WCN-07-1930

WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

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VOLUME V NUMBER 11

SAN FRANCISCO, JUNE 10, 1930

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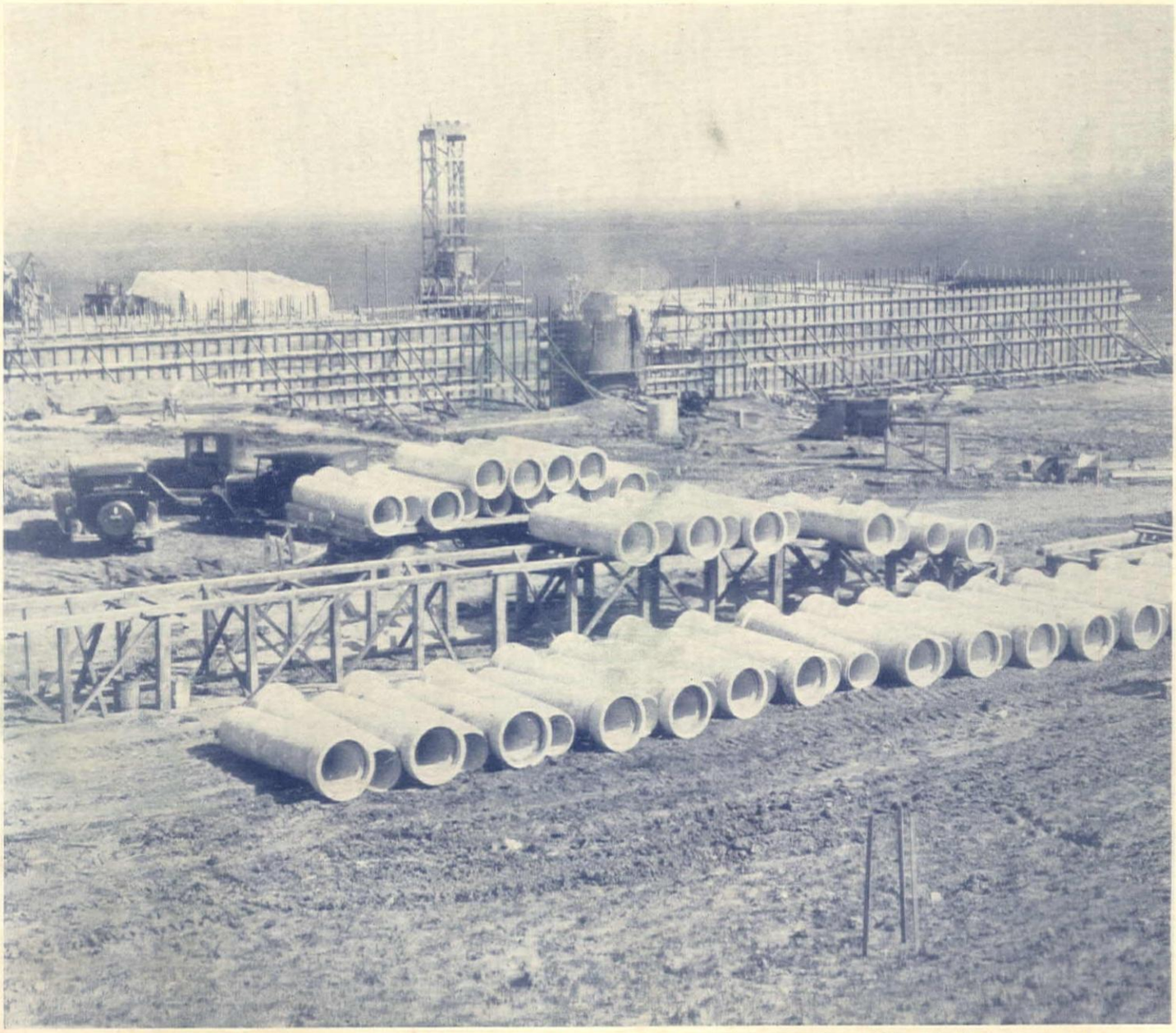
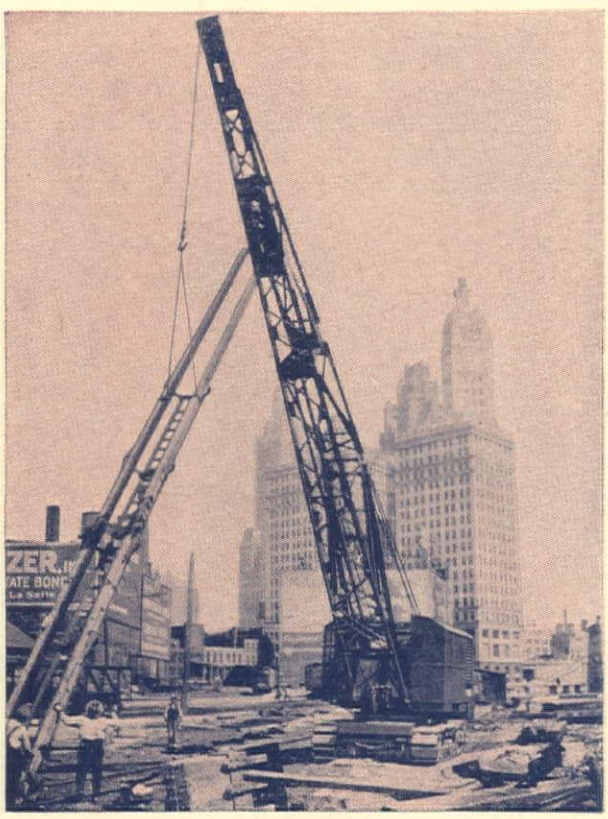


CONSTRUCTING FILTRATION PLANT FOR CHENERY WATER SUPPLY PROJECT, CONTRA COSTA COUNTY, CALIFORNIA, FOR CALIFORNIA WATER SERVICE COMPANY

Typical P&H CONVERTIBILITY



AS A CRANE

Construction of the bascule bridge which will span the Chicago River at Wabash Avenue, Chicago, brings out a good example of the ready convertibility of P&H Excavators.

Ketler-Elliott Company, the contractor, has a P&H Diesel Model 700 on the job. It started work as a Crane. Both clamshell and orange-peel buckets were used for grading and filling and also for digging under-water trench ahead of steel sheet piling.

AS A PULL SHOVEL

The machine was then converted into a Trench Hoe, as shown above. The change was made in a short time—and work started on the excavation of the bridge pits. As soon as the pits are finished, a crane boom will be put on the machine, and it will then be used for handling steel and other general erecting service.

P&H EXCAVATORS

Harnischfeger Sales Corporation
Established 1884
3890 National Ave., Milwaukee, Wis.
BRANCH OFFICES: Los Angeles and San Francisco
ROBERT M. TAYLOR, *Pacific Coast Manager*
Service Stations, Complete Repair Part Stocks and Excavators at San Francisco, Los Angeles, Seattle

(Made in Sizes from ½ to 3½ Cu. Yds.)

QUALITY, in WEIGHING EQUIPMENT

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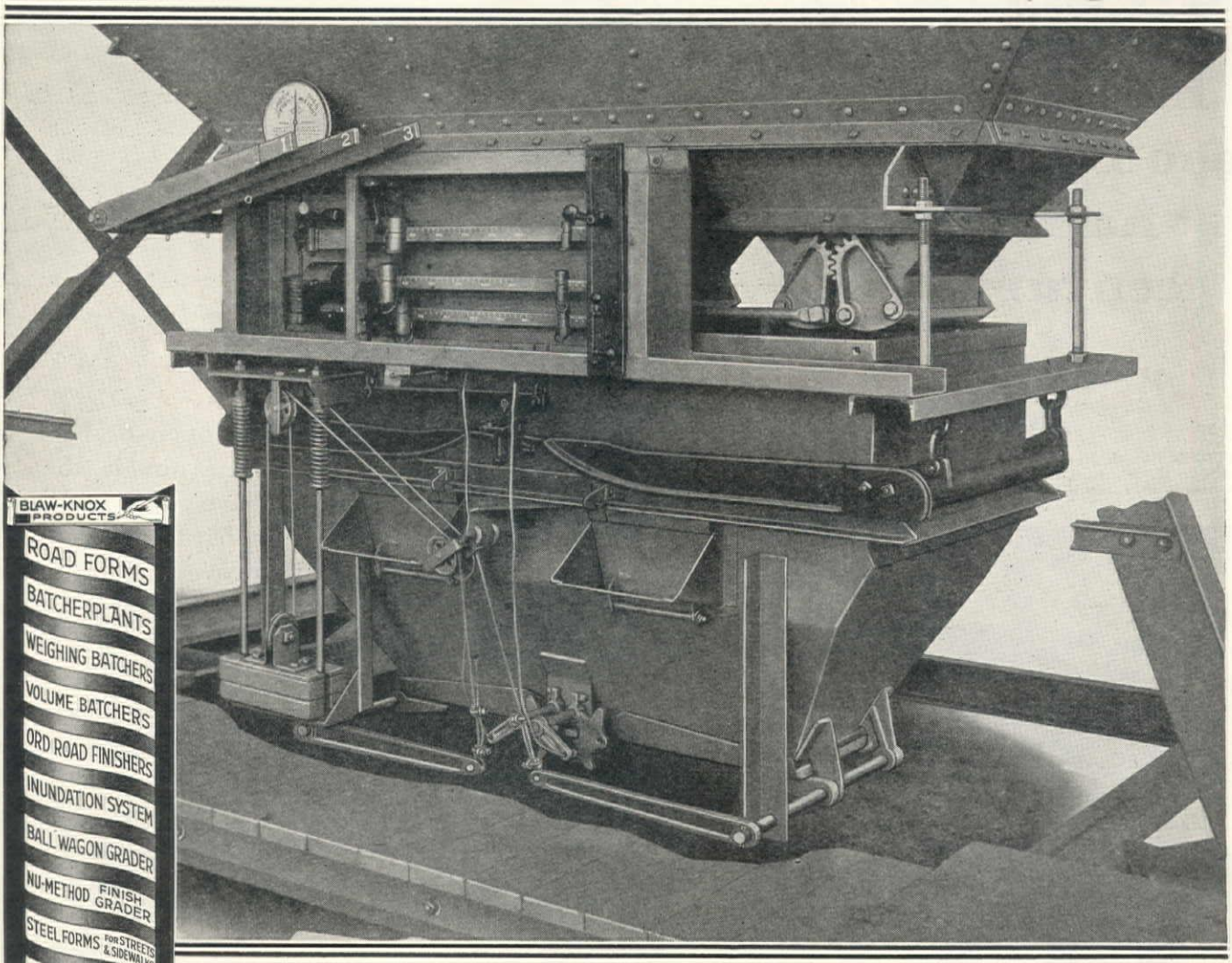
The engineering experience and mechanical thoroughness of BLAW-KNOX has constantly improved, *and perfected,* the WEIGHING BATCHER.

BLAW-KNOX



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- BATCHERPLANTS
- WEIGHING BATCHERS
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- AGITATOR TRUCK BODIES
- READY MIXED CONCRETE PLANTS

BLAW-KNOX

THE BLAW-KNOX *TRIPLE* WEIGHING BATCHER

For the quick and accurate Weighing of one, two, three or more materials; even surpassing rigid specifications.

One man runs a Blaw-Knox Weighing Batcherplant, watches the Tell-Tale Dial, and checks every batch for overweight and underweight---operates rapidly and easily.

Blaw-Knox Weighing Batchers are shipped completely assembled with or without the bin, ready for instant service.

Bulletin No. 1105 gives you the details---Weighing Batchers for Cement and Aggregates---write for it.

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DEVOTED TO CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

VOLUME V JUNE 10, 1930 NUMBER 11

CONTENTS

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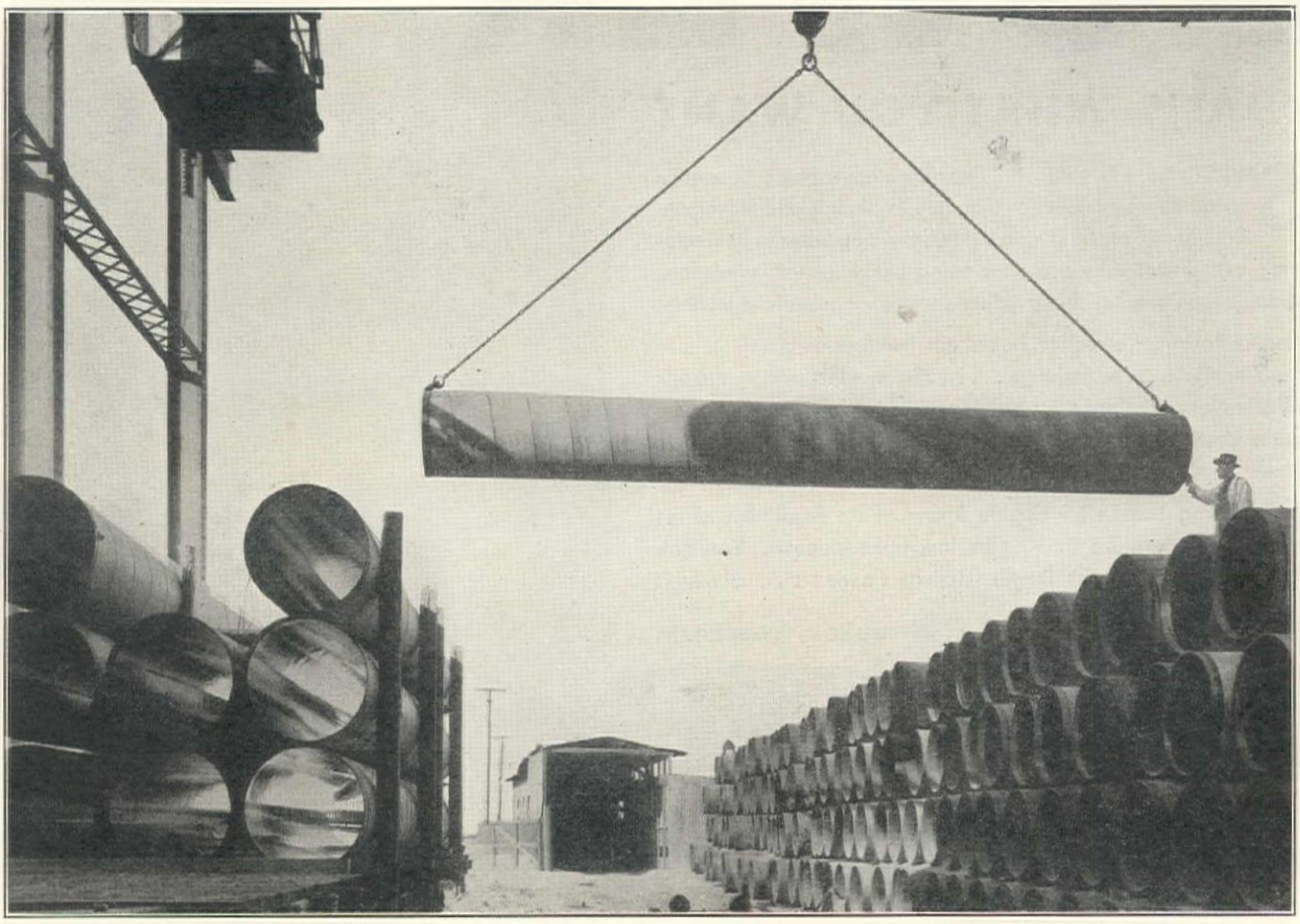
Water Pipe for San Diego



LOADING steel water pipe at our South San Francisco plant for shipment to San Diego. We are fabricating and installing on this order 16 miles of 40" and 36" diameter steel pipe, dipped and wrapped. The pipe section in midair shows the efficiency of our wrapping methods, and the smooth interiors of the pipe sections on the car show the result of proper dipping. This pipeline, known as the Otay Reservoir-San Diego Second Main Pipeline, is the third large consecutive order placed with us by the city of San Diego in recent years.

Western Pipe & Steel Co. of California

SMOOTHER POWER

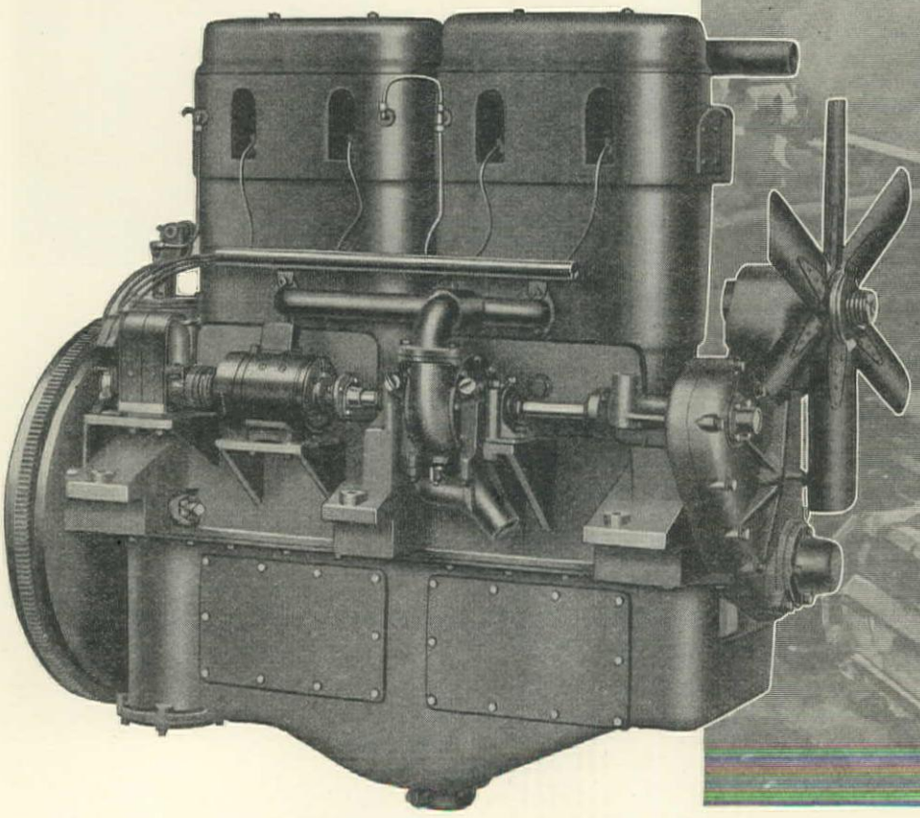
THAT'S WHAT YOU WANT

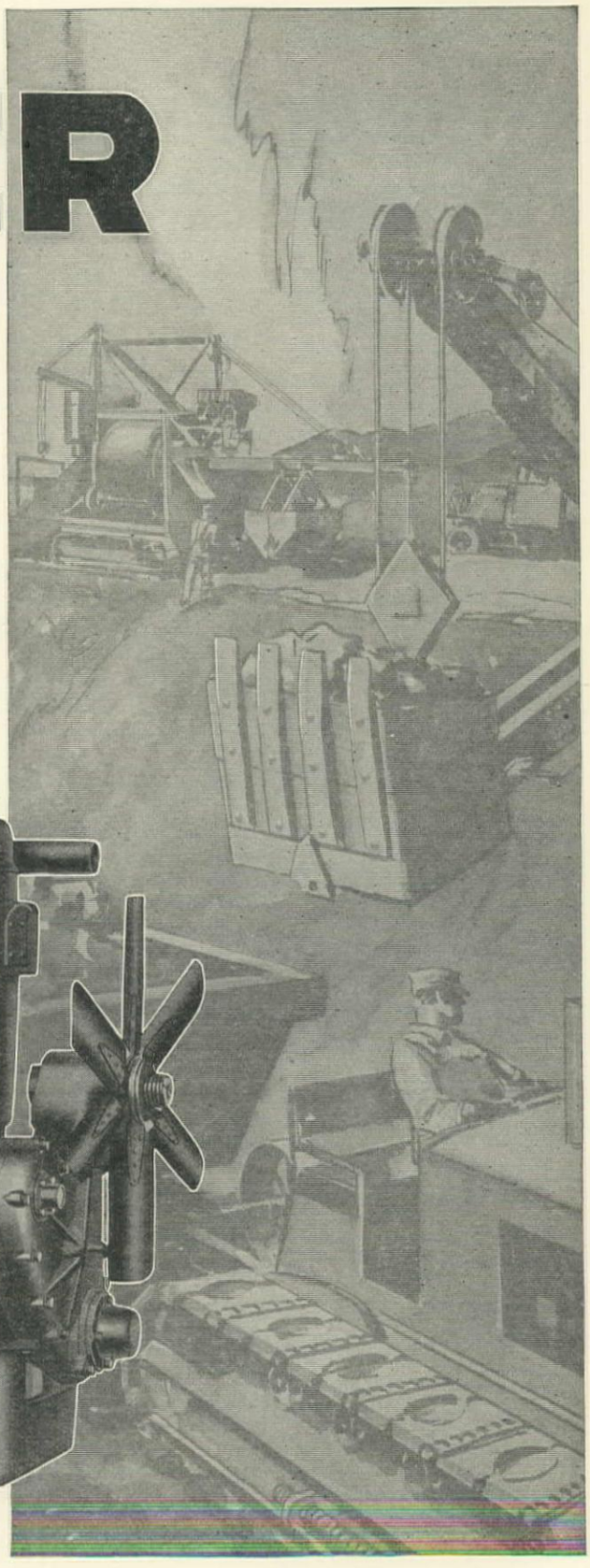
SMOOTHER POWER . . . vibrationless power bespeaks LeRoi Engine quality . . . quality in design and materials. So completely has this quality been apparent to its world-wide users, that they are now using LeRoi gasoline engines in the "toughest" of heavy duty service of manifold variety.

And LeRoi's performance bears out its staunch build . . . in road-building . . . in logging . . . in dirt-moving and hundreds of other applications. Its efficiency is told in its low operating costs . . . its ability to provide "full-measure" power under capacity load . . . and its long years of faultless service.

Those using the LeRoi Engine know of its flexibility, of its smooth acceleration and of its low upkeep costs. You can look to the LeRoi for Dependable Power . . . always!

LE ROI COMPANY, Milwaukee, Wisconsin





LE ROI ENGINES

FOR DEPENDABLE POWER

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Basement Excavators!

reach that truck with a NORTHWEST

NORTHWEST ENGINEERING CO.
The world's largest exclusive builders of gasoline, oil burning and electric powered shovels, cranes and draglines
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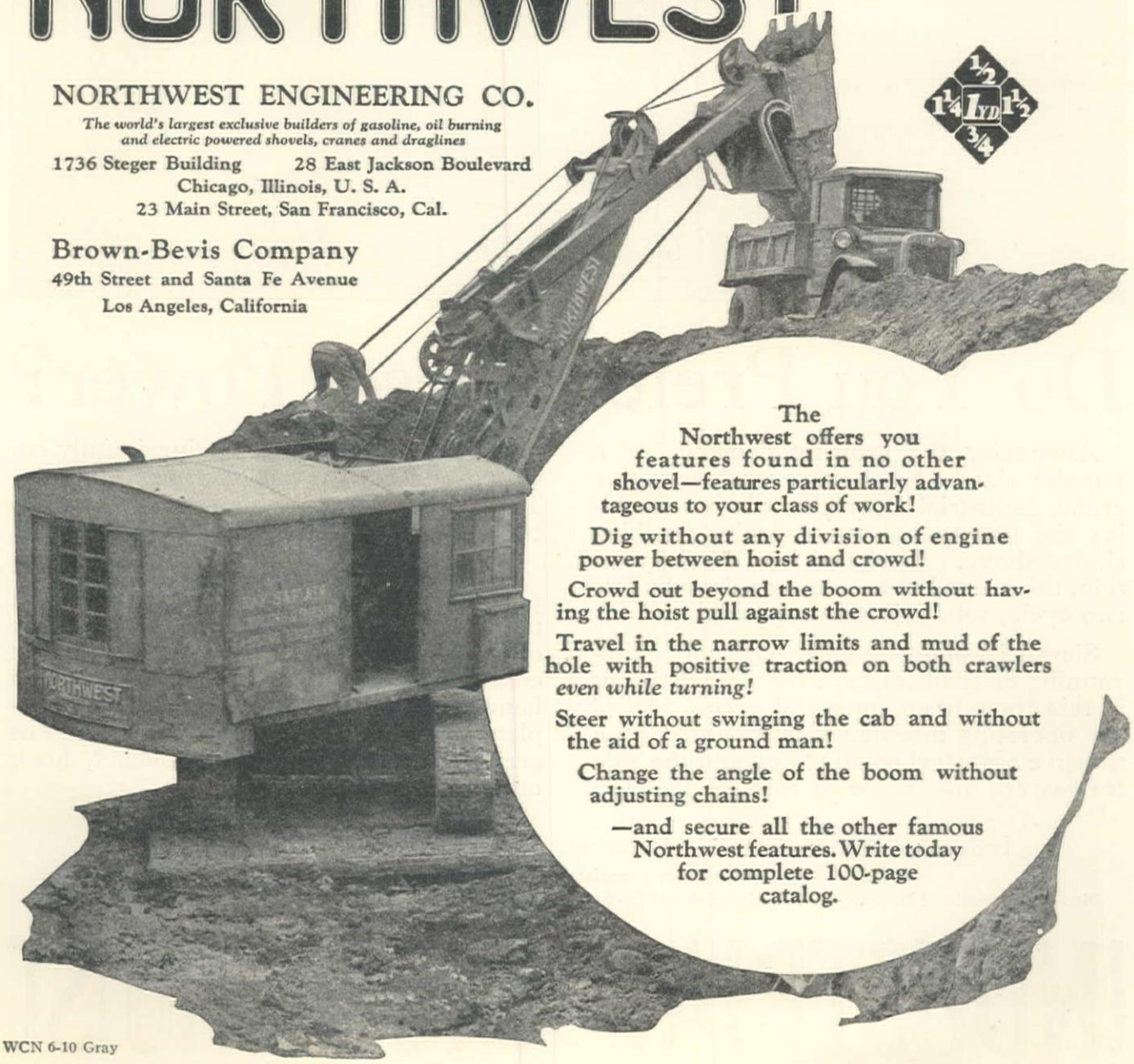
Los Angeles, California



The Northwest offers you features found in no other shovel—features particularly advantageous to your class of work!

