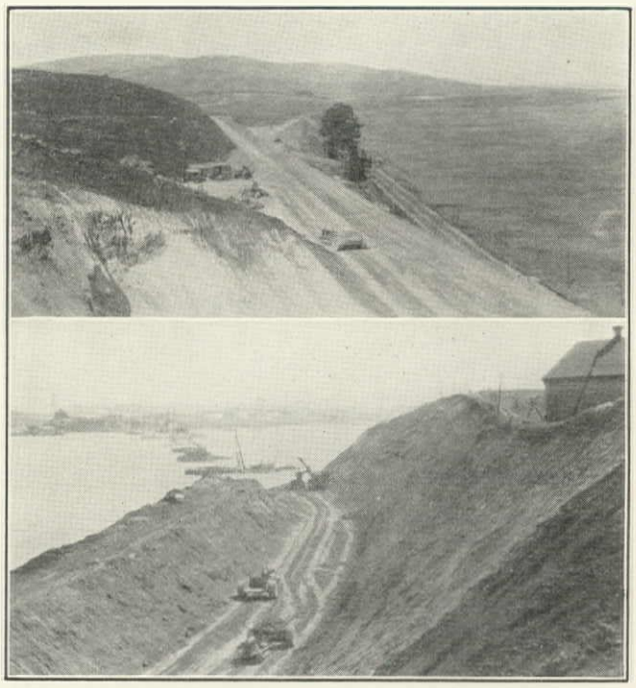
The major cut near the bridgehead, with a maximum base width of 45 ft., contained 170,000 cu.yd., mostly shale. Near the north end of this cut there was a slide of 12,000 cu.yd. additional. LeTourneau

Bucyrus-Erie 50-B Diesel-Powered Shovel, Caterpillar '60s', and Le Tourneau 16-yd. Dump Wagons Completing 75-ft. Cut at Bridgehead. Main Piers (Siems, Helmers & Schaffner Contract) in Background

used on the major and other cuts $4000 of Hercules explosives—3 tons of black powder and the rest 40% dynamite.

The maximum fill was 60 ft., which was placed in one-foot layers without sprinkling or rolling, the engineers for the Southern Pacific Co. being satisfied with the compaction secured by the heavy equipment used in grading. Tests made by the resident engineer on this part of the bridge project showed an average compaction of 12%; and this compaction together with the heavy winter rains has provided a fill and roadbed which will settle but little hereafter.

Across the small arm of the Suisun marsh there was a subsidence for 250 ft., requiring 18,000 cu.yd. additional fill. At this point the fill was 60 ft. wide and 34



(Upper) Grading Near Le Tourneau's Field Headquarters, with Y in Background and Existing Mainline Tracks on Right. (Lower) Material Handling Equipment, with Shovel and Bridge in Background

ft. high, and the peat bog was squeezed up and away on either side in large mounds. The Southern Pacific Co. spent a small fortune for many years on similar subsidences across the marsh.

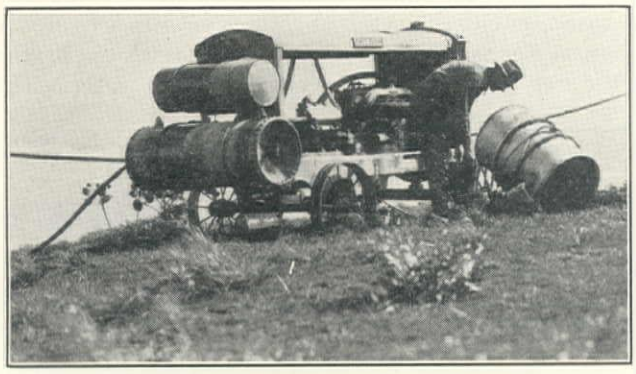
Even though the excavation around Army point was in shale and sandstone—which had to be 'shot'—and was immediately above the main line tracks of the Southern Pacific Co., no single main line train was delayed during the entire dynamiting and excavating period. This feature speaks well for the general supervision over the work.

Culverts—Included in this contract was 476 lin.ft. of 36-in. and 700 lin.ft. of 24-in. (4-in. shell thickness) pre-cast concrete pipe culverts of Southern Pacific Co. manufacture; also 224 lin.ft. of Massey culvert pipe, 46-in. openings and 8 ft. long, weighing over 8000 lb. per piece.

These culvert pipe were placed economically with a Caterpillar '60' tractor, equipped with a temporary hoist (see above) devised by LeTourneau to work in conjunction with his patented power control unit. A total of 91 cu.yd. of concrete was required in the culvert headwalls.

Field Repair of Equipment—All of LeTourneau's grading equipment is of massive size and of all-welded construction. His men are trained to make welded

repairs in fast time. Shortly after starting the job, the boom of the Bucyrus-Erie shovel was broken in



Sullivan Air Compressor on North Approach

two, but was welded and the shovel again placed in operation with only 11 hours lost time.

The Sterling truck has a flat body which can be raised like a dump truck by a hoisting device installed by LeTourneau.

Most of the grading equipment is operated from the Caterpillar tractors, equipped with a special hook-on device which LeTourneau designed.

Personnel—R. G. or 'Bob' LeTourneau was on the job personally a good deal of the time. His superintendent was Howard Peterson; J. S. Clark and O. W. Peterson being grade foremen and J. A. Barker foreman in charge of culvert construction.

C. R. Harding, assistant to the president, Southern Pacific Co., and W. H. Kirkbride, engineer of maintenance of way and structures, are in charge of the entire Suisun bay bridge project, with the assistance of G. W. Rear, engineer of bridges. H. I. Benjamin, assistant engineer of bridges, is in charge of construction and field work. J. M. Farrell is resident engineer on the north approach and C. M. Kurtz is office engineer for the project.

Pumping Plants for West Stanislaus Irrigation District

By PAUL C. BUTTE

President, Butte Electric & Manufacturing Co., San Francisco

When the directors of the West Stanislaus Irrigation District planned to construct an irrigation system at Westley, California, it was decided to build well. Under the supervision of W. F. Wooley, chief engineer of the district, a high grade system was obtained at reasonable cost. Three requirements have been met, as follows:

(1) Buildings and canals, with their respective equipment, have been built so as to give the minimum of depreciation and upkeep expense.

(2) The equipment has as high an efficiency as possible, consistent with the cost limitation. This feature reduces the running expenses.

(3) The system functions automatically, thereby reducing the operating overhead.

Fig. 2 shows the general layout of the pumping system, the distance from the nearest station to the town of Westley in Stanislaus county being 2½ miles. There are six pumping stations on the project. Station 1 is the largest and its intake canal draws water from the San Joaquin river; the other stations serving as boosters. There are a number of laterals (not shown on Fig. 2) connecting with the main canal and extending for miles on each side. The canals and laterals are concrete lined and the buildings are of reinforced concrete, class 'A' construction throughout.

Pumping Equipment—The buildings have been designed for the following equipment:

Station	No. of Units	Unit Capacity (c.f.s.)	Normal Static Pumping Head (ft.)	External Static Heads
1	6	42	30	18 to 35.5
2	6	42	23	16 to 30
3	6	42	23	16 to 30
4	5	42	23	16 to 30
5	3	42	23	16 to 30
6	2	42	23	16 to 30

There will ultimately be 28 pumps installed, 17 being now in operation and 11 on order. These pumps were designed and built in San Francisco by The Pelton Water Wheel Co. and are known as Pelton-Moody spiral pumps, the original design having been credited to Lewis F. Moody, consulting engineer for I. P. Morris & De LaVergne, Inc., of Philadelphia. The pumps are designed for vertical shaft operation and are completely submerged while operating. All of the units are of 26 in. inlet diameter, with a capacity of 1900 g.p.m. against 30 ft. head when driven by 150-hp. motors at 720 r.p.m. Three of the 17 pumps are direct-connected to 200-hp. motors to deliver the required capacity at a somewhat higher head.

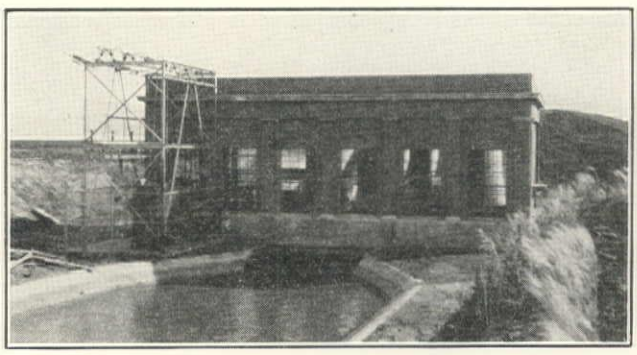


Fig. 1. Pumping Station No. 2 from Main Canal

These Pelton-Moody spiral pumps are able to maintain high efficiency at high speed. The higher speed permits the use of smaller and lighter motors, and their high power factor is largely responsible for the overall efficiency of the units. Power costs on this district will be further reduced after July 1, 1930, the

reduction being in the form of a bonus earned through installation of high-speed equipment.

Twenty-eight electrically welded steel discharge pipes have been installed. These pipes have a discharge diameter of 48 in.; they are enveloped at the lower ends in a block of reinforced concrete. Each discharge pipe is provided with a flap type valve and air inlet pipe. The flap valves are provided with dash pots so as to prevent slamming and the resultant impact forces due to sudden closing. As the system is automatic, the pumps are self-priming and the valves are self-operating. The Pelton Water Wheel Co., San Francisco, furnished the flap valves.

Electrical Equipment—All electric motors are of the squirrel-cage induction type, operating on 440-volt, 3-phase, 60-cycle current as follows:

Station	No. of Motors	Horse-power	Float Switch Controls	Remarks
1	6	250	6	1 master control
2	6	150	6	
3	6	150	6	(All motors in system designed for 40° C. temperature rise)
4	5	150	5	
5	3	150	3	
6	2	150	2	

Control Equipment—Each station is provided with an incoming line panel containing the following instruments: one voltmeter with potential transformer; one polyphase watthour meter; one overload oil circuit breaker and current transformer; and three disconnecting switches.

Each motor is provided with automatic starting equipment, mounted on a panel, as follows: one indicating ammeter; one starting time delay relay; one starting contactor with interlocks; one running contactor with interlocks; one accelerating relay with definite time relay; one thermal relay with inverse time limit; one automatic transformer; one pilot control switch to provide hand starting in place of automatic starting, when desired.

Heavy copper busbars are extended along the lower members of the roof trusses of each station and to their respective transformer substations on the outside, close to the buildings. These busbars make the required connection from the transformer secondaries at 440 volts to the main disconnecting switches on the incoming line panels.

Automatic Operation—Float switches of the rod-operated, enclosed weatherproof type are provided in the intake canal at station 1, so as to prevent operation of the motors in case of exceedingly low water. This

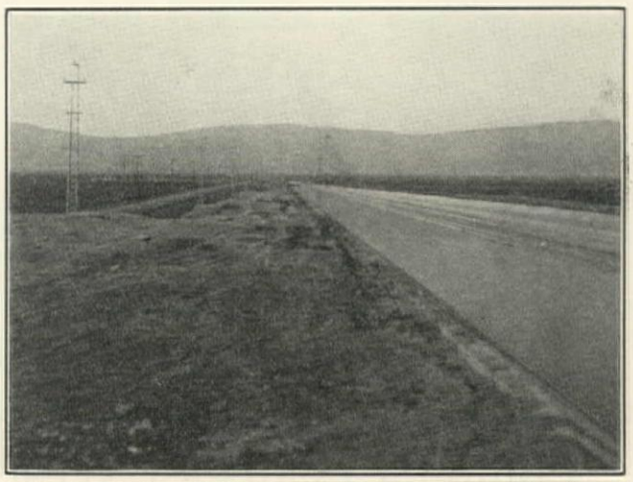


Fig. 3. Section of Main Canal, West Stanislaus Irrigation District

prevention is obtained through the control of the main connection to the control circuit of all starters.

Each discharge canal at the end of the discharge pipes leading to the stations is provided with a float well. In this well is placed a group of float switches, one switch for each control panel. The switches are provided with adjustable floats so that they may be made to operate at different water levels in the float well.

In the operation of the pumping stations, the number of motors in actual use is determined by the height of water in the float wells. If the water is at the lowest point, all motors are in operation—as the water rises, one motor at a time is thrown out until the maximum level is reached, when the last motor is disconnected. Only one motor at a time is started or stopped, resulting in a low demand factor and thus affecting the rate charged for electric current.

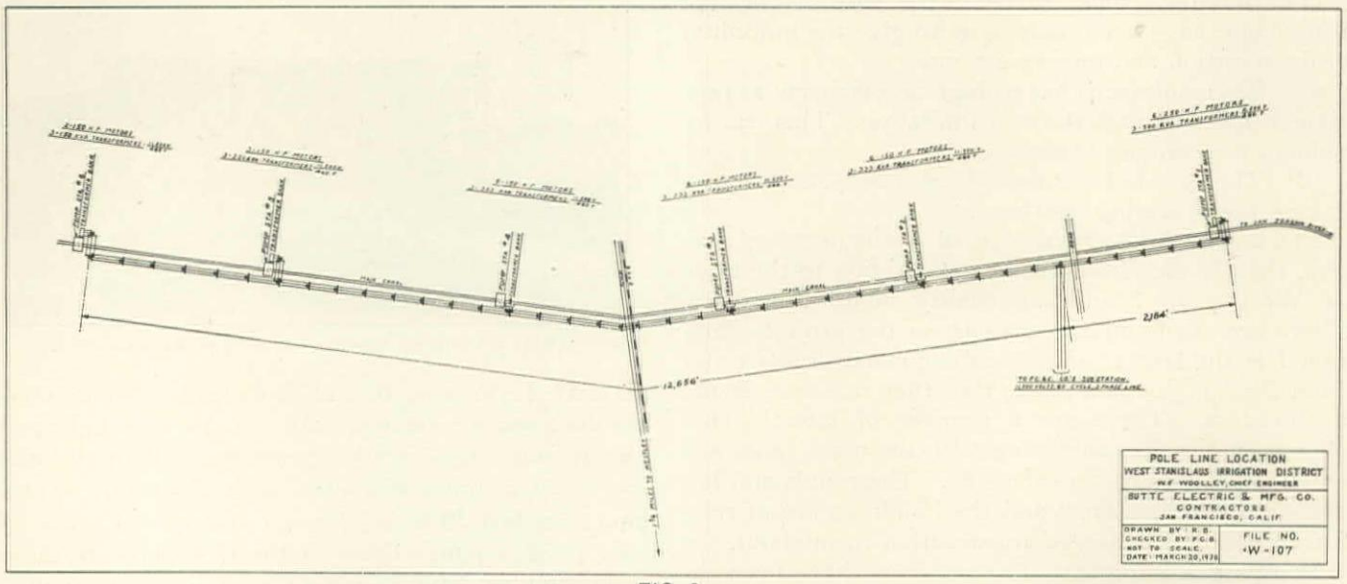


FIG. 2

Time delay relays adjustable within a range of one-half to 30 minutes are provided in each station. These relays are so connected and adjusted that in case of

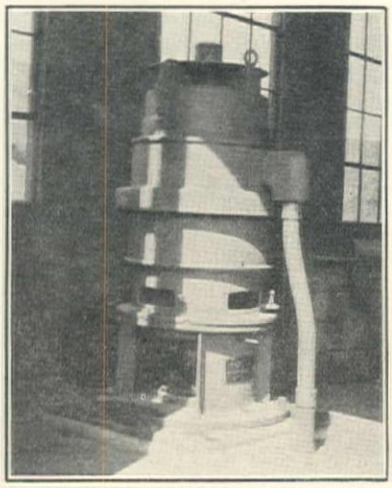


Fig. 4. Vertical, Direct-Connected Pelton-Moody Spiral Pump and General Electric Motor

temporary failure of electric power through the main lines, the stations will not all start at once when the current supply returns.

Transformers and Transmission Lines—Each station is provided with a separate bank of transformers

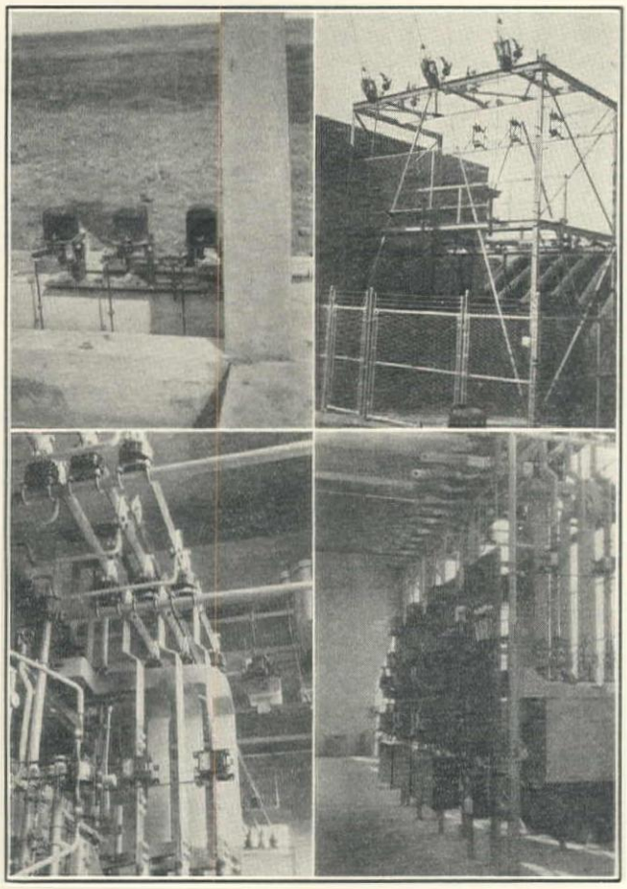


Fig. 5. (Upper Left) Float Switches in Float Well. (Upper Right) Three 500-kv-a. Transformers for Station 1. (Lower Left) Bus Bars Behind Starting Panels. (Lower Right) Central Panels for Station)

stepping down the voltage from 11,500 primary to 440 secondary, 3-phase. The transformers are mounted on a concrete platform with wire screen enclosures, made of copper bearing steel thoroughly galvanized. The following transformers are provided:

Station	No. of Transformers	Kv-a. Capacity Each
1	3	500
2	3	333
3	3	333
4	3	333
5	3	200
6	3	150

A structural steel frame supports the high tension disconnect switches, lightning arrestors, and busbars, with strain insulators mounted above the transformer.

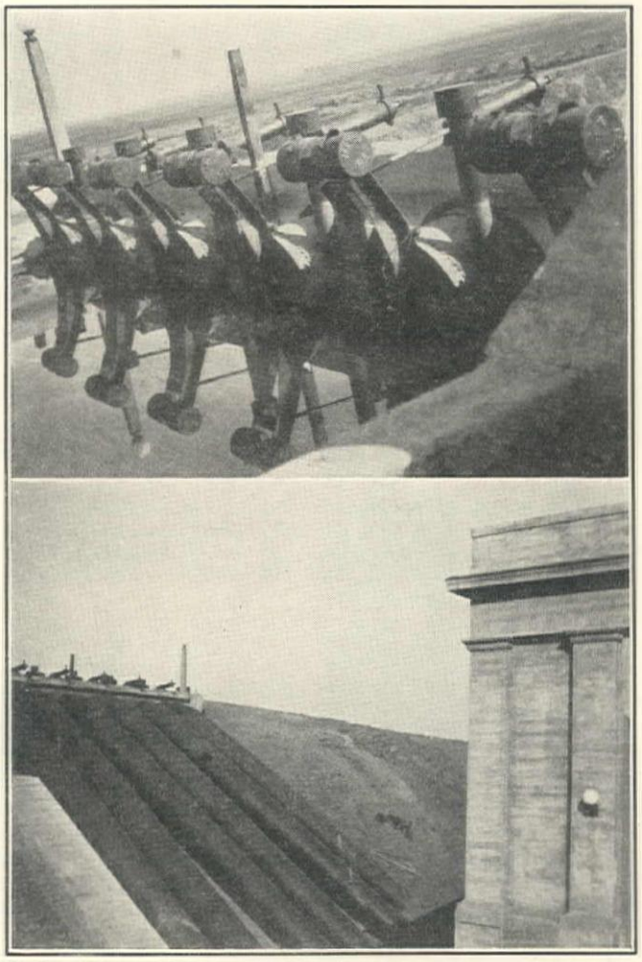


Fig. 6. (Upper) Self-Operating Pelton Flap Valves on 48-in. Steel Discharge Pipes. (Lower) Discharge Pipes Between Pumping Station and Lateral

The transmission lines consist of three No. 0 bare copper wires mounted on Locke insulators. Lattice steel transmission towers (Pacific Coast Steel Co.) set in concrete foundations are provided throughout.

Electrical equipment, including motors, controls, and transformers, was furnished by the General Electric Co. Erection of the discharge pipes, pumps, motors, and control equipment (also including the transmission lines) was done by the Butte Electric & Manufacturing Co., of San Francisco. W. W. Cox is president and Eldridge Smith is secretary of the West Stanislaus Irrigation District.

Editor's Note—The West Stanislaus Irrigation District will hold dedication ceremonies at Westley, California, on April 26; speeches, races, and a rodeo being included in the program. A large attendance is anticipated for the dedication.

Earth Work Table

Cubic Yards for Sum of End Areas—100-ft. Prisms

By Raymond A. Hill*

Quinton, Code & Hill, *Consulting Engineers, Los Angeles, California*

A Tabulation Developed from a Table in Use by the U. S. Reclamation Service About 20 Years Ago, the Principal Difference Being the Table for Decimal Parts Given on the Right Hand Side and Arranged Like a Logarithmic Table

1100	1000	900	800	700	600	500	400	300	200	100	00	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
594	540	486	432	378	324	270	216	162	108	54	0	0.0	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7
595	541	487	433	379	325	271	217	163	109	55	1	1.9	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.3	3.5
596	542	488	434	380	326	272	218	164	110	56	2	3.7	3.9	4.1	4.3	4.4	4.6	4.8	5.0	5.2	5.4
597	543	489	435	381	327	273	219	165	111	57	3	5.6	5.7	5.9	6.1	6.3	6.5	6.7	6.9	7.0	7.2
598	544	490	436	382	328	274	220	166	112	58	4	7.4	7.6	7.8	8.0	8.1	8.3	8.5	8.7	8.9	9.1
599	545	491	437	383	329	275	221	167	113	59	5	9.3	9.4	9.6	9.8	10.0	10.2	10.4	10.6	10.7	10.9
600	546	492	438	384	330	276	222	168	114	60	6	11.1	11.3	11.5	11.7	11.9	12.0	12.2	12.4	12.6	12.8
601	547	493	439	385	331	277	223	169	115	61	7	13.0	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.4	14.6
602	548	494	440	386	332	278	224	170	116	62	8	14.8	15.0	15.2	15.4	15.6	15.7	15.9	16.1	16.3	16.5
603	549	495	441	387	333	279	225	171	117	63	9	16.7	16.9	17.0	17.2	17.4	17.6	17.8	18.0	18.1	18.3
604	550	496	442	388	334	280	226	172	118	64	10	18.5	18.7	18.9	19.1	19.3	19.4	19.6	19.8	20.0	20.2
605	551	497	443	389	335	281	227	173	119	65	11	20.4	20.6	20.7	20.9	21.1	21.3	21.5	21.7	21.9	22.0
606	552	498	444	390	336	282	228	174	120	66	12	22.2	22.4	22.6	22.8	23.0	23.1	23.3	23.5	23.7	23.9
607	553	499	445	391	337	283	229	175	121	67	13	24.1	24.3	24.4	24.6	24.8	25.0	25.2	25.4	25.6	25.7
608	554	**500**	446	392	338	284	230	176	122	68	14	25.9	26.1	26.3	26.5	26.7	26.9	27.0	27.2	27.4	27.6
609	555	501	447	393	339	285	231	177	123	69	15	27.8	28.0	28.1	28.3	28.5	28.7	28.9	29.1	29.3	29.4
610	556	502	448	394	340	286	232	178	124	70	16	29.6	29.8	30.0	30.2	30.4	30.6	30.7	30.9	31.1	31.3
611	557	503	449	395	341	287	233	179	125	71	17	31.5	31.7	31.9	32.0	32.2	32.4	32.6	32.8	33.0	33.1
612	558	504	450	396	342	288	234	180	126	72	18	33.3	33.5	33.7	33.9	34.1	34.3	34.4	34.6	34.8	35.0
613	559	505	451	397	343	289	235	181	127	73	19	35.2	35.4	35.6	35.7	35.9	36.1	36.3	36.5	36.7	36.9
614	560	506	452	398	344	290	236	182	128	74	20	37.0	37.2	37.4	37.6	37.8	38.0	38.1	38.3	38.5	38.7
615	561	507	453	399	345	291	237	183	129	75	21	38.9	39.1	39.3	39.4	39.6	39.8	40.0	40.2	40.4	40.6
616	562	508	454	**400**	346	292	238	184	130	76	22	40.7	40.9	41.1	41.3	41.5	41.7	41.9	42.0	42.2	42.4
617	563	509	455	401	347	293	239	185	131	77	23	42.6	42.8	43.0	43.1	43.3	43.5	43.7	43.9	44.1	44.3
618	564	510	456	402	348	294	240	186	132	78	24	44.4	44.6	44.8	45.0	45.2	45.4	45.6	45.7	45.9	46.1
619	565	511	457	403	349	295	241	187	133	79	25	46.3	46.5	46.7	46.9	47.0	47.2	47.4	47.6	47.8	48.0
620	566	512	458	404	350	296	242	188	134	80	26	48.1	48.3	48.5	48.7	48.9	49.1	49.3	49.4	49.6	49.8
621	567	513	459	405	351	297	243	189	135	81	27	50.0	50.2	50.4	50.6	50.7	50.9	51.1	51.3	51.5	51.7
622	568	514	460	406	352	298	244	190	136	82	28	51.9	52.0	52.2	52.4	52.6	52.8	53.0	53.1	53.3	53.5
623	569	515	461	407	353	299	245	191	137	83	29	53.7	53.9	54.1	54.3	54.4	54.6	54.8	55.0	55.2	55.4
624	570	516	462	408	354	**300**	246	192	138	84	30	55.6	55.7	55.9	56.1	56.3	56.5	56.7	56.9	57.0	57.2
625	571	517	463	409	355	301	247	193	139	85	31	57.4	57.6	57.8	58.0	58.1	58.3	58.5	58.7	58.9	59.1
626	572	518	464	410	356	302	248	194	140	86	32	59.3	59.4	59.6	59.8	60.0	60.2	60.4	60.6	60.7	60.9
627	573	519	465	411	357	303	249	195	141	87	33	61.1	61.3	61.5	61.7	61.9	62.0	62.2	62.4	62.6	62.8
628	574	520	466	412	358	304	250	196	142	88	34	63.0	63.1	63.3	63.5	63.7	63.9	64.1	64.3	64.4	64.6
629	575	521	467	413	359	305	251	197	143	89	35	64.8	65.0	65.2	65.4	65.6	65.7	65.9	66.1	66.3	66.5
630	576	522	468	414	360	306	252	198	144	90	36	66.7	66.9	67.0	67.2	67.4	67.6	67.8	68.0	68.1	68.3
631	577	523	469	415	361	307	253	199	145	91	37	68.5	68.7	68.9	69.1	69.3	69.4	69.6	69.8	70.0	70.2
632	578	524	470	416	362	308	254	**200**	146	92	38	70.4	70.6	70.7	70.9	71.1	71.3	71.5	71.7	71.9	72.0
633	579	525	471	417	363	309	255	201	147	93	39	72.2	72.4	72.6	72.8	73.0	73.1	73.3	73.5	73.7	73.9
634	580	526	472	418	364	310	256	202	148	94	40	74.1	74.3	74.4	74.6	74.8	75.0	75.2	75.4	75.6	75.7
635	581	527	473	419	365	311	257	203	149	95	41	75.9	76.1	76.3	76.5	76.7	76.9	77.0	77.2	77.4	77.6
636	582	528	474	420	366	312	258	204	150	96	42	77.8	78.0	78.1	78.3	78.5	78.7	78.9	79.1	79.3	79.4
637	583	529	475	421	367	313	259	205	151	97	43	79.6	79.8	80.0	80.2	80.4	80.6	80.7	80.9	81.1	81.3
638	584	530	476	422	368	314	260	206	152	98	44	81.5	81.7	81.9	82.0	82.2	82.4	82.6	82.8	83.0	83.1
639	585	531	477	423	369	315	261	207	153	99	45	83.3	83.5	83.7	83.9	84.1	84.3	84.4	84.6	84.8	85.0
640	586	532	478	424	370	316	262	208	154	**100**	46	85.2	85.4	85.6	85.7	85.9	86.1	86.3	86.5	86.7	86.9
641	587	533	479	425	371	317	263	209	155	101	47	87.0	87.2	87.4	87.6	87.8	88.0	88.1	88.3	88.5	88.7
642	588	534	480	426	372	318	264	210	156	102	48	88.9	89.1	89.3	89.4	89.6	89.8	90.0	90.2	90.4	90.6
643	589	535	481	427	373	319	265	211	157	103	49	90.7	90.9	91.1	91.3	91.5	91.7	91.9	92.0	92.2	92.4
644	590	536	482	428	374	320	266	212	158	104	50	92.6	92.8	93.0	93.1	93.3	93.5	93.7	93.9	94.1	94.3
645	591	537	483	429	375	321	267	213	159	105	51	94.4	94.6	94.8	95.0	95.2	95.4	95.6	95.7	95.9	96.1
646	592	538	484	430	376	322	268	214	160	106	52	96.3	96.5	96.7	96.9	97.0	97.2	97.4	97.6	97.8	98.0
647	593	539	485	431	377	323	269	215	161	107	53	98.1	98.3	98.5	98.7	98.9	99.1	99.3	99.4	99.6	99.8
1100	1000	900	800	700	600	500	400	300	200	100	00	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

Cubic Yards for Sum of End Areas Over 500

500= 925.9	1500=2777.8	2500=4629.6	3500=6481.5	4500=8333.3
1000=1851.9	2000=3703.7	3000=5555.6	4000=7407.4	5000=9259.3

EXAMPLE

Section at 0+00=200.5 sq.ft.
Section at 1+00=180.0 sq.ft.
Sum of End Areas=380.5 sq.ft.

With the whole number, 380, enter the table on the left. At the top is found the hundreds of cubic yards, i.e. 700 cu.yd. On the same horizontal line and in the column headed 0.5 find 4.6 cu.yd. Hence the volume for the prism from Section 0+00 to Section 1+00 equals 700 plus 4.6 or 704.6 cu.yd. For sections less than 100 ft. in length find the volume for a 100-ft. section, point off two places, and multiply by the length of section.

Assume sum of end areas=380.5 sq.ft. Length of section=43.2 ft.
Volume of 100-ft. section as above=704.6 cu.yd. Volume of 43.2-ft. section=7.046 x 43.2=304.4 cu.yd.

*Member, American Society of Civil Engineers.

Conduit No. 13 Completed for Denver Water Works

By JOSEPH C. COYLE
Englewood, Colorado

Nearly 11 miles of 60-in. reinforced concrete conduit, extending from the Wynetka distributing station of the Denver water works to First ave. and Clayton st., where it connects with a 66-in. steel line, has been completed for the city water commission by the Lock Joint Pipe Co., of Ampere, New Jersey. The new conduit supplements and replaces a part of a 48-in. wood-stave line which formerly supplied the Capitol hill pumping station; it will have a capacity of 60,000,000 g.p.d.