Dig without any division of engine power between hoist and crowd!

Crowd out beyond the boom without having the hoist pull against the crowd!

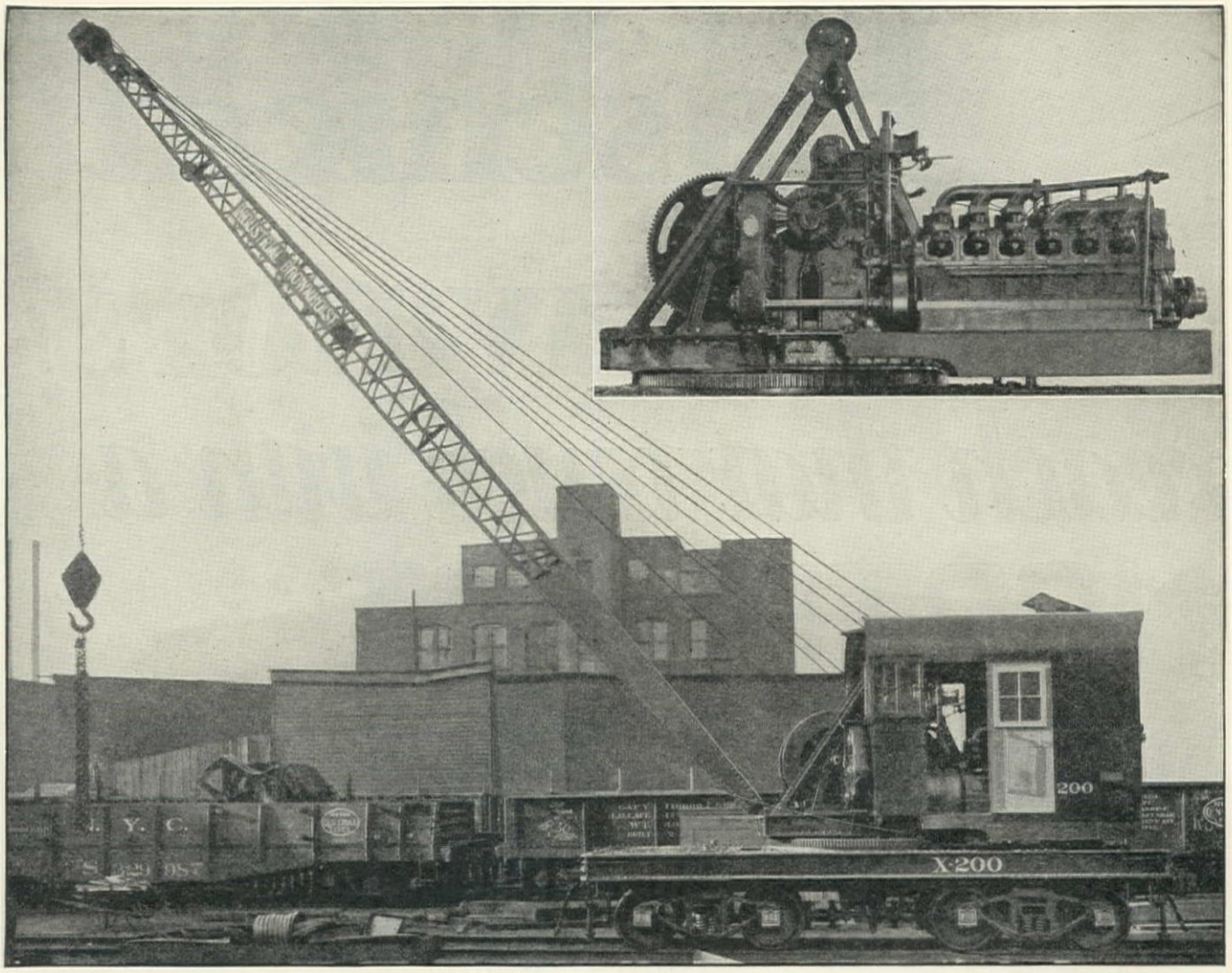
Travel in the narrow limits and mud of the hole with positive traction on both crawlers *even while turning!*

Steer without swinging the cab and without the aid of a ground man!

Change the angle of the boom without adjusting chains!

—and secure all the other famous Northwest features. Write today for complete 100-page catalog.

WCN 6-10 Gray



Do You Prefer Diesel Power?

Answering the growing demand for a popular sized Diesel powered locomotive crane, Industrial Brownhoist is now building the twenty-five ton capacity machine shown above. Designed for Diesel operation, this crane is powered by a six cylinder, two cycle, solid injection type engine.

Simplicity of design and a powerful, quiet-running mechanism have been worked out in this crane to an unusual degree. All of the operating machinery is mounted on a massive cast steel rotating bed and the side frames are also made of cast steel. The power take-off from the engine is fully enclosed and runs in oil on roller bearings. The crane gears are slow running and a two-speed travel mechanism is provided.

Combining the dependable operation expected of an Industrial Brownhoist with the well recognized economy and flexibility of Diesel power, this crane marks a distinct contribution to the art of better materials handling. We will be glad to give you complete information regarding the work this crane will do, equipped for bucket, hook or magnet operations.

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Monadnock Building, San Francisco; 3322 White Building, Seattle

Plants: Brownhoist Division, Cleveland; Industrial Division, Bay City, Michigan; Elyria Foundry Division, Elyria, Ohio

INDUSTRIAL BROWNHOIST

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**Building a levee on the Mississippi River at Pecan Point, Arkansas (S. A. Hunter Co.)*

Cutting TIME and COSTS with "Caterpillars"*

BIG WAGONS to make the most of the traction and power of the "Caterpillar" Sixty Tractor. One man operates the tractor and dumps the wagons. Bigger tools, heavier scarifiers, stout graders! It takes power to win contracts (and profits)—much of the finest equipment today available has been designed for use with "Caterpillar."

Caterpillar Tractor Co.

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Track-type Tractors ' Combines ' Road Machinery

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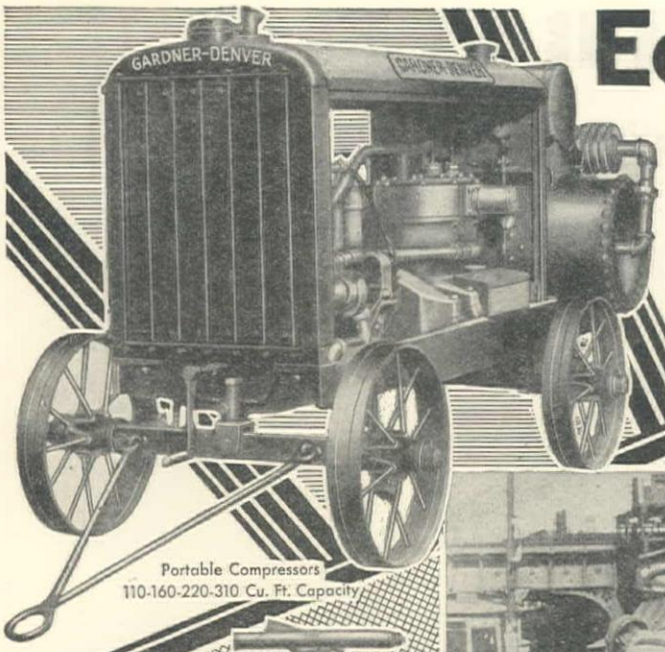
REG. U.S. PAT. OFF.
TRACTOR

Equipment for all Needs



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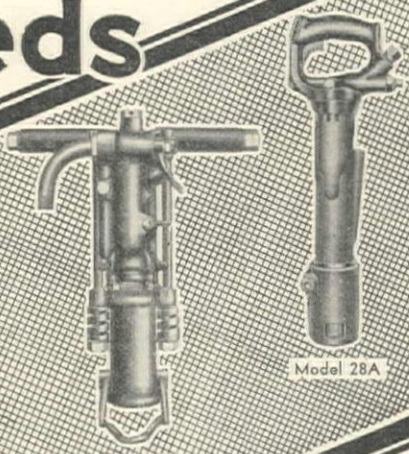
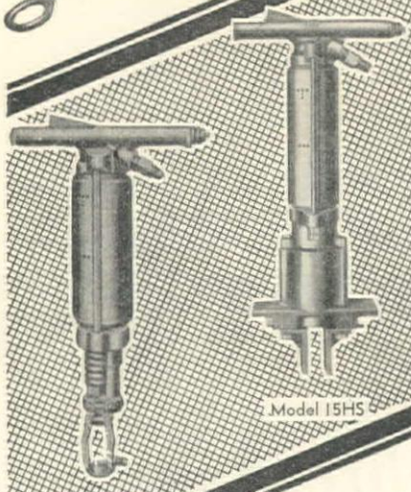


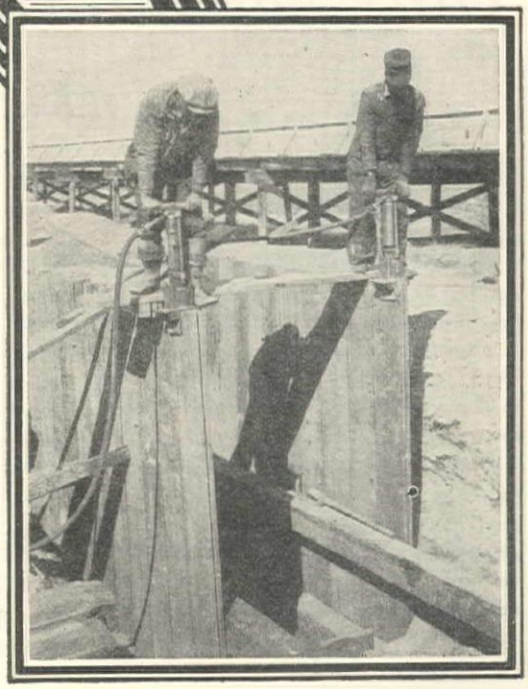
Model 28A

Model 11



Model 15HS

Model 15



On all types of construction or demolition work where air powered tools are necessary, you will find that **Gardner-Denver Portable Compressors and Air Tools** stand alone where a certain amount of work must be accomplished in a given period of time. The ability to stay on the job day in and day out, gives the operator that feeling of assurance that good tools in the hands of competent operators always do.

Let our representative call and convince you.

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"HEAVY TRAFFIC" *Pavement* *at* "LIGHT TRAFFIC" *Costs*

Bit-u-muls

Your secondary-road problem solved .....at considerably lower costs

USING only a minimum amount of asphalt, as prescribed by the best modern practice . . . Bitumuls Penetration Macadam Surface makes an ideal year-round, smooth-riding, non-skid pavement . . . and at considerably lower costs.

Voids are reduced to a minimum. Shoving and surface bleeding eliminated . . . because the use of excess asphalt is eliminated. With Bitumuls you actually get "heavy traffic" pavements at "light traffic" costs.

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For "heavy traffic pavement at light traffic costs" . . . be sure that your specifications measure up to Bitumuls. It is backed by years of extensive research and use throughout the world.

Technical data, detailed facts, and specifications available in the Bitumuls Manual. Mail the coupon for a free copy.

Make this practical test

Order a sufficient number of barrels of Bitumuls to make a thorough test. Have your regular paving crews apply it . . . in small areas . . . with ordinary gravity or pressure distributors, or with pouring pots. See for yourself the amazing possibilities of Bitumuls in your pavement construction and maintenance . . . its low cost . . . its durability . . . its non-skid surface.

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The GAS+AIR IS HERE TO STAY

A Gas Machine With a Steam Machine's Characteristics

Five years ago announcement was made of the world's first Gas +Air Shovel. Not a single new principle was employed — only a NEW combination of old and tried principles of proved reliability.

Among those who were first to acclaim the Gas+Air were many who remembered the difference between the one-engine and three-engine steam machines; and many who had waited for the day when someone would produce a gas or Diesel shovel with the crowd and swing characteristics of a steam machine — "if it could be done". It HAS been done — and these machines have proved they are here to stay! . . . During the past five years hundreds of these machines have been put into operation . . . The skeptics have tried them—the unbelievers have given them a merciless third-degree. Now no doubt remains. The fact has been established that for big production in heavy digging these machines have no equal.

They have proved they have the stuff that champions are made of. Their pedigree is written by 11,000 other successful machines.

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A-98-6-10-30-WCN

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BUCYRUS-ERIE COMPANY, manufacturers of the only complete line — all sizes, types and powers. *Plants:* South Milwaukee, Wis., Erie, Pa., Evansville, Ind.
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[SEE SIX JENISON MACHINERY COMPANY PAGES FOLLOWING]

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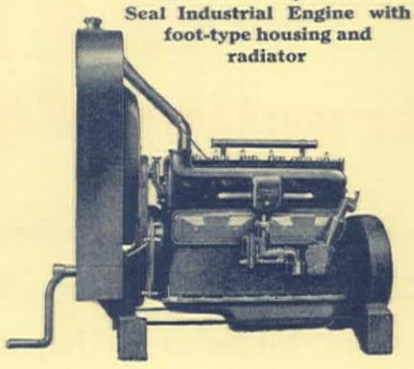
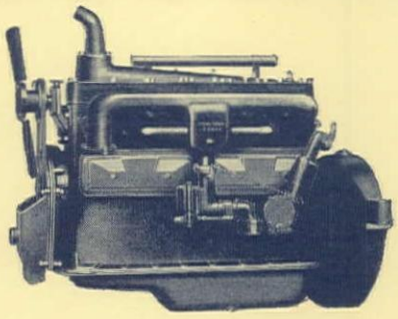


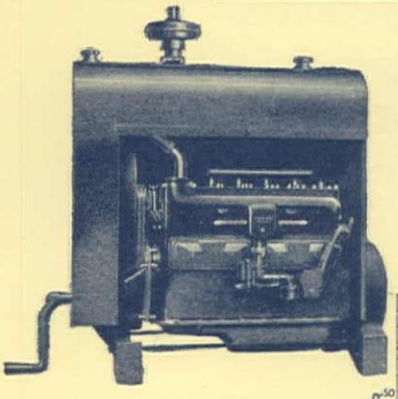
Model 14C – 6-cylinder Red Seal Industrial Engine with foot-type housing and radiator



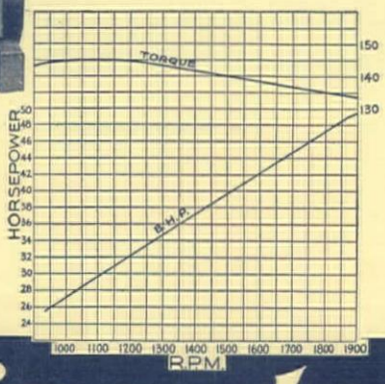
Model 14C—6-cylinder Red Seal Industrial Engine with Automotive type housing

The span of Continental service reaches from the very beginning of the gasoline motor industry to the present finely developed engine building era.

This unmatched experience is reflected in all Continental Engines today. As a result, they insure a dependability of performance that does not deviate, an economy through daily use of inestimable value to every industry in which they are used.

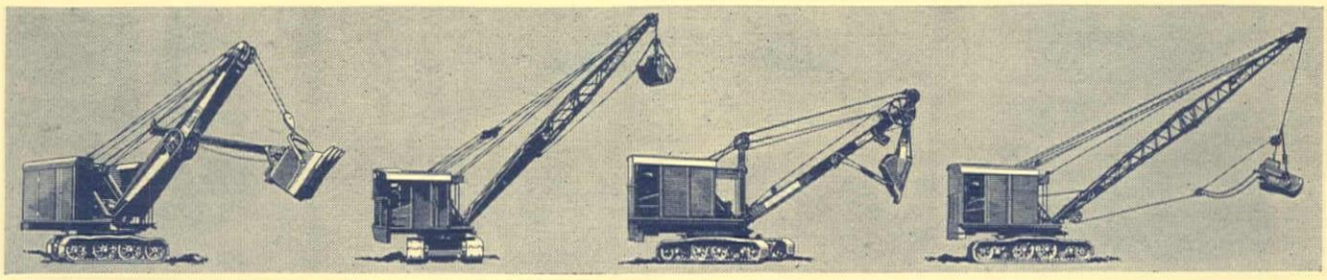


Model P4,5A—Red Seal Industrial Power Unit with 14C Industrial Engine



CONTINENTAL MOTORS CORPORATION
INDUSTRIAL EQUIPMENT DIVISION
Office and Factory: Muskegon, Michigan
The Largest Exclusive Gasoline Motor Manufacturer in the World

Continental Engines



Extra weight in a shovel or crane is like fat on a horse. It adds nothing to producing power. There is no excess weight in a Lorain. Its strength is obtained without bulk because it is built to the simplest of all shovel and crane specifications—the Center Drive.

THE THEW SHOVEL COMPANY * Lorain, Ohio

THEW LORAIN

THEW CENTER DRIVE

Distributed by:
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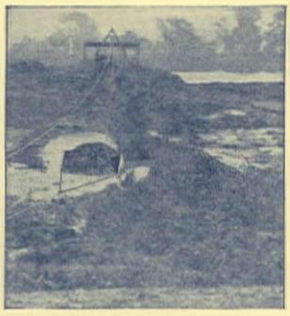
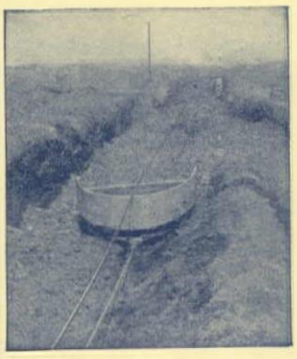
Digging Sand From River



Leveling Off Wet Land

Digging Material for Levee



Cutting Top Off Hill

To Handle Largest Yardage at Lowest Cost, Use a SAUERMAN SCRAPER

WHEN you use a Sauerman Power Drag Scraper for the first time to solve a problem of moving overburden, sand, gravel, clay, broken rock or other loose materials, the results amaze you.

You are given a new idea of the amount of materials that one man can dig and convey in a day with a single machine. You are pleasantly surprised, too, by the small amount of power required to handle this increased yardage.

The large handling capacity and low operating cost of this excavator-conveyor is traceable directly to the unique design and construction of the Sauerman "Crescent" scraper bucket. The plow-share design and curved plate construction of this bottomless bucket endow it with great digging power combined with light weight. It requires less line pull than any other type of scraper.

A "Crescent" scraper in operation gives the impression of accomplishing so much with such little effort. It starts to gather its load the instant it is pulled forward, filling to capacity within a few feet of travel; then it ceases to dig and simply "rides" its load across the surface.

When the bucket reaches the designated dumping point, the operator simply moves two levers on the power unit to cause the bucket to discharge its load and retrace its path to the loading point at a speed of 400 to 600 ft. per minute. The bucket will make 30 to 40 trips per hour on the usual span of operation which ranges from 300 to 400 ft. The operating span can be extended several hundred feet beyond the above-mentioned distances, if necessary.

There are 15 sizes of Sauerman "Crescent" drag scrapers, offering handling capacities ranging from 10 to 500 tons per hour. For complete details, write for the Sauerman Scraper catalog.

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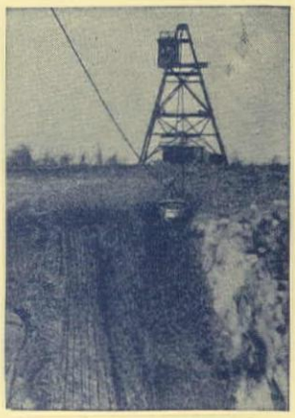
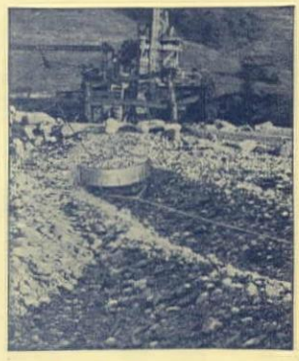


Movable Tower Installation

Building an Embankment

Cut-and-Fill for Road

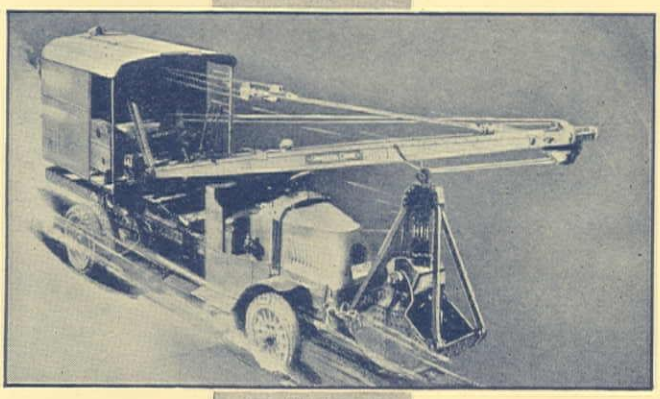


Digging Coarse Gravel

SAUERMAN

The UNIVERSAL is the Same Dependable Machine on any of these Mountings

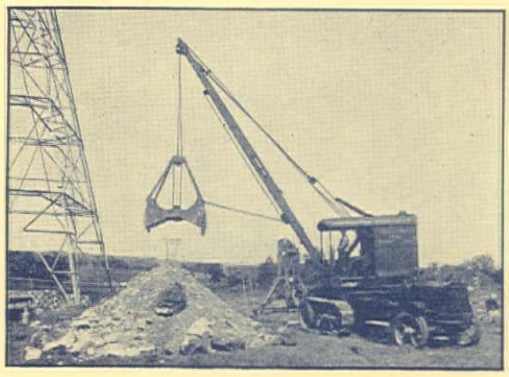
Motor Truck:



10 to 15 miles an hour traveling speed. Here is the machine that can handle 1001 "short crane jobs" at a profit. Gets there, does the job and is gone before slower equipment can be placed.

Motor Truck (Christie) Crawler:

Eight rubber tired, load-carrying wheels on pavement; for traction off the highway, crawlers may be attached as easily as a set of tire chains.



2 Speed Center Drive Crawler:

the same design as the mounting for the famous Lorain 75. The Universal 35 gives you a ½ yd. machine big enough to handle a sizeable job alone yet small enough to be profitable on jobs where big machines won't pay.

THE UNIVERSAL CRANE CO.
Lorain, Ohio

UNIVERSAL

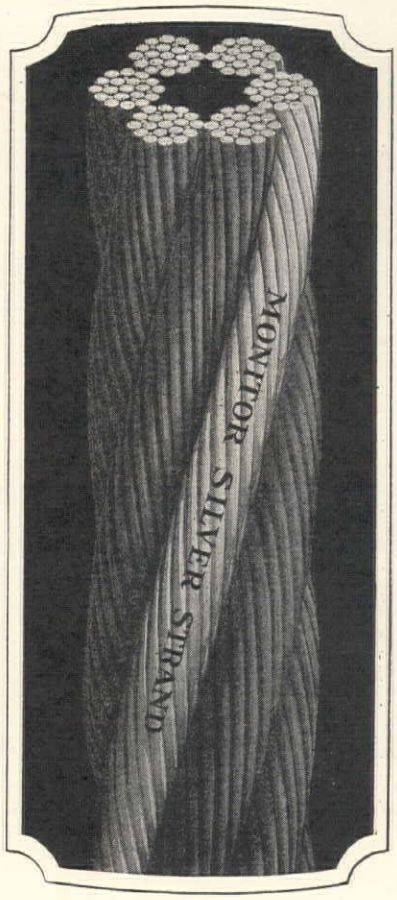
Truck Crane and Universal "35" Representatives: The Universal Crane Co., Los Angeles, Calif.; The Universal Crane Co., San Francisco, Calif.; The Feenaughty Machinery Co., Portland, Seattle, Spokane.

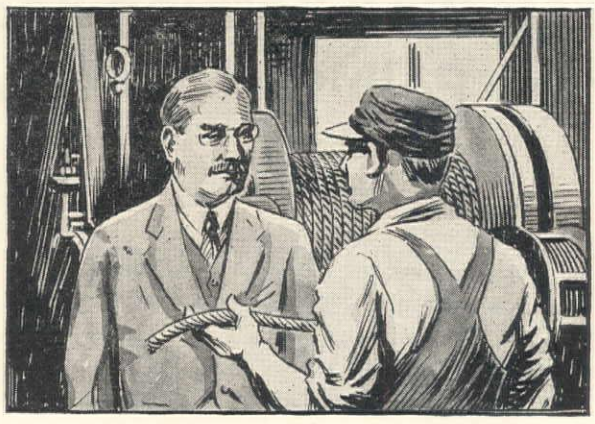
Universal "35" Representatives only: The Smith Booth Usher Co., Los Angeles, Calif.; The Jenison Machinery Co., San Francisco, Calif.

When writing to THE UNIVERSAL CRANE COMPANY, *please mention Western Construction News*

The Measure of Wire Rope Quality is the SERVICE it has Rendered

Which wire rope to use on your equipment—which brand will give the longest and most economical service—may be best determined by past records of performance established under similar operating conditions. This and the reputation of the maker are of paramount importance.





For over half a century American Wire Rope, made exclusively by the American Steel & Wire Company, has demonstrated its superiority—proved beyond question that its tough, flexible and abrasion-resistant nature is the best insurance against breakdowns and costly delays.

Regardless of your particular problem, you will find an American Wire Rope exactly adapted to its economical solution. Consult our nearest branch office or distributor to get the right rope for your purpose.

AMERICAN STEEL & WIRE COMPANY WIRE ROPE

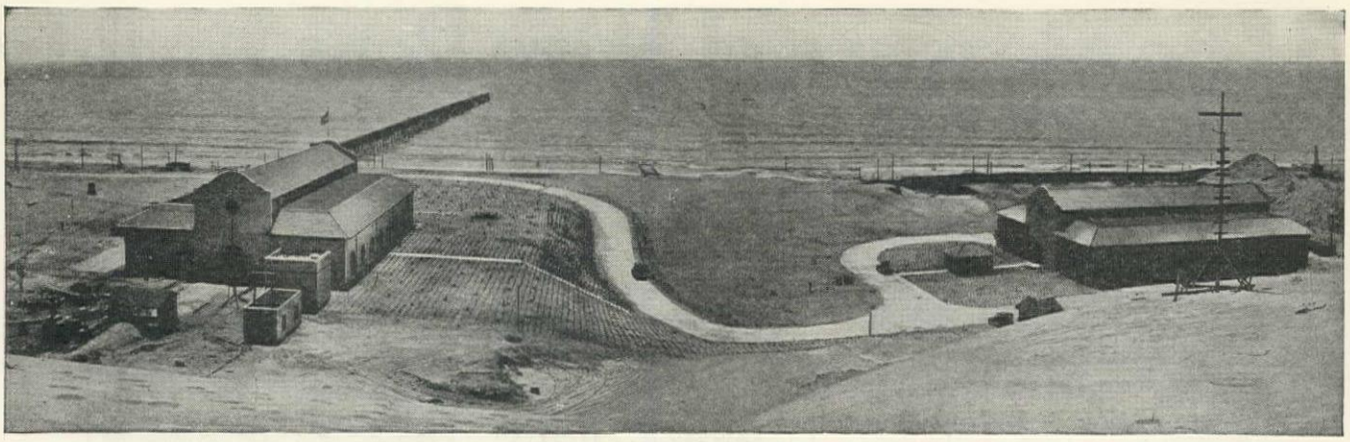
AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY UNITED STATES STEEL CORPORATION

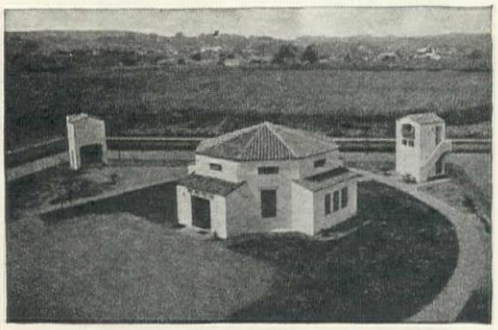
PACIFIC COAST DISTRIBUTORS

UNITED STATES STEEL PRODUCTS COMPANY

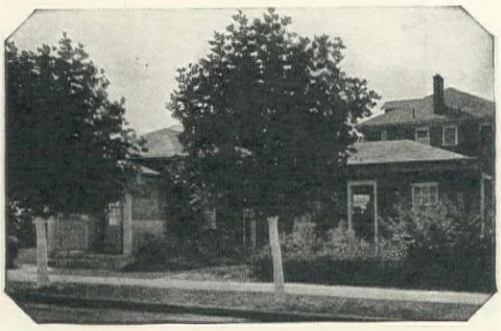
SAN FRANCISCO LOS ANGELES PORTLAND SEATTLE HONOLULU



North and South Hyperion Sewage Screening Plants, Los Angeles, California. A total of 18 Dorrco Screen Units is installed, with a daily capacity of 380 million gallons



Two Dorrco Screen Units are installed in this Sewage Screening plant at Santa Cruz, California



Raleigh Ave. Sewage Screening plant, Atlantic City. This is one of the three plants in Atlantic City operating Dorrco Screen Units

DORRCO

Protecting Bathing Beaches from Pollution by Sewage

ALL coastal cities are subject to the danger of waters polluted by sewage and the resultant littering of the shore and bathing beaches with obnoxious solids. How is it, then, that one never hears of beach pollution at Atlantic City or some of the well-known resort cities on the California coast?

The answer is simply that most of the resort cities, both on the Atlantic and the Pacific, are protected from pollution by Dorrco Screen units, which remove the solids from the sewage before it is discharged into the water. The Screens are simple and dependable in operation, and the plants are neat and attractive in appearance. In fact, in many cases, screening plants are operated in residential districts without arousing any complaints on account of odors or other causes.

Our Sanitary Engineering Division will be glad to furnish full information on the uses of Dorr Equipment to consulting engineers or municipal officials who have a beach pollution or any other sewage treatment problem under consideration.

Ask our nearest office for copies of our booklet "Modern Sanitary Engineering Practice" and of Bulletin 6291, which describes the Dorrco Screen Unit.

DENVER, COLO.
1009 17th Street

CHICAGO, ILL.
333 North Michigan Avenue

LOS ANGELES, CAL.
108 West 6th Street

WILKES BARRE, PA.
Miners Bank Building

ATLANTA, GA.
1503 Candler Building

TORONTO, ONT.
330 Bay St.

THE DORR COMPANY

ENGINEERS

247 PARK AVENUE NEW YORK CITY

INVESTIGATION TESTS DESIGN EQUIPMENT

MELBOURNE, AUSTRALIA
Crossle & Duff Pty., Ltd., 360 Collins Street

TOKYO, JAPAN
Andrews & George Co., Inc., Central P. O. Box F-23

LONDON
The Dorr Company, Ltd.
Abford House, Wilon Rd.,
S. W. 1

BERLIN
Dorr Gesellschaft m. b. H.
Kielganstr, 1 W. 62.

PARIS
Societe Dorr et Cie
26 Rue de la Pepiniere

JOHANNESBURG, S. A.
E. L. Bateman
Locarno House.

The Cheapest known method of moving dirt

IF you haven't investigated the present day type of Elevating Grader-Crawler Wagon method of moving dirt, you are overlooking the most important development of earth moving methods developed during recent years!

Many contractors have found the Austin Contractor's Special Elevating Grader used with Western Crawler Wagons enables them to bid to get the job without sacrificing profits!

The advantages of using the combination are twofold. The cost per yard is materially reduced, and the outfit can go on working under conditions where the usual type equipment would mire down and necessitate inactive days.

The Austin Contractor's Special, for example, can be fitted with a power take-off whereby the elevator is driven by the tractor engine. Such an outfit can be used under soft or wet conditions where graders without this feature could not be used at all.

Western Crawler Dump Wagons are equipped with the famous Athey Truss Wheels. These wagons will take full loads through sand or wet ground wherever a crawler tractor can go. Deliveries are speeded up, hourly production is greater, and the working season is lengthened.

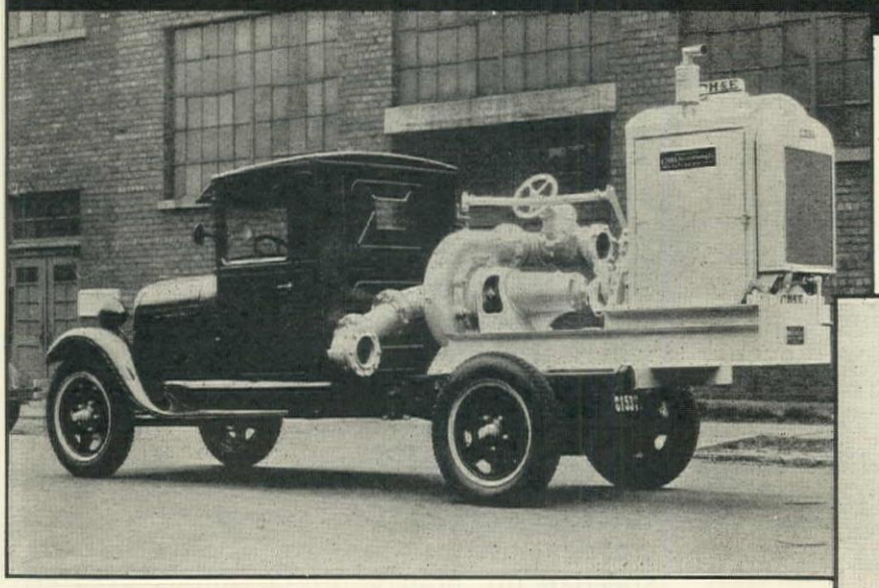
A bulletin just off the press shows detailed examples of the savings contractors are making by using this combination. A copy will be mailed on request.

The Austin-Western Road Machinery Co., 435 Brannan Street, San Francisco, California. Chicago Office: 400 North Michigan Avenue.

Austin-Western
ROAD MACHINERY

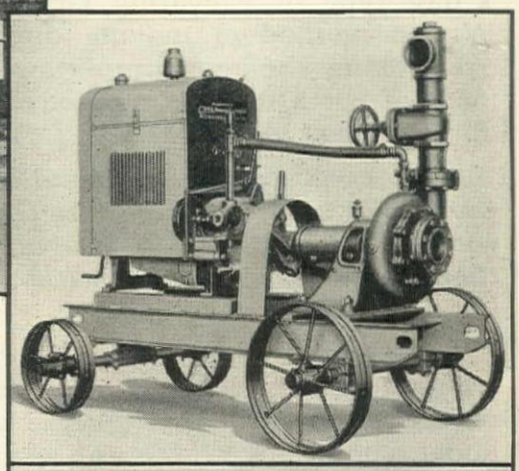
Working in sand where rear drive elevating graders could not be used at all, this Austin Contractor's Special is loading a Western 7-yard Crawler Dump Wagon.

NO CLOGGING! NO SCREENING!



A 6-in. F-M. Wood Trash Pump driven by a 30 hp. 4-cylinder gasoline engine and mounted on a Ford truck.

F-M Wood Trash Pump unit mounted on a truck built of channel iron with steel wheels.



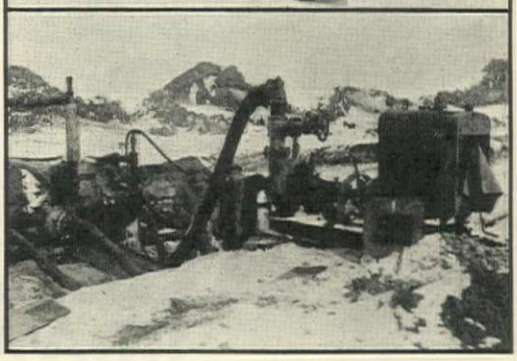


Illustration shows three F-M Wood Trash Pumps in operation.

See how these portable trash pumps save time and money

PORTABLE Fairbanks-Morse Wood Trash Pumps save time and money where fluids containing fibrous or stringy foreign matter and large solids must be handled. These pumps operate continuously without clogging. They eliminate the necessity and expense of screening.

The use of F-M Wood Trash Pumps speeds up work. Shut-downs to take the pump apart are avoided. Time is saved because it is unnecessary to raise the end of the suction hose during operation as neither screen nor foot valve is used. A single bar keeps out bricks, tin cans and other refuse that might lodge crosswise. The pump will pass any solid that will pass around the 90° suction elbow and enter the impeller.

Portable F-M Wood Trash Pump units are made in sizes 4 to 8 inches. Gasoline engine or electric motor power is optional. Several types of mounting are offered. Write for complete information.

FAIRBANKS, MORSE & CO., Chicago

Pacific Coast Service:

Los Angeles, Calif., 423 East Third Street
San Francisco, Calif., Spear and Harrison Streets
Portland, Ore., East First and Taylor Streets
Seattle, Wash., 550 First Avenue, S.
Spokane, Wash., 1113 West Railroad Avenue
Salt Lake City, Utah, 14 S. West Temple
Tacoma, Wash., 432 Perkins Building

FAIRBANKS-MORSE PUMPS

POWER PUMPING AND WEIGHING EQUIPMENT

PA 31.3

A Brute for Power!

Established 1859

PARTS
and
Mechanical
Service
Available at
San Francisco

STOCKLAND
Road Graders

The roughest, toughest job has no terror for the Bates "Steel Mule" Tractor. You can count on it to come through 100%.

This rugged tractor has earned a reputation for exceptional power.

The reliable Bates Waukesha motor supplies power for the wide, long crawlers extending beyond the full length of the tractor. The Bates crawlers take full advantage of every ounce of power applied, and account in a large measure for its extraordinary traction. Perfect balance, low center of gravity, and other design features make this tractor exceptionally powerful.

BATES Steel Mule

W. H. WORDEN COMPANY

DISTRIBUTORS

355 Fremont Street, San Francisco

Write for This Book

W. H. Worden Company
355 Fremont St.
SanFrancisco, Cal.

Send me a copy of Tractor Book

Signed_____

Address_____

When writing to W. H. WORDEN COMPANY, *please mention Western Construction News*

TWINS!

THE mother of twins who had to mark them with colored ribbon to identify them would have far worse trouble in a Lock Joint manufacturing yard.

Each length "looks like the one before it, only more so," as the Irishman phrased it; and one would have to mark any one length of Lock Joint Pressure Pipe to be able to recognize it again.

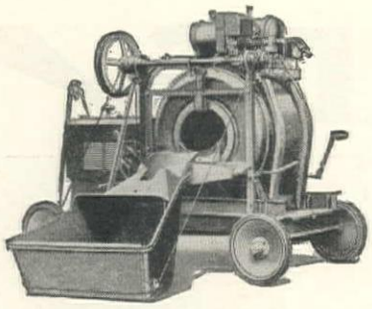
But far more important than their similarity in appearance is their similarity in service; each length of Lock Joint Pressure Pipe is a counterpart of every other length in Strength, in Long Life, and in Freedom from Tuberculation, which fact, in turn, insures Highest Carrying Capacity.

LOCK JOINT PIPE CO. :: Ampere, New Jersey

Established 1905

PRESSURE, SEWER, SUBAQUEOUS, CULVERT

When writing to LOCK JOINT PIPE CO., *please mention Western Construction News*

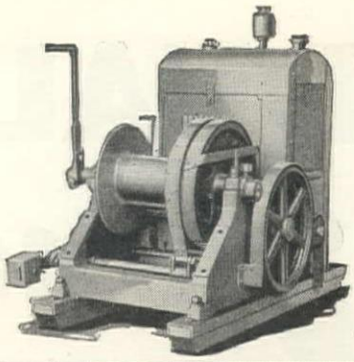


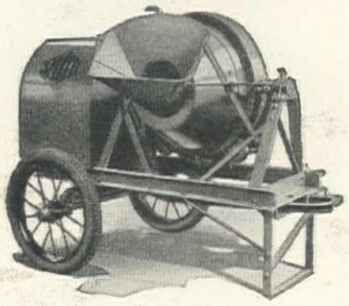
Koehring Dandie

The famous Koehring Dandie—handy, long-service quality mixer. Worm gear drive enclosed in oil bath, charging skip low enough for wheelbarrows without runway! Folding steel platform, wide batch hopper, hoist! Batchmeter, automatic water measuring tank. Write for Dandie catalog.

C. H. & E. Hoist

Right priced unit. Single-acting one-way hoist. No. 20 reversible ,direct gear drive—4 and 8 H. P. National Equipment line of C. H. & E. hoist meets every demand for hoists of every capacity! Also material elevators. Ask N. E. C.



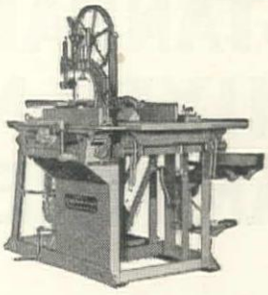


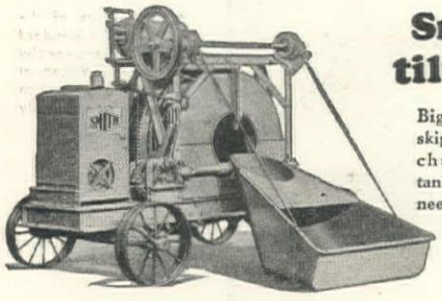
Smith Tilter

Short swing of drum means fast discharge! Big wide charging hopper, only waist-high, saves your back and means fast charging. Smith end-to-center mixing action delivers uniform quality concrete! 3½-S may be equipped with power charging-skip, steel or rubber tires; water tank.

C. H. & E. Saw Rig

Home Builder's Saw Rig (illustrated) with rip and cross cut saws; band saw, jointer and boring attachments; gasoline or electric power, built in and under table. Other C. H. & E. Saw Rigs for every need; also pumps, hoists, material elevators. Ask N. E. C. for literature.



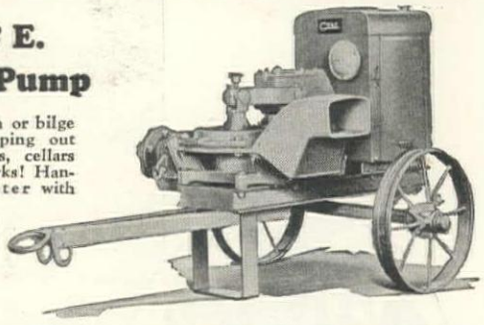


Smith Non-tilting Mixer

Big drum opening, wide skip throat and discharge chute, water measuring tank, auxiliary pump when needed! Steel wheels or rubber tires.

C. H. & E. Mud-Hen Pump

Diaphragm trench or bilge pump. For pumping out footings, trenches, cellars and for public works! Handles muddy water with minimum wear. Capacity 6,000 gallons per hour.



Write N. E. C. for Catalogs!

ALL of these long and well known lines are sold by N. E. C. co-operative engineering and supported by N. E. C. national service organization.

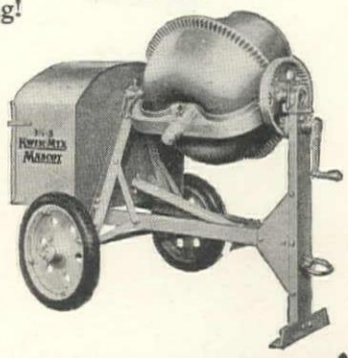
No matter what you need in contractors' equipment you're sure to find the right type and price range in N. E. C. lines. Write for catalogs of anything you want.

Kwik-Mix Mascot

$168 with steel wheels 2 H.P. engine F.O.B. Port Washington, Wis. With cushion rubber tires, as shown, $21.00 extra.

Never before such a low price on such a capable full capacity 3½-S Mixer! Lip of drum is only 41½" from ground in charging position. Big 18" drum opening!

Get a Catalog of this big value! Ask for the Mascot folder No. NKM 4!



National Equipment Corporation

30th St. & Concordia Ave.
Milwaukee, Wisconsin

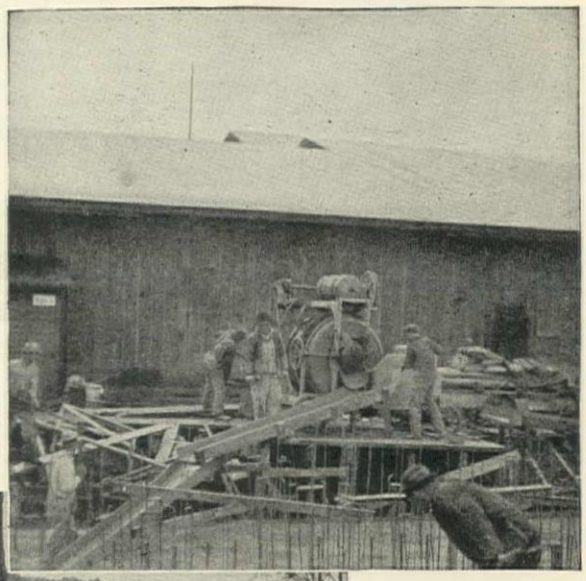
A 5796-I

Harron, Rickard & McCone Co., 1600 Bryant St., at 15th, San Francisco, Calif.
Harron, Rickard & McCone Co.....2205 Santa Fe Ave., Los Angeles, Calif.
Wilson Machinery Co.....1936 Market Street, Denver, Colorado
Lund & Company.....49 N. Second, West, Salt Lake City, Utah
Northwest Equipment Co., Inc.....Great Northern Tracks, Great Falls, Montana
L. A. Snow Company, 1082 Sixth Ave., S., Seattle, Wash., Portland, Spokane

When writing to NATIONAL EQUIPMENT CORPORATION, *please mention Western Construction News*

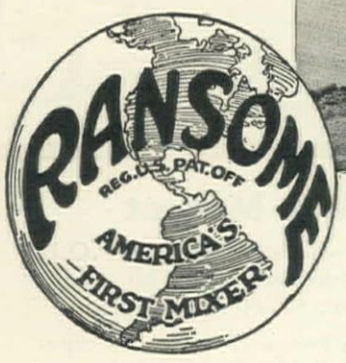
DUAL RECORDS.

Ransome 10-S STANDARD BUILDING MIXER MAKES ANOTHER RECORD



Action picture of the Ransome 10-S Standard Building Mixer owned by Gordon and Wagnor at Elma, Washington, which operated continuously for 122 hours.

This picture shows the Ransome 10-S Standard Building Mixer which operated continuously for 168 hours on the job near Bound Brook, N. J.



In his historic flights over both poles Byrd met the challenge of nature at her worst with dauntless courage, seasoned skill and scientific preparation.

Stamina and science enabled Byrd to conquer both poles.

Experience and science put stamina in Ransome Mixers—the sort of stamina that made the Ransome 10-S stand up under continuous operation for record periods of time on two jobs, one on the East Coast and one on the West.

At Bound Brook, N. J., a Ransome 10-S Standard Building Mixer, owned by Ellis B. Edgar, operated continuously 24 hours a day for 7 days—168 hours—without a hitch or a squawk. Ate up 10,080 bags of cement—mixed 5,040 batches! At Elma, Washington, another Ransome 10-S Standard Building Mixer, owned by Gordon and Wagnor, performed a similar feat—operated continuously for 122 hours.

When you are crowded for time, put a Ransome 10-S Standard Building Mixer on the job and *meet the contract date*. The Bulletin gives the quick facts in "14 points" and complete specifications. Ask for Bulletin No. 118.

Ransome Concrete Machinery Company

1850 — Service for 80 Years — 1930

Star Machinery Co.
Seattle, Wash.

McCraken-Ripley Co.
Portland, Ore.

Kratz & McClelland, Inc.
San Francisco, Calif.

Crook Co.
Los Angeles, Calif.

2,000 HOURS of HEAVY WORK

and no time lost for repairs

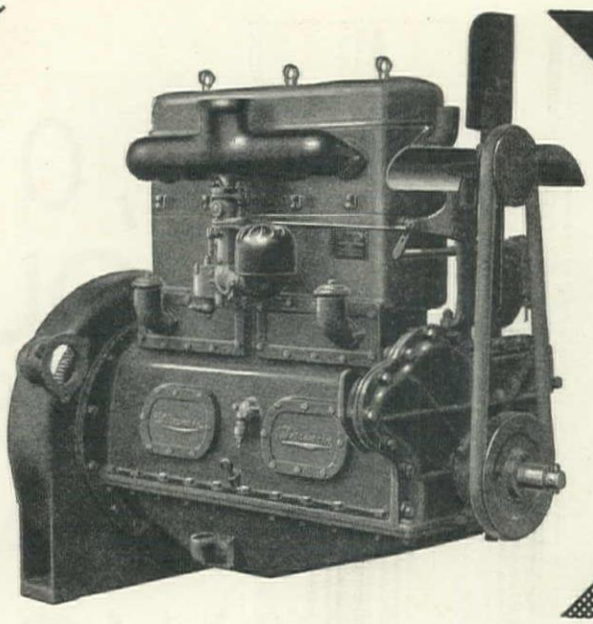
TWELVE months ago Platte County, Mo., added a Cletrac to the county's equipment. It was a Cletrac "40"—famous for power and dependability. One of its first jobs was grading and dragging 120 miles of roadway. Within one year's time this rugged Cletrac rolled up a total of 2000 working hours and no time lost for repairs.

Such performance is typical of Cletracs. Inbuilt stamina is one of their strongest characteristics. They have proved their ability to stay on the job day after day and month after month—to keep going without loss of time for adjustments or repairs. That is the kind of service Cletracs are giving to thousands of satisfied users.

Whatever the class of work there is a Cletrac size and model to handle it—better and at a lower cost! Five units to choose from, with a power range from 20 to 100 h.p. See the Cletrac distributor near you or write direct to us for literature.

THE CLEVELAND TRACTOR CO.
19332 Euclid Avenue CLEVELAND, OHIO

Cletrac Crawler Tractors



Weather-Proof Performance

Hot weather doesn't bother Wisconsin Engines—nor does cold. They give "More Power per Cubic Inch" the year 'round. Wisconsin Engines are first acclimated on the drafting table, then on the test block, and finally in actual service .... made ready to meet all manner of load and climatic conditions. You can run Wisconsin Engines continuously, under full load, on the hottest days, without overheating or loss of efficiency. And Admiral Byrd selected Wisconsin-powered tractors for his Antarctic expedition.

Made in a full range of Sixes and Fours, from 20 to 150 h. p., for industrial machinery, trucks and tractors.