Specifications called for a leakage test of not to exceed 150 gal. per diam. inch per mile of pipe in 24 hours, under static head. The final test showed on a 13,000-ft. section of the conduit a leakage of only 19.2 gal. and on a second section of 43,000 ft., a leakage of 47 gal.

The total cost of the installation was $1,466,000; that of the 45,000-ft. section of 66-in. steel pipe installed previously being $150,000. The original contract on the reinforced concrete Lock-Joint pipe required the installation of 43,861 lin.ft.; which was later increased by 13,866 lin.ft.

Trenching—A 100-ft. right-of-way was arranged for during construction through private lands, 60 ft. of this to remain a permanent right-of-way. The nature of the ground through which the excavation was made included swamp, sand, rock, and adobe. The usual width of trench was 8 ft. and the depth ranged from 9½ to 15 ft. Most of the excavation was made by two Northwest 1¼-yd. pull shovels, one of these operating in conjunction with a 25-ton American crane which placed the pipe and backfilled the trench. The other shovel excavated and laid pipe as well, using a sling on the bucket for that purpose. As much as 300 ft. per day was laid with the pull shovel and crane.

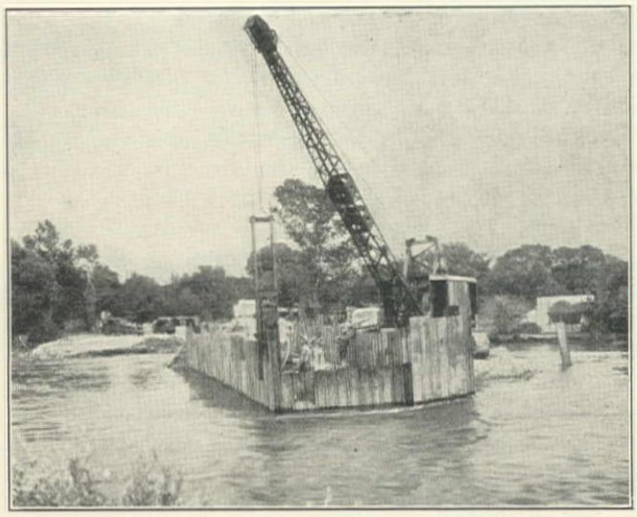
Backfilling was done by the crane after the regular day shift quit, using a heavy steel drag for scraping in the dirt. Uneven spots in the backfill were worked over during the day with a Blair hydraulic digger, equipped with a Fordson motor. Most of the surplus dirt was hauled away by White trucks while the work was going on, the shovels dumping directly into the trucks.

Ground Water—Nearly 4000 lin.ft. of right-of-way lay through a swampy section of the Platte river bottom, where considerable trouble was experienced with water. Two extra 5-in. centrifugal pumps were procured and connected directly to used Ford automobile engines for removing water which could not be drained off through the pipe as it was laid. To hold the banks of this section of the ditch until the pipe could be placed, a permanent section of shoring, 15 ft. long, was constructed of heavy planking and timbers, with the ends and bottom open and the portion where a section of pipe would be installed free from obstruction. This shoring was handled with the clamshell, being placed in the excavation at an early stage and driven down

(UPPER LEFT) REMOVING OLD 48-IN. REDWOOD WOOD-STAVE PIPE. (UPPER RIGHT) PLACING 15-FT. SECTION OF TIMBER SHORING IN TRENCH THROUGH PLATTE RIVER BOTTOM. (LOWER LEFT) INGERSOLL-RAND 8 BY 6-IN. PORTABLE COMPRESSOR AND TWO DRILLS WORKING IN FROZEN GROUND. (LOWER RIGHT) DRIVING INTERLOCKING STEEL SHEET PILING FOR CHERRY CREEK CROSSING

by blows from the clamshell as the work progressed. When a section of pipe was in place, the shoring was pulled and moved ahead.

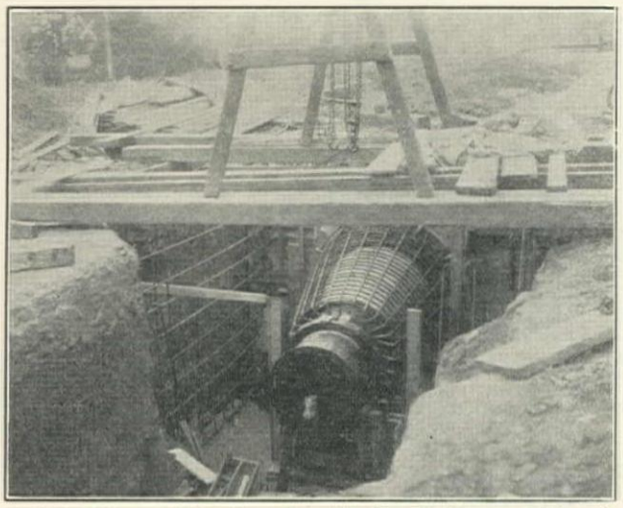
River Crossing—In crossing the bed of the Platte river, the pipe was laid 2 ft. below the surface of the soft shale bedrock, with 12 in. of concrete under the pipe and about 18 in. on each side and over the top for protection against floods. Three sections of cofferdam were employed in the crossing, making a total of 309



Constructing Platte River Crossing on Conduit No. 13

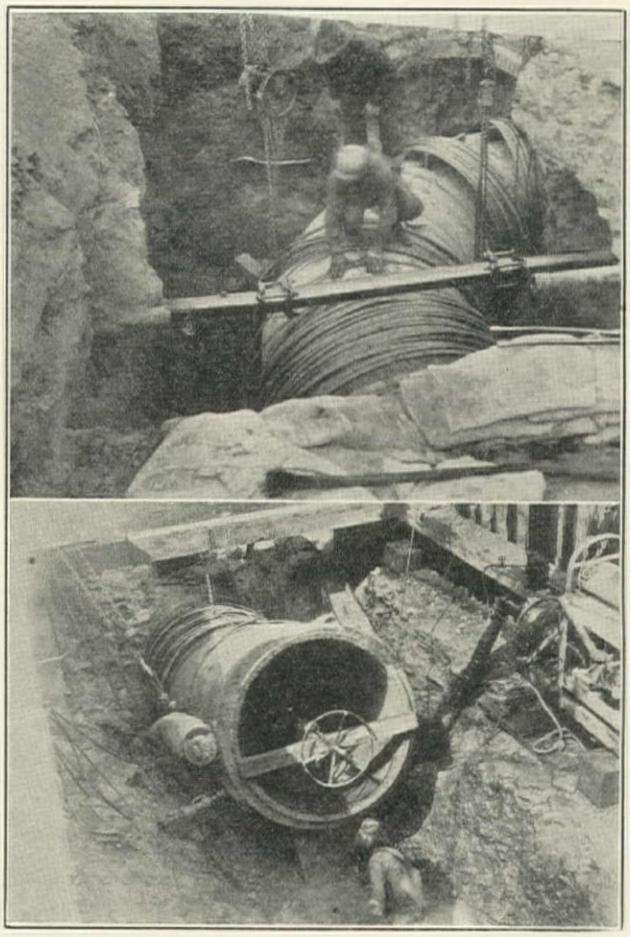
ft. installed in this way. Interlocking steel sheet piling was driven to bedrock around an area of 18 by 103 ft. and the trench excavated with a clamshell, blasting the shale after the 6-ft. covering of gravel was removed. After the pipe was in place, the piling was removed and the next section of cofferdam constructed.

Four C. H. & E. diaphragm pumps were required for the unwatering. One Jaeger 1-sack and one Koehring ½-yd. mixers were used for the concrete work.



Venturi Meter at Wynetka, Conduit No. 13, Denver, Colorado, Showing Throat Ring and Reinforcing of Inlet End

Other Crossings—A crossing of two railroads and a public highway was made, where the three are parallel and only a few yards apart, by excavating and laying the pipe in culverts through which an electric car line once passed. The excavation at this point was practically all in soft rock and blasting was resorted to. Less than one hour was required in putting down a round of holes 8 ft. deep, using air drills. Beneath the culverts two lifts, with holes lightly loaded, were used in order to protect the structures from damage. Shattered rock was carried through the culverts by the pull shovel, which had a scant 6 in. of clearance, and was wasted. As room was made for a section of pipe, it was dragged in and placed. Where the pipe could not be joined with the shovel it was pulled together with a chain and hooked to an expanding bar inside the pipe and to a tension wheel at the front of the joint being laid. A 2-in. cushion of screened sand was placed beneath the pipe at this point to protect it from sharp edges of rock; 6 in. of concrete being placed over the



(Upper) Placing Reinforcement at Elbow on 66-in. Lock-Joint Pipe for Conduit No. 13, Denver. (Lower) Laying Section of Pipe in Platte Riverbed. Concrete Cover in Background and Device for Closing Joint Shown in Foreground

top of the pipe to guard against possible erosion by floods, before backfilling.

Valves—Connections for future installations and with existing conduits were installed as the work proceeded. Twelve-inch blow-off valves were placed at each low point, and 4-in. air valves at every high point, with manholes near the blow-off valves to admit a suction hose or pump when necessary because of ground water. Crispen air valves were used on the conduit.

At the crossing of Cherry creek, the pipe was laid by the cofferdam method, but no rock was encountered as in the Platte riverbed. The pipe was placed in concrete, 6 ft. below the grade of the streambed.

A throttling valve was installed to serve certain high territory near the line, as the full capacity of the con-

duit will not be required by the Capitol hill reservoir for some years.

Valves were laid with the 25-ton American crane.

Frozen Ground—During the latter stages of construction, approximately one mile of the trench involved the blasting of frozen ground to a depth of 3 to 5 ft. Air drills were used to sink three rows of holes 2½ ft. deep in the roadway ahead of the pull shovel. These holes were 3 ft. apart each way, and were loaded with 1½ sticks each of 40% Dupont special gelatine. Electric blasting caps were used, three holes being fired at a round from the cab of the pull shovel. A 6 by 12-ft. mat of heavy plank was first placed over each round by the shovel. When several rounds had been fired, the shovel operator would resume the excavating and laying of pipe.

Pipe in Place for Closeup Section on Conduit No. 13

Three Ingersoll-Rand 8 by 6-in. compressors were used on the contract.

Personnel—The Denver Water Commission includes C. C. Schrepferman, president; Fred. R. Ross and W. H. Leonard, vice-presidents; A. P. Gumlick; Hiram E. Hilts, manager; D. D. Gross, chief engineer; Herbert S. Crocker, consulting engineer; John Burgess, office engineer; H. R. Oliver, construction engineer.

W. B. Freeman is manager of the Lock Joint Pipe Co. branch office at Denver, and W. W. Trickey was superintendent in charge of manufacture and installation for the company. The Lock Joint Pipe Co. plant for this project was at w. Yale ave. and Santa Fe tracks, where the daily output was 360 lin.ft., or 30 sections each 12 ft. long.

Editor's Note—The unit bid summary for Conduit No. 13 was published in the February 25th, 1929, issue, p. 38. Progress articles appeared in the following issues: May 25th, 1929, p. 277; October 25th, 1929, p. 567; and February 25th, 1930, p. 48.

California Railroad Commission Makes Forty Independent Appraisals of Public Utility Property in 1929

During 1929, the valuation division of the engineering department of the California Railroad Commission engaged in work on 40 independent appraisals of public utility property, authorized under 6 condemnation proceedings, 12 rate proceedings, and 22 proceedings involving security issues, according to the annual report by P. E. Dufour, valuation engineer.

Properties of six different types of utilities, situated in various parts of the state, were included in these investigations. Six of the valuations were in progress when the year opened, 30 were commenced and finished during 1929, and 4 were still in progress at the close of the year. Several of the valuations for rate and financial proceedings do not represent entirely new field inventories and appraisals during 1929.

The value of the properties included in the 40 appraisals is as follows: condemnation proceedings—$5,200,000; rate proceedings—$468,200,000; financial proceedings—$16,100,000; total—$489,500,000.

Besides the above valuations, the commission has kept up to date with the valuation of all electric railways within the state, and also those of the steam railroads prepared in 1916 by the Interstate Commerce Commission.

NORTHWEST 1¼-YD. PULL SHOVEL AND WHITE TRUCK TRENCHING FOR CONDUIT NO. 13, CITY OF DENVER

Washington St. Bridge and Sixth St. Viaduct for Los Angeles

City Will Soon Receive Bids for 310-ft. Reinforced Concrete Girder Bridge and 3600-ft. Reinforced Concrete Viaduct Over Los Angeles River

By H. H. WINTER*

Principal Assistant Engineer of Bridges and Structures, City of Los Angeles

With award of the Figueroa st. tunnels and the early award of the Fourth st. viaduct (bids for which have already been received), and with plans completed for the Washington st. bridge and a portion of the Sixth st. viaduct, a busy year of tunnel and bridge construction is assured for the city of Los Angeles. The latter two projects are about to be advertised for bids and will be described in this article.

Need of Bridge—Construction of the Washington st. bridge across the Los Angeles river, for which bids are about to be received, will make possible the early use of that portion of Washington st. between Soto st. and Santa Fe ave. It is an essential part of the major traffic project of extending Washington st. from Alameda st. to Mines ave., thus providing a much-needed through artery for this district. At the present time there is a distance of 3950 ft. between 9th st. viaduct and 26th st., the nearest river crossings north and south of the proposed structure. (Washington st. bridge is in the extension of 23rd st., at the river.)

Rights-of-way are now being secured for the complete project, which will require the construction of several railway and highway grade separations in addition to the river bridge.

Description—The bridge consists of five 62-ft. reinforced concrete girder spans simply supported on concrete piers and abutments. The river piers and abutments extend to a depth of about 20 ft. below streambed. The east abutment and most easterly pier come in an excavation made previously for removing sand and gravel at a commercial pit. All footings are founded on concrete piles.

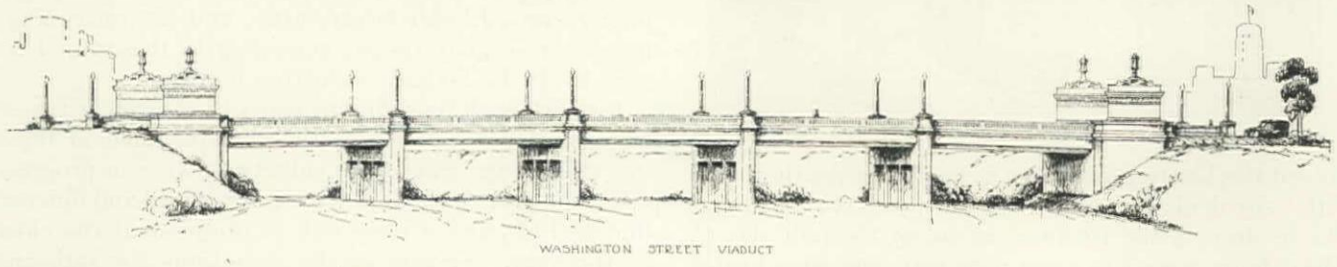
The roadway of the bridge is 56 ft. wide between curbs, the overall width being 71 ft., except across the abutments where it is 94 ft.

Included in the bridge contract is the paving of approaches with 8 in. of asphaltic concrete. An extensive fill will be required in the east approach.

The architectural treatment of the bridge is Renaissance in feeling, the principal features being the pylons at each entrance. There will be a frieze around each pylon of polychrome terra cotta. This frieze will be modeled in low relief in a processional form to depict some feature of bridge construction.

Quantities—The bridge contains 6975 cu.yd. of class 'F' concrete (1:2:3), not including handrails and pylons; 830,000 lb. of reinforcing steel; 696 concrete piles 16 ft. long; 4 large ornamental pylons on the abutments; 12 lighting standards and lighting units; and 4 large ornamental lanterns on which alternate bids based on using bronze or aluminum are being received.

The approach street work quantities are as follows: 63,700 sq.ft. of 8-in. asphaltic concrete pavement; 29,600 cu.yd. of embankment; 36 lin.ft. of 18-in. cast-iron storm drain; and 20 lin.ft. of rock-fill underdrain.



WASHINGTON STREET VIADUCT

The 1926 bridge bond issue provides $350,000 for the construction of this bridge, including the purchase of necessary rights-of-way.

Requirements—The specifications require the completion of all work in 200 days from the date of execution of contract, and require a concreting plant having not less than 200 cu.yd. capacity per 8 hours. Three bins are required for the storage of rock—pea gravel, 1-in. maximum, and 1½-in. maximum. Aggregates will be combined as directed by the engineer to conform to a table of grading included in the specifications.

Cast-in-Place Concrete Handrail—Considerable thought was given to the design of the concrete handrail in order to obtain one which would be free from expansion and contraction cracks, this feature being particularly troublesome to care for.

The handrail will be made of cast-in-place class 'G' (1:2½:2½) concrete, using waterproof cement. The base of the handrail will be continuous from pier to pier, but the cap and upper part of the rail—subject to the maximum change of temperature—will be divided into 10 to 12-ft. sections by ⅛-in. cuts. Each section will be thoroughly reinforced except the cap, which will be cast separately and held to the lower portions of the rail by dowels only. It is hoped thus to greatly reduce, if not to entirely eliminate, the hair cracks and crazing which normally occur.

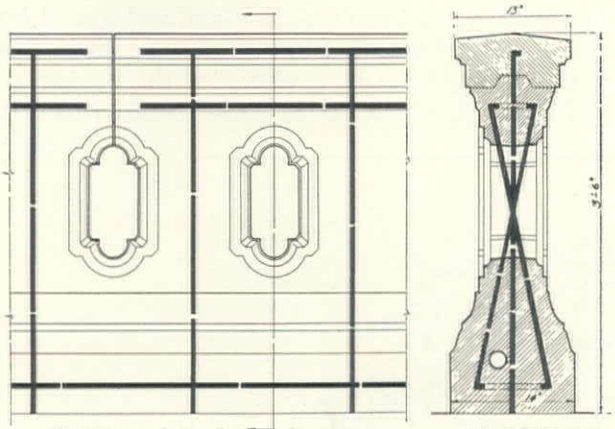
Engineering—This bridge was designed under the

*Associate Member, American Society of Civil Engineers.

direction of Merrill Butler, engineer of bridges and structures, for whom I am principal assistant. A. L. Enger was project engineer in charge of design, and personally designed the architectural features of the bridge. J. J. Jessup is city engineer, D. M. True is office engineer, and H. P. Cortelyou is construction engineer for the city of Los Angeles.

SIXTH ST. VIADUCT

Description—The proposed extension of Sixth st. from the west side of the Los Angeles river to a connection with Whittier blvd. at Boyle ave. involves the construction of a viaduct 3600 ft. long. It is necessary to carry Sixth st. over the Los Angeles river at a



DETAIL OF HANDRAIL SECTION

height sufficient to clear a proposed elevated railway which will pass under the viaduct near the east bank of the river. There is also a difference in grade of 70 ft. between Sixth st. west of the river and Whittier blvd.; this difference the proposed structure will overcome. The viaduct as planned to meet these conditions will begin at Mateo st. and will pass over Santa Fe ave., the Santa Fe Railway tracks, the river, the Union Pacific Railway tracks, and the lowland east of the river, terminating at the bluff west of Boyle ave.

Because of the magnitude of the completed project, involving as it does special construction over the river and long reinforced concrete girder spans over the railways, it seemed desirable to first award a contract for certain of the main piers and abutments and for a vehicular subway in Sixth st. from Santa Fe ave. under the Santa Fe Railway tracks to the riverbed. Necessary rights-of-way have been obtained for this work, making it possible to proceed with construction at an early date.

The main structure will be more fully described in a later article.

Vehicular Subway—The subway is for the purpose of permitting vehicles to enter the river channel without crossing the railway tracks. It will be used at present by sand and gravel haulers and for maintaining city-owned water and power lines along the channel banks. It will also provide a connection to the proposed River Truck Speedway.

The subway is an open U-shaped structure from Santa Fe ave. to Mesquit st., a distance of 275 ft., from Mesquit st. to the river it is a closed box section 306 ft. long. The subway has a clear inside width of 17 ft. 6 in., and in the closed section a clear height of 14 ft. 6 in.

Present Contract—The first contract will include the construction to ground line of all footings and columns adjoining the subway, and of the river pier and abutments which will carry the two main 135-ft. semi-through bowstring girder spans. No particular complications are expected in the substructure work. The river pier and abutments extend about 23 ft. below riverbed and are founded on 15-ft. concrete piles. The abutments are constructed at the banks of the river channel, their tops being 50 to 55 ft. above the bottoms of the excavations.

This contract will also include the finished improvement of the widened Sixth st. adjoining the subway section, which will be paved with 8-in. asphaltic concrete. It is also necessary to construct a 36-in. sewer from Santa Fe ave. to the river, 96 ft. of which will be cast-iron pipe supported on piers of variable depth.

Quantities—The first contract involves the following main quantities: 7075 cu.yd. of class 'F' (1:2:3) concrete; 840,000 lb. of reinforcing steel; 11,145 lin.ft. of concrete piles; about 36,000 sq.ft. of 8-in. asphaltic concrete pavement; 1600 sq.ft. of concrete gutter; 458 lin.ft. of 36-in. precast heavy reinforced concrete pipe sewer; 96 lin.ft. of 36-in. bell and spigot cast-iron pipe sewer; 733 lin. ft. of 8-in. sewer; and 205 lin.ft. of 6-in. sewer.

Engineering—L. L. Huot did the architectural design for this viaduct; other engineering personnel has been previously given.

REGISTRATION OF CIVIL ENGINEERS IN CALIFORNIA

Receipt of class 1 applications for registration as civil engineers in the state of California will close at midnight on June 30, 1930. Class 1 applicants are entitled to registration without examination, under the provisions of section 10, chapter 801, California Statutes of 1929. The only applications acceptable after that date are class 2 (reciprocal registration under section 11 of the Act), and class 3 (examination required).

The Board of Registration for Civil Engineers in California has mailed application blanks and instructions to every civil engineer whose address could be obtained through the mailing lists of technical societies, and by other means. However, many engineers have not yet been reached and these persons should communicate at once with the Department of Professional and Vocational Standards, State Capitol, Sacramento, California. All engineers who come within the provisions of the Act and have received but not yet returned their applications are urged to do so immediately in order that the Board may be aided in its tremendous task of determining qualifications of the several thousand persons affected.

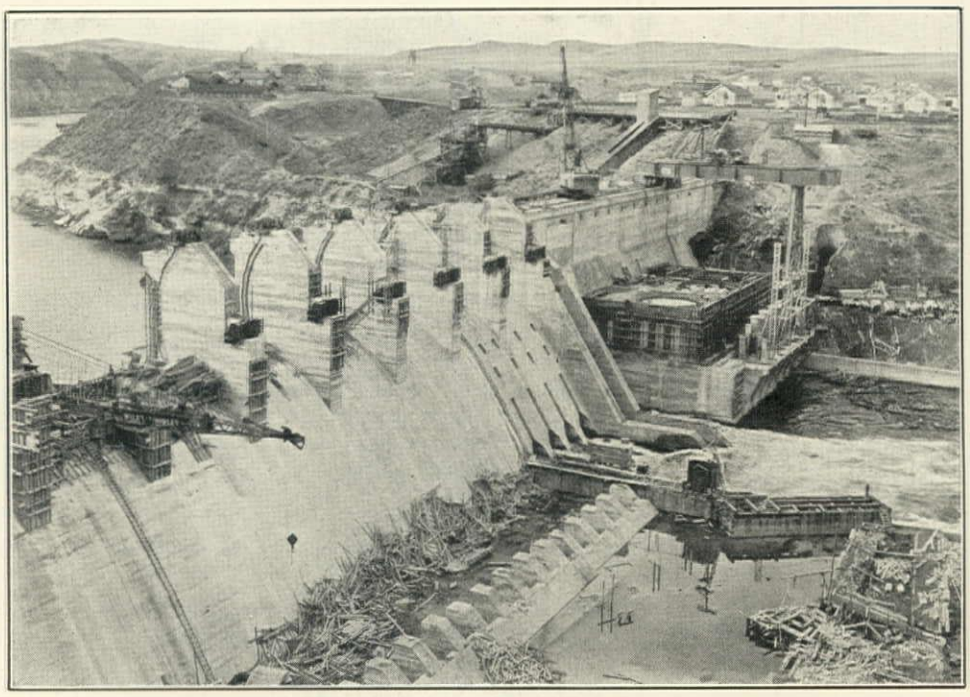
A digest of the civil engineers' registration act was published in the July 10th, 1929, issue, p. 361, and a definition of civil engineering in the December 25th, 1929, issue, p. 673.

Moroney Development of Montana Power Co.

The Phoenix Utility Co., New York City, has completed the Moroney hydroelectric development of the Montana Power Co., a $5,000,000 project on the Missouri river about 20 miles below Great Falls. This is the seventh plant of the Montana Power Co. on that stream, and backs water 6 miles to the Volta dam. Operation began January 3, following a contract period of 13 months.

Dam and Powerhouse—The dam is a gravity section, 92 ft. high and 850 ft. long, and contains 120,000 cu.yd. of concrete, all of which was placed between April 11 and November 1, 1929.

The right, or spillway, section of the dam has nine gates, with a total capacity of 120,000 c.f.s. Against the left abutment and adjacent to the bank is a powerhouse containing two 35,000-hp. vertical reaction turbines, generators, and auxiliary equipment. A 150-ton gantry crane, with one track on the dam and the other on an extension of the powerhouse floor, serves the generating units and switching station (see illustration).



DAM AND POWERHOUSE FOR MORONEY DEVELOPMENT OF MONTANA POWER CO. ON THE MISSOURI RIVER 20 MILES BELOW GREAT FALLS

Construction Railroad—A 7½-mile standard gauge railroad extension was required to reach the project. Over this spur was hauled 81 cars of construction equipment, 600 cars of bulk cement, 150 cars of plant equipment, and 200 cars of miscellaneous materials and equipment. The railroad extension was built by the Phoenix Utility Co. during November, 1928.

Concreting Plant—A complete Telsmith (Smith Engineering Works) plant, with a capacity of 150 cu.yd. per hour, was erected on the left bank to wash and grade sand and gravel and convey it to the mixing plant. Bank-run gravel, with everything over 6 in. scalped out, was obtained at Cascade, 52 miles from the job, transported 49 miles in steel gondola cars by the Great Northern Railway to a receiving yard, then taken over by the contractor and hauled to the concreting plant and dumped into a track hopper equipped with a 30-in. by 5½-ft. plate feeder. A 24-in. by 86½-ft. belt conveyor took material from the feeder and discharged it into a washing box. Enough water was then introduced to flume the sand and gravel into a 60-in. by 20-ft. 'Ajax' washer. Sand and dirty water were taken out of the first section of the washer and flumed to a No. 8 sand settling tank, from which the sand was discharged into a twin-screw rewasher. The rewashed sand was then dumped to a ground storage pile. The gravel was carried through the washer, graded to the proper size, and then chuted to ground storage piles. Storage was provided for a total of 3000 cu.yd. of sand and gravel. A 24-in. by 100-ft. belt conveyor in tunnel beneath the storage piles reclaimed the sand and gravel. This conveyor was fed through eight 'Boquad' bin gates. From the tunnel, material was discharged onto an inclined 24-in. by 196-ft. belt conveyor and carried to the batching hoppers at the concrete mixing plant.

Bulk cement was chuted and belt-conveyed to the mixing plant, where concrete was produced by a 2-yd. T. L. Smith mixer. Two Wiley 'Whirleys' were used on the dam.

C. H. Tornquist was superintendent of construction for the Phoenix Utility Co. and R. A. Moncrieff was resident engineer for the Montana Power Co.

Petaluma-Ignacio Section, Redwood Highway, California

High Concrete Strengths on 11.9-Mile Cement Concrete and Asphalt Concrete Pavement in Marin and Sonoma Counties for California Division of Highways

Earth slides during dry weather, high average concrete strengths at 28 days, and the completion of grading before the fall rains are the principal features of an 11.9-mile Hanrahan Co. contract on the Redwood highway in Marin and Sonoma counties, California.

Work Involved—This state project, known as Sonoma-Marin 1-C & A, was awarded September 26, 1929, to Hanrahan Co., San Francisco, at a contract price of $540,983. About 8.9 miles of the contract will be paved with cement concrete 20 ft. wide, with a 9-7-9-in. section for new pavement and a 9-6-9- in. section for reconstruction, or second-story work. Three miles of the project will consist of 7-in. bituminous macadam paving over fills which have not yet reached their ultimate settlement. The date of completion is set for September 25, 1930. The contract, total length 11.9 miles, extends from one mile south of Petaluma in Sonoma county to Ignacio in Marin county.

Grading Operations—Grading began October 7, 1929, and before the rainy season 340,000 out of 355,000 cu.yd. of excavation had been moved. Much of this was placed in new fills and the heavy rains of the past winter allowed considerable settlement of the fills. In connection with the grading, earth slides occurred in two or three places before any rain had fallen. The alignment was on sidehill with a slight slope, and it was necessary to excavate some extra material. Overhaul in the contract amounted to 5,591,000 sta-yd., the unit price being $0.004. Roadway excavation was contracted at $0.35 per cu.yd.

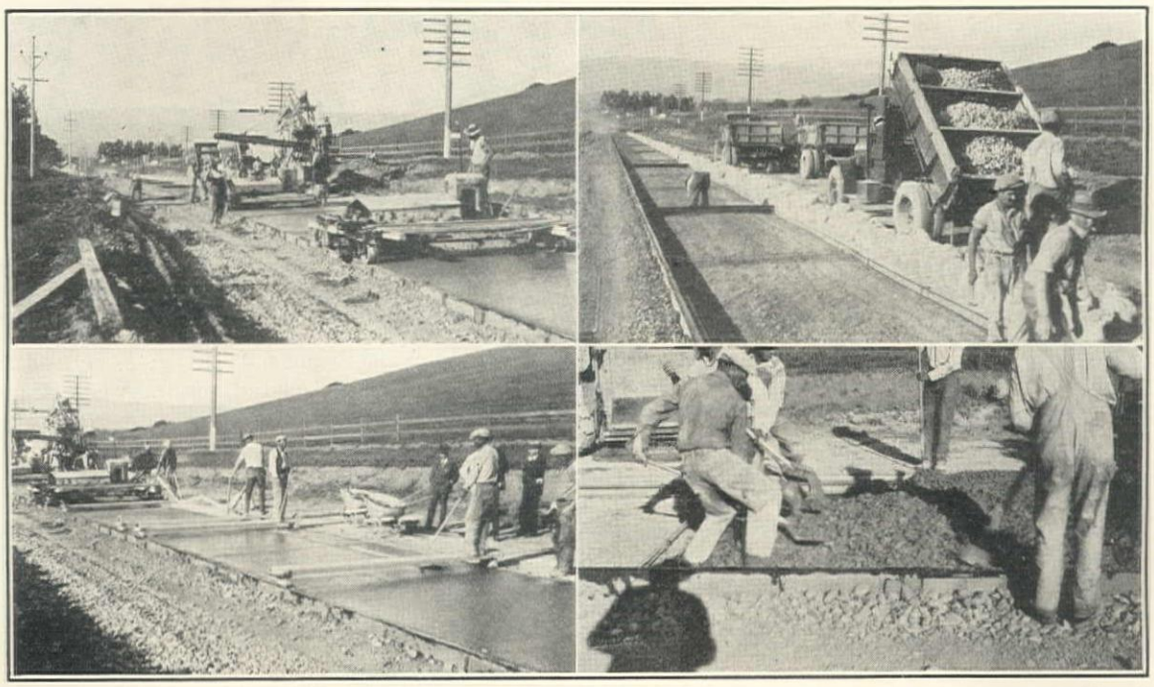
The drainage structures, which have been completed, involved 5200 cu.yd. of structure excavation at $1.50; 1280 cu.yd. of class 'A' concrete at $20.00; 3408 lin.ft. of 12 to 36-in. pipe culverts at $0.50 to $1.00;

Curing Cement Concrete Pavement on Petaluma-Ignacio Section of Redwood Highway

and 4760 lin.ft. of 8-in. perforated metal pipe underdrain at $1.30.

The following grading equipment is now on the work: one 1¼-yd. Northwest power shovel; one 1½-yd. Erie gas+air shovel; four Fageol 6-wheel dump trucks; five International 4-wheel dump trucks; two '60' and one '30' Caterpillar tractors; one 12-ton Austin roller; and one No. 12 Adams road grader.

Paving Operations—Paving was delayed until February 10, 1930, on account of heavy grading and win-

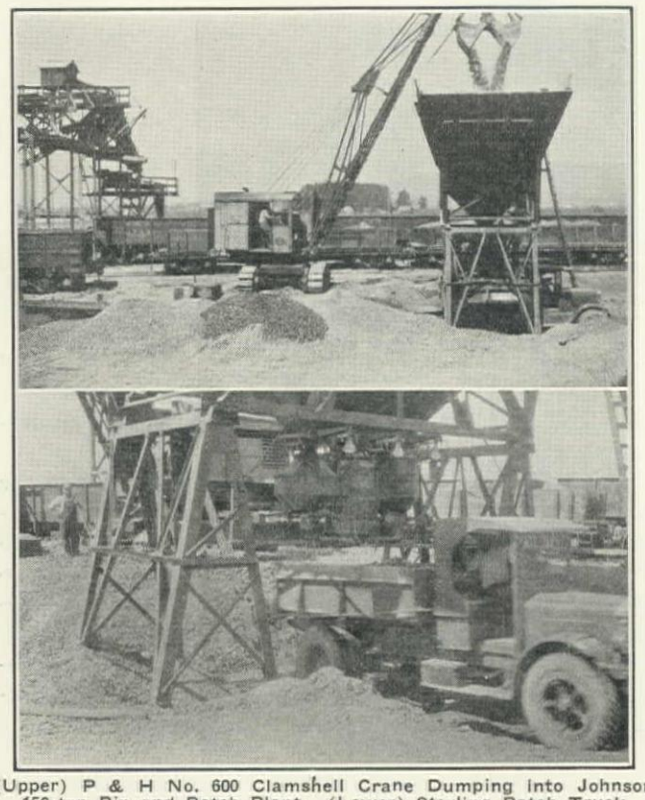


(UPPER LEFT) FOOTE 27-E PAVER AND ORD FINISHER ON PETALUMA-IGNACIO SECTION, REDWOOD HIGHWAY. (UPPER RIGHT) STERLING BATCH TRUCK READY TO DUMP INTO PAVER SKIP. COMPLETED SUBGRADE, EDGE REINFORCEMENT, DUMMY AND EXPANSION JOINT STEEL IN FOREGROUND. (LOWER LEFT) LONGITUDINAL FLOAT FOLLOWS MECHANICAL FINISHER. (LOWER RIGHT) DISTRIBUTING FRESH CONCRETE ON SUBGRADE

ter rains. Since that date, about 5000 cu.yd. of cement concrete has been laid, completing the Sonoma county portion of the pavement.

Cement concrete materials were batched at Hein Bros. rock plant, three-fourths mile from the north end of the job, for the Sonoma county portion. The plant has since been moved to Burdell where materials will be batched for the Marin county end.

The normal mix for the concrete is 1:1.88:2.18:1.86 (two sizes of coarse aggregate being used), with an average slump of 1 in. The sand is furnished by the Grant Rock Co. from Healdsburg, the coarse aggregate by the Hein Rock Co. of Petaluma, and cement by the Calaveras Cement Co. High average strengths



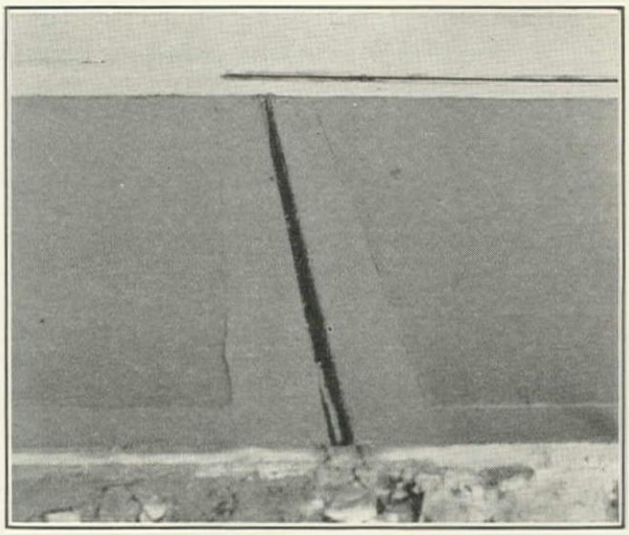
(Upper) P & H No. 600 Clamshell Crane Dumping into Johnson 150-ton Bin and Batch Plant. (Lower) Sterling Batch Truck Leaving Plant

have been obtained on the concrete paving, the cylinders to date having averaged 5220 lb. for 28 days. The average daily run of concrete amounts to date to 272 cu.yd. The lowest run was on the first day when 191 cu.yd. was placed and the highest on March 24 last when 337 cu.yd. was placed.

Three-fourths inch round dowel bars are being used at transverse expansion joints only. Edge reinforcement consists of ½-in. deformed bars. Dummy joints are being constructed according to standard California specifications.

The paving requires 28,000 tons of crusher-run base at $2.00; 74,000 sq.yd. of subgrade at $0.09; 20,200 cu.yd. of class 'A' cement concrete at $9.25; 569,000 lb. of reinforcing steel at $0.05; 8700 sq.yd. of reinforcing steel in second story pavement at $0.30; 5500 tons of oil-treated rock borders at $2.40; 5400 tons of broken stone at $2.50; and 285 tons of asphalt oil at $20.

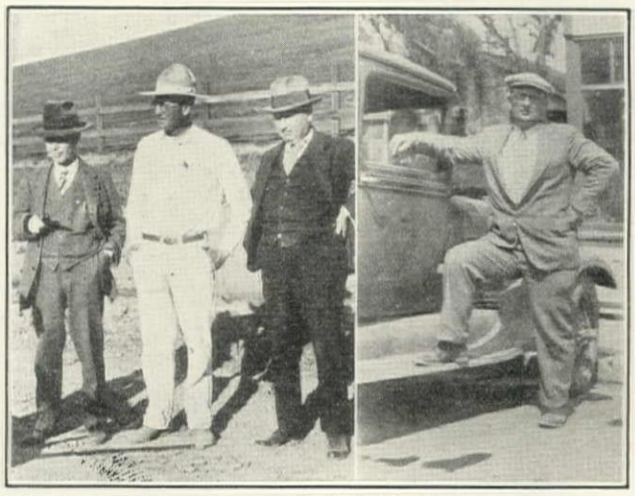
The following subgrading and paving equipment is now on the work: one 27-E Foote paver; one 1½-yd. P&H No. 600 clamshell crane; one 15-ton Buffalo-Springfield roller; two Ord finishing machines; one Johnson 150-ton bin and batch plant; one '60' and one



Transverse Expansion Joint on 10-ft. Strip of Cement Concrete Pavement. Adjustment Slabs Tied by ¾-in. Round Dowels

'30' Caterpillar tractors; one No. 12 Adams road grader; one Russell special road grader; three Autocar batch trucks; two Sterling batch trucks; one C.H.&E. triplex pump; 1 mile of 3-in. and 3 miles of 2½-in. pipe-line.

The personnel is as follows: for the California Division of Highways—J. H. Skeggs, district engineer of



(Left) H. A. Day, Engineer, S. T. Corfield, Job Superintendent, and T. A. Hanrahan, General Superintendent, Hanrahan Co. (Right) E. E. Sorenson, Resident Engineer, California Division of Highways

district IV, San Francisco; E. E. Sorenson, resident engineer, and Fred Carlstad, paving inspector; and for the Hanrahan Co.—T. A. Hanrahan, general superintendent; H. A. Day, engineer; and S. T. Corfield, job superintendent.

STEEL BRIDGE DESIGN CONTEST

Three students at the University of Illinois won the 1930 cash prizes offered by the American Institute of Steel Construction for the most beautiful architectural design of a steel bridge. These prizes, amounting to $500, $250, and $100, were made through the Beaux-Arts Institute of Design.

Drainage District Improvement No. 29, Los Angeles County

Los Angeles County Supervisors to Receive Bids Until May 5, for Storm Drain System to Relieve Conditions Along Santa Monica and Sunset Boulevards

Bids will be received until 2 p.m. May 5, 1930, by the Board of Supervisors of Los Angeles county, Hall of Records, Los Angeles, California, for construction of county drainage district improvement No. 29. Protests on this improvement were withdrawn and work ordered at a continued hearing on April 7. The preliminary estimate, prepared by C. E. Arnold, county storm drain and construction engineer, is $296,945. The contract time on this improvement will terminate November 3, 1930.

Location and Extent—Drainage district improvement No. 29 is designed to relieve conditions along

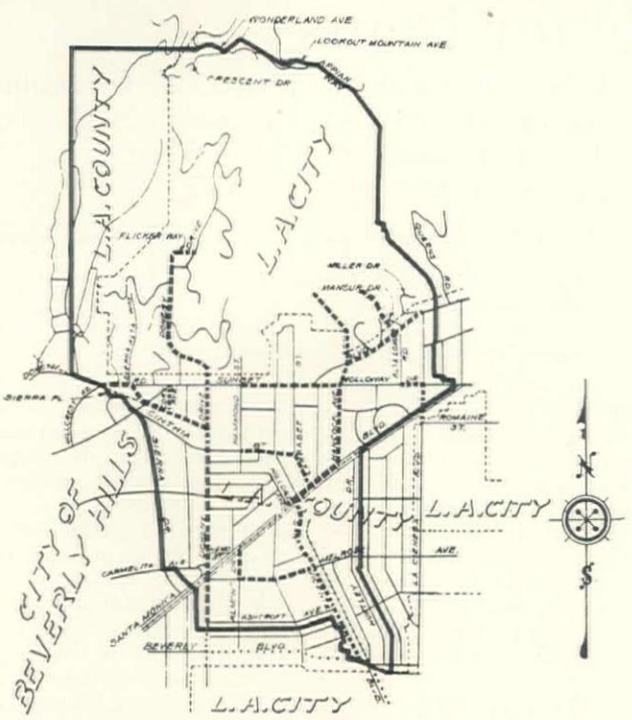


Fig. 1
Los Angeles County Drainage District Improvement No. 29. Outline of District in Full Lines, Location of Proposed Drains in Heavy Dash Lines, and Location of Existing Drains on Beverly Blvd. in Dotted Lines

Santa Monica and Sunset blvd. It will obviate the necessity for putting storm drains in the two boulevards and assessing their cost directly against the frontage.

The district, which embraces an area of 1261 acres, is highly improved. It is bounded on the north by the top of Lookout mountain, on the east by La Cienega blvd., on the south by Beverly blvd., and on the west by Sierra drive. Fig. 1 shows the district boundary, and the location of existing and proposed drains.

The system is designed for a discharge of 855 c.f.s.—equivalent to a runoff of 434 c.f.s. per square mile of district.

Payment for Work—Work will be done under the Drainage District Act of 1919, as amended, under which the contractor takes bonds drawing 6% interest. The bonds run for 16 years and are to be retired in 15 annual payments, beginning two years after the date of issue. Money for their retirement is to be collected with the county taxes in the same manner as school taxes. The bonds are practically underwritten by Los Angeles county, as the law provides that should any property owner fail to pay his taxes, the amount due for drainage work shall be paid from the general fund until the next general tax collection. This feature makes the bonds most desirable; similar bonds have sold for par or better.

No cash is available for the construction of these improvements.

The total assessed valuation of land in the district is $7,870,170, the average assessed valuation per gross acre being $6241. The estimated cost of improvements is, therefore, 3.7% of the assessed valuation.

Quantities—Estimated quantities are given in the following table:

Excavation
- 9,000 cu.yd. unclassified

Concrete
- 2,217 cu.yd. Class 'A'
- 41.5 cu.yd. Class 'B'
- 45 cu.yd. Class 'C'

Reinforcing Steel
- 257,745 lb.

Catchbasins Without Aprons
- 10 No. 1
- 7 No. 2
- 1 No. 3
- 11 No. 8 (with one grating)
- 13 No. 8 (with two gratings)
- 3 No. 8 (with three gratings)
- 5 No. 9 (with two gratings)
- 1 No. 9 (with three gratings)
- 3 No. 6 (special structure)

Catchbasins With Aprons
- 18 No. 1
- 8 No. 2
- 3 No. 3
- 26 No. 8 (with one grating)
- 15 No. 8 (with two gratings)
- 10 No. 8 (with three gratings)
- 2 No. 9 (with one grating)
- 5 No. 9 (with two gratings)

Manholes
- 11 No. 1 (standard)
- 56 No. 2 (standard)
- 3 Sanitary sewer standard drop
- 4 Sanitary sewer special

Standard Junction Structures, Etc.
- 7 No. 1 (30-in. or under)
- 5 No. 1 (33-in. or over)
- 1 Sanitary sewer junction chamber
- 30 Chimney pipe (sanitary sewer 6-in. standard)

Reinforced Concrete Pipe, Centrifugally Spun
- 1,194 lin.ft. 18-in. (standard)
- 2,591 lin.ft. 21-in. (standard)
- 2,529 lin.ft. 24-in. (standard)
- 2,339 lin.ft. 27-in. (standard)
- 2,451 lin.ft. 30-in. (standard)

Reinforced Concrete Pipe, Centrif. Spun—Continued
1,221 lin.ft. 33-in. (standard)
3,101 lin.ft. 36-in. (standard)
1,124 lin.ft. 39-in. (standard)
994 lin.ft. 42-in. (standard)
584 lin.ft. 45-in. (standard)
915 lin.ft. 48-in. (standard)
356 lin.ft. 51-in. (standard)
90 lin.ft. 54-in. (standard)
608 lin.ft. 57-in. (standard)
686 lin.ft. 66-in. (standard)
888 lin.ft. 72-in. (standard)
340 lin.ft. 27-in. (specification A)
260 lin.ft. 30-in. (specification A)
436 lin.ft. 36-in. (specification A)
329 lin.ft. 48-in. (specification A)
1,086 lin.ft. 54-in. (specification A)
476 lin.ft. 66-in. (specification A)
528 lin.ft. 72-in. (specification A)
30 lin.ft. 27-in. (specification B)
68 lin.ft. 36-in. (specification B)
271 lin.ft. 72-in. (specification B)

Plain Cement Pipe
91 lin.ft. 6-in.
1,244 lin.ft. 12-in.
1,593 lin.ft. 15-in.
1,183 lin.ft. 18-in.
9 lin.ft. 21-in.

Vitrified Clay Pipe
1,750 lin.ft. 10-in. (main line)
6 lin.ft. 8-in. (main line)
50 lin.ft. 6-in. (house connection)

Resurfacing
3,099 sq.yd. 6-in. asphaltic concrete
3,168 sq.yd. 5-in. asphaltic concrete
1,003 sq.yd. No. 2 oiled macadam
3,142 sq.yd. No. 3 oiled macadam
820 sq.yd. No. 4 oiled macadam

There will be some ground water encountered, but no great amount is anticipated.

J. E. Rockhold is county surveyor of Los Angeles county.

Building Code for Dams

Discussion of the Tentative Suggestions by Fred A. Noetzli for a 'Building Code for Dams', Published in the September 10th, 1929, Issue, pp. 461 to 465, Discussion by A. Floris and Lars Jorgenson in the November 10th Issue, pp. 574 to 576; with reply by Fred A. Noetzli in the December 25th Issue, p. 577.

Los Angeles, California, February 6, 1930.

THE EDITOR:

Dear Sir—Standard regulatory measures under centralized state control governing the design and construction of dams are essential and will have a beneficial influence upon the safety of such structures.

For this reason, Noetzli's proposed code published in your September 10th, 1929, issue is not only a timely, but also a valuable contribution toward this end. However, I am of the opinion that more cooperation is needed among engineers on this subject. Unfortunately, this was not evidenced, judging from the few published discussions.* The writing of such a code is not one man's job. The efforts, experience, and judgment of many are necessary before any tolerably complete code can be worked out. It also follows to a certain extent that the provisions of the code must be reasonably conservative and cautious against dubious and untried novelties of design or construction.

In this connection, attention is directed as noted by Floris, to possible objections to the part of the proposed code, part IV, par. 29. Therein the use of inclined joints in buttresses is advocated and a reduction or omission of horizontal reinforcement is permitted. This is a theoretical conception in connection with the theory of trajectories of the principal stresses in a body without joints, which demands further investigation by the engineering profession before it can be accepted, per se.

If inclined joints parallel to the trajectories of principal stresses are to be accepted as proper and necessary, then some consideration in the code should be given to the stability of the subdivided member with inclined joints from a standpoint of the slenderness ratio, in accordance with established practice for concrete column design, particularly in thin buttresses.

If vertical radial joints in arch dams are left ungrouted, it follows that little or no arch action can be expected, as stresses do not jump across gaps in the joints. It would be better to state in par. V, "All vertical joints must be pressure-grouted solid, within a reasonable time, to the satisfaction of the state engineer after most of the shrinkage of the concrete has taken place when the temperature of the dam is low".

In several arch dams now existing, the vertical joints have been left ungrouted, which condition cannot be justified from a scientific viewpoint.

The following paragraph should be added to part III covering general requirements for the design:

"The safe allowable foundation pressures assumed in the design of dams must be derived by careful investigations covering adequate test borings, a report from a qualified geologist, and all necessary physical and chemical tests such as strength of rock, permeability, and solubility. Copies of all foundation tests and reports must be filed with the state engineer."

If such foundation tests had been carefully made, several recent foundation failures of important dams in California would possibly not have occurred.

It has been my experience that the foundations in the streambed proper are usually much sounder, denser, and more impervious than the bearing rock above the flow line in the walls of the canyon. Accordingly, the safe pressures should vary over the entire foundation, particularly when different strata of rock are encountered. To cover varying foundation conditions, the following paragraphs should be added to part III:

"The stresses transmitted to the base of the dam should be not greater than one-half of the allowable bearing value of the foundation.

"Steps in the foundations shall have horizontal bearing planes not less than two-thirds of the vertical face.

"All bearing planes in the foundations must be at right angles to the principal stresses in the section of the dam over the plane in question".

In part IV, par. 6, the requirements for cutoff walls under all foundation conditions may be questioned. Deep cutoff walls should be installed where there is a question of seepage under the dam proper because of lack of dense rock or seamy conditions. But, where dense and impervious rock is encountered, particularly deep down in the bed of the stream, it seems rather foolish to excavate a deep cutoff trench below the acceptable datum for the dam foundation proper. This cutoff trench is usually excavated under trying conditions—deep down in the glory hole—requiring heavy pump duty, with surging bulkheads or cofferdams above, and the possible shattering or loosening of good sound rock by shooting, not to mention the delays that usually occur during rising water conditions while a conscientious inspector is checking the depth of the trench for the last inch, or waiting until the en-

*Floris and Jorgensen, November 10th, and Noetzli, December 25th, 1929, issue. A 'Letter to the Editor' by M. H. Gerry, San Francisco, will be published shortly.—Editor.

gineer arrives to approve the cutoff trench excavation. Why replace good, solid rock with concrete of less strength?

It is essential that foundations be impervious by nature or else be made so by proper and adequate grouting (see 'Technique of Pressure Grouting', October 10th, 1928, issue).

In par. 14, part IV, the requirements covering grouting of holes as "at a suitable stage of the construction, ..." may be criticised. Grouting of foundations should not be attempted until at least a carpet or covering of concrete is placed over the rock area to be grouted. This covering of concrete should be of proper strength, weight and age to withstand, without undue stress, the upward pressure of the grout. Furthermore, with concrete covering the rock, the additional benefit is obtained of grouting the joint between the foundation proper and the concrete; providing, of course, that the grout pipe is not projecting past the joint.

No mention is made in the code in reference to a combination of arch and gravity dams, or arch dams with gravity abutments. In several dams now built, the upper arch rings abut against gravity sections rather than natural rock abutments, the design in some cases being required by lack of rock, or good rock. Special care should be taken to ascertain the rib shortening stresses when a gravity and arch section are combined, also the radial shears resulting from arch and water pressure on the gravity section.

The code does not state any requirement relative to the safety of dams against seismic forces. If we are considering earthquake provisions in our Pacific coast building codes, why not for dams, particularly structures containing frame work, such as multiple arch and other buttress type dams?

Dams of all types should be made resistant within reasonable safe limits to seismic forces and vibrations. There appears to be no published material covering methods of analysis or construction relative to seismic resistance of dams. In this connection, the dynamic behavior of dams containing relatively slender structural elements, such as buttresses or thin arches where resonance may occur, can be ascertained to some degree by the aid of the theory of springs, involving the use of energy equations. Gravity type dams, or other massive types, may be made seismic resistant within practical limitations by designing them to withstand a lateral static force equal to a seismic factor of one-tenth of the weight of the structure.

In this connection, my ideas parallel those of Floris in his remarks covering resistance to earthquakes in your November 10th, 1929, issue.

It is unfortunate that Noetzli neglected to discuss this important subject.

In part VI, par. 34, mention is made of "reinforced gunite not less than 1 in. thick". The word 'reinforced' should be omitted, as it is impractical to reinforce gunite less than 1½ in. thick, at least, for facings on dams.

In part VII, 'Earth Fill Dams', par. 48, in the construction of hydraulic filled dams, the cross-section should be consolidated as much as possible, and made as impermeable as practical. This can be accomplished only if proper means are provided to drain the water freely away from the core, not allowing it to stand or settle on the embankment. If the surplus water is allowed to remain, a saturated condition prevails until the residual water drains, which may take a long time. If sufficient and proper drains are not provided, a continual saturated and dangerous condition exists. The code now provides drains only for the downstream toe.

In connection with the design and construction of hydraulic filled dams, it would be well to include in the code some of the fundamental rules covering design and construction as recommended by James Dix Schuyler in his valuable work entitled 'Reservoirs for Irrigation, Water Power and Domestic Water Supply', 1908 edition.

All dry earth-fill dams are unquestionably safer when constructed with impervious core walls, preferably if reinforced concrete, whereby the probable saturation zone is confined to the upstream slope or prism. Therefore, why not include in the code that all dry-filled earth dams be constructed with impervious core walls and with ample drainage provisions?

From a paper, 'Safety in Dam Construction', read by Allen Hazen at the recent World Engineering Congress in Tokyo, the following statement is quoted in your January 10th, 1930, issue by Fred A. Noetzli: "it is the shear that really holds many or most dams in position". This statement cannot be rceonciled with the elementary principles of mechanics, and appears to me to be fallacious and not well founded.

In a dam, besides the horizontal water pressure there is acting also in a vertical direction the weight of the structure. This being the case, to any shearing tendency of the dam at the base, its weight will act against such a movement, thus contributing materially to the resistance of the structure against failure. Consequently, not the shearing stress alone holds many or most dams in position, but also the stress normal to the planes of this shearing stress. (See 'Sliding Factor in Dams', by Floris, **Western Construction News**, March 10th, 1929, issue.) It is an impossibility to assume, by the existence of this normal stress, that pure shearing stresses are produced in a dam, on which its safety alone depends.

If shearing stresses are to be considered as the criterion of the safety of dams, then this conception of failure contradicts, to a certain extent, the validity of the law of the trapzoid, which is generally used in the design of dams.

It is hoped that more interest will be manifested concerning this important subject, which requires more discussion and constructive criticism.

R. McC. BEANFIELD, *Consulting Engineer.*

Pacific Gas & Electric Co. Plans Merger

The Pacific Gas & Electric Co. applied to the California Railroad Commission on March 31 for permission to conclude negotiations by which it might assume control of the Great Western Power Co., San Joaquin Light & Power Co., Midland Counties Public Service Corp., and subsidiary public utilities within the state. The proposed merger involves combined assets of $650,000,000, and would create the second largest operating utility within the United States. It would enable the P. G. & E. Co. to control the California public utility field between Eureka on the north and Bakersfield on the south. The combined properties serve 1,200,000 customers and produce annual gross revenues in excess of $87,000,000.

Simplified Practice—The simplified practice committee, northern section, of the California State Chamber of Commerce, held its organization meeting at the Palace hotel, San Francisco, on February 17, attendance 24. This committee organized to consider simplified practice and the elimination of waste in industry, as recommended by the U. S. Department of Commerce. (See examples of simplified practice accomplishments in the February 25th, 1929, issue, p. 111, and an editorial on the subject in the March 25th, 1929, issue.)

A second meeting of the committee was held March 17 at the Palace hotel, with an attendance of 30. Reports were presented by the representatives of the following groups: Pacific Coast Electrical Association, iron and steel, foundry, structural steel, corrugated sheets, reinforcing steel, masonry, lumber, architects, and others. The third meeting was held April 21.

Charles M. Gunn, of the Gunn-Carle Co., San Francisco, is chairman and Charles S. Knight, of the California State Chamber of Commerce, is secretary of the northern section committee.

The Irrigation Districts Association of California held a semi-annual convention at San Diego April 17 to 19 to discuss federal aid for irrigation districts, the conflict of lien between county and municipal taxes and irrigation district assessments, collection of irrigation district assessments on operative railroad property, and other subjects.

The International Highway Association was formed at a meeting in Portland, Oregon, April 14, by delegates from Oregon, Washington, California, and British Columbia. Previous sectional meetings of the organization had been held, but the one at Portland was the first with a combined attendance. The object of this meeting was to develop a procedure and an organization to direct activities toward completion of a highway connecting the state of Washington and Point Barrow, Alaska (through Canada), and one connecting Southern California with the proposed and partly constructed International Highway from Laredo, Texas, through Mexico City into Central and South America.

City Planning for Portland, Oregon

What was once regarded as an ineffective adjunct to the activities of the city of Portland, Oregon, has become an important means of making it one of the most livable of cities. This agency is the city planning commission, now composed of J. C. Ainsworth, president; Henry E. Reed, B. W. Sleeman, Coe A. McKenna, John A. Laing, C. W. Norton, E. F. Lawrence, C. A. McClure, secretary, and J. P. Newell, consultant. Ex-officio members of the commission are George L. Baker, mayor; Frank S. Grant, city attorney; and O. Laurgaard, city engineer.

Activities in 1929—During 1929, the commission held 9 regular and 5 special meetings. Its routine business included 99 petitions, as follows:

Change of zone	67
Fuel yards	12
School locations	9
Church locations	5
Garage locations	1
Hospital locations	3
Setback lines	2

Other matters considered were:

Street widenings and extensions as referred by city engineer	6
Street vacations as referred by the city engineer	10
Tentative layout for new subdivisions	7
Plats approved	5

In addition, 14 special planning studies were made, as follows:

1. Approaches to the St. Johns bridge
2. Development of the north end of Interstate ave.
3. Extension and widening of east Morrison st.
4. Street development in the Guilds lake area
5. Improvement of the west end of the Steel bridge
6. Extension of Front st.
7. Widening of Burnside st.
8. Roadway width on the St. Johns bridge
9. Model of the west end approaches to the St. Johns bridge
10. Waterfront development
11. Connection to a proposed super-highway from Oregon City
12. Improvement along the west side Willamette blvd. to give an open view of the Swan island airport
13. Road from Jefferson st. into city park.
14. Road from Tacoma ave. to Johnson creek blvd., making a direct route between Sellwood and Mt. Scott.

Members of the commission delivered 16 talks on city planning before community and luncheon clubs. An official representation attended the National Conference on City Planning, at Buffalo, New York; the Northwest Realtors Conference, at Salem, Oregon; and the Northwest Conference on City Planning, at Vancouver, B. C.

Expenses of the commission for 1929 were $10,172.

Publicity—A 'catchy' method is being employed to make the citizens of Portland planning conscious. This device is the monthly 'Plan-It', a mimeographed bulletin edited by Theron R. Howser and now in its fourth year, average circulation 410. The 'Plan-It' reports progress in other cities; defines city planning terms; gives reviews and excerpts from leading reference books on city planning; presents impersonal arguments for street widenings and extensions, the establishment of parks and recreation facilities, and the proper use of zoned areas in Portland.

This is a type of publicity which other western city planning commissions might well use to increase the effectiveness of their work and the endorsement of needed legislation.

As an example of the attractive manner in which its campaign material is presented, the following extracts are taken from the January, 1930, 'Plan-It':

A local instance of what future historians are apt to call a dominant trait of the early 20th century is the changing attitude of Portland concerning its west side waterfront. Originally the sewer and waterfront improvements were planned to protect and clean up the district, as a farmer might paint his barn or, in the good old Yankee phrase, 'red up' the stable yard—it was expected to make neat and orderly a place decidedly lacking in neatness or order. It was admittedly commercial in a 'big business' way, as the waterfront was to become a marketplace and a warehouse. Concrete was to replace rotten wood, streets were to be made wide enough to allow for traffic. But, withal, it was a move toward a more efficient business machine, with no opportunity for consideration of architectural beauty as displayed in the great old-world cities—a thing for which we as citizens of modern America have heretofore shown little regard.

About a year ago a few far-sighted citizens began to talk of making something better, more appealing, to a different side of our nature. At first these ideas were more a cause of interested speculation than of action, but within the year there has come a change of mind on the part of many citizens. Today the chances of an outstanding development from the point of beauty are most favorable. If the suggestions of the local chapter of the American Institute of Architects, or something similar, could be worked out, Portland could boast of one of the most beautiful instances of city building. The fact that the waterfront development is being seriously considered by men who do things as well as by men who plan things is concrete evidence of a change that is coming over modern America—a change that time will show to have been as much of a revolution in thought as any of the great changes of the Renaissance.

Portland might be a leader in this Renaissance of the city, or it might wait until other more progressive centers have shown the way. But, the day of cities built to express a massed desire for beauty that will endure for future ages to admire and say 'this our fathers did for us' is surely dawning. More significant than endless scheming to make our cities fit the transportation devices of today is the beginning of a tendency to think that there are other things to do with a city than to make it a place to eat, sleep, and pile up great fortunes.

U. S. GOVERNMENT TO DREDGE ALAMEDA ESTUARY AND SAN JOAQUIN RIVER

The U. S. War Department has appropriated $230,000 for additional dredging of the Alameda Estuary channel, to increase the depth from 30 ft. to 35 ft., and bids soon will be solicited for this work by the U. S. Engineer's office, San Francisco.

An appropriation of $450,000 also has been made available (additional to two previous appropriations totalling $925,000) for the government's share of constructing the Stockton ship channel up the San Joaquin river.