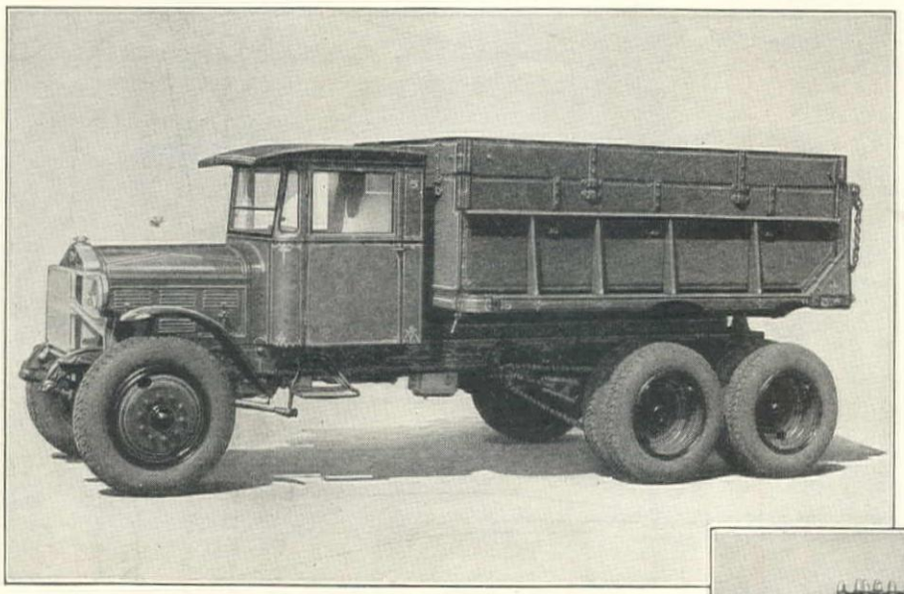
Wisconsin Motor Co.
Milwaukee
Wisconsin

WISCONSIN ENGINES

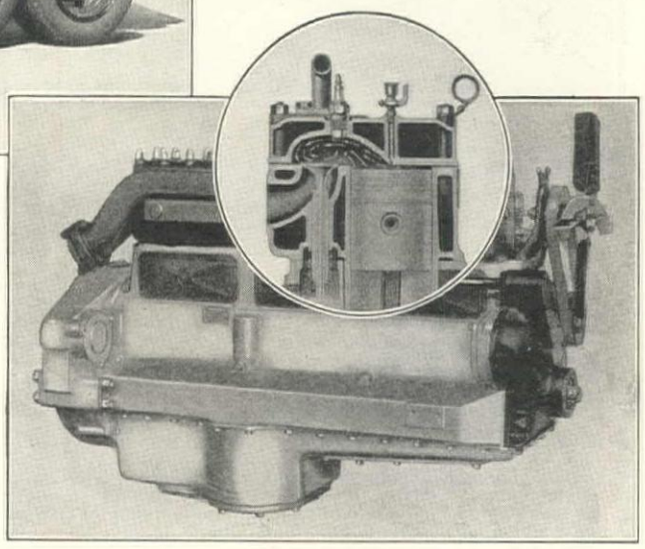
MORE POWER per CUBIC INCH

When writing to WISCONSIN MOTOR CO., *please mention Western Construction News*

MORE POWER from a gallon of gasoline



For grueling, heavy work .... STERLING DC-26 .... a heavy duty, six cylinder chain drive unit.

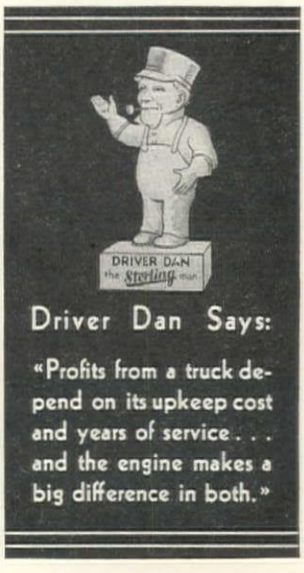


Hauling costs are being cut with Sterling Trucks .... because of the *many economy features* that *only Sterling* can build in. *One* of them is a more reliable engine. Equipped with the genuine *Red Head* Ricardo Combustion Chamber, it develops far greater power output from a gallon of gasoline .... and gives more years of low upkeep service.

The converting of raw fuel into power takes place in the engine's combustion chamber. The *Red Head* Ricardo Combustion Chamber .... by its proportions, shape and properly placed spark plug .... controls the *turbulence*, or agitation of the explosive mixture, which assures proper firing. The result is rapid and complete combustion ... after-burning is eliminated ... and every part of the gas is *completely* burned and converted into useful power.

"Anti-knock" fuel is not necessary. The *Red Head* Ricardo Head Combustion Chamber not only permits higher compression but eliminates engine-wrecking "ping" or detonation. No after-burning means that exhaust valves stand up longer. Complete combustion assures far less formation of carbon and an almost total elimination of crankcase dilution.

For the complete story write to Driver Dan, in care of Sterling Motor Truck Co., Milwaukee, Wisconsin.



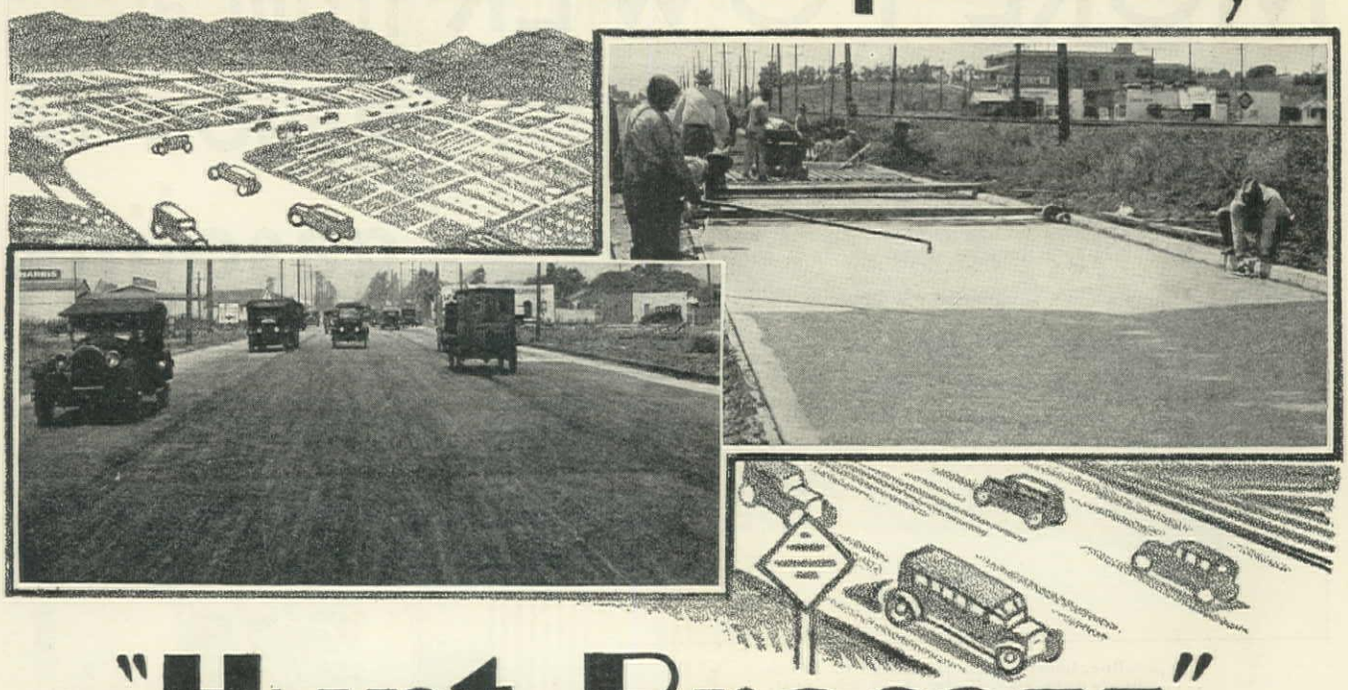
STERLING MOTOR TRUCK CO. OF CALIFORNIA
1190-98 Howard St., San Francisco

Oakland Sacramento Fresno Stockton San Jose

Sterling TRUCKS

158

Perfected for ONE Purpose Only-



"Hunt Process"

The Unique Curing Medium

CONTRACTORS and engineers know that for every construction requirement there is one best method or material. By its use the particular result desired is attained most satisfactorily.

Such a material is the "Hunt Process." It has been developed and perfected for *one purpose only* — to embody in one curing medium all the advantages contractors and engineers have long been searching for.

"Hunt Process" is a *processed compound,* composed chiefly of Trinidad type Lake Asphalt, Bermudez Asphalt and Gilsonite, blended at a high temperature, thinned to a working consistency with a petroleum solvent and combined with a pigment.

When this processed compound is applied to the concrete *immediately behind the finisher,* it dries quickly, forming a film which seals the original mixing water into the concrete and thus provides ideal conditions for the hardening of the concrete.

As the concrete hardens, the film of "Hunt Process" also hardens, adhering closely to the surface of the concrete without penetrating it or entering into chemical combination with it.

The surface of the concrete retains the non-skid character given to it by the finisher because the film of "Hunt Process" adjusts itself to every marking on the surface.

Painstaking research has given the construction industry this unique material. Wherever concrete is placed "Hunt Process" enables engineers and contractors to secure the curing advantages that can be secured by no other method or material. Mail the coupon for informative booklet giving complete details.

McEVERLAST, INC.
[THREG]

111 West Seventh Street, Los Angeles, California

35 East Wacker Drive, CHICAGO, ILL. 1314 Magnolia Bldg., DALLAS, TEXAS 1754 Graybar Bldg., NEW YORK, N. Y.

OFFICES IN PRINCIPAL CITIES

I want further information on this better method of curing.

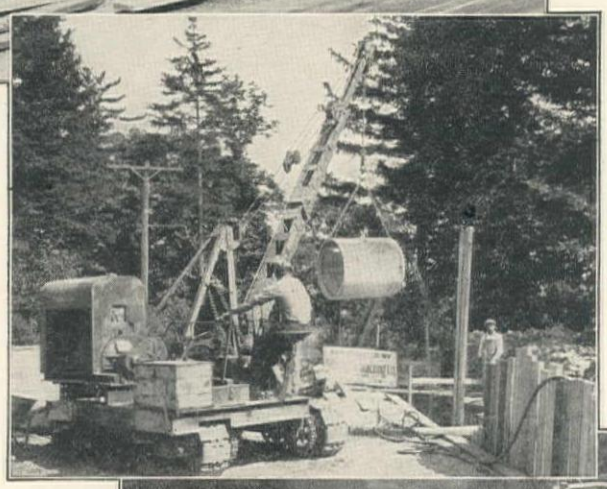
Name_____

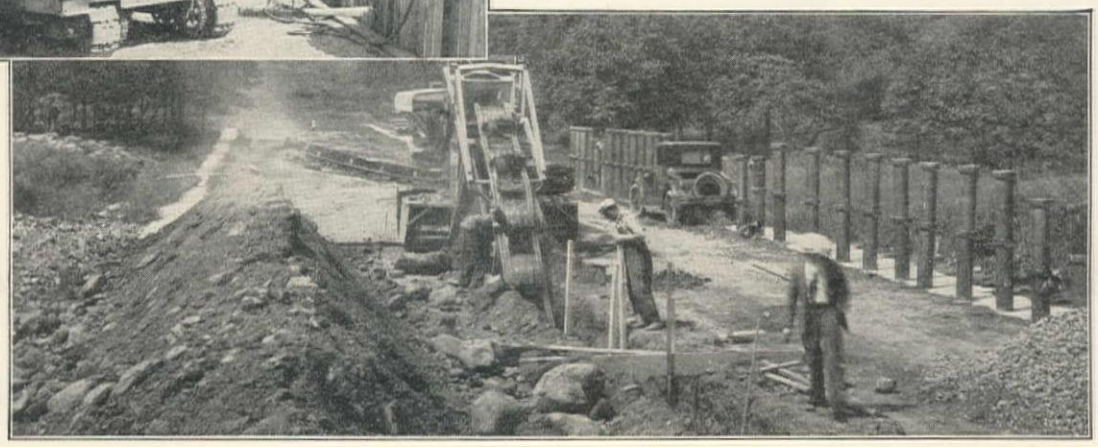
Address_____

City_____ State_____

WCN June

AUSTINS HAVE STEEL





AUSTIN ability to dig more trench, in a given time, is the result of high traction speed plus improved, more rugged design – built-in dependability – greater power at the digging end.

▲ ▲ ▲ ▲

DEPENDABILITY ALWAYS

more safety factors – patented features – fewer, but heavier parts – all steel construction of highest quality.

AUSTIN
MACHINERY CORPORATION
MUSKEGON · MICH.

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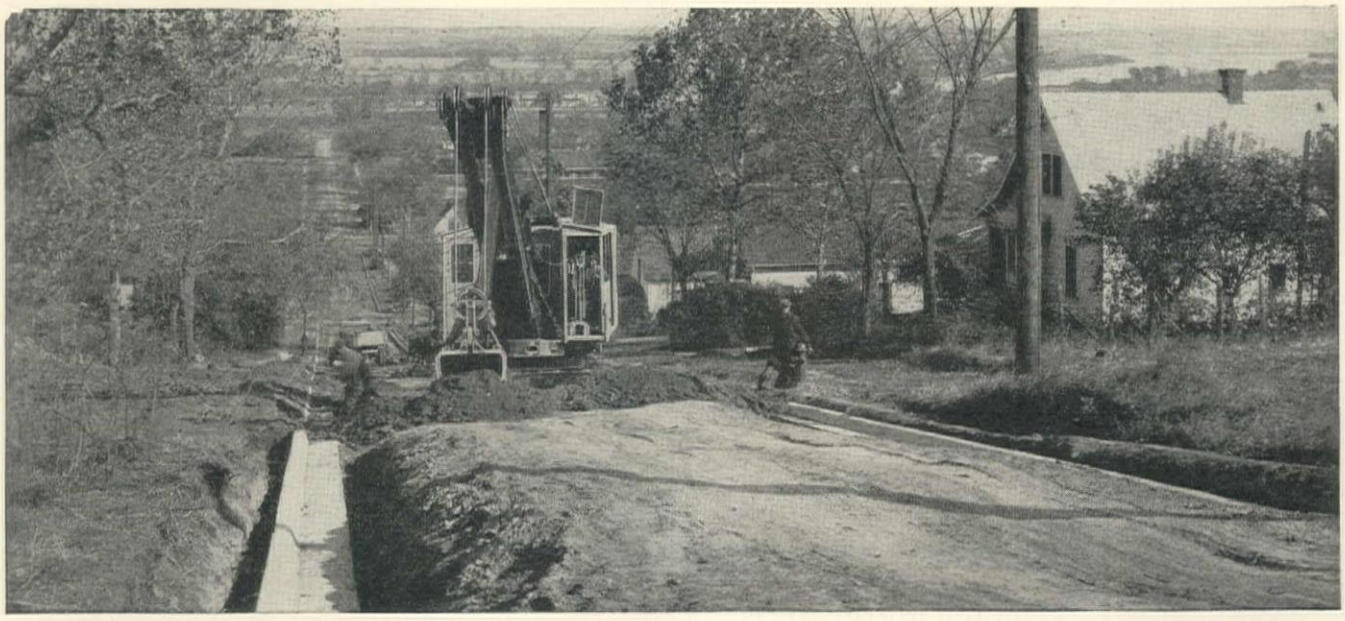

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VOLUME V | JUNE 10, 1930 | NUMBER 11

Ridge Route Alternate

The proposed 'Ridge Route Alternate,' an important improvement by the California Division of Highways, extends through mountainous country from Castaic school to a point near Gorman, Los Angeles county, a distance of 28.5 miles. This project involves 3,000,000 to 4,000,000 cu.yd. of grading and will cost $3,400,000, including pavement. The first section (7 miles) has already been placed under contract for grading. The many contractors desirous of competing (there were 16 bids on the first section) for remaining sections will find the pre-bid article on the entire route, published elsewhere in this issue, of value.

Valuable Service Available

To engineers and contractors concerned with the development of large projects in developed or undeveloped territory, the U. S. Geological Survey, through its preparation of topographic and geologic maps and special reports, furnishes a real but seldom appreciated service. Much information, in addition to the hydraulic data, is available in the reports alone; mapped areas are constantly being increased. Credit is due this organization for the excellence of its work and for the volume of information offered the public without charge or at only nominal price—all in the face of deficient working appropriations.

Another 100% Metered Water Works

The Chenery project, described elsewhere in this issue, is another example of a 100% metered water works. No privately owned utility today, such as the Chenery water supply project, would or could continue to operate on any other basis, unless restricted by legislation. Installation of meters in Reno (private ownership) has been prevented by state legislation, and in Sacramento (municipal ownership) by city ordinance. The per capita consumption in these cities is between 300 and 400 g.p.d.; whereas the average of all-metered systems is but little over 100 g.p.d. Most of the water works in the Far West are metered.

The growing necessity for water conservation should soon bring about a revision of legislation where needed to permit the installation of meters—it really should be mandatory.

Engineers as Public Speakers

Although the recent spring meeting of the American Society of Civil Engineers at Sacramento was pronounced by all who attended one of the best ever held, it has been interesting to hear the same criticism from so many—the only one—that most of those who read papers were such poor speakers; although they were no worse than at previous meetings.

The younger generation of engineers, especially the many students who attended, should bear this in mind and make every effort to become proficient in public speaking and also in the use of correct and concise engineering English.

Sterilization of Water Mains

Few people realize the responsibility that rests on the shoulders of the water works superintendent. Great credit is certainly due the men who have operated the various water works in the United States during the past few years with but a few minor epidemics chargeable directly to contaminated water.

A 'safe' water is the slogan of the water works superintendent. Today this is accomplished in almost every case by automatic chlorination at the wells or reservoir, filter plant, or in the principal supply-mains.

Nevertheless, it has been definitely determined that this does not ensure a safe water at the tap, and that periodic sterilization of the distribution pipes as well as flushing and sterilization of new mains, is imperative, in addition to continuous chlorination of the supply.

This subject was one of the foremost topics of discussion at the 1930 annual meeting of the Pacific Northwest Section of the American Water Works Association at Portland and at that of the Arizona Public Health Association at Phoenix. The conclusion reached was that mere flushing or sterilization with chloride of lime is not sufficient or dependable and that chlorination—liquid chlorine being preferable to dry-gas chlorine—is essential to ensure a safe water at the tap.

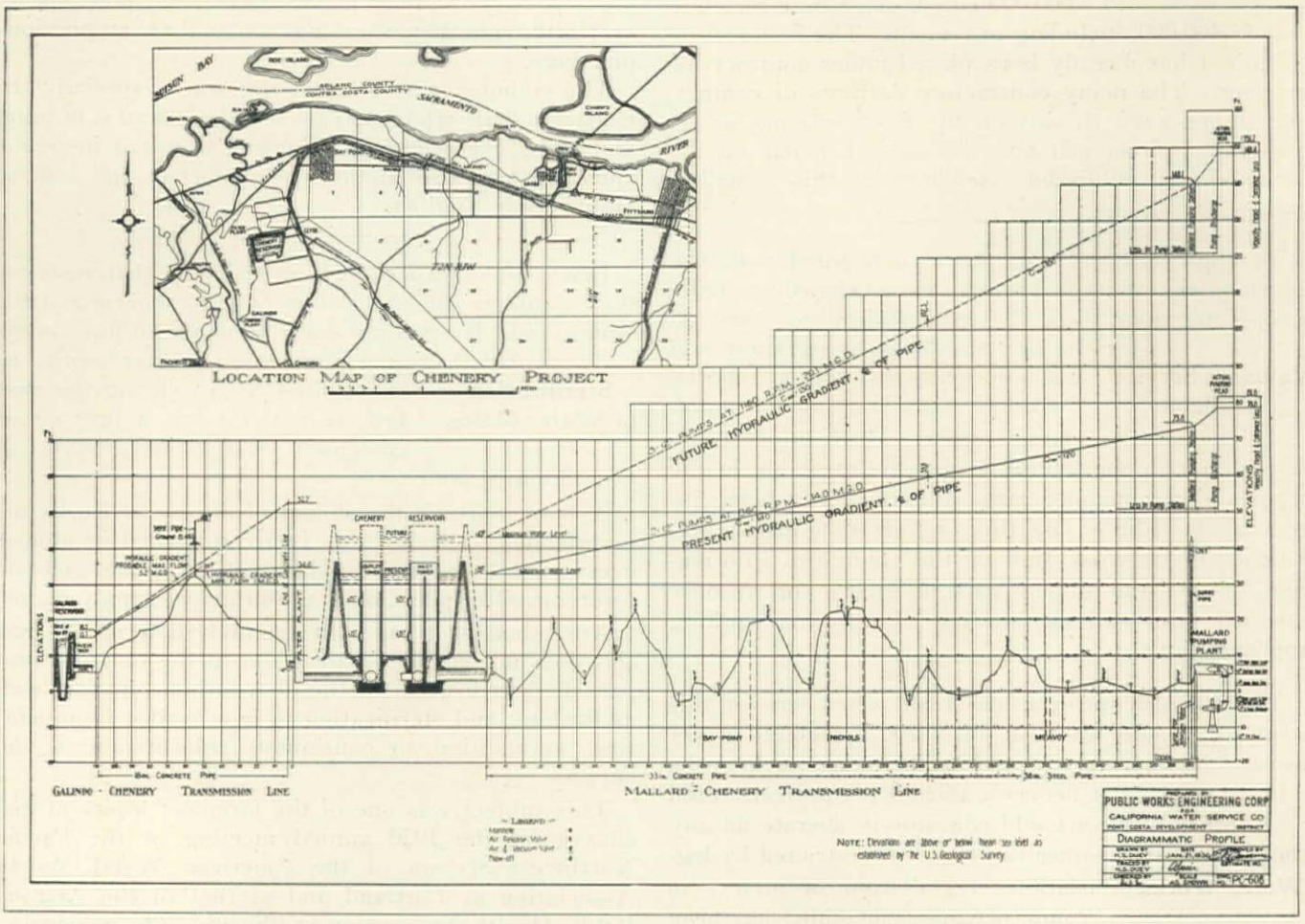
The Los Angeles Bureau of Water Works and Supply recently added to its equipment a portable liquid chlorine water-main sterilizer. All water works should be similarly equipped. The expense is small, but is justifiable at any price.

Chenery Water Supply Project of the California Water Service Company

By E. K. BARNUM*

Vice-President and Chief Engineer, Public Works Engineering Corp., San Francisco

Contra Costa county, one of the East Bay counties adjacent to Berkeley and Oakland and near San Francisco, is a strategic location for an important water development. From the city of Pittsburg west to the county line are many ideal industrial sites—ideal because of topography, deep water-way facilities, and excellent rail and transportation opportunities. While this territory has been developed industrially to a limited extent, its possibilities have not yet been touched. Those seeking an industrial location have looked over the district and have been impressed with its natural advantages, but many have been deterred by the lack of an adequate water supply.



This situation was recognized by the California Water Service Co., which acquired in 1927 the properties of the Port Costa Water Co., serving part of the district, and immediately began an engineering investigation to determine the most feasible and economical method for providing this area with an adequate water supply. In fact, it became imperative for the continued growth and life of the communities and industries within the area that immediate steps be taken for the construction of a large impounding reservoir near Clyde at the eastern end of the present system. The filling of this reservoir with water from the Sacramento river, at times of low salinity, and the distribution of the impounded water after filtration to consumers in Contra Costa county was conceived, actual construction started, and the plant put into operation during the past year. The area served by this project lies on the south side of Suisun bay and at the present time extends from Bay Point to Crockett, and includes the towns of Bay Point, Concord, Martinez, Port Costa, Crockett, and many of the large industrial consumers located therein. The project is unique and has created much interest among engineers, water works executives, and men interested in industrial and domestic water supply.

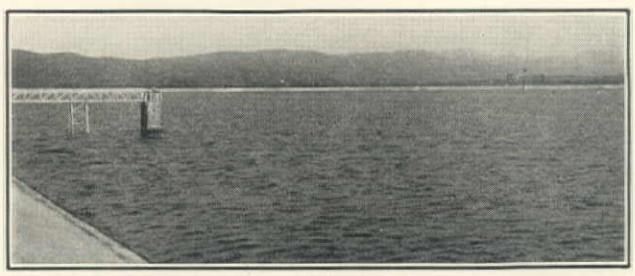
The Old System—Prior to construction of this proj-

*Member, American Society of Civil Engineers.

ect, the area served by the Port Costa Water Co. received its supply from 6 different well fields in an area lying between Bay Point and Crockett. The following table shows the various fields, the number of wells, and the test capacity of each field as determined early in 1929:

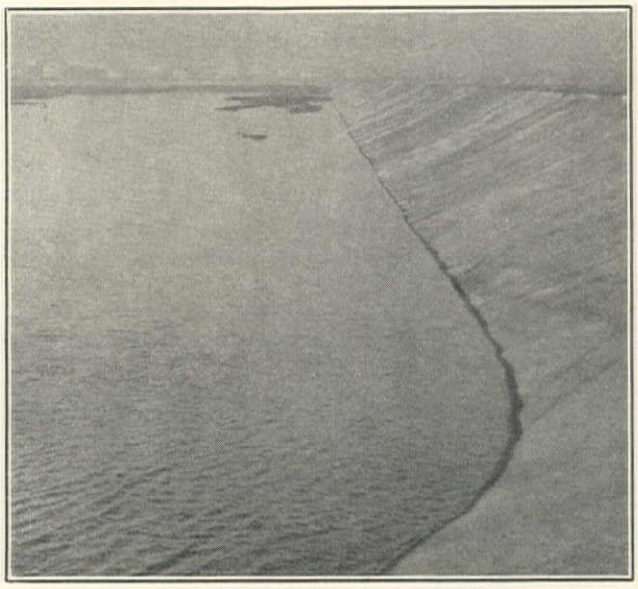
Field	Location	No. Wells	Capacity of Field (g.p.m.)
1	Government Ranch	11	1100
2	Galindo Field	15	860
3	Fenway Farms	3	300
4	Hollar Field	3	250
5	Moore Ranch	2	150
6	Bay Point	3	300
	Totals	37	2960 (4.25 m.g.d.)

The values given in the above table on yield of the various well fields could not be sustained under continuous pumping, and it was found that before the season was over the combined capacity of all fields was nearer 3 than 4.25 m.g.d. Slow replenishment of these well fields, together with rapidly increasing demands on the system, resulted in a strenuous effort on the part of the California Water Service Co. to complete and put in service the Chenery reservoir project in time to care for the 1930 demand.