Irrigation, Reclamation, and Power Development

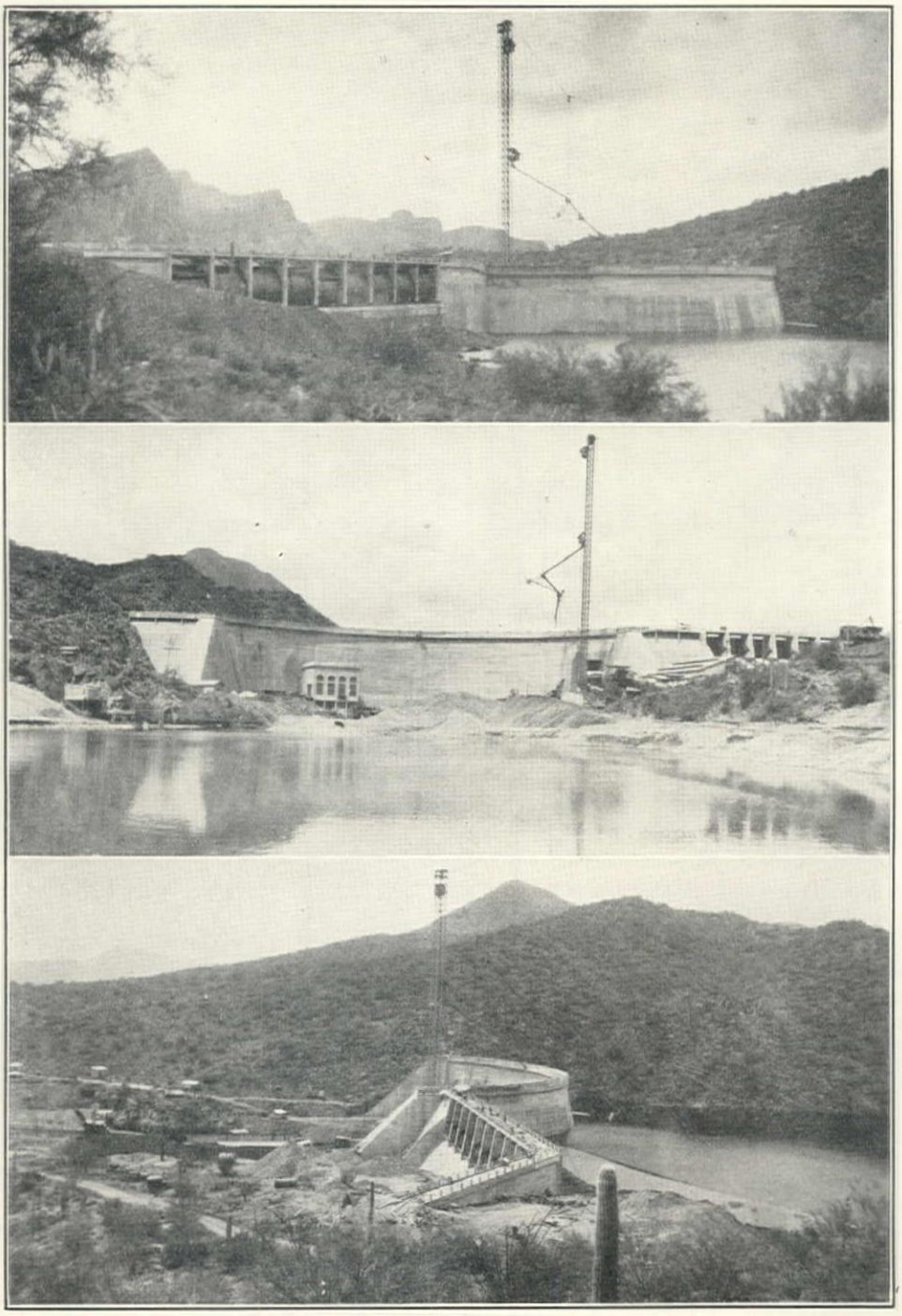
By S. J. SANDERS
Editor, Daily Construction News Service

Progress is being made on important projects as follows:

SALT RIVER VALLEY WATER USERS ASSOCIATION, PHOENIX, ARIZONA

Stewart Mountain Dam and Powerhouse—The last concrete in the body of the dam was placed March 8, 1930. This, for all practical purposes, marks the completion of the dam. Storage of water began February 21, 1930, and the power plant first went on the line in a test run March 7.

This dam is 10 miles below the Mormon flat dam of the Association. It is 170 ft. high above bedrock and 1200 ft. long and contains 117,000 cu.yd. of concrete. The dam consists of a central variable-radius



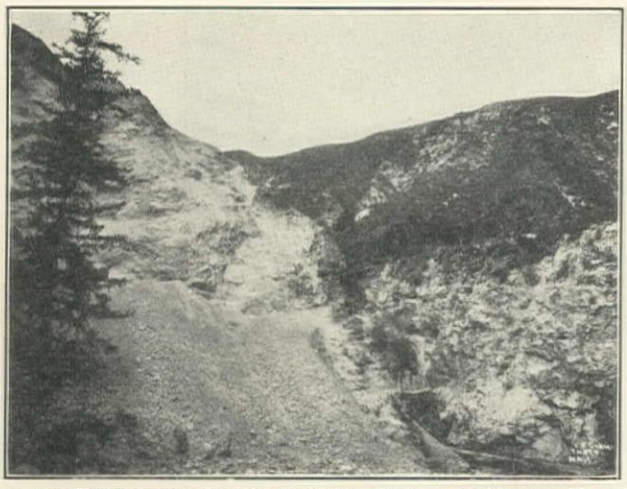
STEWART MOUNTAIN DAM AND POWERHOUSE FOR SALT RIVER VALLEY WATER USERS ASSOCIATION, PHOENIX, ARIZONA, MARCH 18, 1930

arch thrusting against artificial abutments, the abutments connecting to the hillsides by gravity sections. Much of the gravity section on the left side of the river serves as a spillway.

C. C. Cragin is chief engineer and superintendent of construction and T. A. Hayden is his assistant for the Salt River Valley Water Users Association. The work on this project was done by force account.

LOS ANGELES COUNTY FLOOD CONTROL DISTRICT, CALIFORNIA

Hansen Dam—The Los Angeles County Flood Control District awarded a $717,245 contract on January 8, 1930, to Edwards, Wildey & Dixon Co., Los Angeles, for the Hansen dam. This is a concrete arch structure with an earth-fill wing on the north end, the height above streambed being about 204 ft. and the length between abutments 300 ft. The dam is in Big Tujunga canyon 1 mile above Hansen's lodge and 12



Looking Downstream in Big Tujunga Canyon at Hansen Damsite for Los Angeles County Flood Control District. Edwards, Wildey & Dixon, Contractors

miles northeast of Sunland. Work began February 22 and will be completed about March, 1931.

The quantities include 90,000 cu.yd. class 'A' excavation at $3.34 and 18,000 cu-yd. class 'B' excavation at $1.00; 10,000 cu-yd. earth fill at $0.90; 90,000 cu-yd. plain concrete at $3.85 and 2500 cu.yd. reinforced concrete at $9.45; 5500 sq.ft. reinforced concrete face slab at $0.12; drilling 4000 lin-ft. grout holes at $1.50; placing pipe in 250 grout holes at $2.00; 250 cu.yd. pressure grouting at $42.00; placing 10,000 lb. reinforcing steel and 50,000 lb. trash racks, both at $0.02; placing 100,000 lb. steel outlet pipes and 150,000 lb. valves and gates, both at $0.03; placing 8000 lb. iron pipe railing at $0.05; placing 4000 ft. water and grout stops at $0.40; placing 800 lin. ft. tile drain at $0.20. Bids on 102,000 bbl. of portland cement for this project were received by the County on March 17, the lowest being $1.85 per bbl.

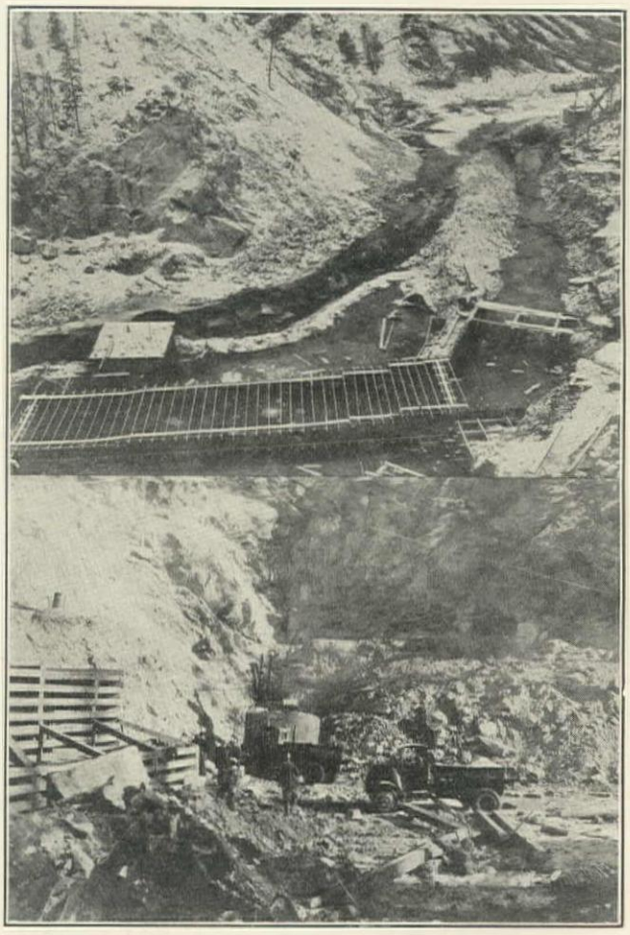
Early in March, a construction road to the damsite and the contractor's camp had been completed and excavating equipment was being installed, ready for electric power. A 22,000-volt transmission line of the Southern California Edison Co. has been extended from Tujunga to the damsite. Before its completion, a 1½-yd. Osgood steam shovel was used in the excavation, supplemented by two 310-c.f.m. gas-powered portable air compressors and six Ingersoll-Rand S-49 jackhamers. To March 1, the contractor had moved 8000 cu.yd. of the 108,000 cu.yd. total excavation.

E. C. Eaton is chief engineer of the Los Angeles County Flood Control District.

BOISE PROJECT, BUREAU OF RECLAMATION, IDAHO

Deadwood Dam—The Utah Construction Co., Ogden, Utah, sublet its contract for the Deadwood dam to Morrison-Knudsen Co., Boise, Idaho. This dam is a concrete arch structure with upstream radius, 160 ft. high and 700 ft. long on crest, and is on the Boise river east of Cascade. Work was shut down December 20 for the winter and reopened March 20. The camp has been built, construction plant installed, and excavation over 75% completed. A Caterpillar '60' and snow plow has been required to open the 65 miles of road between Cascade and the damsite, there being 7 to 10 ft. of snow on three summits on March 24. The project will be completed about December 1, 1930.

Equipment in use includes one P&H No. 700 power shovel and dragline; two 4-yd. Mack trucks; one 2-yd.



(Upper) Diversion Flume for Boise River at Deadwood Damsite; Morrison-Knudsen Co. Subcontract from Utah Construction Co. (Lower) P&H No. 700 Power Shovel and 4-yd. Mack Trucks on Foundation Excavation for Deadwood Dam

T. L. Smith mixer; two crushers; four portable air compressors; one 150-kw. diesel engine generator set; one 5-ton cableway. The shop equipment includes a saw and planing mill, drills, etc.

The contract price, $953,485, involves $280,000 for

clearing reservoir site; $24,000 for diversion and care of river; 12,650 cu.yd. rock excavation for dam at $5.00; 50,000 cu.yd. concrete for 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 $0.40.

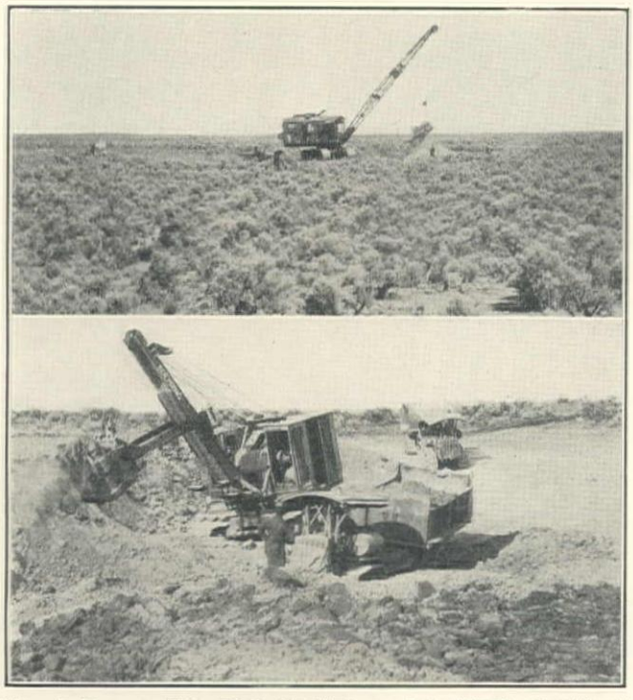
R. J. Newell is superintendent of the Boise project, Bureau of Reclamation, at Boise, Idaho.

MINIDOKA PROJECT, BUREAU OF RECLAMATION, IDAHO

Gravity Extension Division, Main Canal

Specification 489, Schedules 1, 5, and 6—To March 1, John Phillips Co., San Francisco, had worked combined schedules as follows: excavation (class 1 and 2)—completed on schedules 1 and 6, and 90% completed on schedule 5; class 3 excavation—90% completed on schedule 1, 0% on 5, and 75% on 6; structures—65% completed on schedule 1, 10% on 5, and 85% on 6. The contract will be completed about June 1, 1930.

Earth cover in the canal section on schedules 5 and 6 was stripped from the rock for use in building embankments. Where this supply was inadequate, material was side-borrowed. Drilling was done with eight Ingersoll-Rand R12 jackhamers, powered by two 360



(Upper) Bucyrus-Erie 50-B Starting on Schedule 5, Specification 489, Gravity Extension Division, Minidoka Main Canal. John Phillips Co., Contractor. (Lower) Koehring 1-yd. Shovel in Borrow Pit Loading Athey Wagons Pulled by Caterpillar Tractors, Mittry Bros. Construction Co. Contract for Portions of Minidoka Main Canal

c.f.m. portable compressors. All excavation on schedules 5 and 6 was done with one 50-B Bucyrus-Erie dragline. On schedule 1, a second 50-B Bucyrus-Erie dragline was used except for a heavy cut between sta. 308 and 350, where Mittry Bros. Construction Co., Los Angeles, subcontracted the work with a 175-B Bucyrus-Erie dragline, using a 110-ft. boom and 6-yd. bucket.

Specification 489, Schedules 2, 3, 4, 8, and 9—On March 1, Mittry Bros. Construction Co. had made the following progress on combined schedules: excavation—85% class 1 and 2 and 43% class 3 on schedule 2, 4% class 1 on schedule 3, none on remaining schedules; structures—30% on schedule 2 and none on remaining schedules except a small yardage on schedule 8.

Stripping of the earth cover from rock in schedules 2 and 3 was done with one ¾-yd. and one 1½-yd. Koehring draglines. Drilling was done with three Gardner-Denver model 17 drills mounted on a frame carried by a Caterpillar tractor and by three Gardner-Denver model 17 drills on a steel truss spanning the canal. Rock excavation is being handled by the 175-B Bucyrus-Erie electric dragline. Haul on heavy embankments in schedule 2 was made from borrow pits with a 1-yd. Koehring shovel loading into Athey wagons pulled by Caterpillar tractors, or into 4-yd. International trucks. A Chicago-Pneumatic compressor was used.

E. B. Darlington is superintendent of the Bureau of Reclamation, Minidoka project, at Burley, and John K. Rohrer is associate engineer at Eden, in charge of the above two contracts.

Main Canal, Sta. 2315 to 3129—Haas, Doughty & Jones, San Francisco, started stripping a rock cut in the vicinity of sta. 3000 on February 22, using a P&H No. 208 gas-driven dragline. Drilling on this rock was begun February 23, using one 210-c.f.m. portable compressor, with two 310-c.f.m. portables added later in the month. To March 1, there had been excavated 6568 cu.yd. of class 1 material. A new model P&H No. 800 diesel-driven dragline was recently moved in on the work. One Caterpillar '60' tractor, and one 4-yd. McMillan scraper, three Ford trucks, and miscellaneous equipment are also in use on this contract.

The contractors' headquarters are in Shoshone and present plans are to handle this section of the main canal from Shoshone rather than to establish camps along the line. Structures have been sublet to Don J. Cavanaugh, Twin Falls, Idaho, who plans to open up a gravel pit in the north edge of Shoshone.

This contract involves 1,050,000 cu.yd. of excavation, all classes; 900,000 cu.yd. overhaul; 900 cu.yd. reinforced concrete in structures, etc. A large number of structures is required on this reach of canal, as the location intercepts the natural drainage lines of the country and also crosses numerous roads and irrigation tributaries.

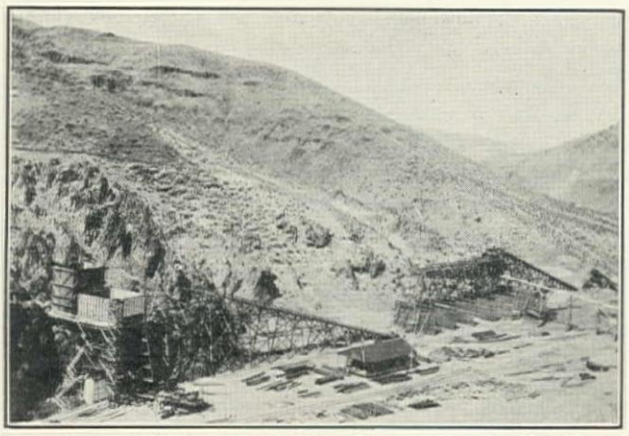
E. B. Darlington is superintendent of the Bureau of Reclamation, Minidoka project, at Burley, and C. H. Spencer is associate engineer at Shoshone. The several contracts in the main canal gravity extension division are described in the March 25th issue, p. 161 to 163.

OWYHEE PROJECT, BUREAU OF RECLAMATION, OREGON AND IDAHO

The Owyhee project lies along the west bank of Snake river in Oregon and Idaho, and extends 30 miles above and 30 miles below the mouth of Owyhee river. The area included in the project when completed will consist of a tract 60 miles long and 2 to 10 miles wide. The Owyhee dam will regulate and divert Owyhee river waters for distribution through canal systems running northerly and southeasterly along the upper border of the lands. The dam will raise the water

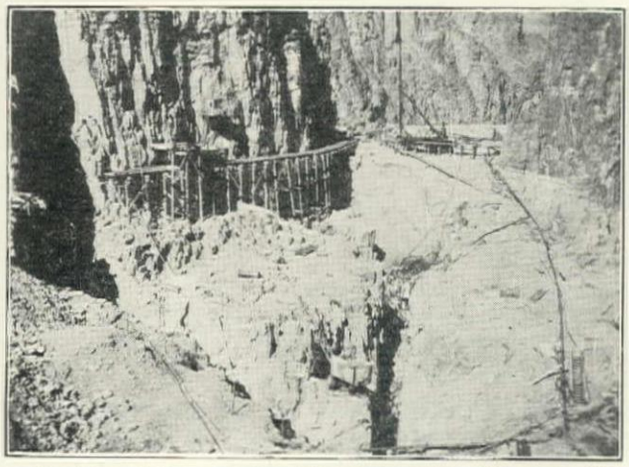
level 300 ft. and will have a total impounding capacity of 1,100,000 ac-ft. The estimated cost of the entire 125,000-acre Owyhee project is $18,000,000, that of the dam being $6,000,000. The area to be irrigated includes 73,000 acres of new lands, 12,000 acres of Owyhee Ditch Co. land, and 40,000 acres now under pumping districts.

Owyhee Dam—The dam is a massive concrete arch-



Screening and Mixing Plant of the General Construction Co. at Owyhee Damsite

gravity structure, 520 ft. high from lowest foundation to the top, 405 ft. from river section foundation to top, and 317 ft. from the river to the top. The top thickness of the dam is 30 ft. and the bottom thickness at bedrock 255 ft.; the crest length is 835 ft. The average width of canyon is 300 ft., the top of dam at elev. 2675 ft., and the high-water surface at elev. 2670 ft. The Owyhee reservoir will have a length of 52 miles and a surface area of 13,000 acres when full, the live storage being 715,000 ac-ft. and the dead storage 405,000 ac-ft. There will be 540,000 cu.yd. of concrete in the dam and 3400 lin.ft. of inspection and drainage galleries. The ring spillway capacity will be 40,000 c.f.s. at maximum water surface of 2675 ft. and 30,000

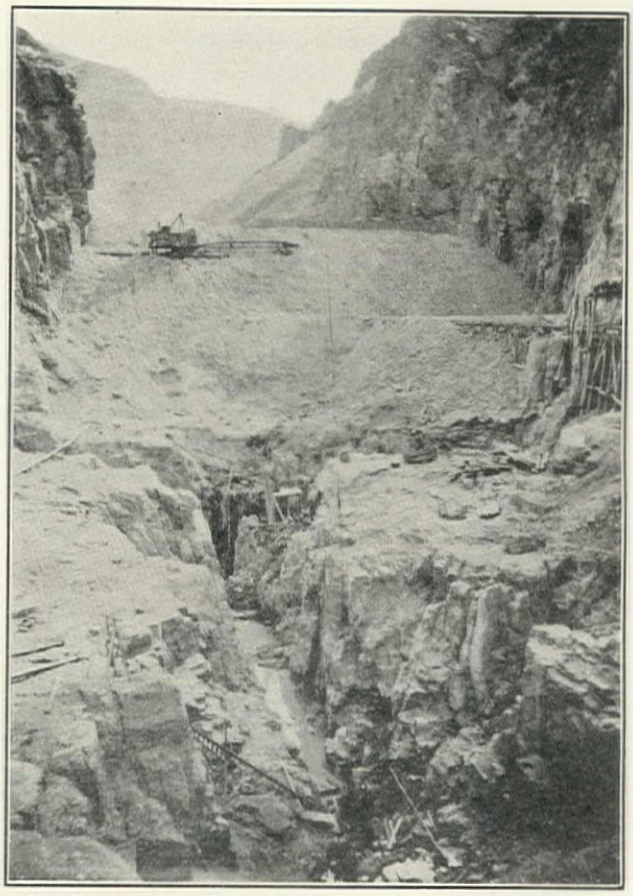


Looking Downstream at Excavation for Owyhee Dam Foundation

c.f.s. at normal water surface; the needle valve outlet capacity being 2800 c.f.s. under full head.

The General Construction Co., Seattle, has completed the diversion work, side wall and keyway trench, and foundation excavation except for a small portion in the crevice or fault zone under the dam. Pressure grouting has started in deep grout holes at the bottom of the cutoff trench. The concrete plant was recently completed and concreting of the spillway shaft has begun. Gross earnings to March 24 were about $950,000, with the work about 30% completed. The project will be finished about December, 1932.

Material from the foundation excavation was loaded by a Marion class 220 dragline into 16-yd. Western air dump cars and hauled by two 8-ton and one 25-ton Plymouth gas dinkies to the cofferdams and waste banks. At the upper cofferdam the material was distributed by a class 14 Bucyrus-Erie and a class 104 Northwest. The Northwest was also used to load skips where operating space was restricted. These skips were hauled by a 25-ton Lidgerwood cableway having a span of 1300 ft. and a head tower travel of 500 ft. Ingersoll-Rand S-80s are used for deep drilling for grout holes. Byron Jackson deep well pumps



Looking Upstream at 85-ft. Cofferdam, with Foundation Excavation Under Way 400 ft. Below Crest Elevation of Owyhee Dam; General Construction Co. Contract

are used for unwatering the excavation. One Marion 80-ft. boom, 2½-yd. steam dragline is in the Dunaway pit ready to start digging sand and gravel.

F. A. Banks is construction engineer and C. A. Betts is office engineer of the Bureau of Reclamation, Owyhee project, with headquarters at Nyssa, Oregon.

VALE PROJECT, BUREAU OF RECLAMATION, OREGON

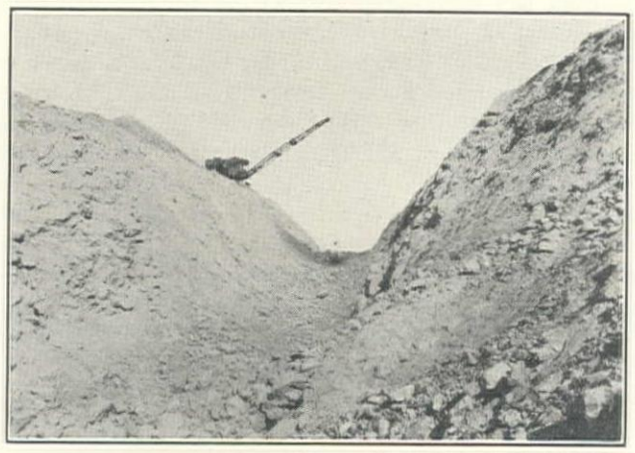
Schedules 1, 2, and 3, Main Canal—W. H. Puckett Co., Boise, Idaho, will complete its contract for sta. 1117+50 to 1980+80 of the main canal before March 7, 1931. This project is being constructed under three

schedules with a combined bid of $495,470. By March 8, the contractor had completed the canal and structures excepting tunnels 4 and 5 for schedule 1, having made 559,783 cu.yd. of canal and structure excavation, placed 1082 cu.yd. of concrete, and excavated 1650 cu.yd. or 395 lin.ft. of tunnel.

Equipment on schedule 1, tunnel 4, includes one Ingersoll-Rand and one Sullivan portable air compressors supplying a No. 7 Gardner-Denver drill. Two shifts are working this tunnel, muck being removed by car and horse. Schedule 1, contract price $179,417, includes 427,000 cu.yd. canal excavation, 5000 sta.yd. overhaul, 8000 cu.yd. structure excavation, 4000 cu.yd. roadway excavation, 3600 cu.yd. tunnel excavation, 2500 cu.yd. structure backfill, 22 M f.b.m. timbering in tunnel, etc.

On schedule 2, which involves 702,000 cu.yd. canal excavation, 70,000 sta.yd. overhaul, 6000 cu.yd. structure excavation, 2000 cu.yd. structure backfill, etc., the contract price is $219,875. Equipment on this schedule includes one Page diesel 4-20 with 80-ft. boom and 4-yd. bucket, working on a 3-shift basis; one Sullivan portable compressor for drilling in advance of excavation; one P&H No. 700 gas shovel with ¾-yd. bucket excavating and loading into one 1½-yd. International and two 2-yd. Four Wheel Drive trucks. This material is hauled into embankments.

Schedule 3, contract price $96,177, includes 271,000 cu.yd. canal excavation, 5000 sta-yd. overhaul, 15,000 cu-yd. structure excavation, 39,500 cu-yd. drainage channel excavation, etc. The following equipment is



Bucyrus-Erie 50-B Diesel Dragline on 50-ft. Cut at Head of Bully Creek Siphon, Vale Project Main Canal; W. H. Puckett Co. Contractor

being used: one 50-B Bucyrus-Erie diesel with 50-ft. boom and 2-yd bucket for canal excavation; one Ingersoll-Rand portable air compressor for drilling; one P&H No. 206 gasoline dragline on structure excavation.

H. W. Bashore is construction engineer for the Vale project, Bureau of Reclamation, at Vale, Oregon.

SALT LAKE BASIN PROJECT, UTAH

Weber-Provo Canal—A contract for construction of the Weber-Provo canal has been awarded to the S. H. Newell Co., Portland. Oregon. for $141,214. This work involves the construction of a diversion dam on the Weber river and 9 miles of 210-c.f.s. capacity canal for diverting water from the Weber to the Provo river. The water will be used for a supplemental supply to lands now under irrigation in the vicinity of Provo, Utah.

Principal quantities in the contract are: 360,000 cu.yd. canal excavation and 20,000 cu.yd. structure excavation; 2155 cu.yd. concrete and 180 M f.b.m. timber in structures, 82,000 lb. reinforcing steel, 15,000 cu-yd. canal bank clay puddle, and 6438 lin.ft. culverts, cross drains, and flumes.

Late in February, one 50-B and one E-2 Bucyrus-Erie draglines (both convertible) were received on the job. The 50-B started excavation at the lower end of the canal on a 40-ft. cut containing 170,000 cu.yd. The E-2 was scheduled to be used first for structure excavation, and afterwards to start at the upper end of the canal. Work on the diversion dam will not be undertaken until after the high water season.

F. F. Smith is construction engineer on the Salt Lake project, Bureau of Reclamation, at Coalville, Utah. O. L. Rice, associate engineer, and Harold W. Mutch, assistant engineer, are directing the work. J. M. Leghorn is superintendent of S. H. Newell & Co.

YAKIMA PROJECT, BUREAU OF RECLAMATION, WASHINGTON

Kittitas Division

North Branch Canal—Division 2, Schedules 1, 2, and 3—Barnard-Curtiss Co., Minneapolis, Minnesota, began construction on these schedules during September, 1929, and will complete the contract by May, 1931. The project was about 20% complete at the end of March. On March 21, 87% of the structure excavation, 25% of the structure concrete, and 10% of the canal excavation had been completed. Work has been mostly confined to canal excavation, the placing of small structures such as turnouts, lock-joint pipe culverts, and one wasteway structure.

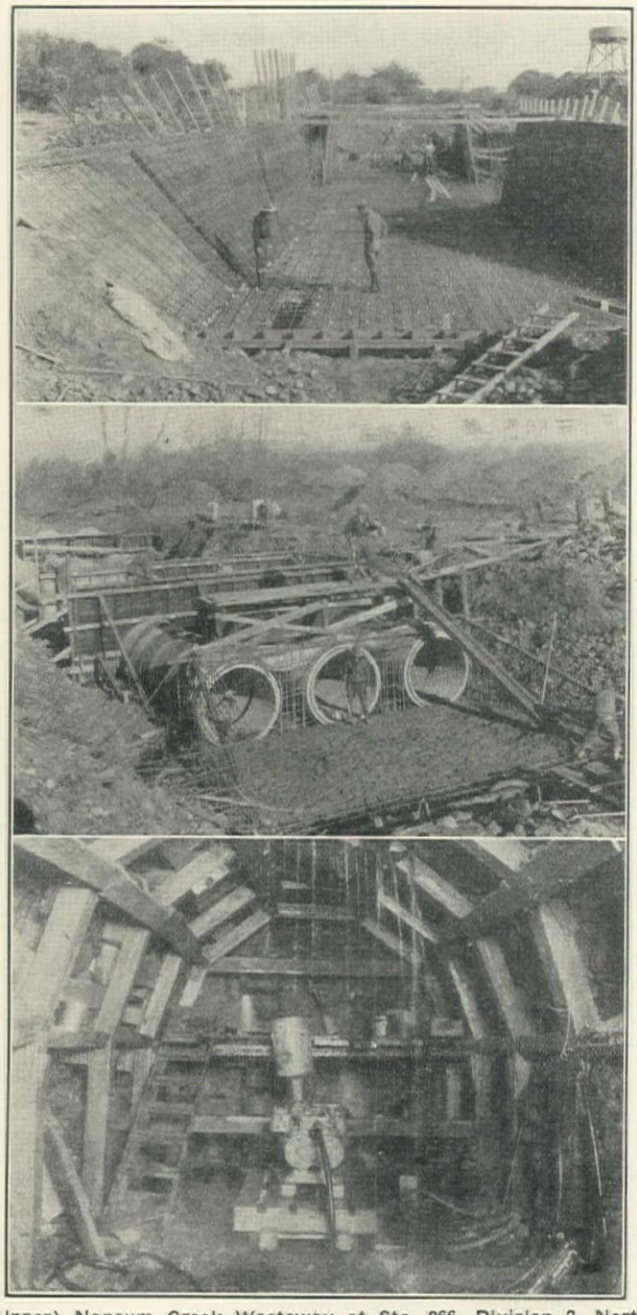
Schedule 1 (sta. 570+24 to 899+54) includes 436,000 cu.yd. canal excavation, 2500 cu.yd. tunnel excavation, 1530 cu.yd. concrete, etc. Schedule 2 extends from sta. 899+54 to 1230+15, involving 250,000 cu.yd. canal, 8400 cu.yd. structure, and 13,600 cu.yd. culvert excavation, etc. Schedule 3 extends from sta. 1230+15 to 1453+00 and includes 144,000 cu.yd. canal and 2100 cu.yd. structure excavation, etc.

A Page dragline with 3-yd. bucket and 75-ft. boom and a Monighan dragline are being used on canal excavation and a P&H dragline with 1-yd. bucket is on the structure excavation.

North Branch Canal—Yakima Tunnel—Work on this 3600-ft. tunnel (9 ft. 3 in. diam.) was begun by Chas. & Geo. K. Thompson, Los Angeles, in April, 1929, and will be completed about December 1, 1930. To March 21, the tunnel excavation was 57% complete and the contract 33% complete. Work began at the wasteway shaft at the center of the tunnel, followed by excavation in headings each way from the shaft. By March 9, excavation of the north end horizontal leg (1575 lin.ft.) had been completed and retimbering and enlargement of a soft rock section had started. The south end horizontal leg tunnel (1845 lin.ft.) was 80% excavated; the pioneer raise in the north inclined shaft (310 lin.ft.) was 65% complete;

excavation had started in the bottom raise in the north inclined shaft (250 lin.ft.); and the concrete plant was half completed. The concrete lining operations were scheduled to start May 1.

Equipment on the work includes three compressors —300-hp., 1700-c.f.m.; a 150-hp. Thomas hoist; four 6-in., 75-hp. DeLaval pumps; two 5-ton General Electric locomotives; a Conway mucking machine and twelve 2-yd. muck cars; Ingersoll-Rand R72 drifter drills, S49 jackhamers, and CA31 stopers; and Ingersoll-Rand No. 50 drill sharpener; and two 7 by 10-in. Gardner-Denver grout pumps.



(Upper) Naneum Creek Wasteway at Sta. 866, Division 2, North Branch Canal, Yakima Project; Barnard-Curtiss Co. Contract. (Center) Placing Concrete at Outlet End of 3-Barrel, 60-in. Concrete Pipe Culvert, Sta. 828, North Branch Canal. (Lower) Easterly Heading of Yakima River Tunnel on North Branch Canal; Chas. & Geo. K. Thompson, Contractors

The contract price is $345,878, main items being 12,700 cu.yd. class 2 canal excavation at $0.45; 4900 cu.yd. excavation for incline shaft at $11.50; 9700 cu.yd. tunnel excavation at $12.70; and 5500 cu.yd. concrete tunnel lining at $13.50.

Walker R. Young is construction engineer and R. B. Williams acting construction engineer on the Yakima project, Bureau of Reclamation, Ellensburg, Washington.

MERCED FALLS PROJECT, SAN JOAQUIN LIGHT & POWER CORP., CALIFORNIA

The San Joaquin Light & Power Corp., Harold K. Fox superintendent of construction, is rebuilding its Merced Falls plant by force account. Excavation along the downstream toe of the old dam has been completed and the old concrete has been grouted. Over 80% of the concrete in the new section on the downstream side of the dam has been placed. Structural steel for supporting the needle type gates has been received and orders have been placed for three radial crest gates, trash rack steel, a hoist for operating the gates, and a gantry crane. Excavation on the powerhouse site is over 50% complete and the placing of concrete has begun. The speed ring of the turbine has been received and deliveries of remaining equipment are expected on schedule. The plant is somewhat unusual as there will be no superstructure over the generator. Instead, designs have been completed for a plate steel generator housing. The project is scheduled for completion on June 1, 1930.

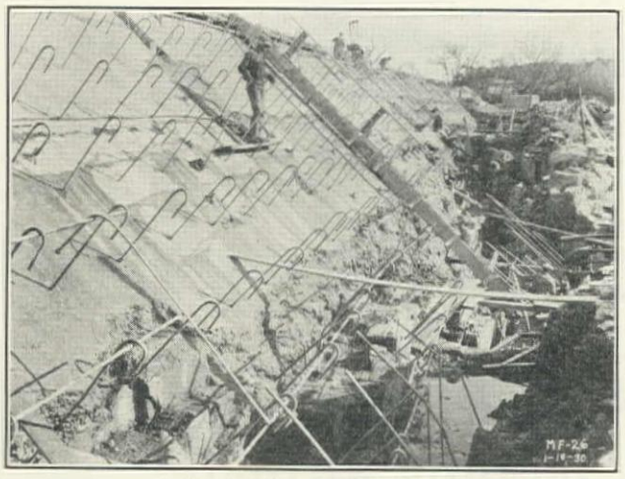
CUSHMAN PROJECT NO. 2, CITY OF TACOMA, WASHINGTON

Cushman Dam No. 2—L. H. Hoffman, Portland, Oregon, has completed excavation in the streambed and sidewalls, except for the cutoff trench, upper part of sidewalls, spillway, and thrust blocks. The project will be completed about August 1, 1930. The lowest point of the cutoff wall is at elev. 245 ft., the centerline of outlet valves at 335 ft., and the top of parapet at 485 ft. The original riverbed is at elev. 320 ft. Concrete has been placed to an average elevation of 290 ft. The contractor had considerable difficulty with deep excavation in river gravel and boulders and in spanning the excavation with a 12 by 20-ft. wooden diversion flume. This flume was carried on long posts and an excellent foundation was finally reached. The flume carries the full output of powerhouse No. 1—at times about 2200 c.f.s. Thorough grouting was carried up with the placing of concrete in the dam.

Butterfly gates for the outlets on the ground and three 14½ by 40-ft. drum gates have been fabricated and are ready for shipment. Two 1-yd. concrete mixers and a gravity spouting system are being used. A guy derrick and skips are used for the riverbed excavation. Lumber and supplies are carried across the damsite on a highline. Panel forms of 1-in. tongue and groove flooring are being used, stayed in place by wire tie backs and pipe struts.

J. L. Stannard is chief engineer of the Tacoma Department of Public Utilities and V. R. Rathburn is assistant engineer of design. J. V. Gongwer is superintendent of hydraulic design and construction and George A. Gregory is resident engineer for the city on this contract. A. P. Dean is the contractor's superintendent and John Alexander is his assistant.

Cushman Tunnel No. 2—Youdall Construction Co., San Francisco, has driven over 9500 ft. of tunnel out of a total of 13,000 ft. About 2000 ft. of tunnel is in solid rock (at west portal and near shaft), the remainder being sand, gravel, and hardpan. Some of the material is very loose. In soft ground, crown bars and the center heading method are principally used; steel poling boards were used near the east portal. Driving



Placing Concrete in New Section of Dam for Merced Falls Project of San Joaquin Light & Power Corp.

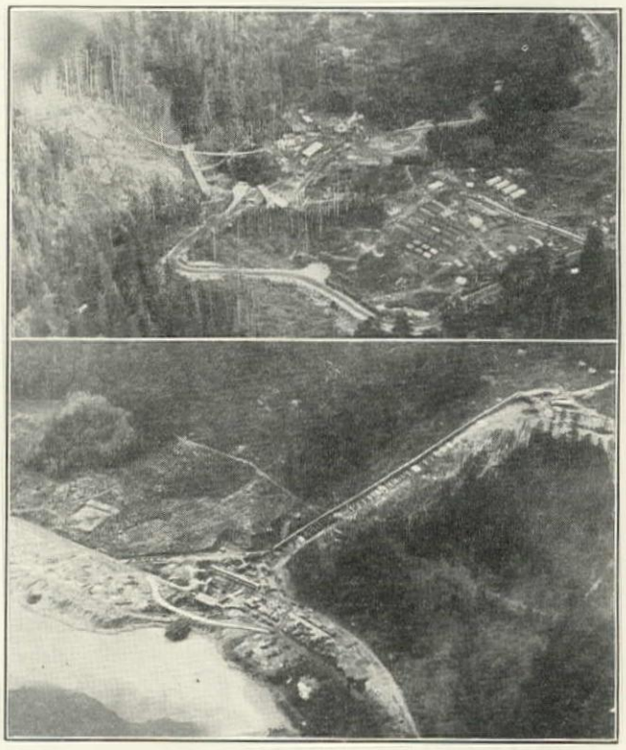
is done from the east and west portals, two ways from an adit at sta. 97+98, and from a shaft at sta. 46+92. Headings 3 and 4 were holed through December 12—these headings extending between the adit and east portal—and on March 10, headings 1 and 5 were 1300 ft. and headings 2 and 6 were 2200 ft. apart. All headings are timbered, the sides being partly lagged in good ground. In some places no side lagging is used, and in part of the solid rock tunnel section no lagging is required. (Headings at the shaft are known as 5 and 6.) Driving will be completed about June 1 and lining about July 15. Driving progress has reached 24 ft. per day for three shifts in soft ground and 14 ft. per day in rock.

Hackley circular steel forms (Western Pipe & Steel Co.) are being used in the lining, the complete bore being placed in one operation. The circular one-pour forms and method appear to be a complete success and a real time saver. The lining is done at the rate of 40 ft. in 8 hours, using a 2-yd. concrete gun. Concrete is transported 3500 ft. in trains to the gun and it is expected that 3 or 4 guns will be used in all. Steel liners at the lower end are completed but not concreted; lining was started from the lower end. Stationary compressors are used at the west portal and adit. Two Conway muckers and two homemade dragline muckers are used for excavating, the muck trains being hauled by storage battery locomotives; gas locomotives haul the concrete trains.

Swan Dalberg, subcontractor, drove the adit and 2000 ft. at the lower end of the tunnel, sunk the shaft, and is driving now from headings 5 and 6. Youdall Construction Co., general contractor, is driving the remaining sections of tunnel and is lining all of the tunnel. This company built a dock on Hood canal for receiving timber, aggregates, reinforcing steel, and steel pipe for liner and penstocks. The dock is equipped with aggregate bunkers and a crawler crane.

R. G. Clifford, R. C. Hackley, and Earl Breiting are superintendents for the Youdall Construction Co. and F. E. Rogers is resident engineer for the city.

Cushman No. 2 Penstocks and Surge Tank—Western Pipe & Steel Co., San Francisco, has the contract for this section of the project and is fabricating all except the lower end of the penstocks. That steel is being fabricated by the Commercial Boiler Makers, Seattle, Washington. Foundations, anchors, and piers are being built by the Youdall Construction Co. under its tunnel contract. Erection of steel will be done by the Gabriel Construction Co. as subcontractor. The surge tank is being fabricated—no steel for this structure had been received on the ground to March 10. The base of all anchors and piers has been placed and over forty 9 ft. 3 in. by 9 ft. 6 in. sections of penstock have been received. The manifold has been nearly installed and valve settings have been concreted at the head of penstocks. The Gabriel Construction Co. expects to haul most of the pipe to the top of the hill over roads constructed by the city and to then let it down by a tramway, using the same stiff-leg derrick now on erection of the steel tunnel liner and scheduled



(Upper) Diversion Flume for Skokomish River, and L. H. Hoffman Camp, Cushman Project No. 2, City of Tacoma. (Lower) Penstock and Cushman Powerhouse No. 2—Two Separate Contracts

later for erection of the surge tank. Penstock valves (10 ft. 6 in.) at the head of the line have been manufactured by the Joshua Hendy Iron Works, San Francisco. Turbine inlet valves are being supplied with the turbines by the Allis-Chalmers Manufacturing Co. Trenches for penstocks under the switchyard at the rear of the powerhouse are over 75% completed; these will be encased in concrete. The contract will be finished about July 1, 1930.

Cushman Powerhouse No. 2—The Ward Construction Co., Tacoma, has completed powerhouse and tailrace excavation except for a dike which will be removed to connect with tidewater after the units are installed and a channel has been dredged to deep water. The tailrace crosses under the Olympic highway, for which the highway bridge has been completed. Curved retaining walls between the powerhouse and highway bridge are about completed.

The main floor of the powerhouse, a structure 52 ft. wide by 184 ft. long is at elev. +20 ft. and the basement floor at elev. +2.0 ft. The floor of the hydraucone draft tubes is at elev. -11.45 ft. To March 10, two-thirds of the 4-ft. powerhouse mat had been placed and the back and end walls were at elev. +2.05 ft. Steel reinforcing had been placed for the remainder of the mat. Relief valve curved plates (dish-shaped cast-iron plates 12-ft. square) were in place on pedestals and ready for concreting in solid. All hydraucone and other curved forms and columns and wall panel forms were made up in advance, the curved forms being covered with Russia iron.

There had been considerable conjecture beforehand regarding the nature of the powerhouse excavation, as other drill holes not far away brought up fine artesian wells. However, the total quantity of water brought up during this construction has not been great, as the flow of artesian wells and neighboring springs has diminished with time. Two exploratory holes at each end of the powerhouse showed fairly dry and firm sand, gravel, and hardpan. One 10-in. pump working half time handled all of the ground water. There was no sea water encountered, although mean tide is at elev. +3.0 ft. and extreme low tide at elev. -7.0 ft.

Two 30,000-kva., 40,000-hp. Allis-Chalmers generating units are being installed and provision has been made for a fourth unit. Plans and specifications for the superstructure have been prepared; the substructure will be completed about May 1, the steel frame June 1, and the building September 15. The powerhouse will be ready to go on the line about November 1, 1930.

John G. Heinz is resident engineer for the city on the substructure contract.

STEAM POWER PLANT FOR EUGENE, OREGON

Stevens & Koon, consulting engineers, Spalding bdg., Portland, Oregon, have been commissioned by the Eugene Water Board, Eugene, Oregon, to prepare plans for an auxiliary steam power plant of 6000 kw. capacity (cost $400,000), to be built in the city on a site adjacent to the existing water plant and electric substation. The Leaburg hydroelectric project was recently completed under direction of these engineers and the new plant will serve as a standby and auxiliary for the two hydro plants which the city now operates on McKenzie river. Oil will be used for fuel, but arrangement of the boiler room will be such that hog fuel may be substituted, if desirable.

PERSONAL MENTION

Alexander Frazer, a civil engineer of Quebec, Canada, has been inspecting the methods of road construction and maintenance in Contra Costa county, California, with Ralph Arnold, county surveyor.

Paul Bailey, former state engineer of California, has been appointed chief engineer of the Tri-Counties Conservation Association and will have charge of design and construction of a $90,000 wing-type dam, 550 ft. long, at the mouth of Upper Santa Ana canyon, California.

R. F. Walter, chief engineer, Bureau of Reclamation, attended a recent conference at Yakima, Washington, to consider engineering and economic features of the proposed Yakima project extensions, and before returning to Denver inspected work in progress on the Kittitas, Vale, and Owyhee projects.

Ray M. Priest, superintendent of the Yuma project, Bureau of Reclamation, Yuma, Arizona, has been appointed a member of the International Water Commission as consulting engineer to make a survey of the entire delta region of the Colorado river below the International boundary. Elwood Mead, commissioner of reclamation, is chairman of the water board.

Walker R. Young, construction engineer, and C. A. Bissell, chief of the engineering division of the Washington office, Bureau of Reclamation, have been selected by Ray Lyman Wilbur, secretary, Department of the Interior, to make investigations of water conservation in California, under a cooperative agreement with the State. Young and Bissell met with State officials in Sacramento on March 20 to outline the work.

B. E. Torpen has since January 1 been consulting engineer to the Russian Soviet on a $100,000,000 water supply project for the Donety basin in the Ukraine and also for the Central Hydroelectric Commission (Soviet) on various projects. The design and construction of over a dozen medium-sized dams is part of the program of these two agencies. Torpen's headquarters are at Hotel Savoy, Moscow, U.S.S.R.

Robert Linton, vice-president and general manager of the Pacific Clay Products Co., Los Angeles, has been appointed a member of the State Mining Board, Division of Mines, California Department of Natural Resources, for which Charles W. Merrill, San Francisco, is chairman. This board was provided for by the last Legislature in an amendment to the Act creating the Department of Natural Resources, and will serve in a policy-making and advisory capacity to the State Division of Mines. Linton is a member of the American Society of Civil Engineers and the American Institute of Mining and Metallurgical Engineers.

OBITUARY

Claude M. Thompson, 48, a partner for 20 years in the firm of Thompson Bros., engineering contractors of Fresno, California, died at Oakland, April 12, following a long illness. Thompson was a native of Fresno and a member of local fraternal orders, including the Elks, Rotarians, and York rite Masons. He is survived by his widow and four children.

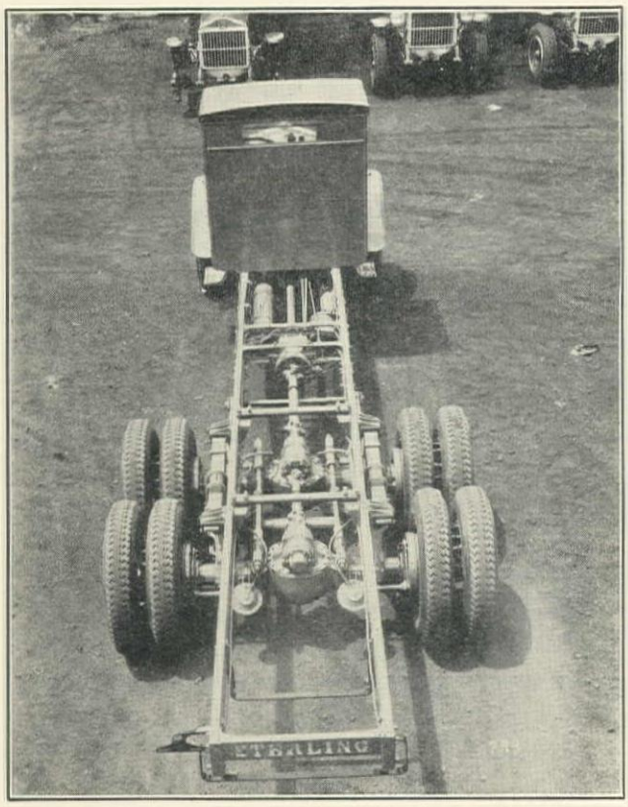
Edwin Duryea, Jr., 68, civil engineer of Palo Alto, California, died March 31 after a long illness. Duryea was born in Craigville, New York, and graduated in engineering from Cornell with the class of 1883, then joining the Northern Pacific Railway staff. After the San Francisco fire of 1906, he served as a member of the committee of 40 on rehabilitation of the city. He was affiliated with the South San Joaquin Irrigation District from 1909 to 1913 and was also chief engineer of the Bay Cities Water Co., of San Francisco. In recent years he practiced as a consulting engineer. Duryea was a member of the American Society of Civil Engineers, serving as director from 1916 to 1918, and the Masonic lodge. He is survived by his widow and five children.

New Equipment and Trade Notes

STERLING PRODUCES HEAVY-DUTY TRUCKS

The Sterling Motor Truck Co., announces the production of two heavy-duty rear four-wheel drive trucks, designed to carry great loads at high speeds.

The model EWS-40 has a capacity of 12 tons, with a maximum total weight of body and load of 40,000 lb. The engine is a Sterling six with a Red-Head Ricardo combustion chamber, which, it is claimed, reduces gas consumption and increases motor efficiency. It has a 5-in. bore by 5¾-in. stroke, 677 cu.in. displacement, and develops 126 hp. at 1800 r.p.m. The four bearings are extra wide and the crankshaft is of chrome nickel steel, heavily cheeked, and perfectly balanced.



Sterling 6-Wheel, EWS-36 Truck Chassis

The oiling system is full pressure, while the governor is built-in as an integral part of the motor.

The frame has 9-in. heavy channel beams with wood-inlay, a patented Sterling feature, which, it is claimed, reduces vibration-and-wear and tear of the truck, in addition to giving the frame added strength. Bolts are used throughout, instead of rivets. The steering gear is of the worm type, making the truck especially easy to handle. The clutch is a heavy-duty Brown-Lipe with 14 driving discs and 14 driven discs. Westinghouse air brakes are used, having 146 sq.in. of braking surface on each rear wheel. The emergency brake is mounted on the propeller shaft and, in all, the truck has 700 sq.in. of braking surface.

The transmission has 4 speeds, augmented by a Sterling patented auxiliary transmission of 9 extra speeds, giving the truck 12 forward speeds, in all. The maximum road speed with load is 30 miles per hour. The front springs have 14 leaves, 48 by 3 in., and the rear 20 leaves, 58 by 4 in. The front axle is of I-beam construction, one-piece forging. The two rear axles are heavy-duty Timken, worm drive, and full-floating. The front axle has a clearance of 13 in. and the rear 10 in. I-beam radius rods form the means of propulsion.

Standard tire sizes are 40 by 8 in., front, and 40 by 8 in., dual rear; both pneumatics. Wheelbases are optional.

The other model is known as the Sterling EWS-36. It is of the same design and construction as the EWS-40, but is of 10-ton capacity. The chassis weight is 13,300 lb. and the maximum total weight, with load, is 36,000 lb. The motor

Frank J. McHugh, Seattle Contractor, Gets First Sterling EWS-40 to Be Delivered on Pacific Coast

size is proportionately smaller, having a 4½-in. bore by 5¾-in. stroke, and 549 cu.in. displacement. It is rated at 98 hp. at 1850 r.p.m.

It also is equipped with a Sterling 12-speed forward arrangement and has a road speed of 33 miles per hour, loaded. The entire frame construction and the tire sizes are the same as the EWS-40.

With these two heavy-duty units added, the Sterling line is most complete, offering bevel-gear units for light hauling, single worm-gear units for medium-sized loads, and rear 4-wheel drive units for heavy hauling, where speed is desired; and chain drives for the most gruelling work.

TRACKSON CO. APPOINTS THREE NEW DEALERS

The Trackson Co., Milwaukee, Wisconsin, announces the appointment of The Concrete Machinery & Supply Co., Los Angeles, the Edward R. Bacon Co., San Francisco, and the Olympic Machinery Co., Seattle (for the Washington territory), as distributors of Trackson tractor equipment for the McCormick-Deering tractor.

These companies will be in a position to give prompt service on all orders for machines, repairs and replacement parts.

CURING CONCRETE BY 'HUNT PROCESS'

McEverlast, Inc., Los Angeles, California, recently published a booklet on 'Curing Concrete by the Hunt Process'. This booklet contains new and helpful information to all engineers and contractors who work with concrete. It describes the curing agent, the method of application, the many advantages through use of 'Hunt Process', and lists some tests that indicate the higher strengths that may be expected from its use.

The 'Hunt Process' is claimed to be the modern method of internally curing concrete, without the use of dirt and water. It introduces important advantages over, and at the same time eliminates the disadvantages of, older curing methods.

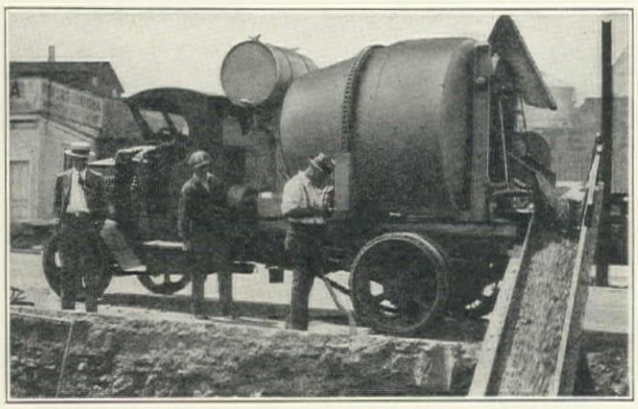
'Hunt Process' is not an asphalt emulsion. It is a compound composed chiefly of Trinidad type lake asphalt, Bermudez asphalt, and Gilsonite, blended at high temperature, thinned with a petroleum solvent, and combined with a pigment. It was developed especially, and exclusively, as a curing medium.

Extracts from a paper on the curing of concrete pavements by the 'Hunt Process' appeared on p. 110, February 25th, issue.

CHAIN BELT CO. PRODUCES THE REX 'MIXHAUL'

The Chain Belt Co., Milwaukee, Wisconsin, has developed the Rex 'MixHaul', a self-contained unit for the efficient truck mixing of concrete. The machine has really been designed in the field to meet actual conditions, and is the result of two years' experiment with test models of several designs.

The 'MixHaul' is designed for extreme portability; is light in weight; and fits any make of truck; it comes in 2, 3 and 4-yd.



The Rex 'MixHaul,' a Chain Belt Co. Product

sizes. Mounted low on the supporting frame, with a large charging opening and variable flow discharge chute, an easy turning drum with 3-point anti-friction suspension, it is an entirely self-contained unit with individual power plant and power take-off. The drum is driven by a Chabelco chain, the transmission is fully enclosed and operates in an oil bath, and the water is supplied by the same accurate system that is provided for all Rex mixers.

TWO HAYWARD CLAMSHELL BUCKETS

The Hayward Co., 50 Church st., New York City, manufactures electric-motor clamshell, class 'E' clamshell, class 'K' digging clamshell, orange peel, and dragline buckets, and automatic cable take-up reels. Two of its products, the Hayward electric motor bucket and the class 'K' digging clamshell, are described in bulletins 700 and 654.

The Hayward electric-motor bucket is a perfected 'hook-on' clamshell which provides a means of utilizing any standard form of hook crane for grab bucket work without any change being made on the crane itself. It is a well-designed, powerful clamshell which is closed and opened by a self-contained motor-operated unit; all the closing power being concentrated within the bucket. A standard reversing motor controller provides electric power which is transmitted to the bucket through a light, flexible, rubber-covered cable. When the electric cable is plugged in, the bucket is ready for work.

Especially designed for service in and about the plant, this bucket can be used for handling sand and refuse and digging pits in foundries; for handling coke, limestone, coal, or other diggable material; and for moving materials around steel mills, chemical plants, and white lead plants. Fully controlled by a single operator, it does away with such devices as trips, latches, shock absorbers, excessive weight, or special preparation of material to be dug or handled. No head room is lost through ropes pulling out of the bucket during the closing movement. The bowl capacities range from 7½ cu.ft. to 3 cu.yd., and the respective weights from 1200 to 10,500 lb.

The Hayward class 'K' digging clamshell bucket is suited to natural excavation and hard digging through surface soil and clay; excavation in loam, sand, and shale; and sewer trenching. It is operated on three, four, five, or six parts of line—which means that softer materials can be handled at high speed and the hard materials at slower speed, but with more power. The bucket is heavily proportioned, properly designed, and built of materials to give long and economical service. The large steel sheaves are well guarded and there is no possibility of the closing line coming in contact with the material handled. The bucket is built in capacities of ¼ to 2 cu.yd.

SULLIVAN HANDBOOK ON ROCK DRILL STEEL

The importance of the steel used in rock and hammer drills, in mining, quarrying, and engineering construction, seldom receives as much attention as it should. Great emphasis is placed on the drilling machines themselves, on the selection of explosives, on the compressed air plant, and on personnel organization. Yet the entire drilling scheme, with the overhead which it represents, is dependent upon the effective operation of the bits in the ground. If the bits are not properly shaped or gauged or tempered, or if the drill shank is not forged to exact dimensions, or if it is too hard or too soft, then not only is the drilling operation slowed up, but the steel itself breaks; the vital parts of the drill are unduly affected by wear and even breakage; loss of time and increase in power consumption become serious factors in production and cost.

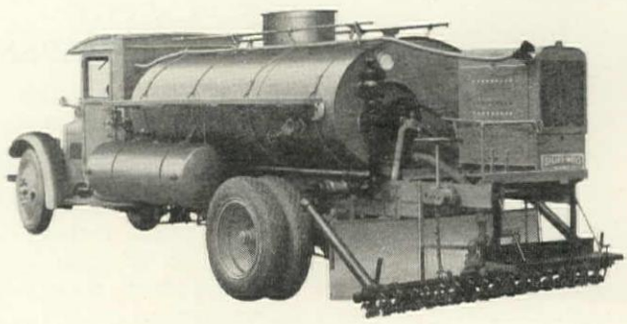
Booklet No. 72-K of the Sullivan Machinery Co., Chicago, entitled 'Handbook of Rock Drill Steel', endeavors to give practical working hints as to the proper handling of the drill steel problem. This 48-page book contains instructions for operation of two different types of Sullivan drill steel sharpeners and also of the Sullivan drill steel furnaces, operated either by oil or gas. There is a separate chapter on pyrometers and pyrometer control, and on the magnetic indicator for indicating the critical point in heating steel for forging or tempering. There is also a separate chapter on heat treatment of drill steel, and an illustration of a drill sharpening shop, showing the proper layout of the equipment.

AMERICAN-HAWAIIAN STEAMSHIP CO. HAS GOOD YEAR

The net profit of the American-Hawaiian Steamship Co., of San Francisco, for the year 1929 was $1,187,421, after deducting for Federal income tax. This was a gain of $802,605 over the net profit for 1928. During the past year, the company's vessels handled over 25,000,000 packages of cargo totalling more than 1,267,000 tons; steamed 1,477,236 miles; transited the Panama canal 220 times; and paid Panama canal tolls of $1,120,694. The company is the oldest of the intercoastal steamship lines and was organized in 1899.

A NEW OIL DISTRIBUTOR

Spears-Wells Machinery Co., Oakland, California, recently shipped Paul Rynning, county engineer of Jackson county, at Medford, Oregon, a 1000-gal. 'Spearwell' road oil distributor, which was made to meet the new 1930 oiling specifications of the Oregon Highway Commission.



'Spearwell' 1000-gal. Road Oil Distributor

This unit differs from the standard unit with which California users are familiar, in that the State of Oregon specifies a separate engine drive for the oil pump, and a separate boot to spray soapy water just ahead of the hot oil. The soapy water is contained in a tank mounted on the side of the oil tank and the water is forced under approximately 10 lb. air pressure to the water boot. The air, under pressure, is supplied by a compressor driven from the truck transmission power takeoff to a reservoir or storage tank.

The Oregon Highway Commission made a long series of tests on this method of oiling in 1929 and adopted it as standard in 1930.