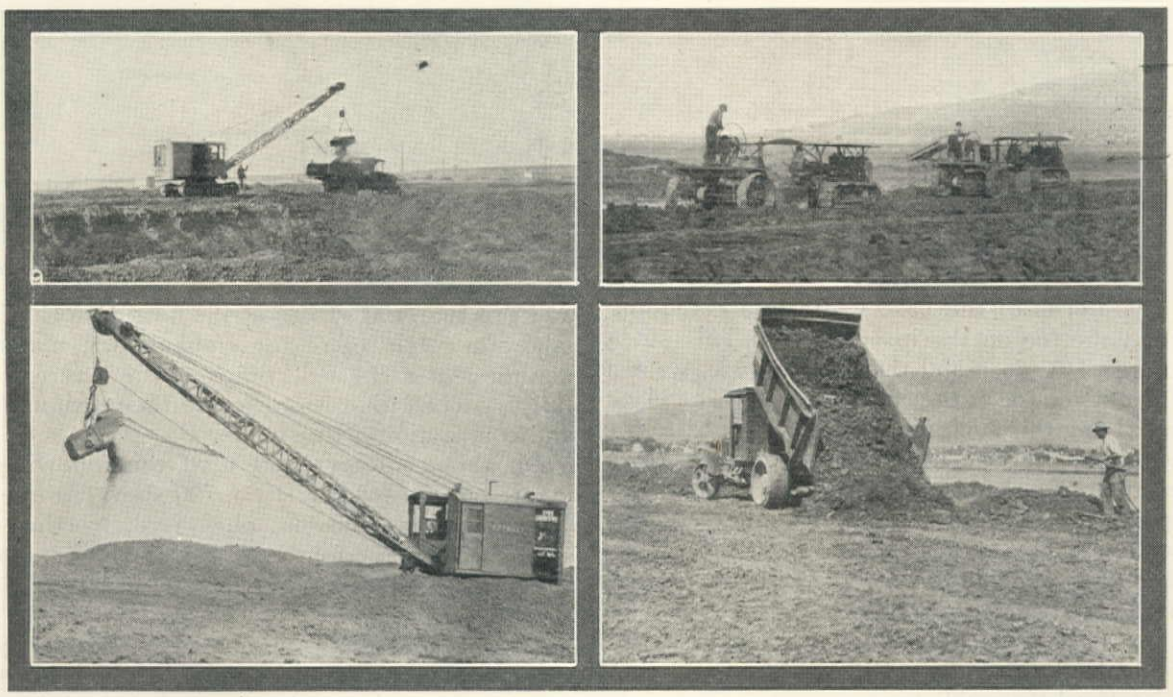
Chenery Billion-Gallon Reservoir, Looking Easterly Toward Clyde

The Chenery Project—The basic unit of the new project is the Chenery reservoir of one billion gallons capacity; a low-service pump station at Mallard (the source of supply) and an 8-mile pipe-line to Chenery reservoir; a modern rapid-sand filter plant and a 2-mile pipe-line to the Galindo booster pump station—total cost $1,300,000. (See June 25th, 1929 issue, p. 324.)



Chenery Reservoir, Looking West Along North Embankment, February 5, 1930, During Early Stage of Filling

The Chenery Reservoir—This reservoir is built above ground on comparatively flat terrain (Government ranch), one-half mile west of the town of Clyde and 2 miles south of Suisun bay. It covers an area of 215 acres, approximately square, and is formed by the construction of a rolled earth-fill dam, or embankment, 11,000 ft. long, on four-fifths of the perimeter, from 0 to 28 ft. high, with a crest width of 10 ft. The

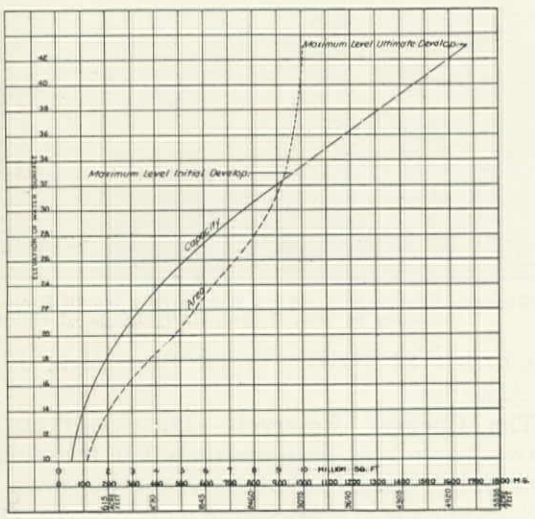


(UPPER LEFT) R. P. EASLEY'S NORTHWEST ¾-YD. DRAGLINE SLOPING BANKS AND RESEALING FLOORS OF BORROW PITS, OCTOBER 15, 1929. (LOWER LEFT) EASLEY'S DRAGLINE EXCAVATING CUTOFF TRENCH SEPTEMBER 20, 1929. (UPPER RIGHT) MANUALLY-OPERATED SCRAPERS DRAWN BY CATERPILLAR 60S REMOVING SURFACE SOIL AT FILTER PLANT SITE, JANUARY 27, 1930. (LOWER RIGHT) H. W. ROHL'S STERLING DUMP TRUCK ON EMBANKMENT FOR CHENERY RESERVOIR

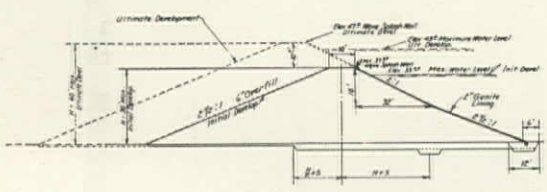
inside slope is 1 on 2 for the top 16 ft., and 1 on 2.5 below this level. The outside slope is 1 on 2.5. The inside slope is faced with gunite. The Chenery reservoir has a maximum capacity of one billion gallons and a daily delivery capacity of more than three million gallons.

A contract was awarded to H. W. Rohl Co., of Los Angeles (see August 25th, 1929, issue, p. 439) on August 10, 1929, for the construction of the reservoir embankment. This embankment contains 500,000 cu.yd. and was completed by Rohl December 1, 1929, in the remarkably short time of 92 working days, operating 2 shifts.

The foundation was first stripped to solid material



CHENERY RESERVOIR
CAPACITY & AREA CURVES



TYPICAL SECTION

for over two-thirds of the base width and extending 6 ft. beyond the toe on the inside slope. This stripping averaged 1 ft. deep and the material was wasted beyond the outside toe of the embankment. The black adobe underlying this surface was then stripped to the subsurface yellow, greenish white, or greenish brown clay, over an area extending from the inside line of the first stripping to a line equal to one-half the height of the embankment plus 5 ft. measured from the centerline of the embankment toward the outside toe. A cutoff trench 2 ft. deep and 8 ft. wide was then excavated, with its centerline a distance equal to the height of embankment plus 5 ft. measured from the centerline toward the inside toe.

The embankment was built of selected material from within the reservoir area. It was specified that the borrow pits should not exceed a depth of 8 ft. and a width of 250 ft., the nearest edge of the pits to be at least 100 ft. from the toe of the embankment. After completion of the fill, the contractor was required to slope all banks of the borrow pits on a 1 to 2 slope in order to facilitate subsequent sealing of the porous strata.

Before placing any fill, that part of the area to be covered by the embankment and foundation refill was plowed to a depth of 6 in. parallel to the longitudinal axis of the embankment, and the soil then moistened and compacted. Uniform layers of material from the borrow pits were then spread, having a thickness of 6 in. after thorough compaction. Material in the fill was moistened enough to secure maximum density after rolling under heavy compression. The contractor was required to over-fill and compact the embankment on the water side a distance of 10 in. measured normal to the slope, which was later trimmed off and spread along the inside toe of the finished embankment. The outside slope was trimmed to neat lines

Completing Inside Slope of Chenery Reservoir Embankment

and this material spread at the outside toe. Complete laboratory control of the embankment material was maintained in the field office and moisture was carefully watched in order to secure the maximum density and compaction of this material.

On this contract Rohl used the following equipment: one 1½-yd. P&H no. 700 shovel; three 1½-yd. Northwest gas shovels; one ¾-yd. Northwest dragline; six 9-yd. and fourteen 5-yd. Sterling dump trucks; four 3-yd. McMillan scrapers; five '60' and one '30' Caterpillar tractors; one 12-ft. Adams blade scraper; six Rohl sheepsfoot tampers. Rohl averaged 5350 cu.yd. per day of embankment in place. (For progress on this contract see the October 25th, 1929, issue, p. 567, and the February 25th, 1930, issue, p. 46.)

The inner face of the embankment was given a 2-in. gunite coating, reinforced with no. 7 gauge (American Steel & Wire Co. standard) wire spaced 4 in. apart in both directions. The total area covered with gunite surface is 425,000 sq.ft. and was placed in record time by the California Gunite Construction Co., of Los

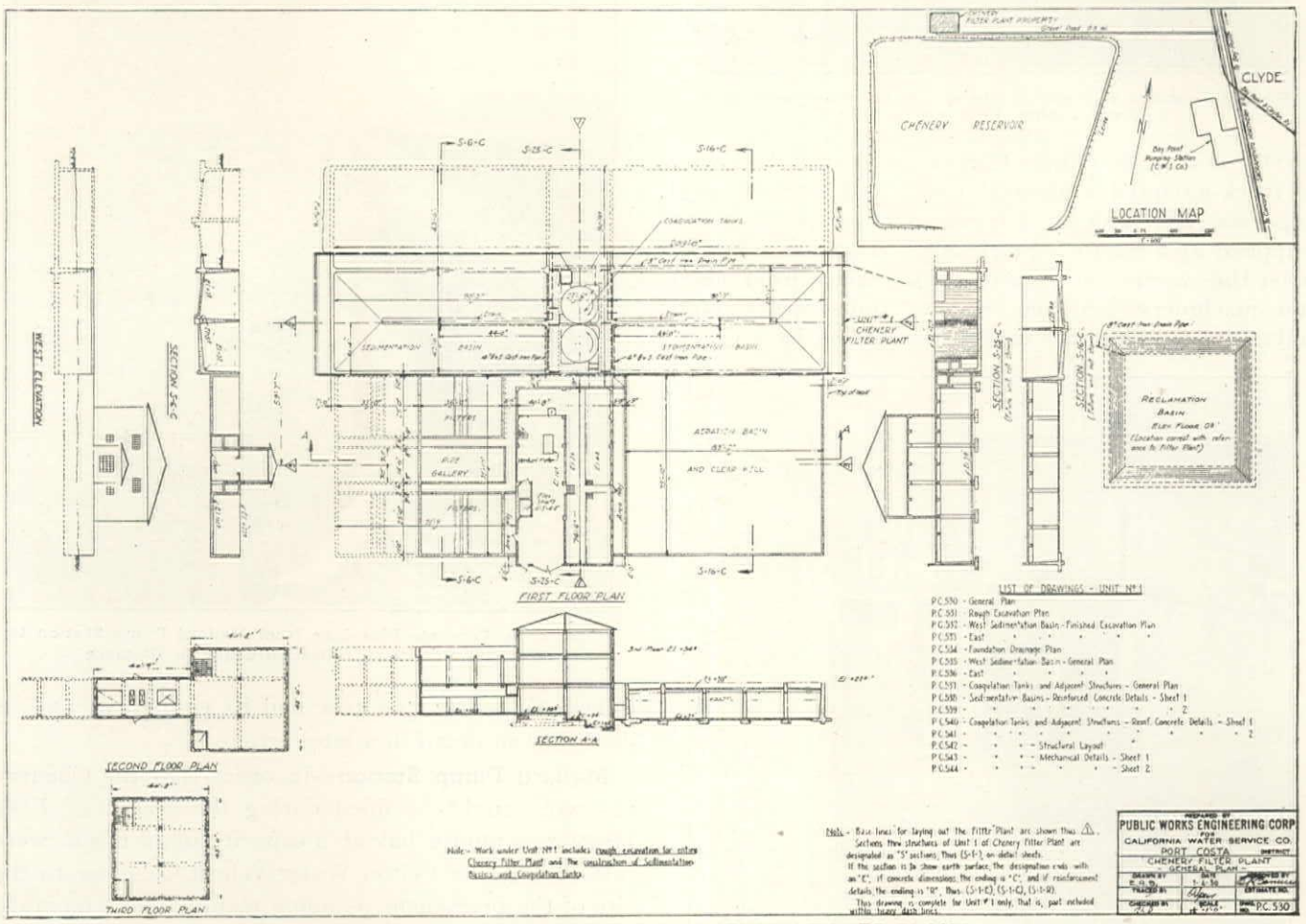
Angeles. Actual placing of the gunite lining started November 23, 1929, the contractor using four nozzle machines, and was completed in about 100 working days—a record achievement. Also included in this contract was 800 cu.yd. of concrete in the wave splash wall and toe wall (see September 25th, 1929, issue, p. 497).

There are two reinforced concrete inlet and outlet towers: tower no. 1 in the northeast corner of the reservoir site and at the termination of the transmission line from the low-service station at Mallard; tower no. 2, opposite the filter plant, at which point all withdrawals from the reservoir are to be made. The two inlet and outlet towers were constructed by E. H. Mellencamp, Oakland, California. These structures are provided at various levels with Calco gates for the control of the inlet water and for withdrawals. Access to the towers is provided by means of light steel bridges from the embankment of the reservoir to landing platforms. The bridges were fabricated by the Pacific Coast Steel Corp.

Filtration Plant—The first unit of the filtration plant was built by the Central Construction Co., Oakland, California, and consisted of the coagulating tanks, sedimentation basins, and a large amount of excavation. The second unit of this plant is now being constructed under contract by E. H. Mellencamp. The filtration plant is of the rapid-sand type with a present capacity of 4 m.g.d., and is so laid out that future expansion up to three times the present capacity can rapidly be made. Water will be pumped from the filtration plant to the existing Galindo pump station, from which point it will be boosted into the distribution system of the old Port Costa Water Co. The

Chenery Filter Plant Elevation, W. W. Wurster, Architect

filtration plant is to be modern in every respect and contains aerators, coagulating tanks and mechanical mixers, sedimentation basins, filters, head house and pipe gallery, pumping installations, clear water basin, reclamation basin, and the necessary chlorinating apparatus. It includes a number of unique features, and a detailed description of the plant and its operation will be published in a later issue. The filtration plant will be completed and placed in operation about August 15, 1930.



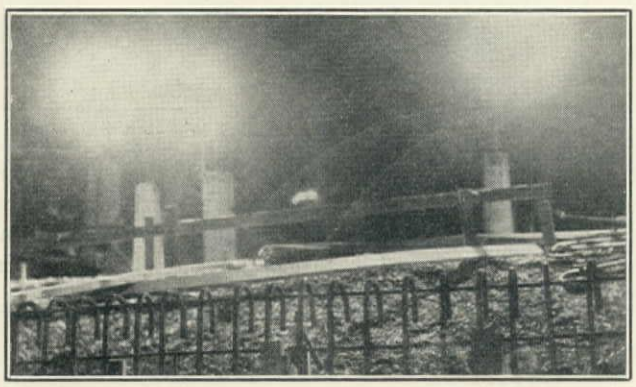
PLAN AND CROSS SECTIONS OF CHENERY FILTER PLANT

Pipe-Line to Galindo Pump Station—This line consists of 10,850 lin.ft. of 18-in. Hume concrete pipe, which was furnished and laid by the American Concrete Pipe Co.

The Galindo booster pump station contains two

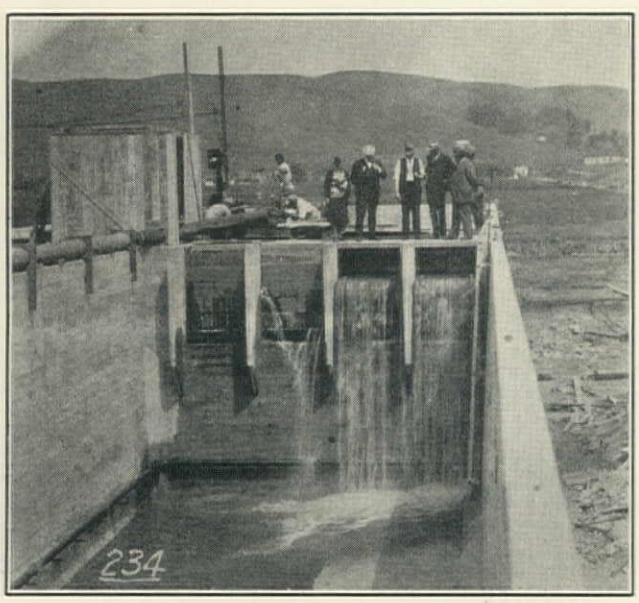
DeLaval single-stage horizontal centrifugal pumps of 1800 g.p.m. capacity each, driven by General Electric motors; the units being hand operated.

Pipe-Line from Mallard Pump Station to Chenery Reservoir—This conduit is about 8 miles long and consists of 15,000 lin.ft. of 36-in. steel pipe, electric-welded, ¼-in. plate, Hermastic dipped and gunite coated; and 25,000 lin.ft. of 33-in. Hume concrete pipe. Trenches were excavated partly with a trench hoe and



Placing Concrete at Night at Chenery Filter Plant with Carbic Flood Lights, February 15, 1930

partly with a dragline. Concrete pipe was laid with a truck-mounted Universal crane and gunited steel pipe was laid with an A-frame, hoisting power being supplied by a tractor. Steel pipe sections were hauled over the swamps on a crawler-type tractor from which the machinery had been removed and a special body substituted. This pipe carrier was drawn by a Caterpillar tractor. Steel pipe was furnished and laid by the Steel Tank & Pipe Co., of Berkeley, and the Hume concrete pipe by the American Concrete Pipe Co.



First Water Entering Sedimentation Basins, Chenery Filter Plant from Reservoir, April 17

There are two 36-in. Rensselaer gate valves and several Simplex air and vacuum valves in the line.

After about three months of operation, this line was tested by Fred C. Scobey and Arthur L. Collins for the determination of retardation coefficient. Two methods were employed, Collins using his Pitot tube method, while Scobey's color method furnished an additional check, both methods being in close agreement. In summarizing the test data, the simultaneous experiments which were made on two sections of the 36-in. steel pipe (total length 14,020.4 ft) and four sections of the 33-in. steel pipe (total length 20,835.4 ft.) resulted in the following coefficients: steel section—Scobey formula 0.269, corresponding value in the Hazen-Williams formula gives $C_w = 144$; concrete section—Scobey formula 0.407, corresponding value in the Hazen-Williams formula $C_w = 146$.

A 36-in. diam. standpipe is provided, its top being at elev. 36 ft., or 3 ft. above the reservoir level. This standpipe is protected against water hammer by a solenoid-controlled, float operated air valve, an ingenious device manufactured by The Pelton Water Wheel Co. The standpipe and its equipment will be described in detail in a later article.

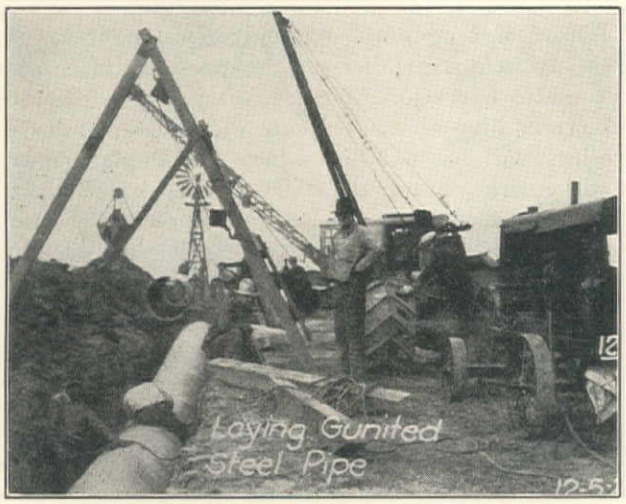
Hume 33-in. Concrete Pipe-Line from Mallard Pump Station to Chenery Reservoir, Universal Crane in Distance

Mallard Pump Station—In order that the Chenery reservoir might be filled during the season of 1930, temporary pumps having a capacity of 13 m.g.d. were installed by the Pelton Water Wheel Co. close to the site of the permanent pumping plant. The temporary units were put into operation on January 26, 1930. Continuous pumping followed and the reservoir was filled to elev. 33 ft. on May 13, 1930. During this pumping period, with the temporary pumping units, construction was started on the permanent plant. A dredged channel some 3000 ft. long, 50 ft. wide, and 8 ft. deep, was excavated from the Sacramento river to the pumping plant site, with protection levees bordering the channel. This channel was made large enough to float in construction equipment to the pumping plant site; it was excavated by R. P. Easley,

Antioch, California, using the 3-yd. clamshell dredge 'Roberts Island'.

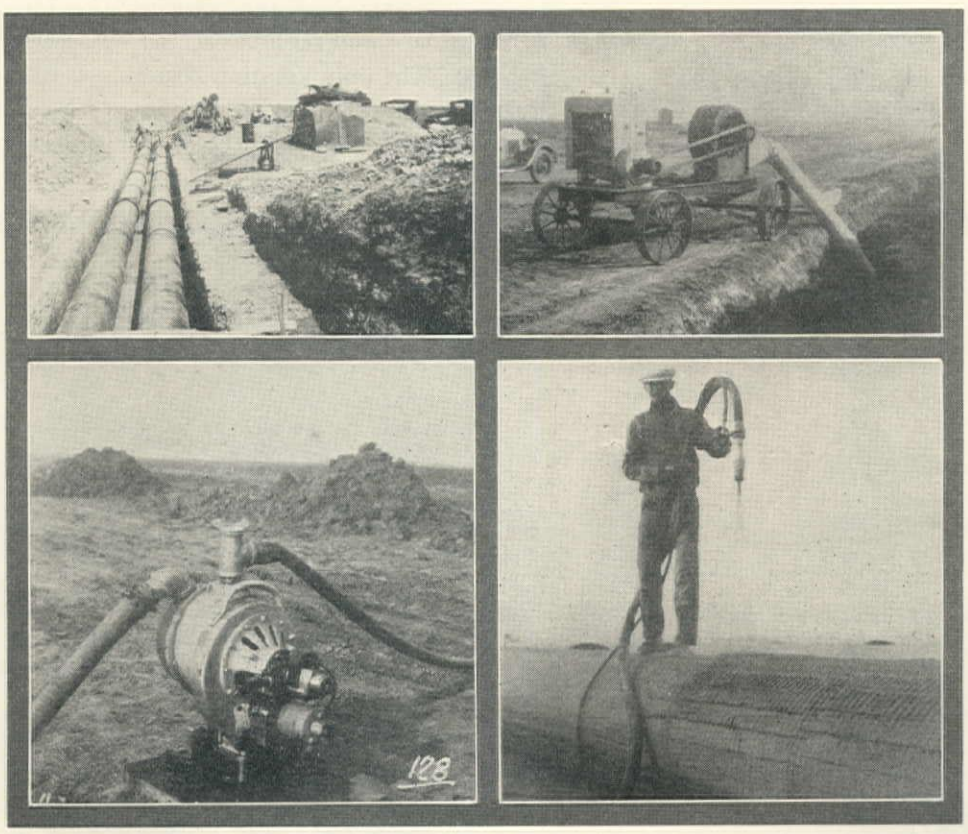
The permanent pumping plant at Mallard is 31 by 46 ft. in plan and is built in the intake channel behind a 20-ft. cofferdam. It will house three Pelton 12-in., vertical centrifugal pumps, with provision for a fourth unit. Hydraulically operated Pelton gate valves control the output of each unit. These valves have differential cylinders and are arranged for automatic operation, opening when the pump starts and closing when the pump stops. A Larner-Johnson type 'P' Pelton check throttle valve, arranged for automatic operation, was placed in the main discharge pipe within the station. The entire output of the plant is measured by a Venturi meter, furnished by the Builders Iron Foundry.