UNIT BID SUMMARY

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

SEWER CONSTRUCTION

ATWATER, CALIF.—CITY—VITRIFIED PIPE SYSTEM, CAST-IRON FORCE MAIN, TREATMENT PLANT, AND PUMPING PLANT

Contract awarded to W. J. Tobin, 527 Balfour Ave., Oakland, $54,673 (on Proposition A, using vitrified pipe and Dorr equipment for treatment plant) for sewer improvements for City. Bids received as follows: (A) Complete system using vitrified pipe, Alternate No. 1 for Treatment Plant; (B) Complete system using concrete pipe, Alt. No. 1 for Treatment Plant; (C) Complete system using vitrified pipe and Alt. No. 2 for Treatment Plant; and (D) Complete system using concrete pipe and Alt. No. 2 for Treatment Plant:

	(A)	(B)	(C)	(D)
(1) W. J. Tobin, Oakland (low bidder)	$54,673	$51,621	$49,673	$48,621
(2) C. H. Johnston, Los Angeles	54,779	52,179	53,218	50,618
(3) Oakland Constr. Co., Oakland	54,779	52,179	53,218	50,618
(4) Harry Gould, Sacramento	60,328		56,828	
(5) Fredrickson & Watson Constr. Co.	62,146	60,143	59,043	57,043
(6) Geo. W. Kemper, Los Angeles	67,731	65,531	65,879	63,679
(7) Oakland Sewer Constr. Co., Oakland	69,064	69,410	66,968	67,314
(8) Southern Construction Co.	74,055	71,421	71,217	68,583

PIPE SYSTEM USING VITRIFIED PIPE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
20,866 ft. 8-in. vitr. pipe	.75	.67	.67	.85	.86	.90	1.00	1.10
684 4-in. Y's on 8-in. pipe	.60	.60	.60	.60	.75	.60	1.50	.75
5,848 ft. 10-in. vitr. pipe	.90	1.48	1.48	.98	.98	2.40	1.50	1.95
96 4-in. Y's on 10-in. pipe	.75	.83	.83	.90	1.00	1.00	2.00	1.25
1,657 ft. 12-in. vitr. pipe	1.28	1.63	1.63	1.20	1.23	2.65	2.50	2.15
148 ft. 8-in. cast-iron pipe	1.62	2.50	2.50	1.50	2.50	4.00	4.00	1.66
54 concrete manholes	50.00	60.00	60.00	70.00	80.00	80.00	80.00	100.00
19 8-in. vitr. pipe lampholes	10.00	10.00	10.00	7.50	25.00	20.00	20.00	50.00

USING CONCRETE PIPE (ALTERN.)

20,866 ft. 8-in. conc. pipe	.72	.625	.625		.80	.85	.94	1.00
684 4-in. Y's on 8-in. pipe	.60	.45	.45		.75	.50	1.50	.75
5,848 ft. 10-in. conc. pipe	.85	1.42	1.42		.88	2.32	1.41	1.85
96 4-in. Y's on 10-in. pipe	.75	.50	.50		1.00	.75	1.15	1.25
1,656 ft. 12-in. conc. pipe	1.20	1.55	1.55		1.13	2.50	2.37	2.05
148 ft. 8-in. cast-iron pipe	1.62	2.50	2.50		2.50	4.00	4.00	1.66
54 conc. manholes	50.00	60.00	60.00		80.00	70.00	80.00	100.00
19 8-in. conc. lampholes	10.00	9.75	9.75		25.00	20.00	20.00	50.00

PUMPING PLANT, FORCE MAIN AND TREATMENT PLANT

Pump pit and pumps	$4,750	$2,900	$2,900	$5,000	$4,350	$4,200	$9,000	$4,372
6,821 ft. 8-in. c.i. force main	1.25	1.21	1.21	1.50	1.35	1.30	1.50	1.60
Treatment Plant, Alter, No. 1	$12.750	$14,000	$14,000	$15,000	$17,000	$12,200	$9,522	$13,612
Treatment Plant, Alter. No. 2	9,750	11,400	11,400	11,500	14,000	10,000	9,868	10,978

W. E. Bedesen, Merced, is City Engineer of Atwater.

BRIDGES AND CULVERTS

LOS ANGELES, CALIF.—CITY—FOURTH STREET VIADUCT—REINFORCED CONCRETE

Fisher, Ross, MacDonald & Kahn, Inc., Room 1204 Spring Arcade Bldg., Los Angeles, who bid $1,246,635, low bid to the City for construction of the Fourth St. Viaduct over the Los Angeles River, to be of reinforced concrete construction, 2400 ft. long. Bids received from:

(1) Fisher, Ross, MacDonald & Kahn, Inc., Los Angeles $1,246,635
(2) General Engineering Corp. 1,291,193
(3) Clinton Construction Co., L. A. $1,306,654
(4) Torson Const. Co., Long Beach 1,310,308
(5) Bent Bros., Inc., Los Angeles 1,493,135

	(1)	(2)	(3)	(4)	(5)
Arch centers	$40,000	$40,000	$53,000	$38,000	$115,000
Reinforcing steel	$250,000	$280,000	$214,000	$208,000	$240,000
44,200 cu.yd. F concrete	16.25	15.60	16.70	18.50	19.85
1,000 cu.yd. D concrete	5.00	15.00	10.00	12.00	7.50
Reinforced concrete piles (pre-cast)	$25,000	$26,940	$23,000	$26,940	$32,000
OR					
Reinf. concrete piles (cast in place)	$25,000	$30,981	$26,000	$26,940	$25,000
6,150 ft. curb	.80	.60	1.34	.75	.45
Grading, lump sum	$40,000	$40,000	$48,000	$30,165	$43,000
7,750 sq.ft. gutter	.30	.25	.54	.25	.25
34,700 sq.ft. sidewalk	.20	.15	.138	.16	.15
Sewer and storm drain	$25,000	$35,000	$31,000	$21,900	$27,000
Paving in place	$30,000	$37,000	$44,000	$46,000	$36,000
Ornam. handrail and pylons	$36,000	$38,000	$55,000	$44,000	$40,000
Lighting standards (bronze)	$66,000	$80,000	$76,000	$65,000	$65,000
OR					
Lighting standards (aluminum)	$62,000	$78,000	$72,000	$62,000	$64,250
Transformer vault	$1,200	$900	$1,300	$1,500	$1,100

SEATTLE, WASH.—CITY—YOUNGSTOWN PLACE VIADUCT

Contract awarded to Lindstrom & Feigenson, Worcester Bdg., Portland, Ore., who bid $115,373 for Youngstown Place Viaduct on West Spokane Street, for City of Seattle. Three lowest bids from:
(1) Lindstrom & Feigenson....$115,373 (2) W. T. Butler Co.....$116,161 (3) Stillwell Bros., Inc.....$123,993

		(1)	(2)	(3)
44,500	cu.yd. Class A excavation	.32	.37	.50
2,129	cu.yd. Class B excavation	2.00	2.40	3.00
2,344	cu.yd. Class B concrete	15.00	16.50	14.96
406	cu.yd. Class C concrete	13.00	10.50	14.70
449,926	lb. reinforcing steel	.0375	.04	.039
31,900	lb. structural steel	.085	.075	.071
4,890	lin.ft. timber piles	.38	.33	.48
3,150	lin.ft. concrete piles	2.20	1.80	1.57
200	lin.ft. test piles	1.50	2.00	2.62
660	lin.ft. pipe railing	3.00	3.40	2.45
20	stand. brick catchbasins	75.00	92.00	80.00
11	inlets (each)	85.00	34.00	50.00
6	brick manholes (each)	110.00	110.00	95.00
215	lin.ft. 10-in. vitr. sewer	2.75	2.30	2.62
1,694	lin.ft. 8-in. vitr. sewer	3.00	1.90	2.36
500	lin.ft. 6-in. vitr. sewer	1.00	.70	2.10
125	lin.ft. 4-in. vitr. drain	.80	.70	.315
1,327	sq.yd. concrete pavement	1.80	1.90	1.90
863	lin.ft. 24-in. conc. curb	1.50	.70	.65
909	lin.ft. 13-in. conc. curb	1.00	.45	.45
102.7	M b.m. lumber in timber trestles	60.00	37.00	50.00

W. D. Barkhuff is City Engineer of Seattle.

STREET AND ROAD WORK

SAN FRANCISCO, CALIF.—CORBETT AVE.—CONCRETE AND ASPHALT PAVING, ETC.

Contract awarded to Meyer Rosenberg, 1755 San Bruno St., San Francisco, $55,859, to the Board of Public Works, City Hall, S. F., for the improvement of Corbett Way from Clayton to 24th Sts. Bids from:

(1) California Const. Co., S. F.....$57,317
(2) Meyer Rosenberg, S. F. (low bidder)..... 55,859
(3) A. G. Raisch, S. F..... 62,685
(4) Pacific States Const. Co..... 63,190
(5) E. J. Treacy, S. F.....$68,701
(6) Fay Improvement Co., S. F..... 56,466
(7) Chas. L. Harney, S. F..... 57,685
(8) M. J. Lynch, S. F..... 64,101

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
17,600	cu.yd. excavation	.44	.50	.60	.60	.70	.50	.40	.65
103	cu.yd. B conc. (walls, etc.)	27.00	20.00	22.00	23.00	23.00	25.00	22.00	25.00
7,220	lb. reinf. steel	.05	.05	.05	.05	.05	.04	.05	.045
30	ft. 15-in. vitr. sewer	2.50	1.50	1.00	3.00	2.20	2.70	3.00	3.00
90	ft. 12-in. vitr. sewer	1.60	1.25	1.00	2.70	2.75	1.68	2.50	2.00
140	ft. 8-in. vitr. sewer	1.60	1.00	1.00	2.00	1.50	1.68	2.00	2.00
2,700	ft. 6-in. vitr. side sewer	.75	1.00	1.00	1.25	.50	.68	1.00	1.00
5	12-in.x6-in. Y branches	2.00	1.00	1.00	2.50	1.50	1.00	2.00	1.50
1	8-in.x6-in. Y branch	1.50	1.00	1.00	2.00	2.00	1.00	1.50	1.50
2	brick manholes	90.00	100.00	100.00	98.00	100.00	70.00	100.00	90.00
15	brick catchbasins	100.00	100.00	100.00	95.00	85.00	87.00	85.00	100.00
1	brick catchbasin reset	50.00	25.00	50.00	25.00	35.00	5.00	40.00	50.00
330	ft. 10-in. vitr. culvert	1.00	1.00	1.00	1.60	1.50	1.00	1.00	1.00
7,000	ft. armored conc. curb	.75	.70	.80	.70	1.00	.70	.85	.90
20	ft. conc. curb, reset	.25	.20	.50	.20	.50	.35	.40	.50
200	ft. 2-in.x8-in. redwood headers	.12	.15	.10	.25	.10	.16	.15	.05
125,000	sq.ft. 6-in. F concrete base and 2-in. asphalt surf.	.234	.22	.24	.237	.2675	.224	.23	.24
4	tons asphalt surface	6.00	6.00	8.00	8.00	6.00	6.00	7.00	9.00
12,000	sq.ft. wire mesh	.04	.04	.03	.04	.04	.03	.04	.04
39,400	sq.ft. conc. sidewalk	.13	.12	.14	.155	.15	.125	.14	.125
7,000	lin.ft. 1½-in. black pipe conduit	.20	.25	.40	.32	.35	.30	.25	.35
1	wooden bulkhead	30.00	25.00	10.00	35.00	100.00	45.00	100.00	50.00
1	wooden stairway, reconst.	25.00	25.00	10.00	20.00	100.00	35.00	100.00	20.00
3,400	ft. 6-in. painted traffic lines	.02	.02	.01	.03	.05	.025	.02	.02
430	pedest. lane markers	.25	.05	.10	.20	.07	.23	.07	.12
4	traffic turning buttons	5.00	.75	1.00	3.00	1.00	3.30	1.00	2.50
3	painted slow signs	12.00	2.00	1.00	3.75	2.50	6.00	10.00	4.00
1	post mounted slow sign	50.00	15.00	10.00	20.00	20.00	70.00	20.00	20.00

SAN FRANCISCO, CALIF.—GOVT.—GRADING—SIERRA COUNTY

Award recommended to J. P. Holland, Inc., 1834 McKinnon St., San Francisco, who bid $63,448 low bid to Bureau of Public Roads, 461 Market St., San Francisco, for grading Section D of Route 26, Yuba Pass National Forest Highway, in Tahoe National Forest, SIERRA COUNTY, consisting of 3.1 miles grading. Bids received on the following items for this project:

(A) 80,645 cu.yd. excavation
(B) 340 cu.yd. structure excavation
(C) 28,000 sta.yd. overhaul
(D) 3.1 mi. finish earth graded road
(E) 30 cu.yd. C concrete
(F) 250 lb. reinforcing steel
(G) 1,182 ft. 18-in. corr. metal pipe
(H) 30 ft. 30-in. corr. metal pipe
(I) 500 cu.yd. hand-laid riprap
(J) 400 cu.yd. hand-laid rock embankment
(K) 84 lin.ft. haul and place Government furnished corr. metal pipe
(L) Haul and pile logs, lump sum
(M) 114 right-of-way monuments (each)

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	TOTALS
J. P. Holland, Inc., S. F.	.665	1.00	.03	$300	28.00	.10	2.00	3.25	4.00	3.50	1.00	$500	3.50	$63,448
Bert Calvert, Los Angeles	.63	2.00	.02	265	40.00	.08	2.75	4.00	5.00	6.00	1.00	1000	3.50	63.841
Yglesias Bros., San Diego	.67	1.50	.04	200	35.00	.08	2.00	3.00	4.00	5.00	1.00	250	4.00	64.596
Frank C. Cuffe, San Rafael	.65	2.00	.04	300	40.00	.10	2.25	5.00	5.00	5.00	1.50	500	3.50	64,708
Christie & Allen, S. F.	.88	1.50	.01	528	45.00	.07	1.75	3.00	4.00	5.00	.50	500	3.00	65,675
Fred F. Cassidy, Nevada City	.72	1.50	.05	300	40.00	.10	2.25	3.90	1.50	1.50	1.00	600	3.00	67,281
Isbell Const. Co., Carson City	.77	2.00	.04	500	35.00	.10	2.35	3.75	3.00	7.00	1.00	500	4.00	74,751
Granfield, Farrar & Carlin	.78	2.50	.02	300	45.001	.07	2.10	3.10	4.25	4.50	1.00	2000	6.00	75,878
C. G. Willis & Sons, Los Angeles	.80	1.50	.02	350	40.00	.08	2.25	4.50	6.00	5.00	1.50	900	3.50	77,110
Finnell Co., Inc., Sacramento	.90	2.00	.04	300	30.00	.10	2.95	3.80	4.50	4.50	1.00	2500	3.00	86,812
Jasper Stacy Co., San Francisco	.92	2.20	.049	558	43.70	.08	1.90	4.25	3.90	4.25	.81	2142	3.60	88,017
Engineers estimate	.75	1.50	.05	300	40.00	.07	2.25	3.50	4.00	3.00	.75	275	3.50	71,242

MENLO PARK, CALIF.—CITY—ASPHALT AND MACADAM PAVING AND SEWERS

Peninsula Paving Co., Standard Oil Bdg., San Francisco, who bid $64,518 to City of Menlo Park, San Mateo County, for improvement of College Ave. and Cambridge Ave. Bids received on:

(1) 13,600 cu.yd. grading
(2) 295,000 sq.ft. 4-in. waterbound rock macadam base with 3-in. asph. surface
(3) 10,500 lin.ft. curb and gutter
(4) 200 ft. 18-in. concrete sewer
(5) 2,000 ft. 24-in. concrete sewer
(6) 9 brick catchbasins
(7) 7,000 ft. 4-in. vitrified sewer

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
Peninsula Paving Co.	.28	.12	.70	1.75	3.50	$90	.50	$64,518
S. M. McGaw	.40	.13	.60	2.50	3.00	$80	.50	66,210
L. A. Batchelder	.45	.135	.58	1.98	3.48	$55	.38	67,766
Union Paving Co.	.33	.145	.60	2.00	4.50	$110	.45	72,503
A. G. Raisch	.50	.14	.75	2.00	3.30	$50	.40	72,970
Hanrahan Co.	.30	.149	.75	2.50	3.50	$75	.75	76,085

DENVER, COLO.—STATE—CONCRETE PAVING—EL PASO AND PUEBLO COUNTIES

Bids from following concerns by State Highway Comm. for 15.5 miles concrete paving north of Pueblo, State Highway No. 1, EL PASO and PUEBLO COUNTIES (three lowest):

(1) Edward Selander, Fort Morgan, Colo. $333,250
(2) H. C. Lallier Const. Co., Denver 338,900
(3) J. E. Miller Const. Co., Denver $350,130

	(1)	(2)	(3)
Removing 16 structs.	$400	$300	$320
10,000 cu.yd. unclassified excav.	.22	.20	.25
50 cu.yd. dry com. struct. excav.	1.00	1.00	3.00
53,300 cu.yd. unclassified borrow	.25	.20	.25
20,500 sta.yd. overhaul on excav. and borrow	.02	.02	.02
29,400 yd.mi. special overhaul	.20	.20	.12
163,880 sq.yd. conc. pavement	1.73½	1.79	1.89
24,480 cu.yd. sand cushion	.70	.70	.60
7.2 M ft. BM misc. untreat. timber	75.00	80.00	75.00
250 cu.yd. class 'A' conc.	13.50	18.00	9.00
27,800 lb. reinf. steel	.06	.05	.05
1,540 lin.ft. wire cable guard fence	.70	.80	.70

DENVER, COLO.—STATE—CONCRETE PAVING—EL PASO COUNTY

J. F. Roberts & Sons, Denver, Colo., $238,200 low bid to State Highway Comm. for 10 miles concrete paving south of Colorado Springs, State Highway No. 1, EL PASO COUNTY. Bids from (three lowest):

(1) J. F. Roberts & Sons, Denver, Colo. $238,200
(2) J. L. Busselle, Colorado Springs 242,500
(3) Driscoll Const. Co., Pueblo $258,200

	(1)	(2)	(3)
3,700 cu.yd. unclassified excav.	.25	.25	.30
36,600 cu.yd. unclassified borrow	.25	.25	.30
16,500 sta.yd. overhaul	.02	.02	.02
18,800 yd.mi. special overhaul	.30	.20	.30
103,355 sq.yd. conc. pavement	1.80	1.84	2.00
8,780 cu.yd. sand cushion	.75	.85	1.00
6.3 M ft. b.m. misc. untreated timber	60.00	70.00	70.00
224 cu.yd. class A conc.	16.00	12.00	16.00
84,600 lb. reinf. steel, Type A	.1425	.15	.06
73,900 lb. reinf. steel, Type B	.08	.085	.06
33,700 lb. reinf. steel, Type C	.054	.07	.055
31,700 lb. reinf. steel, Type D	.07	.0825	.08
26,400 lb. reinf. steel, br. approach slabs	.05	.05	.05
3,210 lin.ft. wire cable guard fence	.65	.70	1.35

LOS ANGELES, CALIF.—CITY—CONCRETE PAVING—LAUREL CANYON ROAD

J. L. McClain, 3452 West Slauson Ave., Los Angeles, who bid $241,736, low bid to City of Los Angeles, for improving Laurel Canyon Road, from Pacoima Ave. to Lookout Mountain Road. Bids received on:

(1) Grading, lump sum
(2) 425,168 sq.ft. 8-in. conc. pavement
(3) 23,075 lin.ft. reinf. integral curb
(4) Storm drain
(5) Sanitary sewer
(6) Water system, complete
(7) 311 water service connections
(8) Concrete headwalls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	TOTALS
J. L. McClain, Los Angeles	$50,000	.23	.57	$30,000	$29,000	$2860	21.00	$3000	$241,736
Griffith Co.	40,000	.25	.55	29,000	30,000	2700	20.00	4000	242,274
John Papac	45,648	.235	.64	37,000	25,670	2750	19.80	5200	245,232
Basich Bros.	55,000	.24	.60	26,000	25,000	3000	21.60	3500	245,354
Tryon & Brain	55,000	.245	.65	28,000	32,000	3200	23.50	4000	258,239

PORTLAND, ORE.—SURFACING—LANE COUNTY—STATE

Contract awarded to J. W. & J. R. Hillstrom, Marshfield, Ore., who bid $72,380 to Oregon State Highway Commission, Portland, for resurfacing 21 miles of Nimrod-Belknap Springs Section of McKenzie Highway, and furnishing materials for maintenance purposes, LANE COUNTY. Bids on:

(1) 1,000 cu.yd. subbase materials
(2) 18,000 cu.yd. base materials
(3) 200 cu.yd. key materials
(4) 5,500 cu.yd. top materials
(5) 5,800 cu.yd. screenings
(6) 5,250 cu.yd. A materials (stockpile)
(7) 5,250 cu.yd. B materials (stockpile)
(8) 3,000 cu.yd. earth filler
(9) 6,000 yd. mi. filler haul

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	TOTALS
J. W. & J. R. Hillstrom, Marshfield	1.70	1.70	1.70	1.70	1.80	1.70	1.70	.30	.20	$72,380
A. S. Wallace, Roseburg	1.80	1.80	1.80	1.80	1.80	1.50	1.50	.30	.20	72,750
C. R. Vaughn, Portland	1.80	1.80	1.80	1.80	1.80	1.70	1.70	.35	.17	75,860
J. J. Dann, Portland	1.90	1.90	1.90	1.90	1.90	1.50	1.50	.40	.20	76,100
Newport Constr. Co., Portland	1.98	1.98	1.98	1.98	1.98	1.55	1.55	.30	.16	78,525
C. L. Camp, Medford	2.00	2.00	2.00	2.00	2.00	2.00	2.00	.30	.20	84,100

PHOENIX, ARIZ.—STATE—OIL PROCESSING YUMA-PHOENIX HIGHWAY

Contract awarded to Schmidt-Hitchcock Cont. Co., P.O. Box 292, Phoenix, Arizona, who bid $149,469 to Arizona State Highway Commission, Phoenix, for oil processing of Yuma-Phoenix Highway, F.A.P. 55, Reo., Schedule 1, work beginning about 7 miles west of the Yuma-Maricopa County line, consisting of oil processing by the road mix method about 42½ miles of road. Bids received on:

(1) 449,613 sq.yd. prepare subgrade
(2) 35,124 cu.yd. additional mater. (surf.)
(3) 140,328 cu.yd.mi. haul add. material (surf.)
(4) 899,226 gal. oil applied to road
(5) 42.577 miles mix, lay, and finish

	(1)	(2)	(3)	(4)	(5)	TOTALS
Schmidt-Hitchcock Cont. Co., P.O. Box 292, Phoenix	.01	1.13	.15	.07	$500	$149,469
R. E. Hazzard Constr. Co. and E. F. Sanguinetti, San Diego	.0174	.84	.16	.07	600	148,316
Skeels & Graham Co., Tucson	.01	1.90	.16	.07	525	178,982

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

Dam, tunnel, conduit, power plant for Pacific Gas & Electric Company on Bear River, etc., in El Dorado National Forest, Calif.

Office building on Vine and Yucca Sts., Hollywood, for Hollywood Medical-Dental Bdg., Calif. $1,000,000.

Dam, earth fill type, for El Dorado Irrigation Dist., Placerville, Calif. $435,000.

Washington St. Bridge for City of Los Angeles. $350,000.

Sixth St. Viaduct for City of Los Angeles. $450,000.

Wells, pumps, pipe-lines, reservoirs, etc., for City of Whittier, Calif. $325,000.

Reservoir, filtration plant, and mains for City of Great Falls, Mont. $690,000.

BIDS BEING RECEIVED

School, Balboa South Side High School at San Francisco, $650,000, bids to May 7.

Penstocks, power plant equipment, etc., for City of Centralia, Wash., $400,000, bids to April 29.

Concrete and asphalt paving 6 miles of Main St. north of Wilmington for Los Angeles County, bids to May 5.

CONTRACTS AWARDED

Tunnel on Figueroa St. Extension through Elysian Park for City of Los Angeles, to H. W. Rohl Co., L. A., $652,788.

Pipe-line, 16 miles from Napa County to Crockett, Calif., for California-Hawaiian Sugar Co., S. F.—Furnishing pipe to U. S. Pipe & Fdy. Co. and laying pipe to Jas. Currie, Burlingame.

STREET and ROAD WORK

WORK CONTEMPLATED

SAFFORD, ARIZ.—Plans by Weiland Engineering Co., Thatcher Bdg., Pueblo, Colorado, for improvement of 19 blocks of pavement, curb, and gutter, drainage, pipe for irrigation, ditches, etc. $150,000. 4-5

BAKERSFIELD, CALIF.—Plans by City Engr., J. B. Holfelder, protests April 21 for sidewalks and curb on portions of 21st St., 22nd St., H. St., G St., F St., E St., and D St., in the City. 4-5

BERKELEY, CALIF.—City is considering paving and widening of Spruce St. to cost $200,000. H. Goodridge is City Engr. 4-8

HOLLISTER, CALIF.—Plans by City Engr., protests Apr. 28 for paving with 6-in. concrete on 4-in. gravel base on 17 blocks of streets on South St., East St., Hawkins St., Third St., etc., and paving with 5-in. concrete with 4-in. gravel base on four alleys, also constructing concrete curbs, concrete gutters, etc. $81,000. 1911 Act. 4-12

SALINAS, CALIF.—Plans by City Engr., protests May 5, for improving Spring St., concrete paving, etc. 4-12

BIDS BEING RECEIVED

PHOENIX, ARIZ.—Bids to 2 p.m., May 2, by Arizona State Highway Commission, Phoenix, for construction of the Florence-Tucson Highway, F. A. Project 94-F, beginning about 1 mile northwest of Rillito and extending about 15.5 miles southeast toward Tucson, consisting of grading, draining, and surfacing of about 15.5 miles of road, involving: ROADWAY—7800 cu.yd. road excavation; 91,000 cu.yd. road borrow; 1600 cu.yd. structure excavation; 3600 cu.yd. drainage excavation; 850 cu.yd. concrete; 47,500 lb. reinforcing steel; 394 ft. 24-in. corr. metal pipe; 236 ft. 30-in. corr. metal pipe; 50 ft. 36-in. corr. metal pipe; 23,000 lin.ft. reset old stock fence; 29,000 cu.yd. min. aggregate (surface); 65,000 cu.yd.mi. min. aggr. (surf.) haul. BRIDGES—1500 cu.yd. excavation; 1300 cu.yd. concrete; 163,000 lb. reinforcing steel; 1800 lin.ft. concrete piling. 4-14

HILLSBOROUGH, CALIF.—Bids to 5 p.m., May 6, by City Clerk for improvement of Ranelagh Road, Ericson Road, El Cerrito Ave., involving 1600 cu.yd. grading, 3400 ft. 24-in. gutter, 30,000 sq.ft. 3-in. asph. base and 3-in. asphalt surface. 4-16

LONG BEACH, CALIF.—Bids to 2 p.m., Apr. 29, by City Clerk for improving Daisy Ave., involving: 3216 lin.ft. curb; 202 lin.ft. armor; 16,049 sq.ft. sidewalk; 450 sq.ft. 6-in. sidewalk; water mains, complete. 4-15

LOS ANGELES, CALIF.—Bids to 2 p.m., May 5, by Board of County Supervisors, Hall of Records, Los Angeles, for improvement of Main St., north of Wilmington, from S St. to Olive St., 6.12 miles, Cash Contract No. 394, involving 74,135 cu.yd. excavation, 364,933 sq.ft. 10-7-7-10-in. conc. pavement, 335,554 sq.ft. 9-7-7-9-in. conc. pavement, 38,154 sq.ft. 8-in. concrete pavement, 472,106 sq.ft. 2-in. asph. conc. surface, 467,443 sq.ft. 6-in. asph. conc. base, 321,260 sq.ft. 5-in. disintegrated rock pavement and shoulders with oil and rock wearing surfaces, 1,243,200 sq.ft. 5-in. old Mac. and dis. rock base, concrete headwalls, box culverts, 17 ft. 24-in. reinforced concrete pipe, 206 ft. 12-in., 465 ft. 18-in., 36 ft. 24-in., and 30 ft. 30-in. corrugated metal pipe, 150 ft. wire link highway guard fence, 140 6 by 6-in. by 6-ft. redwood posts. 4-18

LOS BANOS, CALIF.—Bids to 6 p.m., May 5, by Board of Education, West Side Union High School District for 515 lin.ft. concrete sidewalk. 4-12

SACRAMENTO, CALIF.—Bids to 3 p.m., April 30, by Division of Highways, Division Engineer District X, 502 State Office Bdg., Sacramento, for 8.6 miles light fuel oil to be furnished and applied as a dust layer in Alpine County, between Hangman's Bridge, about two miles southeast of Markleeville, and Woodfords. 4-16

SACRAMENTO, CALIF.—Bids to 2 p.m., May 14, by Division of Highways, Public Works Bdg., Sacramento, for 0.8 mile grading at Mojave River, in SAN BERNARDINO COUNTY, work involving 19,200 cu.yd. road excavation Loc. A, 11,700 cu.yd. road excavation Loc. B, 173,300 sta.yd. overhaul. 4-16

SACRAMENTO, CALIF.—Bids up to 2 p.m., May 7, by California Division of Highways, Public Works Bdg., Sacramento, for: HUMBOLDT COUNTY—4.3 miles grading and paving with cement concrete at Scotia and from Fortuna to Loleta, involving: 56,900 cu.yd. roadway excavation; 1850 cu.yd. structure excavation; 4190 cu.yd. salvaged macadam surface; 4760 cu.yd. screened gravel (sub-base); 5820 cu.yd. river run gravel (shoulders and approaches); 9875 cu.yd. 'A' concrete paving; 247,000 lb. reinforcing steel. SAN JOAQUIN COUNTY—0.7 miles grading and surfacing from Lodi to ¼ mile west of Mokelumne River, involving: 3.7 acres clearing and grubbing; 3650 cu.yd. roadway excavation; 45,600 cu.yd. imported borrow; 1500 tons untreated gravel or stone surface. DEL NORTE COUNTY—15.2 miles surfacing with untreated gravel or stone from Smith River to Patricks Creek, work involving: 12,000 cu.yd. untreated gravel or stone surfacing; 785 M gallons water applied to surface.

SAN FRANCISCO, CALIF.—Bids to 10:30 a.m., May 20, by Joint Highway District 9, Room 235, City Hall, San Francisco, for first unit of Ocean Shore Highway, which will connect San Francisco and Santa Cruz. First unit is Pedro Mountain Grade, involving: SECTION A (4 miles), involving 50,000 cu.yd. roadway grading, 4000 cu.yd. structure excavation, 1700 cu.yd. concrete, 140,000 lb. reinf. steel, corr. pipe; and SECTION B (2 miles), involving 35,000 cu.yd. roadway excavation, 3000 cu.yd. structure excavation, 650 cu.yd. concrete, 61,000 lb. reinf. steel, corr. and concrete pipe. Geo. A. Kneese, Redwood City, is Engr.