Due to the variation which will occur in the water level of the Chenery reservoir, it was deemed advisable from an economical standpoint as well as from operating necessity, to install pumping equipment that could be operated at two different speeds and capacity ratings. These conditions were met by having the centrifugal pumps designed for two different shaped runners and by direct connecting to each pump runner, one above the other, two separate squirrel-cage induc-



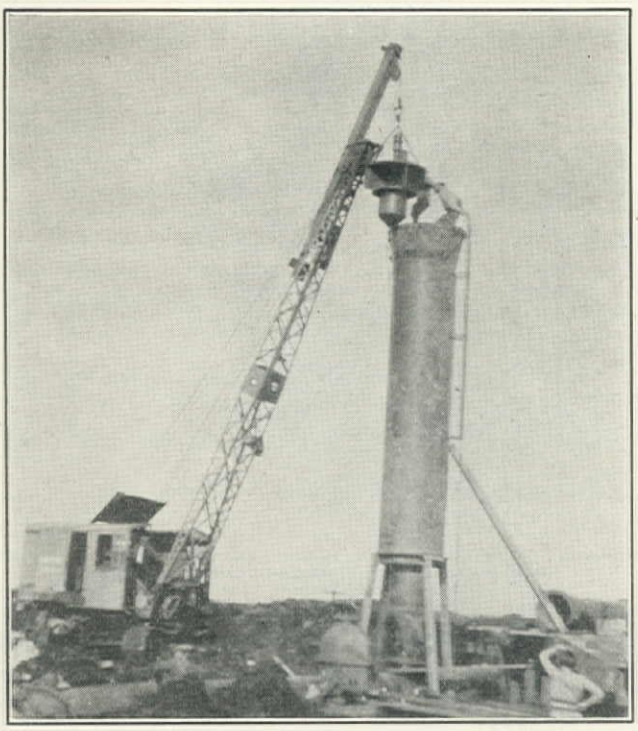
Laying 36-in. Electric Welded, Gunite Coated, Steel Pipe, near Mallard Pump Station, December 5, 1929

Universal Crane Laying 33-in. Hume Concrete Pipe for Supply Main from Mallard Pump Station to Chenery Reservoir, November 9, 1929



(UPPER LEFT) TWO 24-IN. ELECTRIC WELDED STEEL PIPES UNDER CHENERY RESERVOIR EMBANKMENT FOR OUTLET TO FILTER PLANT. (UPPER RIGHT) PORTABLE BLOWER DRIVEN BY LE ROI ENGINE FOR VENTILATION DURING CONSTRUCTION OF MALLARD-CHENERY PIPE-LINE. (LOWER LEFT) HOMELITE PORTABLE PUMP FOR DEWATERING BELL HOLES AND MANHOLES ALONG PIPE-LINE. (LOWER RIGHT) GUNITING 36-IN. STEEL PIPE

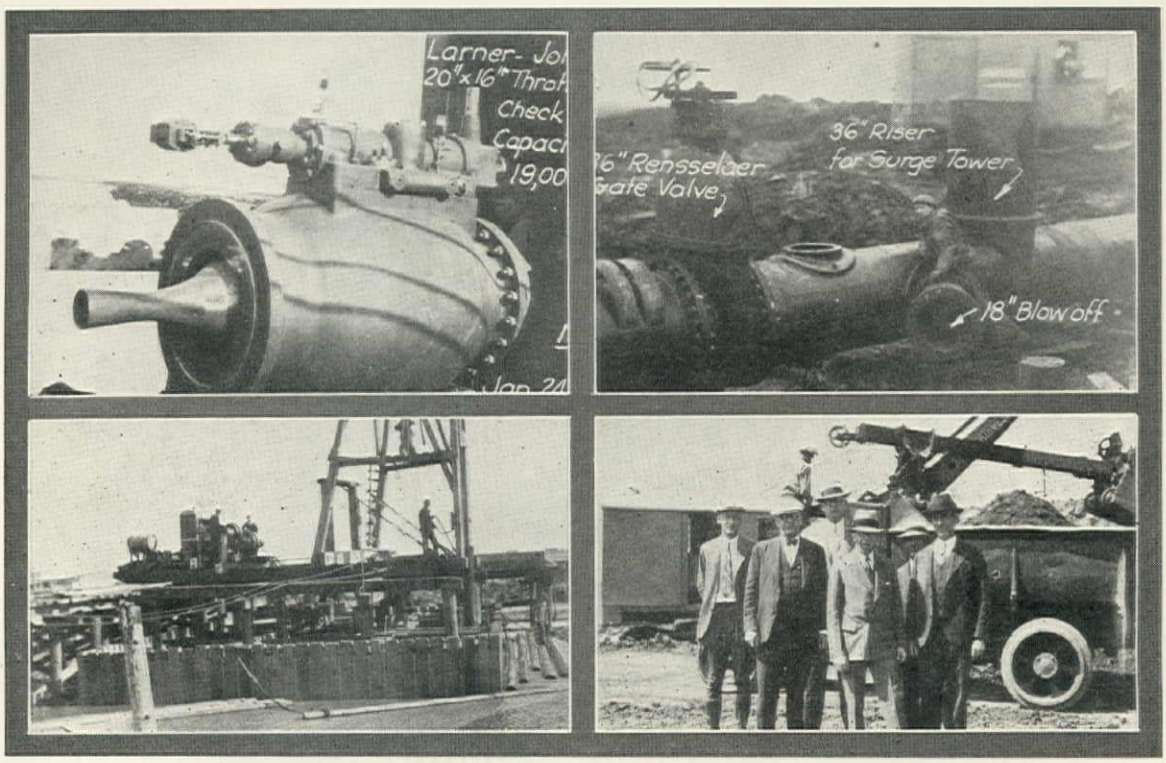
tion motors with separate stators, frames, and rotors. One motor is rated at 150 hp., 900 r.p.m., 440 volts, 60-cycle, 3-phase, and the other at 250 hp., 1200 r.p.m. The normal pumping units are equipped with impellers



Placing Pelton Air Valve in Top of Differential Surge Tank at Mallard Pump Station, January 25, 1930

for two pumps operating in parallel. When three pumps are to be operated, the impellers can be changed and the speed of the units increased from the low-speed winding to the high-speed winding by simply throwing a 600-amp. TPDT switch, mounted on the frame of each unit. Small DPDT switches on the main switchboard enable instant changes of the proper thermal protection equipment, there being independent equipment for the 150-hp. and 250-hp. motors. The switchboard is designed for a maximum of four 150/250-hp. pumping units, but only equipment for three units is being installed at the present time. Semi-automatic operation of the plant is provided, but in all probability at a later date electrical salinity controllers will be installed whereby the plant may be made entirely automatic. The operator will then set the cylinder control switches and by means of a single push button switch the motors can be started. From this point on, the pumps start automatically, and the sequence is determined by the selector switch setting. For instance, if selector switch no. 1 is closed when the starter button is pressed, no. 1 starts first, followed by pumps no. 2 and 3 at two-minute intervals. Should selector switch no. 2 be closed first, then pump no. 2 starts, followed by units no. 3 and no. 1, respectively. Should a thermal unit or the oil circuit breaker on any pumping unit open the relay, the signal circuit functions and connects the battery circuit with a signal horn. This horn will then operate intermittently until the operator opens the circuit. The machine which is in trouble is noted at a glance by means of red lights shown on the switchboard panel. The Westinghouse Electric & Manufacturing Co. furnished the switchboard and motors.

The pump station structure is of reinforced concrete, resting on pile foundations, with a 5-ft. tremie concrete mat, and heavy reinforced concrete floor slab. The lowest floor of the station is at elev. –13.5 ft., while the



(UPPER LEFT) LARNER-JOHNSON TYPE 'P' PELTON CHECK AND THROTTLE VALVE AT MALLARD PUMP STATION. (UPPER RIGHT) VALVES AND PIPE CONNECTIONS AT MALLARD PUMP STATION. (LOWER LEFT) DRIVING FOUNDATION PILING INSIDE COFFERDAM, FOR MALLARD PUMP STATION. (LOWER RIGHT—FROM LEFT TO RIGHT) OSWALD SPEIR; E. K. BARNUM; H. K. GRIFFIN, DIVISION MANAGER AT STOCKTON, CALIFORNIA WATER SERVICE CO.; EARL C. ELLIOTT, PRESIDENT, CALIFORNIA WATER SERVICE CO.; F. L. LATHROP; AND T. H. WIGGIN, PRESIDENT, PUBLIC WORKS ENGINEERING CORP.

operating floor is at 10.5 ft. A contract for the construction of this station was awarded Ben C. Gerwick, Inc., San Francisco.

The engineering department of the company is now studying the advisability of constructing a tidal basin with flood gates, whereby all fresh water in the river during high-tide periods will be impounded, thus allowing the plant to operate over a longer period than when the low-tide salinity would otherwise affect the daily operation. During flood stages in the pumping period, it is expected that chlorides in the river will vary from 25 to 150 p.p.m. However, during the summer and fall periods a salinity of several thousand p.p.m. is reached. The maximum pumping limit has been tentatively set at 250 p.p.m. It is interesting to note that during the first filling of this reservoir in 1930, the average chlorides in the water were 48 p.p.m.

Distribution System—The distribution system of the Chenery water supply project, including all the pipe-lines of the old Port Costa water works, contains 56 miles of mains from 1½ to 18 in. diam. Most of the larger pipe-lines are cast-iron, which type of pipe the company is now laying exclusively in its distribution system. Service connections are being now laid or replaced with Anaconda copper pipe, up to 1 in. diam.; with Mueller corporation cocks and service cocks. The system is 100% metered, the majority of the meters being Neptune 'Trident'.

Water Rates—The present water rates are: up to 2000 cu.ft.—35¢ per 100 cu.ft.; from 2000 to 6000 cu.ft. —30¢; from 6000 to 12,000 cu.ft.—25¢; over 12,000 cu.ft.—17½¢.

Conclusion—This project has been named after C. T. Chenery, president of the Federal Water Service Corp., whose vision was responsible for its inception. (The California Water Service Co. is a subsidiary of the Federal Water Service Corp.). Earl C. Elliott, president of the California Water Service Co., has stated that the Chenery development will prove to be the most important interest of the company on the Pacific coast, that this project is in a sense experimental, and that the company is ready to develop additional supply as fast as the district can absorb it.

I wish to acknowledge the able assistance rendered in bringing this project to successful completion in record time, including the several consulting engineers, members of our own organization, and the various contractors. The consulting engineers included Chas. Gilman Hyde on the salinity problem; Chas. D. Marx and C. E. Grunsky on the design of the dam; Chas. H. Lee on underground water problems; W. F. Langelier on purification and filtration; and W. W. Wurster, architect on the filtration plant. The project was designed and constructed by the Public Works Engineering Corp., the following being in responsible charge of the various units: P. E. Magerstadt, designing engineer (Magerstadt was intimately connected with the original design of the plant, leaving in early stages of the work to join The Loveland Engineers, Inc.); Oswald Speir, designing engineer; R. F. Brown, resident engineer; and John S. Bates, S. A. Redding, Jules Hvorslev, W. J. Ashley, R. L. Derby, and E. A. Brown.

Ridge Route Alternate Will Improve North Entrance to Los Angeles County, California

State Division of Highways Planning Major Project Between Castaic School and a Point Near Gorman—Involves 3,000,000 to 4,000,000 cu. yd.—Will Cost $3,400,000 Including Pavement—Grading of First 7-Mile Section Recently Contracted

The proposed 'Ridge Route Alternate' of the California Division of Highways (LA-4ABCD) extends through mountainous country from Castaic school to a point near Gorman, a distance of 28.5 miles. It will replace the existing ridge route, a road 35.8 miles long, having excessive curvature, unsatisfactory radii, and heavy adverse gradient.

One of the urgent highway needs of California is a new road on modern standards of alignment and grade, connecting southern California with the San Joaquin valley and central and northern portions of the state. The first investigations for such an improved route were ordered in 1923. A tentative location for the entire route is now available, the reconnaissance and nearly all of the preliminary survey having been completed. The first section of the route, extending 7.05 miles from Castaic school to Canton creek, has recently been placed under contract and it is hoped that remaining sections may be graded within the next few years. The entire project involves 3,000,000 to 4,000,000 cu.yd. and will cost about $3,400,000, including pavement.

Existing and Proposed Routes Compared—A comparison of the present ridge route (built to standards of 14 years ago) and the proposed alternate is given in Table I.

TABLE I

Comparative Study of Existing and Alternate Ridge Routes

Factor	Alternate Route	Existing Route	Difference
Length	28.5 miles	35.8 miles	7.3 miles
Max. elev.	3,550 ft.	4,234 ft.	684 ft.
Total rise	3,350 ft.	4,630 ft.	1,280 ft.
Adverse grade	940 ft.	2,220 ft.	1,280 ft.
Min. radius	1,000 ft. (first section)	70 ft.	.....
Grade	6% comp.	6% uncomp.	.....
Total curvature	7,500 deg.	35,141 deg.	27,641 deg.
Min. width roadway	30 ft.	25 ft.	5 ft.

The existing route has 22 curves with radii of 70 to 90 ft., 224 curves with 100-ft. radius, and 238 curves with radii of 100 to 200 ft.

On Sunday, July 17, 1927, for a 16-hour count, 2616 vehicles passed the Liebre mountain maintenance

station of the Division of Highways, the traffic past this point being 1891 vehicles on July 18. As there is much through trucking on this highway, it is dangerous and exceedingly difficult for automobiles to pass trucks under existing standards on the present road.

For the section between Castaic school and Canton creek, the present and estimated traffic for the next 10 years is as shown in Table II.

TABLE II

Comparative Study of Daily Traffic

Type	Present Traffic	Estimated Average for Next 10 Years
Autos	2,100	3,675
Trucks	200	350
Freight (tons)	620	1,100

In addition to intangible values such as time, safety, comfort, and convenience, the economic value of reduced vehicle operating expense on the basis of average annual traffic over the next 10 years is equivalent to a capitalized value of $25,603,660, where on the basis of present traffic that valuation is $14,630,630.

The proposed Ridge Route Alternate is less subject to fog, sleet, and snow, as it is on the average at a lower and more protected elevation than the existing route. It will provide a safe highway at reasonably high speed, and under the plan of construction will respond to future requirements of widening. The alternate route will provide a much-needed additional highway, as Los Angeles county would after its construction maintain the old road for the benefit of local residents.

Territory Traversed—The Ridge Route Alternate passes through lands of little value, except for the southerly 2½ miles where barley is cropped and grazing practiced. From mile 0 (Castaic school) to mile 2, the soil is sand and gravel; thence to mile 10 (past Oak flat summit) it is clay, overlying standstone. Between mile 10 and mile 13 at Piru creek, there is evidence of slide material, particularly in the last 1½ miles. From mile 13 (Piru creek at the mouth of Oso creek) to mile 15 where the route enters Piru gorge, the line lies along the banks of the stream and there is evidence of slide material, clay, and sandstone. Three stream crossings, a wall, and one tunnel are required between mile 15 and mile 15.9 (mouth of Liebre creek). In this section, the line is in a gorge and the roadway will be formed by cutting across points and keeping in solid rock—a soft, stratified shale—wherever practicable. Crossings will be made on straight reaches where the channel is defined and within bounds. To mile 16.7 at Los Alamos divide, the line ascends on the west side of Liebre creek, heavy sidehill work and channel changes being required to gain embankment footings. The material encountered in this section is clay, sandstone, and shale. From mile 16.7 to mile 18.0 (in Los Alamos creek) heavy sidehill work is required, the line keeping up over the saddle and continuing along the east side of the canyon through material similar to that in the previous section. From mile 18.0 to a terminus (mile 28.5) at the existing highway 2.9 miles northerly from the Bailey patrol station and 1.1 miles northerly from Gorman, the route lies along the west side of Los Alamos valley, no heavy work being encountered.

Los Alamos creek has cut through alluvial soil to bedrock and appears to be in a permanent channel.

Construction Materials—No hard rock or quarry stone is in evidence throughout the project. However, some granite boulders and deposits of fine sand are in evidence. Water is scarce and no running streams occur during the dry season between mile 13.1 and mile 21.2, except for Piru and Los Alamos creeks.

Profile of Alternate Route—Table III gives the profile for ruling points on the proposed Ridge Route Alternate:

TABLE III

Profile for Proposed Ridge Route Alternate

Mile	Elevation (ft.)	Point
0	1140	Castaic school
2.5	1400	Begin ascent
4.6	2000	Violin gap
6.9	2580	Violin summit
7.7	2520	Canton creek
9.8	2970	Oak flat summit
13.1	2100	Piru creek at mouth Oso creek
15.9	2280	Piru creek at mouth Liebre creek
16.7	2500	Liebre-Alamos divide
17.4	2500	East bank Los Alamos creek
18.1	2500	In Los Alamos creek
	2900	Los Alamos creek turns west
28.5	3550	Terminus near Gorman

Accessibility—The project is accessible from the highway by wagon road from both ends and at three intermediate points—Bogg's ranch (mile 7.6), Oak flat summit (mile 9.8), and Liebre-Alamos divide (mile 16.7). There is a road contiguous to the project,

over which automobiles and light trucks can pass, between miles 0 and 13.7, and 16.7 and 28.5, there being no road from mile 13.7 to mile 16.7. The nearest railroad is the Southern Pacific with a station at Castaic Junction 4 miles southerly from the south end of the project.

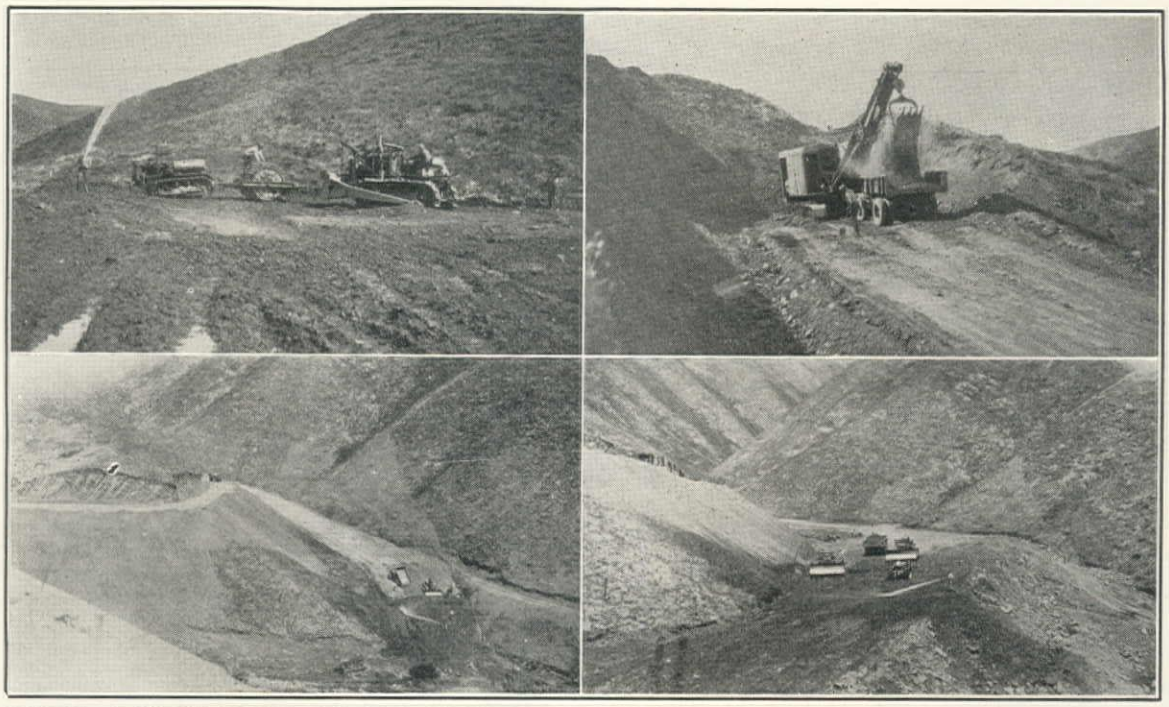
Castaic School-Canton Creek Section—This section has a length of 7.05 miles, extending from Castaic school northerly to Canton creek near the patrol station of the Midway Gas Co. It is being constructed as the first unit of the proposed Ridge Route Alternate and is being financed from surplus funds. The present contract includes the grading of a 36-ft. roadway, drainage structures, a 40-ft. bridge over Palomas wash, and new property fence where required. The project will not be surfaced, as it will not be usable for public travel until the entire 28.5 miles has been graded.

Unclassified excavation is being made in sand, gravel, and sedimentary rocks. There is no borrow or imported borrow, but much overhaul is required. Some fills are as high as 100 ft. and culvert pipes must be placed in the bottoms of steep canyons difficult of access, where the width of fill often exceeds 200 ft. The usual roadway side ditches are required but, as the hillside slopes are steep, few slope ditches are needed at the top of cuts. Roadway ditches are provided along the edges of high fills. Four channel changes are required, as is 60 ft. of reinforced concrete cribwall near sta. 240 to catch the fill slope. The average annual rainfall in this region is 15 in.; there are no surface springs or marshes along the roadway. The right-of-way width is 100 ft. except within the Santa Barbara National Forest, where it is 132 ft.

Bids for this first section were received February 13, 1930. The contract was awarded to H. E. Doering & von der Hellen & Pierson, Berkeley, California (the lowest of 16 bidders), for $537,629*, and work was begun March 19. The principal quantities include: 372 stations clearing and grubbing at $15; 1,230,000 cu.yd. roadway excavation at $0.36; 8,530,000 sta.yd. overhaul at $0.005; 4500 cu.yd. structure excavation at $1.25; 715 cu.yd. structure concrete at $22.50; 76,000 lb. reinforcing steel at $0.045; 7506 lin.ft. 24 to 48-in. corrugated pipe culvert at $1.00 to $2.50; 11 miles new property fence at $500; 372 stations finishing roadway at $10.

The contract is just getting under way. Two shovels are working two shifts per day each and good progress is anticipated, the estimated completion date being July 1, 1931.

Major items of equipment on the first contract include: two 1¼-yd. Thew-Lorain model 75 gasoline power shovels; ten 4½-yd. Autocar dump trucks; three Caterpillar '60' tractors equipped with McMillan bulldozers; one 5-yd. hydraulic scraper; one Fordson and one Rohl tamping rollers; one 12-ft. Galion grader; one 300-c.f.m. Rix compressor; three jack hammers; one 14-S Smith concrete mixer; one Fairbanks-Morse duplex pump and 60-hp. motor; three Kohler light plants; four miles of 3 and 4-in, pipe-line. 'Giant' explosives are used exclusively on this contract, between 500,000 and 600,000 lb. of 40% gelatine and black blasting powder being required.



CASTAIC SCHOOL—CANTON CREEK SECTION, RIDGE ROUTE ALTERNATE. (UPPER LEFT) CATERPILLAR 60 WITH McMILLAN BULLDOZER AND CATERPILLAR 30 WITH SHEEPSFOOT ROLLER COMPACTING FILL. (UPPER RIGHT) THEW-LORAIN 1¼-YD. GAS SHOVEL LOADING 4½-YD. AUTOCAR TRUCK. (LOWER LEFT AND RIGHT) PLACING, WETTING, AND ROLLING 8-IN. LAYERS

Personnel—Bert B. Meek is director of public works, C. H. Purcell state highway engineer, Fred J. Grumm engineer of surveys and plans, and C. S. Pope construction engineer for the California Division of Highways. The Ridge Route Alternate lies in district VII, for which S. V. Cortelyou is district engineer, and L. M. Ranson district construction engineer. C. N. Ainey is resident engineer on the Castaic school-Canton creek contract and C. W. Pierson is the contractor in charge.

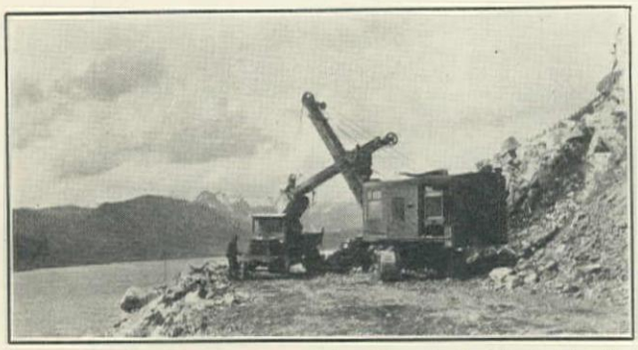
*See pre-bid item in the January 25th, 1930, issue, p. 59, and unit bid summary in the February 25th issue, p. 58.

Washington State Highway Projects

Progress on Five Current Grading Contracts Totalling 42.3 Miles and Nearly $2,000,000

Grading from Bristol East—John Slotte & Co., Astoria, Oregon, is making fair progress on 4.25 miles of grading from Bristol east, State Road No. 3, F.A.P. 165-B, Kittitas county. Blasting is slow, as the roadway is close to the main-line track of the Northern Pacific—minimum distance between centerlines being 121 ft. on steep, solid rock slopes. The project, which is a section of new location following the Yakima river canyon, involves the construction of a high cement rubble retaining wall containing 2200 cu.yd. of masonry and supporting the roadbed above the railway tracks. The contract price is $139,786 and the estimated completion date October 1, 1930.

Equipment in use includes one 1-yd. and one 1¼-yd. Northwest gas shovels; five 4-yd., four 1½-yd., and one 2½-yd. dump trucks; and two air compressors. Giant powder is being used on the work.



Northwest 1¼-yd. Power Shovel Loading 4-yd. Dump Truck on Lake Keechelus Vicinity Project, Edward J. Dunnigan Contract

W. F. Henager is resident engineer on F.A.P. 165-B.

Grading from Cedar Creek to Hoh River—C. J. Erickson, Seattle, and Strong & McDonald, Tacoma, are making good progress on two separate contracts totalling 11.7 miles on State Road No. 9 from Cedar creek to Hoh river, Jefferson county. The work will cost $388,000 and will be completed about December 1. Erickson's contract extends from Hoh river to Nolan creek and the Strong & McDonald contract from Nolan creek to Cedar creek. On April 24, clearing and grubbing was nearly completed and grading was 13%, stripping 60%, drainage 40%, and surfacing 0% completed. The right-of-way was cleared in 1925 under a previous contract.

Grubbing was done with a 125-hp. Clyde gasoline donkey at an average rate of 500 ft. per shift on 60-ft. right-of-way. C. J. Erickson is using a 1-yd. P&H and a ½-yd. Mead Morrisson power shovel for excavation on the north end of the project, material being moved on a narrow-gauge railroad in 1-yd. cars hauled by Fordson locomotives. Strong & McDonald, on the south end of the project, are using two 1-yd. Northwest convertible draglines for excavation and Caterpillar tractors with crawler-tread trailers for transporting materials.

On the north end of the project all construction materials and supplies are brought in over the narrow gauge railroad laid between the Bogachiel and Hoh rivers. The contractor has had to build two construction bridges over the Hoh river, the first one being washed out by flood as soon as completed. Prior to the completion of clearing, all gasoline, oil, and powder was brought in by pack train from the north. Work was delayed at times when the pack trains could not cross the Hoh river on account of high water. The point of entry for the south end of the project is on the coast at Cedar creek. All materials for this end of the work were brought in by barge and hauled over the grade or over tote roads by Caterpillars and crawler-tread trailers. Operation of machinery on the beach is costly, as the metal parts rust under the action of salt water. Aggregates for concrete are being developed from gravel bars in the Hoh river and on the coast at Cedar creek.

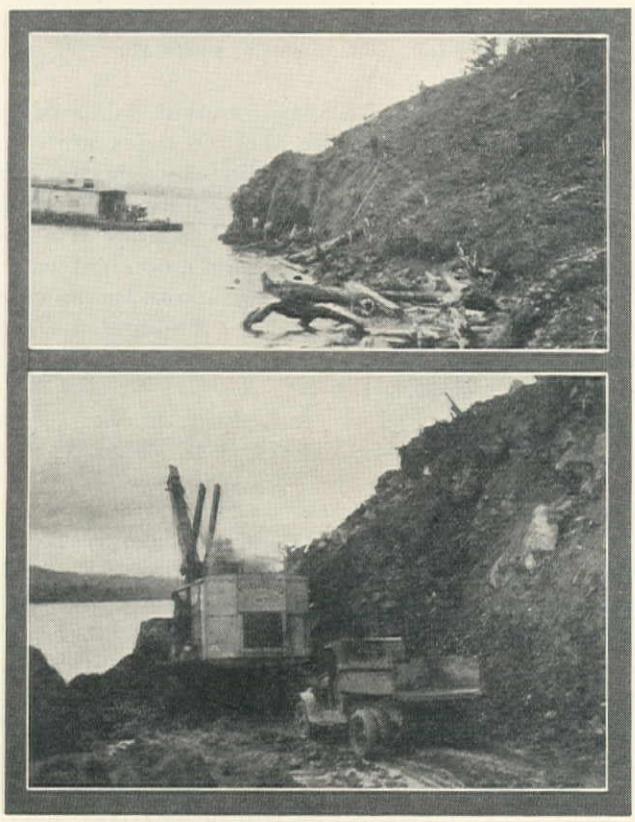
Due to weather conditions, the working season is short and grading on heavy cuts and fills cannot be done to advantage during the winter months because of slides. The excavated material is extremely wet and therefore hard to handle.

Grading from Morse Creek to Crystal Creek—Von der Hellen & Pierson, Medford, Oregon, will complete their contract about December 1, 1930, for grading 15.6 miles of State Road No. 3 from Morse creek to Crystal creek, Yakima and Pierce counties, contract price $729,740. This contract covers one of the most rugged sections of highway across the Cascade mountains via Chinook pass. When completed, it will be one of the most scenic highways in the state. Principal items include 72 acres of clearing, 790,000 cu.yd. of excavation (mostly rock), 8800 lin.ft. of concrete culvert pipe, a timber bridge 90 ft. high over Dead-

Thew-Lorain Power Shovel Opening Road After Blast on Morse Creek-Crystal Creek Section, State Road No. 3, Von der Hellen & Pierson Contract

wood creek, and 10,000 cu.yd. of crushed rock surfacing. Large concrete culvert pipe (up to 60 in.) was used in place of reinforced concrete box culverts on account of inaccessibility of the project and difficulty in hauling concrete aggregates. On May 1, the project was 35% complete, the clearing 90% complete, and grading and culverts each 30% complete.

Most of the work to date has been done between August 1 and November 15, 1929. Work for the 1930 season has recently been started, the month of April being spent in removing snow on the east side of the



(Upper) Ingersoll-Rand 2-Gun Portable Compressor on Scow Which Is Towed Along Columbia River and Anchored Opposite Rock Cuts on the Ocean Beach Highway. (Lower) Bucyrus-Erie Shovel on Myers & Goulter Contract (Ocean Beach Highway) Between Nassa Point and Eagle Cliff

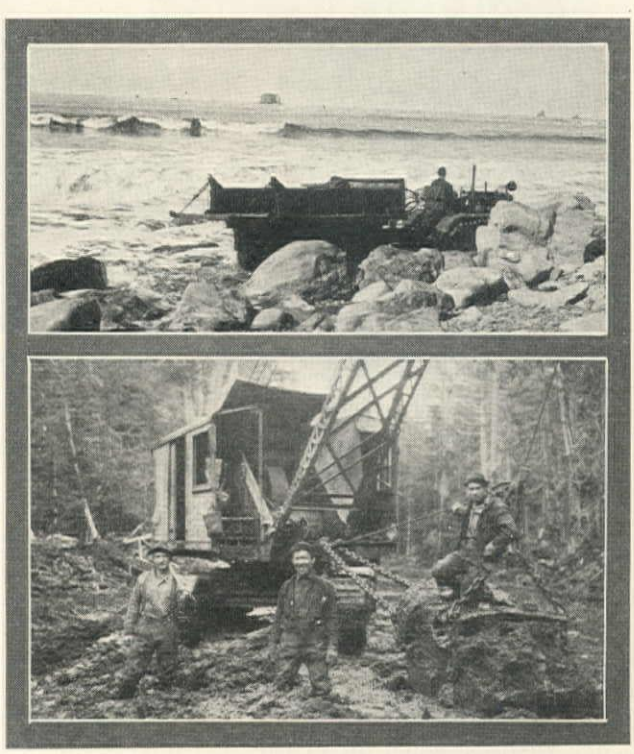
Cascades, hauling in compressors, and drilling. Drilling was continued throughout the winter on the extreme western end of the project and the rock was shot in March, permitting one shovel to construct a mile of pioneer road during April. Five power shovels, nine compressors, and seven trucks comprise the major equipment. Three of the shovels are 1¼-yd. Lorain-75s, one is a ¾-yd. Lorain, and one is a 1-yd. Bucyrus-Erie D2. The compressors are Gardner-Denver, Ingersoll-Rand, Chicago Pneumatic, and Sullivan. A difficult problem was to get equipment on the project. Shovels were unloaded at the nearest point, proceeded to the work under their own power, and then dug in at various points. The job reaches an elevation of 5400 ft. but this has not impaired the operating efficiency of the compressors. Giant powder is being used on this contract.

N. M. Arnston is resident engineer on this contract.

Grading on the Lake Keechelus Vicinity Project—Edward J. Dunnigan, Inc., Seattle, has made rapid progress and will complete a contract early in June for 5.2 miles of grading on State Road No. 3 in the vicinity of Lake Keechelus, Kittitas county, at a cost of $304,000. This project, 92% complete on April 28, is the final section of the main highway across Snoqualmie pass between North Bend and Cle Elum (see April 10th, 1930, issue, p. 191).

One shovel, two compressors, two trucks, and one tool sharpener have been working one 10-hour shift near sta. 265 on a large rock cut; and two shovels, three compressors, four trucks, and one tool sharpener have been working two 10-hour shifts between sta. 315 and 365 on rock cuts and backfilling. A section of the project along the shores of Lake Keechelus near sta. 365 where traffic interfered with construction has been cleaned up. Smith & Smith, Inc., have the contract for surfacing.

The following equipment has been used on this project: one Caterpillar '30' on clearing; eight Sullivan compressors, two Sullivan sharpeners, two Sullivan oil furnaces, twenty Gardner-Denver jackhammers, a well drill, DuPont powder, two Northwest 1¼-yd., two Bucyrus-Erie 1¼-yd. gas+air, one Bucyrus-Erie 1-yd. diesel, one ½-yd. Orton power shovel, fourteen 4-yd. dump trucks (six Whites, two Pierce-Arrows, two Internationals, three Kenworthys, and one Republic) on grading; one Cedar Rapids universal and



(Upper) Caterpillar Tractor and Crawler Tread Trailer Transporting Equipment Along Ocean Beach on Strong & McDonald Contract for Cedar Creek-Nolan Creek Section, State Road No. 9. (Lower) Northwest 1-yd. Convertible Dragline Stripping North of Cedar Creek on Strong & McDonald Contract

Symons cone crusher plant, one McCulley gyratory and Symons disc crusher plant, one Bulldog crusher plant, five Mack, and two Kenworthy dump trucks on finishing and surfacing; one Rex 3-sack mixer on structures.

F. W. Gloor is resident engineer on the Lake Keechelus Vicinity project.

Grading from Nassa Point to Eagle Cliff—Myers

& Goulter, Cathlamet, Washington, will complete their contract about September 1, 1930, for grading 5.5 miles of State Road No. 12 (Ocean Beach Highway) from Nassa point to Eagle cliff, Wahkiakum county, contract price $270,274. Clearing and grubbing and two miles of the grading have been nearly completed. Principal quantities include: 57 acres clearing and 32 acres grubbing; 291,000 cu.yd. class 'A', 117,300 cu.yd. solid rock, 2100 cu.yd. structure, and 1800 cu.yd. class 'D' excavation; 663,700 sta.yd. overhaul; 27,100 cu.yd. loose rip-rap; remove 200 trees; 315 lin.ft. 12 and 18-in. plain concrete pipe; 3028 lin.ft. 12 to 30-in. standard reinforced concrete pipe; and 419 lin.ft. 24 and 30-in. extra strength reinforced concrete pipe.

On this contract it was necessary to protect the embankment placed along the Columbia river by rip-rap, a 5-ft. layer being used outside of class 'A'

(Left) Timber Trestle Bridge 90 ft. High Over Deadwood Creek, Von der Hellen & Pierson Contract. (Right) Placing 60-in. Extra Strength Reinforced Concrete Pipe by Means of Chain Blocks and Highline, Von der Hellen & Pierson Contract, Morse Creek to Crystal Creek

material to offset June floods and an 11-ft. maximum daily tide movement. Most of the river fills are talus or rock fragments on 1.33:1 slopes. Talus slopes between sta. 455 and 465 are 1.33:1 and would if disturbed require considerable excavation. The expense of re-establishing any of these slopes disturbed by construction operations rests on the contractors. The rainfall is 70 in. per year and seriously interferes with hauling. The remainder of the contract will be done in dry weather when all of the six shovels can work two and possibly three shifts to meet a completion date extended one month from the contract termination on August 1.

Major equipment includes one Bucyrus-Erie model 20 diesel and five Bucyrus-Erie 1¼-yd. gas shovels; three Reo pneumatic-tired Speedwagons; three 3-ton International pneumatic-tired dump trucks; a Caterpillar tractor equipped with drums for a cable and using a Crescent scraper for sloping and drawing down the tops.

Administrative Personnel—Samuel J. Humes is director of highways, T. G. McCrory is chief engineer, H. G. Porak is construction engineer, L. R. Turnbull is office engineer, and O. R. Elwell is bridge engineer.

FEATHER RIVER CANYON HIGHWAY, CALIFORNIA

The Division of Highways, Department of Public Works, State of California, began work on the Feather River Canyon Highway in March, 1928, when two survey parties started location surveys from each end. The proposed road will be 78 miles long, between Oroville in the Sacramento valley and Quincy in Plumas county. There are three large parties at work this summer on location surveys; more than 50 miles have been located.

In May and June, 1925, two convict labor camps were established: Camp 17, about 8 miles northeast of Oroville, and Camp 16, one mile below Paxton, near the upper end. These two convict camps have graded over 17 miles of road and surfaced 5 miles at a cost of $1,000,000. (The convicts are paid a nominal wage). Camp 16 also constructed a bridge across Indian creek at a cost of $30,000. Camp 17 is building a 700-ft. bridge across the Feather river, 4 miles northeast of Oroville, to cost $170,000.

Bids were received on June 4 for grading on an 1.8-mile section from Bardees creek to Pulga, 35 miles above Oroville. This contract will include 97 sta. clear and grub; 245,600 cu.yd. roadway excavation; 934,000 sta.yd. overhaul; 6200 cu.yd. structure excavation; 255 cu.yd. 'A' concrete in structures; 81,000 lb. reinforcing steel; 16 lin.ft. 12-in., 644 lin.ft. 18-in., 360 lin.ft. 24-in., and 720 lin.ft. 42-in. corrugated pipe; 3210 cu.yd. rubble masonry retaining wall; 97 sta. finish roadway; and 92 monuments. Plans for a bridge to be built by contract (estimated cost $150,000) across Feather river near the upper end of the highway, are nearing completion. The cost of rock surfacing on the graded section will be $100,000, making a total of $1,770,000 expended on 19 miles of highway and 3 bridges. About 31 miles of intervening road will be constructed by contract.

FILTER PLANT FOR WEISER, IDAHO

Bids will be received until June 24 by the city of Weiser, Idaho, for construction of water works improvements (to be paid for by a $64,000 bond issue) including an intake on Snake river, covered concrete settling basins, a high and low service pumping station, and a filter plant of 1,500,000 g.p.d. capacity. Burns-McDonnell-Smith Engineering Co. are the engineers.

The filter plant will consist of an aeration unit with two blowers, a coagulation unit having one agitator mixer together with necessary chemical feed machines and storage capacity, and two filter units. Quantities include 1900 cu.yd. excavation, 850 cu.yd. concrete, and 125,000 lb. reinforcing steel. There will be three contracts—one for furnishing pumping equipment, one for furnishing and installing filter equipment, and one including material for and construction of the remainder of the improvement and installation of pumping equipment.

Recent Development in Sewage Disposal in the East*

By R. F. GOUDEY†

Resident Engineer, Bureau of Water Works and Supply, City of Los Angeles, and formerly Resident Engineer, State Department of Public Health, at Los Angeles

Part III

Sludge Disposal

At present there seems to be no uniform procedure in removal of sludge from clarifiers, whether by pumping or by gravity. At the North Side plant, Chicago, outlet valves from the clarifiers are opened on predetermined cycles, through automatic operation by clocks, giving a gravity discharge for the sludge. This has not proved satisfactory, and they now find it necessary to install pumps to remove the sludge from the clarifiers. Experience elsewhere indicates that the types of pumps formerly used are not heavy enough for the work, and the Barnes pump in particular is to be made heavier. Centrifugal pumps for excess activated sludge have given away at Milwaukee to Worthington plunger pumps. Air and gases caused the centrifugal pumps to lose suction, and they claim the floc was also disturbed.

At Plainfield, New Jersey, an interesting discovery was made, namely: that by adding alum to sludge just as it is being put on to sand beds, it will dewater in four days, instead of requiring two weeks. The explanation is that carbon dioxide is released in minute bubbles from the chemical reaction of alum, making the sludge buoyant, so to dewater rapidly, in addition to the coagulating effect of alum itself. Experiments at Baltimore with alum did not prove this out, but it was admitted that the alum was not added just as the sludge was being applied to the sand beds.

The thought occurs: Why could not gas from the digestion works be mixed with sludge just as it is being placed on sand beds?

A good type of sludge bed cleaner is now being perfected at the Calumet plant, Chicago. It consists of a rather large tractor type of machine, which cuts into the sludge at the rate of 1¼ sq. yd. of bed per minute, and then the sludge is transferred from specially designed elevators to belt conveyors which discharge it into cars. The equipment as now designed costs approximately $60,000, but in large plants, such as being designed at Chicago, such type of equipment readily pays for itself.

The price of sludge fertilizer at Milwaukee, for 130 tons daily, has been increased; now averaging $23 a ton. It is sold in three lots: retail, for lawn use at $40 a ton; wholesale, to fertilizer manufacturers in carload lots at $19 a ton; and wholesale, to anyone in less than carload lots at $26 a ton. The sale of sludge defrays all chemical, filter, and drying costs.

Chicago, in its experiments on hot house drying beds, finds that heating to prevent freezing of sludge, and ventilating to remove humidity, must be employed to secure a 50% better drying rate. Such beds cost $1 per square foot, and 6 months' sludge storage is cheaper.

The Oliver filtration of excess activated sludge at Milwaukee appears less successful than at Pasadena. The filter cake is spotty, thin, and has a water content never less than 84%. At the present time, about 390 gal. of 60% sulphuric acid is added to adjust the pH to 3.25, and 8 lb. of ferric chloride per 1000 gal. of sludge is added.

Permanent jets about 2 in. out from the drum, and both at top and near the cut-off plate, have been installed on the Oliver filters for washing. Hoods have been placed over these jets, and the washing operation is clean, with no splash.

The Atlas dryers have been speeded up by increasing and deepening baffles, lowering temperature, and adding to the oversize return. The inner core of the Louisville dryer has dropped three times and is not in good repute.

Miscellaneous

Promising experiments in grease removal are being conducted at the North Side laboratory, Chicago, which really amounts to filtering sewage downward through a 6 in. layer of light oil, in a tank giving but 5 min. detention. The depth is 6 times the diameter of the tank. The idea originated with the Centrifix Waste Recovery Co. of Chicago, and is well thought of.

Baltimore has a good ordinance on the garage oil problem. In addition to a good underground system of inspection, the city collects regularly all oil from the garage. Prosecutions are made by the Fire Prevention Bureau. This drastic action followed a two-day fire in their oil-laden storm sewer.

A great many of the treatment plants are being troubled with highly nitrified effluent, causing algae and vegetable growth problems in small streams receiving their effluents. At Brockton, Baltimore, Salem (Ohio), and Chicago, very severe algae conditions are set up below the treatment plant, because of the fertilizing elements that the effluent contains. Practically all of these places are studying their algae problems, but do not know yet how to combat them. At Brockton, a suit was recently won by farmers below, because the increased vegetation in the channel caused the stream to overflow private lands.

In Massachusetts, three industrial plants have combined to jointly add 4800 lb. of sodium nitrate daily to the Neponset river, to prevent complete deoxygenation. It is the first case I know of artificial prevention of septic river conditions.

Odor Control

Milwaukee is chlorinating its dryer stack gases during such time as the wind blows from the lake to town. Over $100,000 is spent yearly on this. This treatment is effective. The dose required averages 100 lb. per day.

At Plainfield, New Jersey, where odor control is necessary because of lack of adequate isolation and treatment of an odorous sewage, they have resorted to a unique method of odor control. One of their Im-

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hoff tanks is used to build up an activated sludge during the day, and from 3 p.m. to 10 p.m. one-third of the settled sewage is shunted through this tank on a detention period of 40 min. The effluent contains dissolved oxygen. During the time that the sewage is run through this tank, chlorine is added, giving a dose of 12 p.p.m. at the point of treatment, and a trace of free chlorine at the nozzle. Whether the dissolved oxygen in the effluent of the aeration tank, or chlorine itself, is responsible for odor control, is hard to state. However, when too much chlorine is added, they get an idioform smell ½ mile from the plant, indicating that probably chlorination is the most effective agent.

No other plants visited were using odor control, unless gas collection and burning could be so considered.

However, it was noticed that at none of the gas collection plants was the excess gas burned. In all cases, it was vented to the roof. It does not seem to me that this method of disposal would be satisfactory or suitable for California conditions. At San Bernardino, when the gas is not being burned, it is very odorous. Burning is certainly necessary there. I believe it is desirable in all cases where odor control is imperative.

Results Obtained

In general, fairly good results are obtained by the treatment plants visited. The sprinkling filter plants are producing an effluent which is no better than our California plants. The activated sludge plants are slightly inferior. The effluents from both types of treatment processes are stable, contain quite a bit of suspended solids, have considerable color, and do not give a good impression to the casual observer.

The following table gives variations in suspended solids and B.O.D. for the raw sewage at a number of the plants inspected.

Plant	Suspended solids p.p.m.	B.O.D. p.p.m.
Baltimore	260	200
Chicago, North Side	110	120
Chicago, Calumet	120	75
Cleveland, West	227	163
Cleveland, East	183	98
Indianapolis	300	450
Plainfield, N.J.	230	
Salem, Ohio	240	

All of the plants with complete treatment remove about 90% of the suspended solids and B.O.D., except Plainfield, where the B.O.D. reduction is only 84%, and at Salem, Ohio, where 98% of suspended solids is obtained.

At Cleveland, 9 p.p.m. of chlorine gives 95% reduction of total bacteria and B. coli.

Clarification units are removing 25 to 90% suspended solids.

One of the most startling things I saw was at Chicago where John R. Bayliss at the experimental filtration plant, finds that by adding 3 gr. of alum per gal., and 8 p.p.m. of chlorine to the Calumet sprinkling filter effluent, he can remove all turbidity, taste, odor, and color except for chlorine, by passing through a sand filter. Then a second filtration through active carbon removes all traces of chlorine. The final effluent is truly crystal clear, sparkling as a pure diamond reflection, has a chemical analysis better than most acceptable drinking waters, and a taste like mountain water. The oxygen consumed value is below 1.5 p.p.m.

Perhaps this opens up a further refinement for existing forms of treatment, especially where reclamation is involved.

Plant Control

Greater attention than ever is being given to plant control. Every small plant has its laboratory, fully equipped to make the more important tests. Many of the older tests are now being discontinued. Greatest stress is put on the B.O.D. and suspended solids tests. Next in order of importance are total organic nitrogen, ammonia by direct nesslerization, pH, and alkalinity. A good system of sludge analysis has been worked out at Chicago and is a great saving of time. Daily tests are made for water content and specific gravity. The residue from these tests is saved for weekly composite tests for volatile and fixed solids. These weekly composites are then saved and composite monthly samples are run for nitrogen and grease.

The development of home-made incubator rooms at Chicago for B.O.D. tests and special experiments, has proven a boon to the laboratory men.

Each plant now has accurate meters to determine the sewage flow. At the activated sludge plants, meters are installed to determine sewage flow, air for aeration purposes, air for other than aeration purposes, returned sludge, wasted sludge, and electrical current used. At the North Side plant, a very intricate method of chemical control is provided to regulate returned sludge and wasted sludge.

Mechanical control by operating the valves on cycles, such as operation of screens and opening of sludge valves, has been worked out at Chicago. At Milwaukee the Venturi meter has proven satisfactory, in that its openings are large, and there is less trouble from scale and condensate clogging the orifices.

Chicago has been working out some very excellent devices for continuous mechanical sampling of sewage sludge and final effluent. Not only is the sampling in proportion to the flows, but gives really a composite sample based on portions of the samples diverted every few minutes.

Good telephone and communication systems have been found advantageous at Baltimore. It simplifies the method of operation, reduces the number of operators needed, and gives the operators more confidence.

Tool houses conveniently located are a great assistance to operators. Likewise convenient operating galleries and use of safety devices add to his comfort.

Good lighting systems with underground conduits and more spacious change rooms and quarters for the benefit of the operators are now provided.

Beautification of Works

The East has done a great deal in beautifying the plants. At the North Side plant, the works are laid out spaciously, and many of the parts of the plant, ordinarily left open, have been housed over. A monumental style of architecture has been used, giving the plant the appearance of a modern college campus. A good start has already been made in lawns and shrubbery. At Aurora, Illinois, the treatment plant looks like a California bungalow hotel, with stucco buildings and tile roof. The clarifiers and other works are housed. At Baltimore, over $3400 was spent merely for an entrance gate to the plant.

In general, the plants are well beautified. There are concrete roads. Lawns and shrubbery are well kept. At Salem, Ohio, the interior to the combined blower and pump house has been adorned with pots of ferns and bowls of gold fish.

(FINIS)

Stockton Deep Water Ship Channel

First Contract Awarded—Project Involves 21,500,000 cu.yd. Dredging and Levees in 14 Miles Besides Terminal Facilities

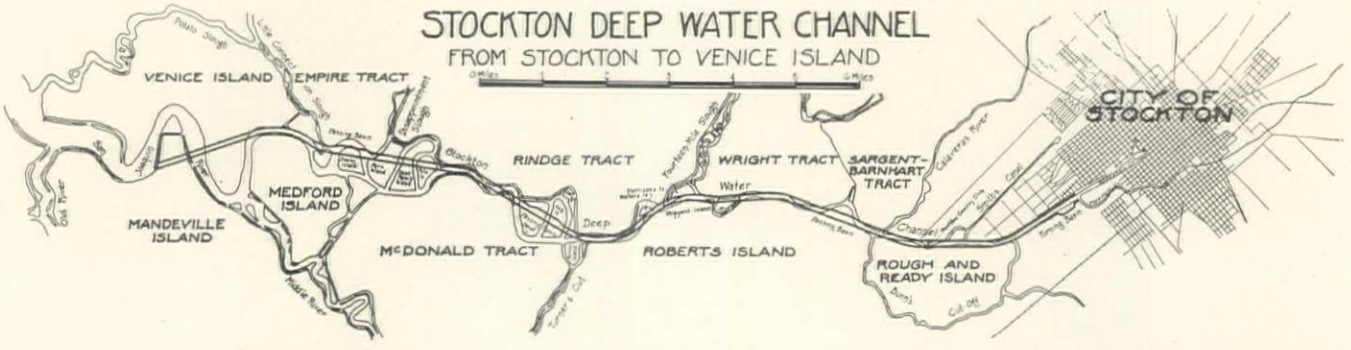
By W. B. HOGAN, *City Manager*

The city of Stockton—on the southerly edge of the confluent delta of the San Joaquin and Sacramento rivers—is strategically situated geographically, physically, and economically for an inland port, a point of trans-shipment from ship to rail to serve the great valleys of California and western Nevada. (See March 25th, 1926, issue, p. 43, for a preliminary article on this project).

The first contract in the consummation of this project has been awarded by the U. S. Engineers, War Department, and work commenced early in April.

Physical Features—The Stockton port terminal facilities will be 90 miles by water from San Francisco and 43 miles from deep water at the head of Suisun bay.

The topography of the lands surrounding the port terminal and the variation of the tide and river stages are favorable for the placing of the wharf aprons at the most desirable elevation with reference to ship decks. Land adjacent to the ship channel and terminal varies from slightly below sea level to 10 ft. above,



so that spoilage areas are available at the levee's edge. Terminal lands may be filled from spoilage to the desired elevation.

The tidal variation is from 3 to 4 ft. and the seasonal variation of the river due to run-off is such that mean low water is 7 ft. below ordinary boating water, and high water necessitates the placing of wharf aprons only 8 ft. above ordinary boating water.

Transportation Facilities—The highways of commerce radiate from Stockton to the million-acre agricultural empire of California's 'Great Valley' and its urban population.

Three transcontinental railways, the Southern Pacific, the Western Pacific, and the Santa Fe, are now serving the port area of Stockton, together with the interurban rail lines of the Tidewater Southern, the Central California Traction Co., and the Stockton Terminal & Eastern. Stockton is now the river terminal for 300 miles of navigable inland waters of San Joaquin county, and 500,000 tons of shipping is handled annually. An unmatched system of radial highways, of which there are more than 600 miles in the county, make possible the rapid and economical concentration and distribution of truck-hauled commodities at the port.

Climate—Mild temperature and freedom from severe storms make for ideal, port weather conditions. The mean annual rainfall is 14½ in., most of which falls during December, January, February, and March. The mean temperature is 60° F., with a mean variation from 46° to 73° F.

Description of Project—The construction of the ship channel will require the deepening and straightening of 14 miles of the San Joaquin river, commencing at Stockton. Bars in the river near Antioch and Pittsburg will require 5 miles of channel dredging. The ship channel will have a depth of 26 ft. at mean lower low water, a bottom width of 100 ft., and 4 on 1 side slopes. The channel right-of-way strip will be 460 ft. wide, which is sufficient for future deepening of the channel. Levee strips on each side of this channel strip are 145 ft. wide. To assist navigation during fogs, the channel will be straightened so that the minimum radius of curvature will be 5000 ft.

Project Economically Justified—This project has been pronounced fundamentally sound by the U. S. District Engineers and the Board of Engineers for Rivers and Harbors. The premise on which this project was analyzed and based, was the saving made possible by the difference in rail and water transportation rates. The cargo available for coastal, intercoastal, and foreign shipment from the Stockton trade area, as compiled by a survey made by the Chamber of Commerce and reviewed by the U. S. Engineers, is one million tons annually. The differential in freight rates shows annual possible savings, if shipped by water through Stockton, of $900,000. Basing the savings in freight charges on lumber and grain only, the U. S. Engineers state that the expenditure of $8,268,-

750 is justified, which is $3,828,000 more than the estimated cost of the work.