SAN GABRIEL, CALIF.—Bids to 7:30 p.m., May 13, by City Clerk for improvement of Mission Drive, involving 147,346 sq.ft. 4-in. asph. conc. base with 2-in. Warrenite surface, 4433 ft. heavy curb, 21,910 sq.ft. monolithic sidewalk, lighting system. 4-18

SAN JOSE, CALIF.—Bids to 11 a.m., May 5, by County Clerk for: (1) Improvement of Silver Creek Road in Sup. Dist. No. 2. (2) Improvement of Union Ave. in Sup. Dist. No. 5. 4-12

SAN RAFAEL, CALIF.—Bids to 11 a.m., Apr. 28, by County Clerk for 4.6 miles oiling from Point Reyes to Inverness Road, involving: 425,000 sq.ft. oil surfacing with emulsified asphalt and screenings. 4-15

SUNNYVALE, CALIF.—Bids to 7:30 p.m., April 28, by City Clerk, City Hall, Sunnyvale, for improvement of portions of Washington Ave., Evelyn Ave., McKinley Ave., Iowa Ave., Pastoria Ave., Mathilda Ave., Taaffe St., Arques St., Sunnyvale Ave., and Carroll St., involving 450,000 sq.ft. 3-in. asphalt base with 2-in. asphalt surface, curbs, sidewalks, gutters, concrete sewers, ¾-in. galvanized iron pipe water service connections, corr. culverts, etc. 4-15

BOISE, IDAHO—Bids to 2 p.m., Apr. 29, by State for: (1) Bituminous treatment of 35.76 miles of the North and South Highway between Lapwai and Culdesac; Thorn Creek and Viola; and Potlatch and the Washington State Line in Nez Perce and Latah Counties, involving: 35.76 miles scarifying; 10,000 bbl. heating and applying oil; 35.76 miles mixing and finishing. (2) Bituminous treatment of 33.3 miles of the North and South Highway between Weiser and Cambridge in Washington County, involving: 33.3 miles scarifying; 10,350 bbl. heating and applying oil; 33.3 miles mixing and finishing. (3) 18 miles from Viola to Princeton, LATAH COUNTY, involving 28,000 cu.yd. rock surfacing. (4) 8 miles from Lapwai to Culdesac, NEZ PERCE COUNTY, involving 11,000 cu.yd. rock surfacing. (5) 20 miles from Thorn Creek to Viola, LATAH COUNTY, involving 24,000 cu.yd. rock surfacing; and (6) 17 miles Coeur d'Alene Yellowstone Park Highway, KOOTENAI COUNTY, involving 9500 cu.yd. rock surfacing.

CARSON CITY, NEV.—Bids to 2 p.m., April 30, by Department of Highways, State of Nevada, Heroes Memorial Bdg., Carson City, Nev., for constructing a portion of the State Highway System in HUMBOLDT COUNTY, from Paradise Hill to Orovada, Route 8, Section C, a length of 18.6 miles, involving: 21,000 cu.yd. excavation; 14.51 mi. prepare subgrade and shoulders; 24,800 cu.yd. cr. rock or gravel in place; 6.76 mi. finish partly graded road. 4-14

SANTA FE, N. M.—Bids to 10 a.m., Apr. 30, by State Highway Comm. for: (1) 15.5 miles grading and surfacing from Park View to El Vado; (2) 21 miles grading from Gallup to Guam; (3) 14 miles surfacing and oil processing from Las Vegas to Watrous; (4) 15 miles surfacing and oil processing from Pojoaque and Alcalde; (5) 2 miles grading and surfacing from Socorro to Belen; and (6) 9 miles surfacing and oil processing from Deming to Las Cruces.

OLYMPIA, WASH.—Bids to May 13 by State Highway Commission, Olympia, Washington, for the following: JEFFERSON COUNTY—Surfacing 7.5 miles with crushed stone of Olympic Highway, from Kalalock Creek to Cedar Creek, involving: 26,660 cu.yd. crushed stone. GRAYS HARBOR COUNTY—Surfacing 6.1 miles of Willapa-Grays Harbor Highway, from Arctic to Salmon Creek, involving 23,900 cu.yd. crushed stone. GRAYS HARBOR AND PACIFIC COUNTIES—Surfacing 10.1 miles of Willapa-Grays Harbor Highway, from Salmon Creek to Raymond, involving: 32,300 cu.yd. crushed stone. FERRY COUNTY—Surfacing 8.8 miles of Tonasket-San Poil Highway, from Columbia river north, involving: 23,100 cu.yd. crushed stone. 4-18

BIDS RECEIVED

BAKERSFIELD, CALIF.—Dean & Stroble, Bakersfield, $13,268 for curbs and sidewalks in County Dist. No. 10. 4-9

EUREKA, CALIF.—Hemstreet & Bell, Marysville, who bid $9750, only bid to Division of Highways, District Engineer, Eureka, for furnishing and stockpiling untreated crushed gravel or stone surfacing and screenings in MENDOCINO COUNTY, in the vicinity of Longvale, at Long Valley Creek bridge. 4-18

LONG BEACH, CALIF.—Masten & Petrie, 248 E. Lime St., Monrovia, who bid $14,291, as follows, submitted low bid to City of Long Beach for improvement of Plenty St., between Long Beach Blvd. and east city limits:

10,299 ft. curb	.38
301 ft. curb armor	.40
51,185 sq.ft. sidewalk	.115
Water mains	$4,370

4-12

SACRAMENTO, CALIF.—Low bids as follows by State Division of Highways: YUBA COUNTY—0.9 mile grading and concrete paving through Wheatland. C. W. Wood, P.O. Box 1435, Stockton (low), $31,296. LOS ANGELES COUNTY—26.5 miles oiling from west boundary to Santa Monica. Ben F. Dupuy, 12,012 S. Vermont Ave., Los Angeles (low), $10,081. SAN DIEGO AND IMPERIAL COUNTIES—A total of 35.4 miles of oiling as follows: 2.7 miles from La Mesa to El Cajon; 11.3 miles from Flynn Springs to Diejas Valley; 7.9 miles from Pine Valley Creek to Kitchen Creek; and 13.5 miles from La Cumba to Myers Creek. Gilmore Oil Co., 2423 E. 28th St. (Vernon), L. A. (low), $22,165. 4-16

SAN LUIS OBISPO, CALIF.—Bradley Truck Co., Santa Maria, $4130, low bid, Division of Highways, District Engineer, San Luis Obispo, for 6.5 miles heavy fuel oil to be furnished and applied to shoulders between Elwood Overhead Crossing and Goleta, and between Carpinteria and Rincon cutoff, SANTA BARBARA CO. 4-16

STOCKTON, CALIF.—Lilly, Willard & Biasotti, 40 W. Clay St., Stockton, $8475 low for grading and surfacing J. R. Pearson Road for County. 4-15

DENVER, COLO.—Edw. Selander, Ft. Morgan, Colo., $333,257 low bid to State for 15 miles grading and concrete paving north of Pueblo, State Highway 1, EL PASO AND PUEBLO COUNTIES.

PORTLAND, ORE.—Geo. C. Arenz, 693 Siskiyou St., Portland, $109,358 low bid to City for concrete paving Hawthorne Ave. from E. Water to E. 55th St.

CONTRACTS AWARDED

EUREKA, CALIF.—To Engelhart Paving & Construction Co., Eureka, who bid $8731 to District Engineer, District No. 1, California Division of Highways, Eureka, HUMBOLDT COUNTY, for one-half mile grading and surfacing with gravel or stone from Arcata crossing easterly. 4-12

HILLSBOROUGH, CALIF.—To Union Paving Co., Call Bdg., San Francisco, who bid $4500 for asphalt patching on Santa Ynez St., etc., work for the city. 4-16

LONG BEACH, CALIF.—Awards as follows by City: (1) to C. W. Holeman, 20 W. Vane St., Long Beach, $7963 for improving alley east of Prospect St. and $5436 for improving alley east of Claremont Ave., paving with concrete; and (2) To Sully-Miller Contr. Co., 1500 W. 7th St., Long Beach, $14,710 for improving Anaheim St., grading, concrete paving, water mains, etc.

LONG BEACH, CALIF.—Awards as follows by City: (1) To P. P. Janich, Pacific Southwest Bank Bdg., Long Beach, $17,475 for improving Coolidge St., 65th St., curbs, gutters and water mains; (2) To Masten & Petrie, 248 E. Lime St., Monrovia, $14,300 for improving Plenty St. from Long Beach Blvd. to east city limits, curbs, walks and water mains; and (3) To J. H. Dudley, 3738 Orange Ave., Long Beach, $8200 for improving La Verne Ave., concrete paving, etc.

LOS ANGELES, CALIF.—To Southwest Paving Co., Washington Bdg., Los Angeles, who bid $11,725 to Division of Highways, District Engineer, Los Angeles, for 3.8 miles oil-treated crushed gravel or stone border in VENTURA COUNTY, between 3.8 miles east of Camarillo and Camarillo. 4-12

LOS ANGELES, CALIF.—Awards as follows by California Division of Highways, District Engineer, Associated Realty Bdg., Los Angeles: To G. M. Duntley, 772 S. San Pedro, Los Angeles, who bid $2724 for 15 miles fuel oil to be applied to shoulders between Galivan and Irvine in Orange County and between Leffingwell Ranch and north county line in Los Angeles County. To G. M. Duntley, 772 S. San Pedro, Los Angeles, who bid $3467 for 18 miles fuel oiling of shoulders from Oceanside and north boundary in SAN DIEGO County. To California Road Oil Service Co., 704 Richfield Bdg., Los Angeles, who bid $3998 for 24 miles fuel oiling for shoulders from Camarillo to Ventura and from Ventura to 3 miles north of Seacliff in VENTURA COUNTY. 4-12

LOS ANGELES, CALIF.—To J. L. McClain, 3452 W. Slauson Ave., Los Angeles, at $241,736, for City of Los Angeles, for improvement of Laurel Canyon Road, from Pacoima Ave. to Lookout Mountain Road, by grading, concrete pavement, storm drain, sanitary sewer, water system, concrete headwalls, etc. (See Unit Bid Summary.) 4-14

OAKLAND, CALIF.—Awards as follows by County: (1) To Lee J. Immel, 1031 Evelyn Ave., Berkeley, who bid $5746 for oil surfacing of 6500 lin.ft. of the Hopyard Road. (2) To Lee J. Immel, 1031 Evelyn Ave., Berkeley, who bid $9818 for oil surfacing of 11,500 lin.ft. of Vineyard Ave. 4-8

OAKLAND, CALIF.—To Paris Bros., 2415 Oregon St., Berkeley, who bid $29,410 (on Alternative C) for the grading of three-fourths mile of the Skyline Boulevard for Alameda County. 4-15

OROVILLE, CALIF.—To Tiffany, McReynolds & Tiffany, 1185 Sierra Ave., San Jose, who bid $4185 for grading Lower Wyandotte Road from County. 4-14

OXNARD, CALIF.—To Will F. Peck Co., Los Angeles, $77,462 for improvement of Palm Drive and other streets for City of Oxnard, work consisting of grading, concrete paving, ornamental lights, sewers, etc. 4-14

SACRAMENTO, CALIF.—To E. F. Hilliard, 1355 43rd St., Sacramento, who bid $11,584 for 42.9 miles light fuel oil to be furnished and applied as dust layer in TUOLUMNE AND MARIPOSA COUNTIES, between Stevens Bar Bridge and Yosemite National Park, for Division of Highways, State Office Bdg., Sacramento. 4-12

SACRAMENTO, CALIF.—To Tractor Grading Co., Stockton, who bid $2009 to County Clerk, Harry W. Hall, Room 201, Court House Bdg., Sacramento, for grading of Manzanita Ave. 4-15

SAN FRANCISCO, CALIF.—Award of contract recommended to J. P. Holland, Inc., 1834 McKinnon St., S. F., $63,448 for grading Section D, Yuba Pass National Forest Highway, Tahoe National Forest, SIERRA COUNTY, for Bureau of Public Roads (See Unit Bid Summary). 4-10

SAN FRANCISCO, CALIF.—Awards as follows by California Division of Highways: (1) SANTA CRUZ COUNTY—To J. A. Casson, 8 St. James Court, Hayward, $5186 for 20 miles from Route 44 to Saratoga Gap, involving: 2530 bbl. light fuel oiling. (2) MENDOCINO COUNTY—To Basalt Rock Co., Napa, $10,342 for 38 miles from McDonald to Flynn Creek, involving: 4788 bbl. light fuel oiling. 4-12

SAN FRANCISCO, CALIF.—To Meyer Rosenberg, 1755 San Bruno St., San Francisco, who bid $55,859 to Board of Public Works for improvement of Corbett Way from Clayton to 24th Sts., by excavation, concrete walls, vitrified sewer, vitrified culvert, 6-in. F concrete base and 2-in. asphalt surface. 4-14

COLORADO SPRINGS, COLO.—To New Mexico Const. Co., Denver, $49,020 for paving in Dist. 6 for City.

BOISE, IDA.—Awards as follows by State: (1) To Olof Nelson, Logan, Utah, $90,948 for 12 miles grading and gravel surfacing Old Oregon Trail & Yellowstone Park Highway from McCammon to Virginia, BANNOCK COUNTY; (2) To Olof Nelson, Logan, Utah, $21,020 for 10 miles surfacing Old Oregon Trail from McCammon to Lava Hot Springs, BANNOCK COUNTY; (3) To D. J. Cavanagh, Twin Falls, Ida., $23,655 for 4.7 miles grading and surfacing Roosevelt Highway from Shoshone to Dietrick, LINCOLN COUNTY.

KLAMATH FALLS, ORE.—To Dunn & Baker, Klamath Falls, Ore., $49,620 for graveling and oiling Chiloquin-Klamath Road and Chiloquin-Dalles California Highway for County.

OLYMPIA, WASH.—Awards as follows by State: (1) To Colonial Building Co., Spokane, Wash., $52,629 for 5 miles grading Mary Hill West, KLICKITAT COUNTY; (2) To Geo. F. Christensen, Stevenson, Wash., for 5.3 miles grading Goldendale to Summit; and (3) To C. J. Erickson, Seattle, Wash., $48,925 for grading and surfacing approaches to Bear Creek Bridge, CLALLAM COUNTY.

OLYMPIA, WASH.—Awards as follows by the Washington State Highway Commission: SNOHOMISH COUNTY—To Northwest Construction Co., Seattle, who bid $59,831 for clearing, grading, draining and surfacing 2.8 miles of Everett to Pacific Highway Road. PIERCE COUNTY—To Joseph L. Warter, Sr., Tacoma, who bid $123,104 for paving 4.1 miles of Pacific Highway with cement, from Fort Lewis to Nisqually. OLYMPIC HIGHWAY—To Fuel Oil Service Corp., Olympia, who bid $27,885 for oil treating as a dust palliative about 139 miles from end of pavement north of Hoquiam to Lake Quinault, end of pavement north of Shelton to junction with State Road No. 14, Lilliwaupy to Jackson's Cove, Quilcene River to Discovery Bay, and Port Angeles to Forks, involving: 12,320 barrels of oil.

SEATTLE, WASH.—Queen City Const. Co., 603 18th Ave. South, Seattle, $124,627 for concrete paving, water mains, etc., on Pike St. for City.

BRIDGES and CULVERTS

WORK CONTEMPLATED

LOS ANGELES, CALIF.—Plans by City Bridge Engineer, Merrill Butler, City Hall, Los Angeles, and bids will be called for soon by City of Los Angeles for: Washington Street Bridge across Los Angeles river, involving: 6975 cu.yd. Class F concrete, 830,000 lb. reinforcing steel, 63,700 sq.ft. 8-in. asph. conc. pavement, 29,600 cu.yd. embankment, 36 lin.ft. 18-in. cast-iron storm drain, 20 lin.ft. rock-fill underdrain. $350,000. 4-18

LOS ANGELES, CALIF.—Plans by City Bridge Engr., Merrill Butler, City Hall, Los Angeles, and bids will be called for soon for Sixth Street viaduct over the Los Angeles river, to be 3600 ft. long, involving: 7075 cu.yd. Class 'F' concrete (1:2:3), 840,000 lb. reinforcing steel, 11,145 lin.ft. concrete piles, 36,000 sq.ft. 8-in. asph. conc. pavement, 1600 sq.ft. concrete gutter, 458 lin.ft. 36-in. precast heavy reinforced concrete pipe sewer, 96 ft. 36-in. cast-iron pipe sewer, 733 ft. 8-in. cast-iron pipe sewer, 205 ft. 6-in. cast-iron pipe sewer. 4-18

SAN CARLOS, CALIF.—Bonds voted $16,000 by the City for bridges. Geo. A. Kneese is City Engineer. 4-16

BIDS BEING RECEIVED

NEWPORT BEACH, CALIF.—Bids to 7:30 p.m., May 5, by City Clerk for improving Channel Place, involving 68,000 cu.yd. excavation and fill and constructing bridges, $30,000. 4-18

OAKLAND, CALIF.—Bids to 10:30 a.m., May 6, by County Clerk for repairs to Bay Farm Island bridge, involving: 12,000 lin.ft. creosoted timber piles, 35,000 b.m. treated timber, 270,000 b.m. untreated timber, 35 cu.yd. concrete, repairing fender system, removal of existing approaches and deck on swing span. 4-16

SAN BERNARDINO, CALIF.—Bids to 11 a.m., Apr. 28, by County for bridge on crest cutoff on Upper Waterman Canyon, 10 miles north of San Bernardino. Bridge is to be 120 ft. long and 24 ft. wide, and involves: Two reinf. concrete abutments; six concrete pedestals; two steel bents; 120 lin.ft. steel bridge, 24 ft. wide; reinf. concrete flooring. $10,500. 4-9

SAN JOSE, CALIF.—Bids to 5 p.m., April 28, by City Clerk for: (1) bridge over Guadalupe River on Park Ave., involving: 520 cu.yd. concrete, 52 tons reinforcing steel, 92 concrete piles, 20 ft. each; (2) bridge over Los Gatos Creek on Park Ave., involving: 430 cu.yd. concrete, 44 tons reinforcing steel, 63 concrete piles, 20 ft. each. 4-17

SAN RAFAEL, CALIF.—Bids to 11 a.m., April 28, by County for: (1) Bridge on Moraga Ranch on Cheleno Valley Road, involving: 58 cu.yd. A concrete, 6300 lb. reinforcing steel. (2) Bridge at Volcinerello on Marshall-Petaluma Road, involving: 104 cu.yd. 'A' concrete, 9200 lb. reinforcing steel, 1200 cu.yd. backfill. 4-15

STOCKTON, CALIF.—Bids to 11 a.m., May 5, by County for pile trestle bridges over Boulton Road and drainage canals. 4-18

TULARE, CALIF.—Bids to 2 p.m., May 5, by County for bridge over Tule River, No. 57, involving 558 cu.yd. "A" concrete and 1024 ft. concrete piles. (Materials will be furnished by County.) 4-15

OLYMPIA, WASH.—Bids will be received up to May 13 by State Highway Commission, Olympia, Washington, for constructing a reinforced concrete bridge, 676.5 ft. long, over Yakima river at Prosser, Federal Aid Project, consisting of five arch spans and six girder spans, 24-ft. roadway with 4-ft. sidewalk on each side. 4-18

BIDS RECEIVED

SACRAMENTO, CALIF.—Low bids as follows by California Division of Highways: CALAVERAS COUNTY—Concrete bridge over Calaveritas Creek three miles south of San Andreas: Geo. J. Ulrich, P.O. Box 773, Modesto (low), $18,037. PLUMAS COUNTY—Concrete bridge over North Fork of the Feather River at Chester. A. T. Howe, 111 Stanford St., Santa Rosa (low), $10,990. 4-16

CONTRACTS AWARDED

MARTINEZ, CALIF.—To C. H. Gildersleeve, Lincoln, California, who bid $2532 to County for construction of culvert on Buchanan Road south of Pittsburg. 4-7

SAN LUIS OBISPO, CALIF.—To Irving L. Ryder, P. O. Box 300, Pismo Beach, California, who bid $676 for construction of a reinforced concrete retaining wall, piers, and sidewalk on Santa Rosa St., near Murray St., in the City. 4-10

BOISE, IDAHO—To Triangle Const. Co., Spokane, Wash., $18,745 for reinf. concrete viaduct over railroad near Athold, KOOTENAI COUNTY for State.

OLYMPIA, WASH.—To Alexander & McNeil, Mt. Vernon, Wash., $39,162 for reinf. concrete bridge over Squallicum Creek, near Bellingham, for State.

SEATTLE, WASH.—To Lindstrom & Feigenson, Worcester Bdg., Portland, who bid $115,373 for Youngstown Place viaduct for City, involving: 44,536 cu.yd. A excavation, 2129 cu.yd. B excavation, 2750 cu.yd. concrete, 450,000 lb. reinforcing steel, 31,900 lb. structural steel, 4900 lin.ft. timber piling, 3150 lin.ft. concrete piling, 103 M ft., B. M., timber trestle. 4-14

SEWER CONSTRUCTION

WORK CONTEMPLATED

CAPISTRANO BEACH, CALIF.—Bonds voted $40,000 by Capistrano Beach Sanitary District, Capistrano Beach, Orange County, for outfall and mains. Burns-McDonnell-Smith Engr. Co., Western Pacific Bdg., Los Angeles, are Engineers. 4-15

GREAT FALLS, MONT.—Bonds voted by City of Great Falls, Montana, in amount of $100,000 for sewer improvements. 4-18

KLAMATH FALLS, ORE.—Plans made by C. C. Kelley, City Engr., for (1) 14th Sewer Unit, involving: 41,000 ft. 6-in. pipe, 6600 ft. 8-in. pipe, 3400 ft. 10-in. pipe, 124 manholes, 100 lampholes, 1000 Y's; (2) 15th Sewer Unit, involving: 13,200 ft. 6-in. pipe, 3100 ft. 8-in. pipe, 950 ft. 10-in. pipe, 56 manholes, 24 lampholes, 275 Y's. Alternative bids will be taken on vitrified or concrete pipe. 4-12

BIDS BEING RECEIVED

FAIRFIELD, CALIF.—Bids to 10 a.m., May 6, by County Clerk, Court House, Fairfield, Solano County, for sewer system covering 300 acres of land to north and south of Vallejo and along Benicia Road, involving 70,000 ft. 6-in. to 36-in. vitrified pipe, 3090 ft. 12-in. cast iron pressure main, pumping plant complete. 1925 Act. $160,000. 4-15

LOS ANGELES, CALIF.—Bids to 10 a.m., Apr. 30, by Board of Public Works for grading, constructing sanitary sewers and storm drains in Virgil Ave., involving: 58,962 cu.yd. grading, storm drain, sanitary sewers, 10,030 ft. 6-in. cement pipe house sewers. 4-18

LOS ANGELES, CALIF.—Bids to 2 p.m., May 5, by County for Drainage District 29, near Sherman, work involving in the main: 9000 cu.yd. excavation, 2217 cu.yd. Class A concrete, 40 cu.yd. Class B concrete, 45 cu.yd. Class C concrete, 257,745 lb. reinforcing steel. REINFORCED CENTRIFUGALLY SPUN CONCRETE PIPE, STANDARD WEIGHT: 1194 lin.ft. 18-in. pipe, 2591 lin.ft. 21-in. pipe, 2529 lin.ft. 24-in. pipe, 1327 lin.ft. 27-in. pipe, 2451 lin.ft. 30-in. pipe, 1221 lin.ft. 33-in. pipe, 3101 lin.ft. 36-in. pipe, 1124 lin.ft. 39-in. pipe, 994 lin.ft. 42-in. pipe, 584 lin.ft. 45-in. pipe, 915 lin.ft. 48-in. pipe, 356 lin.ft. 51-in. pipe, 90 lin.ft. 54-in. pipe, 608 lin.ft. 57-in. pipe, 686 lin.ft. 66-in. pipe, 888 lin.ft. 72-in. pipe. SPECIAL REINFORCED CONCRETE CENTRIFUGALLY SPUN PIPE 'A': 180 lin.ft. 27-in. pipe, 260 lin.ft. 30-in. pipe, 436 lin.ft. 36-in. pipe, 329 lin.ft. 48-in. pipe, 1086 lin.ft. 54-in. pipe, 476 lin.ft. 66-in. pipe, 528 lin.ft. 72-in. pipe. SPECIAL REINFORCED CONCRETE CENTRIFUGALLY SPUN PIPE 'B': 30 lin.ft. 27-in. pipe, 68 lin.ft. 36-in. pipe, 271 lin.ft. 72-in. pipe. PLAIN CEMENT PIPE: 91 lin.ft. 6-in. pipe, 1244 lin.ft. 12-in. pipe, 1593 lin.ft. 15-in. pipe, 1183 lin.ft. 18-in. pipe, 9 lin.ft. 21-in. pipe. VITRIFIED CLAY SEWER PIPE: 1750 lin.ft. 10-in. pipe, 6 lin.ft. 8-in. pipe, 50 lin.ft. 6-in. pipe. $296,000. 4-8

POMONA, CALIF.—Bids will be received up to 12 m., April 29, by City Clerk, Pomona, for constructing Grand Ave. outfall sewer line, work involving in the main: 2977 ft. 14-in. vitrified sewer, 6283 ft. 12-in. vitrified sewer, 21 flush tanks, 49 manholes, 25,815 ft. 8-in. vitrified sewer. 4-11

BIDS RECEIVED

BERKELEY, CALIF.—Schnoor Bros., 6016 Claremont Ave., Berkeley, $11.89 ft. low bid to City for 150 ft. 6½x5 ft. Monolithic horseshoe section conduit in Codornices Creek at Airport for City. 4-17

CONTRACTS AWARDED

ATWATER, CALIF.—To W. J. Tobin, 527 Balfour Ave., Oakland, Prop. A, who bid $54,673 for sewer improvements, using vitrified pipe and Dorr equipment for treatment plant, for City of Atwater. (See Unit Bid Summary.) 4-15

FRESNO, CALIF.—To Oakland Sewer Const. Co., 1003 85th Ave., Oakland, who bid $10,757 for constructing vitrified pipe sewer system from the County Hospital to the City Sewer system, work for Fresno County. 4-9

PACIFIC GROVE, CALIF.—To Oakland Construction Co., 755 60th St., Oakland, who bid $1342 to City Clerk, Pacific Grove, Monterey County, for vitrified sewer on Congress Ave. 4-5

RICHMOND, CALIF.—To J. T. Clinch, Richmond, $1120, for sewer to serve Filice & Perelli Cannery at Richmond Inner Harbor for City. Work involves: 630 ft. 12-in. vitrified pipe, 24 ft. 12-in. cast-iron pipe, 2 manholes, 100 lin.ft. timber cradle. 4-17

SEBASTOPOL, CALIF.—To A. Frederick Anderson, 1039 Longridge Road, Oakland, who bid $21,260 to City of Sebastopol for sewage treatment plant, using concrete pipe. 4-12

VERNON, CALIF.—To M. T. Markovich, 1227 E. 17th St., Long Beach, who bid $55,571 as follows for constructing sewers in Fruitland Southeast Sewer District for City, using vitrified pipe. 4-9

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

SAN RAFAEL, CALIF.—The Marin Municipal Water District, San Rafael, Marin County, is considering installation of pumping plants, details not decided. J. Burt is manager of District. 4-9

WHITTIER, CALIF.—Bonds voted by City $325,000 for: Wells, including motors, pumping plants, and buildings, etc., $45,000. 36-in. pipeline from the wells to settling basin, $21,600. Settling basins, $23,600. Settling basins, $23,800. 30-in. pipe-line from the settling basin to the reservoir, incl. meter, $57,790. 10,000-gallon reservoir, $75,095. 10-in. pipe-line from the reservoir to Rideout Heights, $2130. Rideout Heights reservoir, $8500. 24-in. pipe-line connecting the 10,000,000-gallon reservoir and the Greenleaf reservoir, $22,500. 16-in. pipe-line from the Greenleaf Reservoir to the Painter Reservoir, $4500. Two booster plants, including pumps and motors, to connect the reservoir, $5000. Booster plant, including pump and motor, to connect Greenleaf and Painter reservoirs, $3000. Booster pumping plant, including pumps and motors, in College Hills, $3000. Corliss engine and signals, $10,000. Repairs to the Greenleaf Reservoir, $5000. 4-in. water mains, $8500. 6-in. water mains, $4500. 8-in. water mains, $6500. M. R. Bowen is City Engineer. 4-17

GREAT FALLS, MONT.—Bonds voted by City of Great Falls, Mont., in amount of $690,000 for the following water system improvements: (1) $100,000 for 4,000,000-gallon capacity reinforced concrete reservoir at Eighth Avenue South and 34th Street. (2) Enlargement of the present filtration plant, to have an ultimate capacity of 24,000,000 gallons per day, $350,000. (3) Extension of present 16-in. water mains in the business district, and improvements to distributing system, $240,000. C. P. Wells is City Engineer. 4-18

BIDS BEING RECEIVED

PUENTE, CALIF.—Bids to 8 p.m., May 13, by the Los Nietos-La Puente Valley County Water District, Puente, for the following: (1) Furnishing a deep-well turbine pump with a capacity of 175 inches. (2) Drilling a water well, 20-in. diameter about 250 ft. deep. 4-14

SAN FRANCISCO, CALIF.—Bids to 5 p.m., April 29, by Public Works Engr. Corp., Hunter-Dulin Bdg., San Francisco, for installation of 3300 ft. of 18-in. cement lined class B cast-iron pipe and 1435 ft. of 16-in. cement lined class B cast-iron pipe in City of Martinez, all material furnished by the owner. 4-16

VENTURA, CALIF.—Bids to May 6 by County for one 125,000-gallon steel tank for Moorpark Water District. 4-17

BIDS RECEIVED

LOS ANGELES, CALIF.—Low bids as follows by County for Water Work Dist. 10, Springdale Addition: (1) American Cast Iron Pipe Co., $8600, low for furnishing cast iron pipe and (2) Rich Mfg. Co., $67 each, low for 50 4-in. hydrants. 4-16

MT. VIEW, CALIF.—Peerless Pump Co., San Jose, $2084, low bid to City for one deep well turbine pumping plant. 4-17

CONTRACTS AWARDED

EL CAPITAN, CALIF.—By the Southern Pacific Company, Southern Pacific Bdg., San Francisco, to W. A. Bechtel Company, 206 Sansome St., San Francisco, for the construction of a complete rock-fill dam, to be 73 ft. high and 400 ft. long, and to be constructed on the Bonita River, New Mexico, near El Capitan. Work involves in the main the following approximate quantities: 100,000 cu.yd. rock fill, 5000 cu.yd. reinforced concrete; also considerable stripping excavation and derrick placed rock. 4-5

GLENDALE, CALIF.—Awards as follows by City for gate valves: (1) To Chapman Valve Co., 2314 E. 8th St., Los Angeles, who bid $2633 for: One 30-in. horizontal valve with bevel gears and bypass. Three 24-in. vertical valves with spur gears. Four 20-in. vertical valves with spur gears. Two 16-in. vertical valves with spur gears. One 16-in. vertical valve with spur gears and bypass. (2) To Rensselaer Valve Co., Los Angeles, who bid $2921 for: Five 24-in. vertical valves with spur gears and bypass for operation on 200-lb. pressure. Five 12-in. vertical valves with spur gears and bypass for operation on 200-lb. pressure. 4-11

LOS ANGELES, CALIF.—Contract awarded to Rich Mfg. Co., who bid $67 each for 50 4-in. double outlet fire hydrants, under Adv. 1311, for Los Angeles Water & Power Bureau. 4-17

OAKLAND, CALIF.—To Rensselaer Valve Co., 55 New Montgomery St., San Francisco, who bid $13,700 for furnishing gate valves to the East Bay Municipal Utility District. 4-10

ORLAND, CALIF.—To Grinnell Co. of Pacific, San Francisco, $646 for cast iron pipe, valves and hydrants for City. 4-11

SAN FRANCISCO, CALIF.—Awards as follows by California-Hawaiian Sugar Co., A. A. Brown, Engr., Matson Bdg., San Francisco, for 16 miles of 20-in. pipe-line from Suscol Wells, Napa County, across the Carquinez Bridge to Crockett, Contra Costa County: (1) To U. S. Pipe & Fdy. Co., Monadnock Bdg., San Francisco, for furnishing 80,575 lin.ft. 20-in. (6500 tons) of DeLavaud cast-iron pipe up to 550-ft. head. (2) To Jas. Currie, 1100 Peninsula Ave., Burlingame, for trenching, etc. 4-12

SANTA ANA, CALIF.—To U. S. Pipe & Fdy. Co., Los Angeles, who bid as follows for furnishing cast-iron pipe to City: 15,000 ft. 4-in. pipe, .397; 11,000 ft. 6-in. pipe, .579; 4500 ft. 8-in. pipe, .815; 3000 ft. 10-in. pipe, 1.094; 6300 ft. 12-in. pipe, 1.43. 4-17

SANTA CLARA, CALIF.—To American Cast Iron Pipe Co., San Francisco, who bid $1241 for furnishing 2000 ft. 6-in. cast-iron pipe and fittings to City. 4-8

UPLAND, CALIF.—To American Cast Iron Pipe Co., L. A., who bid $0.456 ft. for 1000 ft. 4-in. cast iron pipe for City. 4-5

WOODSIDE, CALIF.—To Thermotite Const. Co., 580 Stockton Ave., San Jose, who bid $16,653 to University of California for 1,000,000-gallon capacity reinforced concrete water reservoir for the Bear Gulch Water Company. 4-17

SALEM, ORE.—To Pacific Bridge Co., foot of E. Salmon St., Portland, for pumping station in Willamette River, 18x18x58 ft. for Public Works Engr. Corp., Hunter-Dulin Bdg., San Francisco. Work involves the following quantities: Subaqueous foundations, requiring cofferdam to include 25,000 lb. interlocking steel sheet piling, 400 cu.yd. excavation, 318 cu.yd. concrete, 32,000 lb. reinforcing steel, 108 cu.yd. backfill, constructing building, cast-iron piping and valves. Contract for pumping plant equipment will be awarded shortly. 4-12

IRRIGATION and RECLAMATION

WORK CONTEMPLATED

LOS ANGELES, CALIF.—Application filed by George O. H. Buchner, care Walter C. Hintze, 1051 Subway Terminal Bdg., Los Angeles, for 1 cu.ft. per second of water from well in Kern County for oil-drilling operations and domestic use, near Woody, California. Work involves: Pumping plant, 75 gallons per minute. Pipe-line, 2½ miles 3-in. iron pipe. 110-bbl. storage tank. $15,000. Work is to start six months after the permit is secured. 4-15

OAKLAND, CALIF.—Application has been filed by Henry R. Vail, 820 Syndicate Bdg., Oakland, for 37 cu.ft. per second of water from Old River, Dredger Cut, and Italian Slough, in Contra Costa County, for irrigation on 2359 acres, near Byron, work involving: Pumping plant, two 16-in. vertical propeller type Byron Jackson Pumps, capacity 12,000 gallons per minute. Canal, 5938 ft. long, 19 ft. wide on top, 3 ft. wide at bottom. Water depth 5 ft. $10,000. Six siphons, 125 ft. each, 10 in. diameter. 4-15

PLACERVILLE, CALIF.—Plans by Fred N. Hosking, Engr., Placerville, and call for bids will be issued in about two months by the El Dorado Irrigation District, Placerville, Eldorado County, for the construction of a hydraulic fill dam on Weber Creek for the District. Work will involve in the main: 800,000 cu.yd. hydraulic fill. Dam is to be about 160 ft. high. Estimated cost $435,000. Bids for purchase of bonds of the District will be opened soon, and when bonds are sold, bids for the dam will be advertised. 4-12

WOODLAND, CALIF.—Application has been filed by C. Fred Holmes, and R. E. Hughes, 41 Palm Ave., Woodland, for 47.26 cu.ft. per second of water from the East Dredge Cut of Sutter Bypass in Sutter County, for irrigation on 1890 acres, involving: Pumping plant, 351,840 gallons per minute. $15,000. Work to start 10 months after permit is secured. 4-15

BIDS BEING RECEIVED

TURLOCK, CALIF.—Bids to 2 p.m., Apr. 28, by Turlock Irrigation Dist. for canal lining in Dist. 36, involving: SCHEDULE NO. 1—Section No. 1—60,658 sq.ft. 2-in. concrete canal lining; Section No. 2—67,924 sq.ft. 8-in. concrete lining.; Section No. 3—41,694 sq.ft. 2-in. concrete canal lining. SCHEDULE NO. 2—Concrete structures, involving: 16.33 cu.yd. of concrete. 4-8

BIDS RECEIVED

ELLENSBURG, WASH.—General Const. Co., Colman Bdg., Seattle, $201,945, low bid to Bureau of Reclamation for earthwork, tunnels, and structures on Division 3 of North Branch Canal, Kittitas Division, Yakima Project, Wash. 4-17

POWER DEVELOPMENT

WORK CONTEMPLATED

PHOENIX, ARIZ.—The Arizona Water Conservation District, Phoenix, Arizona, has applied for a preliminary permit for a power project on the Hassayampa River, in Yavapai and Maricopa Counties, Arizona. The proposed development involves the construction of a power project in connection with an irrigation project now under way by the applicant, and this application replaces one previously filed by Joseph Wittman, and later withdrawn. It is the intention of the application to build a power-house at the Walnut Grove dam, a conduit thence to a power-house at the mouth of Fools Canyon, and power-houses at the Henry S. Van Buren dam and on the Hassayampa River below the town of Wickenburg. The estimated installed capacity will be 6700 hp., and it is proposed to utilize the power for mining and general commercial purposes. 4-8

LOS ANGELES, CALIF.—Application filed as follows by: (1) Ralph B. Lloyd, Suite 1215, Bank of Italy Bdg., Los Angeles, for 100,000 ac.ft. per annum storage from East Walker River, West Walker River, and Adobe Valley in Mono County, for development of hydroelectric power. Total fall, 5000 ft. Maximum amount of water through penstock, 150 cu.ft. per second; maximum total horsepower to be developed, 85,000 horsepower. Work to start 6 months after permit. Located near Bridgeport. (2) Ralph B. Lloyd, Suite 1215, Bank of Italy Bdg., Los Angeles, for 100,000 ac.ft. per annum for irrigation and domestic use on 50,000 acres in Kern and Tulare Counties. Work on irrigation works to start 36 months after permit is secured. 4-15

SAN FRANCISCO, CALIF.—The Pacific Gas & Electric Co., P.G. & E.Bdg., San Francisco, has applied for a preliminary permit for a project on Bear River, Cold Creek, and North Fork of Mokelumne River, in Amador County, affecting lands within the Eldorado National Forest. The proposed development includes a concrete arch dam about 220 ft. high in Bear River forming a reservoir of about 50,000 acre-feet, a conduit extending from the proposed dam to a proposed power-house on North Fork of Mokelumne River near the applicant's Salt Springs dam, a distance of about 13,000 ft.; and a conduit about 4000 ft. long diverting water from Cold Creek to the foregoing conduit. The power capacity of the site is estimated to be 16,800 hp., and the installed capacity 34,000 hp. Power will be added to the applicant's present system in Central and Northern California. 4-8

PORTLAND, ORE.—Applications filed as follows: (1) The Pacific Power & Light Co., Public Service Bdg., Portland, has applied for a project on public lands in Klickitat and Yakima Counties, Wash., and partly within the Yakima National Forest. The proposed development consists of a 110,000-volt transmission line to extend from the power-house of the Northwestern Electric Co. on White Salmon River in Klickitat County, to a substation of the applicant in Yakima County, a distance of approximately 76 miles. The proposed use of the transmission line is to afford an interconnection between the applicant's source of power near Yakima and the source of power in the White Salmon-Hood River district. (2) The Pacific Power & Light Co., Public Service Bdg., Portland, has applied for a license for a 66,000-volt transmission line extending from Redmond to Cove, in Deschutes and Jefferson Counties, Oregon, a distance of about 20 miles. The line is intended to interconnect other lines of the applicant's system, eventually to replace the present line between Culver and Prineville, and also to furnish power to the mine of the Diatomite Company. 4-8

SPOKANE, WASH.—The Washington Water Power Co., 827 Trent St., Spokane, has applied for a license for a transmission line on public lands in Spokane County, Wash., and Kootenai County, Idaho, extending from Spokane, Wash., to Kellogg, Ida., a distance of 65 miles, and for a 13,000-volt distribution line from Government Gulch to Silver Creek, a distance of 2¼ miles. The transmission line is intended to increase the transmission capacity between Spokane and the Coeur d'Alene mining district, and the distribution line to supply power to mines in the vicinity of Silver Creek. 4-8

BIDS BEING RECEIVED

CENTRALIA, WASH.—Bids to April 29, by City Clerk, Centralia, Washington, for completion of city hydroelectric project, involving the control structure on the river near Yelm, transmission line, substation in Centralia, powerhouse, forebay, penstock, tailrace, switchboards, oil-current breakers, transformers, flume, and lightning arresters. Cost $400,000. 4-14

RIVER and HARBOR WORK

WORK CONTEMPLATED

SAN FRANCISCO, CALIF.—Plans by Frank G. White, Chief Engineer, State Harbor Commission, Ferry Bdg., San Francisco, for a reinforced concrete and steel frame shed for Pier No. 1, north of Ferry Bdg., San Francisco. $100,000. 4-7

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 10 a.m., Apr. 30, by City Harbor Comm., City Hall, L. A., for repairing Terminal Island Jetty, involving 700 tons of quarry rock. 4-18

SURETY BOND AND CASUALTY INSURANCE DIRECTORY

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SAN FRANCISCO, CALIF.—Bids to 3 p.m., May 8, by U. S. Engineer Office, 401 Custom House, San Francisco, for furnishing all labor and materials, and performing all work for dredging about 871,870 cu.yd. of material in Oakland Harbor. 4-10

CONTRACTS AWARDED

RICHMOND, CALIF.—To San Francisco Bridge Co., Nevada Bank Bdg., S. F., at $272,124 for improvement of Ellis Slough in Richmond Inner Harbor. Work involves: 1,500,000 cu.yd. dredging, 9575 lin.ft. dry levee, 4315 lin.ft. wet levee, 1080 ft. core levee. 4-18

MUNICIPAL IMPROVEMENTS

WORK CONTEMPLATED

REDWOOD CITY, CALIF.—Bonds voted by City of Redwood City, $55,000 for construction of street extensions, bridges, and storm sewers in various sections of the City. C. L. Dimmitt is City Engineer. 4-16

FLOOD CONTROL WORK

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., Apr. 28, by County Flood Control District for levee on west bank of Los Angeles River near Long Beach Blvd. involving 60,000 cu.yd. earth fill. 4-17

MACHINERY and SUPPLIES

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 2 p.m., May 5, by County for 2500 Oregon pine piles. 4-17

SAN FRANCISCO, CALIF.—Bids to 3 p.m., April 28, by Board of Supervisors, City Hall, San Francisco, for furnishing: 10,000 ft. 8-in. cast-iron pipe, 10,000 ft. 6-in. cast-iron pipe. 4-18

CONTRACTS AWARDED

ONTARIO, CALIF.—Contract awarded to Western Pipe & Steel Co., 5717 Santa Fe Ave., Los Angeles, who bid $97,000 for construction of two steel gas storage tanks on Ontario Ave., Ontario, for Southern Counties Gas Co., 810 S. Flower St., Los Angeles. Each tank will have 500,000 cu.ft. capacity, and will be 100 ft. high and 50 ft. in diameter. 4-17

RAILROAD and BUILDING CONSTRUCTION

BIDS BEING RECEIVED

MARE ISLAND, CALIF.—Bids to 11 a.m., May 7, by Bureau of Yards & Docks, Navy Department, Washington, D. C., for Shell Houses and Railroad at the Navy Yard (Ammunition Depot), Mare Island, Calif. Work includes earthwork, concrete, steel windows, shutters and doors, roofing and sheet metal work, lightning protection, painting, and railroad tracks. 4-9

TUNNEL CONSTRUCTION

BIDS RECEIVED

SACRAMENTO, CALIF.—MacDonald & Kahn, 315 Montgomery St., San Francisco, $12,000 low bid to U. S. Engineers Office for 1200 ft. inspection tunnels (3 tunnels) for proposed Kennett Dam in Shasta County. 4-15

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To H. W. Rohl Co., Roosevelt Bdg., Los Angeles, who bid $652,788 to the Board of Public Works, City Hall, Los Angeles, for construction of three tunnels on the Figueroa St. Extension, through Elysian Park, a total length of 996 ft., to be 46½ ft. wide and 28 ft. high. (See Unit Bid Summary, Apr. 10th issue.) 4-7

SUBWAY CONSTRUCTION

BIDS BEING RECEIVED

TUCSON, ARIZ.—Bids to 3 p.m., May 12, by City Clerk, Tucson, for construction of the Sixth Avenue subway, work involving: 2380 cu.yd. concrete, 10,100 cu.yd. excavation, 140,000 lb. reinforcing steel, 2050 sq.yd. concrete pavement. 4-14

LIGHTING SYSTEMS

WORK CONTEMPLATED

OAKLAND, CALIF.—Plans by City Engr., protests May 1, for 15 ornamental duplex electric street standards, etc., on 17th St. from San Pablo Ave. to Harrison St., etc. 4-14

BUILDING CONSTRUCTION

WORK CONTEMPLATED

HOLLYWOOD, CALIF.—Plans by John C. Austin and Frederic M. Ashley, Architects, Chamber of Commerce Bdg., Los Angeles, for a height-limit office building to be erected at the northeast corner of Vine and Yucca Sts., Hollywood, for the Hollywood Medical-Dental Building, Inc., of steel-frame construction. $1,000,000. 4-7

LONG BEACH, CALIF.—Plans by W. H. Austin, Pacific Southwest Bank Bd., and Schilling & Schilling, Farmers & Merchants Bank Bdg., Long Beach, Associated Architects, for a reinforced concrete club building on Cedar Ave., between Ocean Ave. and Broadway, Long Beach, for the Long Beach Lodge No. 888, B. P. O. Elks. The building will be 80 by 150 ft., and a tower 115 ft. high. $400,000. 4-15

HAWTHORNE, NEV.—Plans by Bureau of Yards & Docks, Navy Department, Washington, D.C., for buildings, beach development, and fences at the Naval Ammunition Depot, Hawthorne, Nevada. The work consists of concrete and hollow tile work; built-up asbestos shingle roofing; sheet metal work; steel and iron work; steel doors and windows; metal lathing and plastering; wood framing, doors, windows, screens, and finish; plumbing, heating, and electrical systems; wire fencing; and beach developments. 4-8

BIDS BEING RECEIVED

OAKLAND, CALIF.—Bids to 10:30 a.m., May 13, by County Clerk for addition to Fairmont Hospital on Foothill Blvd. $135,000. 4-16

PITTSBURG, CALIF.—Bids to 2 p.m., May 9, by Pittsburg Grammar School District for a Junior High School. Davis Pearce Co., 47 N. Grant St., Stockton, are the Architects. $135,000. 4-16

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., May 7, by Board of Public Works, City Hall, San Francisco, for construction of a three-story reinforced concrete and stucco addition to the Balboa South Side High School on the block bounded by Onondaga, Tioga, Otsega, and Oneida St. $650,000. Bakewell & Weihe, 251 Kearny St., San Francisco, are architects. 4-10

SANTA ROSA, CALIF.—Bids to May 5 by Santa Rosa School District for South Park School, $16,000. 4-16

BIDS RECEIVED

SACRAMENTO, CALIF.—W. C. Keating, Forum Bdg., Sacramento, $21,990 for addition to El Dorado School on 53rd and J St. for City. 4-8

SAN CARLOS, CALIF.—Low bids as follows by San Carlos School District for concrete school building on Chestnut St. north of Arroyo Ave.: GENERAL CONTRACT, H. B. Post, 1330 Webtser St., Palo Alto (low), $34,724; HEATING & PLUMBING, Brand & Sterling, Redwood City, $5767. 4-16

CONTRACTS AWARDED

ARCATA, CALIF.—To Louis Halverson, 120 Dutton Ave., Santa Rosa, who bid $19,726 for general contract for American Legion & Veterans' Memorial clubhouse at Arcata for County. J. P. Ryan, Eureka, $708 for plumbing. Hilfiker Electric Co., Eureka, $567 for electric wiring. 4-18

BURLINGAME, CALIF.—Awards as follows for Herbert Hoover Grammar School, reinf. concrete construction: GENERAL:—To J. H. Johnson, Hearst Bdg., S. F., $56,497, and HEATING—To Morrison & Blair, San Mateo, $4703. 4-15

CENTERVILLE, CALIF.—To Geo. Petersen, 1841 Santa Clara St., San Leandro, who bid $48,296 for reinforced concrete gymnasium building for the Washington Union High School District. 4-10

CORCORAN, CALIF.—To R. J. Hodgson & Son, Porterville, who bid $12,175 for construction of fire house and municipal building at Corcoran. 4-10

FORTUNA, CALIF.—Awards as follows by County for Veterans' Memorial Bdg.: General contract to Louis Halverson, 120 Dutton Ave., Santa Rosa, $22,364. Plumbing to J. P. Ryan, Eureka, at $955. Electric wiring to Eureka Electric Co., Eureka, who bid $592. 4-18

PORTOLA, CALIF.—To Chas. F. Unger, 4532 T St., Sacramento, $38,547 for construction of additions to the Portola High School. 4-8

PRINCETON, CALIF.—To Harry H. Staple, Colusa, $25,800 for frame and stucco, one-story gymnasium building for Princeton Joint Union High School District. 4-10

SAN FRANCISCO, CALIF.—To Healy-Tibbitts Const. Co., 64 Pine St., S. F., $16,640 for steel frame ship loading platform, Cold Storage Terminal for State Harbor Comm. 4-9

STOCKTON, CALIF.—To Lewis & Green, Bank of Italy Bdg., Stockton, for construction of passenger depot at Stockton for S. P. Co., San Francisco. $300,000. 4-8

WILLOW GLEN, CALIF.—Awards as follows by Willow Glen School District, Willow Glen, Santa Clara County, for construction of a reinforced concrete school building at Willow Glen: General construction awarded to Paul Anderson, Willow Glen, who bid $23,372. Plumbing, heating, and sheet metal work awarded to J. W. Turner & Co., 533 No. 19th St., San Jose, who bid $5875. 4-14

OPPORTUNITY PAGE

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Thew Shovel Co., The
United Tractor & Equipment Corp.
Universal Crane Co., The
West Coast Tractor Co.
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Pacific Coast Steel Co.

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Pacific Coast Steel Co.

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Kortick Mfg. Co.
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Detroit Fidelity & Surety Co.
Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
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Bacon Co., Edward R.
Harron, Rickard & McCone Co.
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Lakewood Engr. Co.

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American Cast Iron Pipe Co.
Industrial Brownhoist Corp.
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Portland Cement Association

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Chlorine
Great Western Electro-Chemical Co.

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Bacon Co., Edward R.
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Lakewood Engr. Co.

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Wallace & Tiernan Co.

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Gladding, McBean & Co.
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Young Machy. Co., A. L.

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Northwest Engineering Co.
Ohio Power Shovel Co., The
Orton Crane & Shovel Co.
Speeder Machinery Corp.
Thew Shovel Co., The
Universal Crane Co., The
W-K-M Company, Inc.

Cranes, Tractor
West Coast Tractor Co.

Cranes, Traveling
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Thew Shovel Co., The

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Bacon Co., Edward R.
Diamond Iron Works, Inc.
Garfield & Co.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Smith Engineering Works
W-K-M Company, Inc.
Young Machy. Co., A. L.

Culverts, Concrete
Portland Cement Association

Culverts, Metal
California Corrugated Culvert Co.
U. S. Cast Iron Pipe & Fdy. Co.
Western Pipe & Steel Co.

Culverts, Part Circle
California Corrugated Culvert Co.
Western Pipe & Steel Co.

Culverts, Vitrified
Gladding, McBean & Co.
Pacific Clay Products

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Concrete Curing Co.
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Thew Shovel Co., The
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Rix Company, Inc., The
Schramm, Inc.
Sullivan Machinery Co.

Drill Sharpening
Compressor Service & Tool Co.

Dump Cars
Bacon Co., Edward R.
Jenison Machinery Co.
United Commercial Co.

Dump Wagons
Le Tourneau Mfg. Co.
West Coast Tractor Co.

Engineers
Ambursen Dam Co., Inc.
Burns-McDonnell-Smith Engr. Co.
Hunt Co., R. W.
Porter, Geo. J.

Engineering Instruments
American Paulin System, Inc., The

Engines, Gasoline and Steam
Bacon Co., Edward R.
Continental Motors Corp.
Clyde Iron Works Sales Co.
Harron, Rickard & McCone Co.
Hercules Motors Corp.
Ingersoll-Rand Co.
International Harvester Co.
Jenison Machinery Co.
Le Roi Co.
Novo Engine Co.
Wisconsin Motor Co.

Excavating Machinery
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Cleveland Tractor Co., The
Garfield & Co.
Excavating Equipment Dealers, Inc.
General Excavator Co.
Haiss Mfgr. Co., Geo.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Marion Steam Shovel Co.
National Equipment Corp.
Northwest Engineering Co.
Ohio Power Shovel Co.
Orton Crane & Shovel Co.
Osgood Co., The
Owen Bucket Co.
Sauerman Bros., Inc.
Speeder Machinery Corp., The

(Continued on page 66)

OPPORTUNITY PAGE

CONTINUED

FOR SALE—FOR RENT

USED EQUIPMENT

AIR COMPRESSORS
(Portable and Stationary)

CRANES
(Locomotive and Caterpillar types)

HOISTS
(Gas, Electric and Steam)

SHOVELS
(Gasoline-Diesel-Steam)

LOCOMOTIVES
(Gas, Electric and Steam)

BUCKETS
(Clamshell, Dragline, and Orange Peel)

RAIL

PILE HAMMERS

PIPE

DERRICKS

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Telephone SUtter 0978

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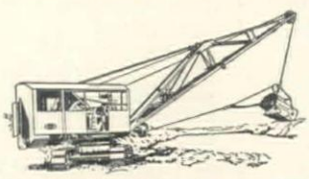

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Paving Breaker Moils, Gads, Spaders, etc. Bitted, Shanked and Resharpened

Each piece of steel normalized and correctly heat treated in a calibrated heating forge, insuring longer life and minimum breakage.

Expert Mechanics *High Class Workmanship*
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Phone ORdway 0173

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Will Rent or Contract
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1861 Waverley Street, Palo Alto
Telephone 21371

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with or without Precalked Joints
Sizes: 1¼ thru 12 inches. Standard lengths
PACIFIC STATES CAST IRON PIPE CO. PROVO UTAH
San Francisco Los Angeles Denver Portland Salt Lake

THE BUYERS' GUIDE—*Continued from Page 64*

Excavating Mchy.(Continued)
Thew Shovel Co., The
United Tractor & Equipment Corp.
Universal Crane Co., The

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
California Filter Co., Inc.

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.

Flooring, Industrial
Paraffine Companies, Inc., The

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.
Victor Welding Equipment 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
Great Western Meter 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.
Diamond Iron Works, Inc.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Meese & Gottfried Co.
Smith Engineering Works
Young Mach. Co., A. L.

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

Hoists, Hand and Power
Bacon Co., Edward R.
Gardner-Denver Co.
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Ingersoll-Rand Co.
Jaeger Machine Works, The
Jenison Machinery Co.

Hoists, Hand and Power (Continued)
Link-Belt Meese & Gottfried Co.
Novo Engine Co.
Sullivan Machinery Co.
West Coast Tractor Co.
Young Machy. Co., A. L.

Hoppers, Steel
Bacon Co., Edward R.
Haiss Mfgr. Co., Geo.
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

Iron—Plates and Sheets
American Rolling Mill Co., The

Jacks, Lifting
Jenison Machinery Co.

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

Leadite
Water Works Supply Co.

Loaders, Power, Truck and Wagon
Haiss Mfgr. Co., Geo.
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.
United Commercial Co.

Lumber
McCormick Lumber Co.

Metal Lath
Truscon Steel Company

Meters, Irrigation
Great Western Meter 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.
Foote Company, Inc.
Garfield & Co.
Harron, Rickard & McCone Co.
Jaeger Machine Works, The
Jenison Machinery Co.
Lakewood Engr. Co.
National Equipment Corp.
Young Machy. Co., A. L.

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

Motors, Gasoline
Continental Motors Corp.

Motors, Gasoline (Continued)
Hercules Motors Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Le Roi Co.
Wisconsin Motor Co.

Oxy-Acetylene Apparatus
Oxweld Acetylene Co.

Paints, Acid Resisting
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Paints, Metal Protective
McEverlast, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Paints, Technical
American Bitumuls Co.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Paints, Waterproofing
McEverlast, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Pavers, Concrete
Foote Company, Inc.
Harron, Rickard & McCone Co.
National Equipment Corp.

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
Standard Boiler & Steel Works

Paving Tools
Bacon Co., Edward R.
Harron, Rickard & McCone 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.
MacArthur Concrete Pile Corp.

Pipe, Cast-Iron
American Cast Iron Pipe Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
National Cast Iron Pipe 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.
National Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe—Centrifugal
National Cast Iron Pipe Co.

Pipe Clamps and Hangers
Kortick Mfg. Co.

Pipe Coatings
McEverlast, Inc.
Paraffine Companies, Inc., The
Wailes Dove-Hermiston Corp.

Pipe, Concrete
Lock Joint Pipe Co.
Portland Cement Association

Pipe, Culvert
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.
National Cast Iron Pipe Co.
Pacific Pipe Co.
Pacific States Cast Iron Pipe Co.
U. S. Cast Iron Pipe & Fdy. Co.
Weissbaum & Co., G.

Pipe—Flanged
National Cast Iron Pipe Co.

Pipe Line Machinery
Bacon Co., Edward R.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
W-K-M Company, Inc.

Pipe, Lock-Bar
Western Pipe & Steel Co.

Pipe, Preservative
Columbia Wood & Metal Preservative Co.

Pipe, Pressure Line
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
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.
Union 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.
International Harvester Co.
Jenison Machinery Co.
Novo Engine Co.

Preservative—Wood, Metal, etc.
Columbia Wood & Metal Preservative Co.
Paraffine Companies, Inc., The

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
Woodin & Little

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

(Continued on page 72)

OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

NOTICE TO CONTRACTORS

Paving and Surfacing

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 May 7, 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:

Del Norte County, between Smith River and Patricks Creek (I-D.N-1-C & D), about fifteen and two-tenths (15.2) miles in length, to be surfaced with untreated crushed gravel or stone.

Humboldt County, at Scotia and between Fortuna and Loleta (I-Hum-1-E, G), about four and three-tenths (4.3) miles in length, to be graded and paved with Portland cement concrete.

San Joaquin County, between Lodi and ¼ mile north of Mokelumne River (X-S.J-4-C), about seven-tenths (0.7) mile in length, to be graded and surfaced with untreated crushed gravel or stone.

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 April 9, 1930.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc., required by the Act of Congress of August 24, 1912, of Western Construction News, published semi-monthly at San Francisco, California, for April 1, 1930.

State of California, City and County of San Francisco, ss.: Before me, a Notary Public in and for the state and county aforesaid, personally appeared S. H. Wade, who, having been duly sworn according to law, deposes and says that he is the manager of the Western Construction News and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Western Construction News, Incorporated, 114 Sansome St., San Francisco, Calif.

Editor—Philip Schuyler, 1462 Trestle Glen Road, Oakland, Calif.

Managing Editor—Philip Schuyler, 1462 Trestle Glen Road, Oakland, Calif.

Business Manager—S. H. Wade, 637 55th St., Oakland, Calif.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.)

Western Construction News, Inc., 114 Sansome St., San Francisco, Calif.; S. J. Sanders, 1848 San Ramon Ave., Berkeley, Calif.; S. H. Wade, 637 55th St., Oakland, Calif.; Philip Schuyler, 1462 Trestle Glen Road, Oakland, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

S. H. WADE, Business Manager.

Sworn to and subscribed before me this 30th day of March, 1930.

(Seal) ELEANOR J. SMITH,
Notary Public in and for the City and County of San Francisco, State of California.
(My commission expires December 29, 1930.)

HELP WANTED

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

SALESMAN, for machinery and equipment. Prefer a local man with very good record of sales experience and capable of producing immediate results. Might also consider a young engineer with sales personality and no experience. Salary open. Apply by letter with photo. Location, San Francisco. R-3103-S.

GENERAL DRAFTSMAN, single, experienced on plant layouts, steel and concrete design and equipment details for chemical plant. Salary $250 month on 3-year contract. Location, Chile. R-3093-S.

COLLEGE INSTRUCTOR in Civil Engineering and Mathematics, preferably not over 30, and married. Should have at least 1 year of successful teaching. Salary $3000-$3250 for 9 months. Apply by letter with references and photo. Location, Northwest. R-3068-S.

POSITION WANTED

POSITION WANTED—Young man desires position with construction company doing street or highway work. Four years' experience on street, sewer, etc., as surveyor and inspector. Three years highway. At present employed on highway survey. Experienced in handling men and had some bookkeeping. Would like to make connection where there is chance for advancement and permanent employment. Would like to start as timekeeper, cost clerk, foreman, or in similar capacity. Single, sober, and will accept any location offering desired opportunity. Field, office, or both. Box 350, W. C. News.

CIVIL ENGINEER—12 years' experience as engineer, foreman and superintendent in road construction. Desires new connection. Box 400, W. C. News.

THE BUYERS' GUIDE—*Continued from Page 66*

Pumps, Dredging and Sand
Jenison Machinery Co.

Pumps, Hydraulic
Jenison Machinery Co.

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

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

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

Pumps, Sewage Ejector
Industrial & Municipal Supply Co.

Pumps, Sludge
Dorr Co., The

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

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.
Blaw-Knox Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Road Forms
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Heltzel Steel Form and Iron Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Road Graders and Scrapers
Austin-Western Road Machy. Co.
Bacon Co., Edward R.
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.
Shell Oil Co.
Standard Oil Co.
Union Oil Co.

Road Oil, Emulsified
American Bitumuls Co.

Road Rollers
Bacon Co., Edward R.
Galion Iron Works & Mfg. C.
Hackley Equipment Co., P. B.
Huber Manufacturing Co.
Jenison Machinery Co.
Spears-Wells Machinery Co.

Roofing
Paraffine Companies, Inc., The

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.
West Coast Tractor 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.
West Coast Tractor Co.

Screens, Sand and Gravel
Bacon Co., Edward R.
Bodinson Manufacturing Co.
Diamond Iron Works, Inc.
Haiss Mfgr. Co., Geo.
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
Atkinson Equipment Agency
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)
American Hoist & Derrick Co.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Excavating Equipment Dealers, Inc.
Garfield & Co.
General Excavator 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.
National Equipment Corp.
Northwest Engineering Co.
Ohio Power Shovel Co.
Orton Crane & Shovel Co.
Osgood Co., The
Spears-Wells Machinery Co.
Speeder Machinery Corp., The
St. Louis Power Shovel Co.
Thew Shovel Co., The
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
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