Historical Development—In the 'Gold Rush' days, sailing vessels came through San Francisco bay and the San Joaquin river to Stockton and unloaded their cargoes. Many of the buildings in the Mother Lode and the San Joaquin valley are constructed of materials which came around the Horn. However, the debris of placer mining operations silted the channels to such an extent as to limit the channel depth strictly to river steamers.

Since the early days, it always has been the ambition of the forward looking citizens of Stockton to make the city the world port of the San Joaquin and Sacramento valleys (California Inland Empire). In 1916, Congressman Charles F. Curry suceeeded in having Congress pass a Rivers and Harbors Act authorizing a survey and report on a channel to accommodate deep water vessels. Succeeding years brought increased activity on the part of Stockton citizens and through the cooperation of the various U. S. District Engineers a measure was enacted by Congress and signed by President Coolidge authorizing the construction of a deep water channel that would make this Stockton dream a reality.

An Economic Survey—The Chamber of Commerce survey of the prospective trade area and cargo available therefrom was determined by the freight rate differential between Stockton and San Francisco. (This same differential applies to Oakland.) The data compiled from this survey revealed a possible volume of commodities in 1930 of 1,000,000 tons, with an annual saving in shipping charges of $902,000. The rate differential in favor of Stockton varies from 2½ to 13 cents or more, dependent upon the classification and point of shipment or receipt. The trade area thus determined includes all the San Joaquin-Sacramento valley counties (except Kern and Solano), the contiguous foothill and mountain counties to the state line east and north of the valleys, Klamath county in Oregon, and the twelve northern counties of Nevada.

Engineering Features—The estimated excavation required to complete the project is 21,459,000 cu.yd., of which 18,380,000 will be suction dredge work in channel areas and 3,079,000 will be required to build the levees.

Levees will be necessary on the entire length of channel where rectified. These will be 12 to 15 ft. high, with a top width of 20 ft. and side slopes of 1 on 4. In the lower delta, the soil is a peat formation ranging in depth from 10 to 60 ft. Levees built on top of deep peat soil are not stable, as the peat is displaced by the superimposed load. In constructing such levees, a channel will first be excavated in the levee position and then backfilled with river sand.

As the channel excavation will be made by suction dredging, areas will be required for the disposal of spoil. These are divided into two classes—temporary spoil areas for use during the construction period, and permanent spoil areas for channel maintenance.

SAN JOAQUIN RIVER AT STOCKTON CHANNEL ABOVE SITE OF TURNING BASIN

The terminal facilities and turning basin will be located on Stockton channel just west of the present river shipping terminals and adjacent to the westerly city limits.

The turning basin will be formed by the addition of a trapezoidal area to the ship channel on the south side only. It forms a basin 850 ft. wide, 1100 ft. long on the short side, and 1900 ft. long on the longest side, with an area of 33 acres.

The city of Stockton is required to submit plans to the U. S. Army Engineers for an ultimate terminal development capable of handling 1,000,000 tons per

year, and build by the date of channel completion at least 1200 lin.ft. of berthing space, and 800 lin.ft. of transit sheds suitable for handling general cargo. Plans for the general layout (1,000,000-ton terminal) have been approved. A tract of land containing 118 acres bordering the south side of Stockton channel and extending from the turning basin to the San Joaquin river has been secured for this purpose. The slip type of development has been chosen as best adapted to meet the conditions. Four slips, each 250 by 1000 ft., will be provided, set at angles of 46° with the ship channel. The piers will be 475 ft. wide, with double transit sheds each 160 ft. wide. Wharf aprons will be 32 ft. wide and will carry two railway tracks. The rear of the transit sheds will each be served by two depressed railway tracks and a truck road. Railway storage, classification and interchange yards, will be provided in the rear of these slips. Open wharf space will be located on the turning basin. The initial installation as required by the government, consisting of 1200 ft. of berthing space, 800 ft. of transit sheds, and 400 ft. of open wharf, will be constructed as a part of the ultimate 1,000,000-ton terminal. An adequate highway borders the southern side of the terminal and a proper service road will connect the transit sheds to it.

The city has 117 acres of waterfront property with 4570 ft. of water frontage for lease to industries.

Financing of Project—The U. S. Government, the State of California, and the city of Stockton are providing finances for the carrying on of this work in the following amounts:

U. S. Government	$2,000,000
State of California	510,500
City of Stockton	3,000,000
Total	$5,510,500

Present Status—The first dredging contract has been awarded to the Longview Dredging & Construction Co. This work is near the mouth of the San Joaquin river and consists of dredging 1,750,000 cu.yd. at a cost of $155,750.

Practically all rights-of-way for channel, spoilage, and terminals have been acquired by the city of Stockton or the State.

The status of the project is encouraging for an early letting of all dredging contracts. It is not presumptuous to say that all contracts may be ready to let by mid-summer.

Deep water should not only make Stockton a leading inland port of the west coast, but also one of California's leading commercial and industrial centers.

Editor's Note—Plans have been made and bids will be called for at once by the U. S. Engineers' office, Sacramento, for the following work: 688,000 cu.yd. of clamshell dredging at the east end of New York slough near Antioch; 118,000 cu.yd. of clamshell dredging at West island near the Antioch bridge; and 9000 cu.yd. of clamshell dredging at the mouth of the Mokelumne river.

Three Government appropriations already made available for dredging, aggregate $1,375,000 (see April 25th, 1930, issue, p. 218).

SALT WATER BARRIER COOPERATIVE STUDIES

On March 21, a crew of 35 surveyors from the U. S. Corps of Engineers began a 6-months study from which it is expected that the best location for a proposed salt water barrier on San Francisco bay (see January 25th, 1930, issue, p. 35) can be selected. This study will include navigation, silting, tidal prisms, hydrological aspects, community growth and development, water front values, etc. The work is in charge of E. H. Ropes, major, Corps of Engineers, district engineer at San Francisco, assisted by C. A. Mees as chief of the civilian forces, and George F. Whittemore on economic phases of the project. Beginning at Martinez, the survey will progress westward toward the San Pablo barrier site investigated by Walker R. Young, construction engineer of the U. S. Bureau of Reclamation.

The U. S. Geological Survey is making precise level surveys and the U. S. Coast & Geodetic Survey is furnishing tide gages and records.

Investigations in progress by several departments of the State of California include: a review of estimates and studies contained in the Young report, a geologic study of the area, an intensive survey of industries within the area affected (started March 14), a survey of agricultural development in the delta area, possibility of use of the barrier as a highway bridge, a detailed study of sewage pollution and industrial waste and their effect on the barrier, a survey of municipal water supplies, and the relation of the barrier to the fishing industry.

The Salt Water Barrier Association, of which C. W. Schedler, Jr., is president, maintains offices in the Sharon bdg., San Francisco. This association, which has an able corps of speakers, is very active in promoting the salt water barrier.

Wyoming Opens Two Highway Structures to Traffic

On May 17, the Wyoming State Highway Commission officially opened the Fort Steele bridge over the North Platte river on the Lincoln highway. This bridge is 305 ft. long and consists of one 180-ft. through truss with two 60-ft. plate girder approaches; it is coated with aluminum paint to increase the visibility. On the same date the Parco overhead was opened, eliminating a dangerous grade crossing with the Union Pacific Railroad. This overhead, paid for jointly by the state and the railroad company, is on a 30-deg. skew and the roadway is 27 ft. above the tracks.

Another Natural Gas Pipe-Line Authorized

Standard-Pacific Gas Line, Inc., has been authorized to construct a natural gas transmission line from Kettleman hills to the San Francisco bay area, to cost $9,000,000. This line will have a daily delivery capacity of 138,000,000 cu.ft. without compression and 180,000,000 cu.ft. with compression.

ITEMS OF INTEREST

Great Falls-Conrad Region Mapped

The U. S. Geological Survey has completed a new map showing the geologic structure of the Great Falls-Conrad region (4500 sq.mi.) in north-central Montana.

Natural Gas Corp. of California

This corporation proposes to distribute natural and artificial gas in the towns of Jackson, Placerville, Lakeport, Susanville, Alturas, King City, Auburn, and Sonora.

Wyoming to Receive Highway Bids

The Wyoming State Highway Commission will receive bids at Cheyenne June 13 on eight highway projects totalling $300,000. The projects are located in Campbell, Carbon, Fremont, Lincoln, Niobrara, and Teton counties. Z. E. Sevison is state highway engineer of Wyoming.

Irrigation Rates for Pasture and Grain

Rates set by the California Railroad Commission for irrigation services by the San Joaquin & Kings River Canal & Irrigation Co. for irrigation of pasture and grain other than rice from October 1 to April 15 are $1.50 per acre per season, with additional irrigations at 75¢ per acre per irrigation.

Cost of Domestic Water in California

Los Angeles	$0.13 per 100 cu.ft.
San Diego	0.20
San Francisco	0.288
East Bay Cities	0.308
Average of 183 representative American cities in 1926	0.179

Ground Water in Little Lost River Valley, Idaho

A manuscript report by Lynn Crandall and H. T. Stearns giving the results of an investigation on the number and character of water-bearing beds and the direction of underflow in the Little Lost River valley, Butte and Custer counties, Idaho, is now available. Copies are on file in Idaho Falls, Boise, and Moscow, Idaho, and Washington, D. C.

Highway Construction Increasing

Highway contracts for the first three months of 1930 amounted to $114,101,383 for 35 states, an increase of 124% over last year. A few increases follow: California—181%, Colorado—455%, Idaho—over 90 times, New Mexico—none in 1929 but a heavy program in 1930, Washington—650%.

New Explorations in Alaska

Field parties of the U. S. Geological Survey will make exploratory and reconnaissance geologic and topographic studies and more detailed examinations of certain tracts and mineral commodities in the territory of Alaska during the present season. Aerial surveys completing a 2000-sq.mi. tract adjacent to Ketchikan are included in one of the major projects.

Union Station Ordered for Los Angeles

On May 27, the California Supreme Court upheld an order issued by the State Railroad Commission on July 8, 1927, directing the Southern Pacific Co., the Atchison, Topeka, & Santa Fe Railway Co., and the Los Angeles & Salt Lake Railroad Co. to construct and operate a union terminal station in the Plaza area of Los Angeles. The estimated cost of the terminal and of the elimination of 23 heavily travelled grade crossings in the heart of the city is $10,000,000.

Green River as a Western Resource

The Green river, draining 45 000 sq.mi. in Wyoming, Utah, and Colorado, occupies an important place in the Colorado river problem, as it contributes 5,700,000 ac-ft. annually to that stream, possesses notable facilities for creating storage reservoirs and developing waterpower, and has extensive possibilities for irrigation. Water Supply Paper No. 618, 'The Green River and its Utilization', by Ralf R. Woolley, prepared by the U. S. Geological Survey and obtainable from the Superintendent of Documents, Washington, D. C., for $1.25, describes this stream.

Census of Construction Being Rushed

The census of construction, at first conducted by mail, is now being completed by field supervisors and enumerators. Mail canvass returns have been received from over one-third of the 140,000 general and subcontractors and operative or speculative builders to whom report blanks were first sent. About 40,000 additional contractors have lately been supplied with blanks and many others are expected to be found during the field enumeration. It is probable that the Bureau of the Census will release preliminary figures on the construction industry within a few months.

Power Required to Propel Motor Vehicles

Ethelbert Favary, consulting engineer for the Moreland Truck Co., of Burbank, California, has written an article for easy comprehension by the layman, on the 'Power Required to Propel Motor Vehicles', which is being published serially in the 'Moreland', beginning with the April issue. He explains quite lucidly why tractive effort increases rapidly with an increase in grade and why gear reductions and slow speeds are necessary as the incline steepens. As motor transportation of equipment and materials on large construction projects in remote regions is rapidly increasing, many will find this article of interest.

PERSONAL MENTION

George Oliver, city engineer of Pittsburg, California, was appointed city manager May 19 to succeed Roy A. Watkins.

Gumaer & Straalsund, highway contractors of Newport, Washington, and Lewiston, Idaho, have dissolved partnership.

C. A. Cunningham, for two years project engineer of the New Mexico State Highway Department at Tierra Amarilla, has been appointed construction and maintenance engineer for the northern section of district 3, succeeding the late M. J. Smith.

Edgar H. Neal, formerly irrigationist for the agricultural engineering experiment station at the University of Idaho, Moscow, has become general manager of the Aberdeen-Springfield Canal Co., a 60,000-acre water delivery, maintenance, and drainage project at Aberdeen, Idaho.

Frank B. Campbell, an engineer in the water resources branch, U. S. Geological Survey at Denver, Colorado, sailed June 4 for Europe to attend the World Power Conference at Berlin and to spend a year abroad, primarily studying hydraulics. Campbell graduated in civil engineering from Cornell University in 1928.

Burns-McDonnell-Smith Engineering Co., Los Angeles, has been retained by Brawley, California, to draw preliminary plans for a 4,000,000-g.p.d. water-filtration plant and by the Gonzales Sanitary District (Monterey county, California) to prepare proceedings and plans for sewer improvements. The firm has completed final plans for a water filtration plant at Weiser, Idaho, for submission to the city council for approval, bids to be called June 24.

John N. Edy, city manager of Berkeley, California, since 1923, and a recognized authority on this type of municipal government, has been elected the first city manager of Flint, Michigan, at a starting salary of $15,000 per year, with annual increases of $1000 to a maximum salary of $20,000. Edy received civil engineering degrees from the University of Missouri in 1905 and 1909 and a master of arts from California in 1926. He had extensive experience in municipal work, civil engineering, and contracting prior to accepting the Berkeley position. In 1928 Edy was elected president of the International City Managers' Association. In 1925 he refused an offer to become city manager of Cincinnati, Ohio, at a salary of $25,000 as against his Berkeley salary of $10,000.

John Van Nostrand Dorr, president of The Dorr Company, engineers, New York City, has been awarded the James Douglas Medal of the A.I.M.E. for 1930 in recognition of 'distinguished achievement in non-ferrous metallurgy'. This award

JOHN VAN NOSTRAND DORR

is based on two important and highly beneficial pieces of milling equipment—the Dorr continuous thickener and the Dorr classifier.

Dorr was born in Newark, New Jersey, in 1872, graduated as a bachelor of science in 1894 from Rutgers University, serving part-time while an undergraduate as a laboratory assistant and experimenter under Thomas A. Edison. After graduation he began mining in the Black Hills as a chemist at a pyritic smelter and at several cyanide plants. Later, while a partner in the firm of Lundberg, Dorr & Wilson, he developed the first mechanical classifier for a cyanide plant at Terry, South Dakota. His continuous thickener was developed while in the Mogul Mining Co. mill at Pluma, South Dakota. Later, Dorr began to manufacture his products on a large scale. To adapt his basic equipment to different ores and to the recovery or manufacture of asbestos, glass, coal, paper, rubber, sugar, caustic soda, alumina, phosphoric acid, and alum, a complete testing plant and laboratory was put in operation. Other products of The Dorr Company include mechanical clarifiers, skimmers, digestors, etc., for the treatment of sewage.

OBITUARY

Oliver M. Thompson, 77, senior member of Thompson Bros., paving contractors, Fresno, California, died at Oakland May 14, about one month after the death of his son, Claude M., a junior member of the firm. Thompson had been a resident of Fresno for over 50 years. He is survived by his widow and one son.

ASSOCIATIONS

Engineering Society, University of Santa Clara—Lawrence O'Conner, San Francisco, has been elected president of this student organization.

National Engineering Inspection Association—This association, formed April 4, 1930, to bring about the standardization of methods of inspection among firms in all parts of the United States, has adopted a code of ethics and actively begun to function. Abbot A. Hanks, San Francisco, represents the western section of the association on the board of directors.

Sixth International Road Congress—At this congress, to be held in Washington, D. C., October 7 to 10, 1930, the American Road Builders Association will exhibit for delegates from 56 countries the highway machinery and equipment of 400 manufacturers in the United States. Manufacturers from other countries have also been invited to exhibit at this, the first International Road Congress to be held in the United States. The United States produces for domestic use and export more road building machinery and equipment than any other nation.

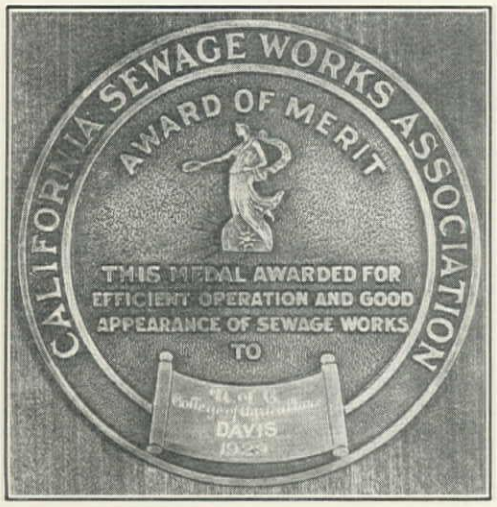
A.W.W.A. Membership Campaign—The 1930 membership campaign began March 25, the goal being 500 new members before the St. Louis convention. To May 2, applications for 109 new memberships and 8 reinstatements had been received. The Pacific Northwest Section had returned 60% of its quota, the California Section 24%, the Montana Section 33%, and the Rocky Mountain Section 15% as of that date. It is expected that May will add 250 members to the organization and that new sections of A.W.W.A. can be formed as a result of the present campaign.

Architects Visit Calaveras Cement Co. Plant—Thirty-two members of the American Institute of Architects and the State Association of California Architects, Northern California Chapters, made a trip to the Calaveras Cement Co. plant near San Andreas May 2 to 4, where they were guests of the company at 'Kentucky House'. The architects were interested in examining a modern cement plant and were impressed with the uniform quality of cement manufactured by the wet process. On the way to the plant they inspected the Pardee dam, recently completed by the East Bay Municipal Utility District at a cost of $7,000,000, and also the dam now being built by the city of Stockton on the Calaveras river for flood protection.

A similar trip was held April 4 and 5, when 53 engineers, and others, were entertained by the company.

Society of Engineers, San Francisco Bay Region—At the regular meeting in San Francisco April 8, William H. Nanry,

director of the San Francisco Bureau of Governmental Research, spoke on 'The $60,000,000 Proposed Bond Issue for the Purchase of Companies Distributing Power in San Francisco'. On May 13, F. A. Savage, an engineer for the Golden Gate Bridge & Highway District, described the present status of 'The Golden Gate Bridge'.



Davis Wins 1929 C.S.W.A. Plaque (See May 10th, 1930, Issue, p. 242)

AMERICAN SOCIETY OF CIVIL ENGINEERS

Colorado Section—The 191st regular meeting, held at the Lakewood Country Club, Denver, on April 7, had an attendance of 50. John F. Coleman, national president, and George T. Seabury, national secretary, were the principal guests and speakers.

Los Angeles Section—A regular meeting was held May 14 at the Los Angeles City Club. The guest speaker, Chas. Gilman Hyde, Berkeley, described 'Engineering Works in Europe' and a member of the Bureau of Water Works & Supply, city of Los Angeles, discussed the local water situation. A caravan to visit the Firestone tire plant was announced for the near future.

San Diego Section—A regular meeting was held at the Golden Lion on May 22. Chas. S. Leeds, captain U.S.A. (retired), of Los Angeles, spoke on 'Harbor Development of the Pacific Coast', outlining the requirements of port construction and maintenance and comparing different problems, especially the design of permanent piling.

Western Washington Section—A joint meeting was held with the University of Washington student chapter at the University Commons, Seattle, on May 20. Foundations and the effects of earthquakes on structures were the subjects of discussion.

CONVENTIONS

American Water Works Association, California Section—The annual convention will be held at Pasadena, October 29 to November 1, inclusive. An interesting and instructive program is planned, including papers by William Mulholland, Chester A. Smith, Ira F. Van Giesen, F. W. Hanna, F. M. Foudy, Ray F. Goudey, W. G. Irving, E. T. Vail, Fred Randlett, F. D. Weymouth, and others.

California Sewage Works Association—The third annual convention will be held at Long Beach in conjunction with the League of California Municipalities, the League meeting being from October 6 to 11.

WESTERN SECTION, COMMITTEE ON MATERIALS, AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS

Conference at Sacramento, California, April 21 and 22

A meeting of the Western Section, Committee on Materials, A.A.S.H.O., was held at the testing and research laboratory of the California Division of Highways, Sacramento, April 21 and 22, with an attendance of 21. Tests and research by the California Division of Highways on fuel oil and fuel oil mixtures, and the various kinds of aggregates used in this work by the several states were discussed April 21. T. E. Stanton, materials and research engineer of the California Division of Highways, and chairman of the Section, presided at the regular morning meeting April 22 and outlined the work done by his laboratory. F. H. Jackson, senior engineer of tests, Bureau of Public Roads, and secretary of the Committee on Materials, presided at the afternoon meeting on April 22, the following matters being discussed:

Fuel Oils

1. Viscosity and asphalt content. No standards or limits determinable because of varying methods of test in different states. Subcommittee appointed to determine standard method for asphalt content tests. Saybolt viscosimeter adopted as standard for viscosity determinations.
2. Pensky-Martin closed cup adopted for flash point determinations.
3. Water, sediment, and solubility tests allowed to stand.
4. Determination of wax content left unchanged until more information available.
5. Specifications for viscosity limits left open.
6. Emulsifying effect of water and minus 200 mesh material in oil mixed work should be studied by subcommittees.
7. Investigation asked of acid and alkali reaction in oil mix work.

Asphaltic Cement

8. Pensky-Martin closed cup adopted for flash point determinations.
9. Portland conference specifications for asphaltic cement adopted. Clause inserted that total bitumen content shall be determined by CS_2 solubility test, at least 99.5% to be soluble.

Non-Bituminous Materials

10. A.S.T.M. committee report recommending portland cement strengths of 275 lb. at 7 and 350 lb. at 28 days adopted.
11. Investigation asked of the Los Angeles rattler test for coarse aggregate.

Attendance

H. G. Bennett, Junior Testing Engineer, California Division of Highways.

L. C. Campbell, Materials Engineer, New Mexico Highway Department.

N. M. Finkbiner, Materials Engineer, Oregon Highway Commission.

S. M. Hands, Junior Testing Engineer, California Division of Highways.

J. L. Hemmert, Assistant Testing Engineer, California Division of Highways.

W. T. Holcomb, Member, Committee on Materials, Nevada Department of Highways.

F. N. Hveem, Junior Civil Engineer, California Division of Highways.

F. H. Jackson, Senior Engineer of Tests, Bureau of Public Roads, Washington, D. C.

H. S. Kerr, Chief Engineer, Utah Road Commission.

G. H. P. Lichthardt, Associate Testing Engineer, California Division of Highways.

C. R. Mabee, Assistant Testing Engineer, California Division of Highways.

F. T. Maddocks, Testing Engineer, California Division of Highways (Section Secretary).

B. W. Matteson, Senior Highway Engineer, Bureau of Public Roads.

Levi Muir, Jr., Materials Engineer, Utah Road Commission.

Nat H. Neff, County Surveyor, Orange County, California.

O. J. Porter, Junior Testing Engineer, California Division of Highways.

J. W. Powers, Materials Engineer, Arizona Highway Department.

J. E. Russell, Materials Engineer, Wyoming Highway Department.

T. E. Stanton, Materials and Research Engineer, California Division of Highways.

W. J. Stonebraker, Assistant Testing Engineer, California Division of Highways.

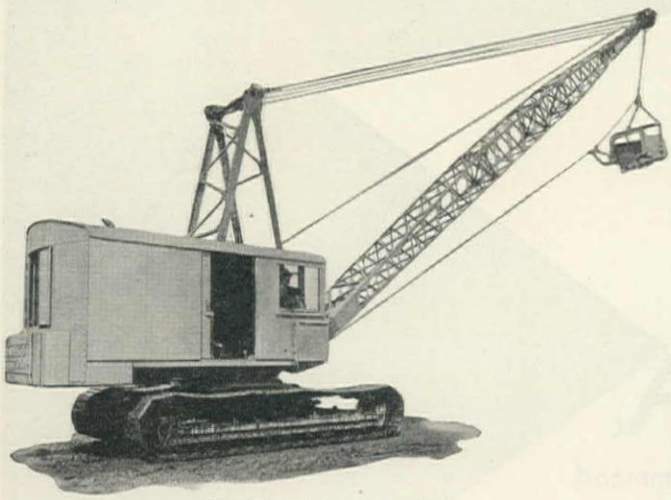
W. E. Watts, Junior Testing Engineer, California Division of Highways.

New Equipment and Trade Notes

NORTHWEST ANNOUNCES A 2-YD. DRAGLINE

The Northwest Engineering Co., Chicago, manufacturer of gasoline and electric shovels, cranes, draglines, pullshovels, and skimmer-scoops, has produced a 2-yd. dragline to meet the demand for such a mobile unit on drainage and general construction. Despite its great size, the dragline can be loaded on one flat car without major dismantling.

This unit has crawlers 17 ft. 5 in. long and treads 33 in. wide, giving a large bearing area so that the machine can

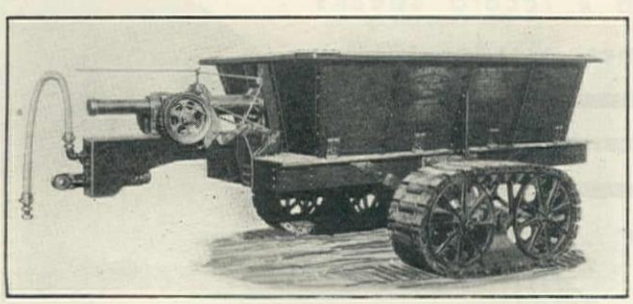


Northwest 2-yd. Dragline

operate over extremely soft ground. Positive traction, even when turning, assures easy maneuvering. The 2-yd. bucket is handled on a 50-ft. boom at 40-ft. radius. A Northwest variable-speed motor, accelerator controlled, is used. The clutches are shifted by a 'feather-touch' control; all high speed shafts are mounted on ball bearings; the drive from the engine is through helical gears on ball and roller bearings and runs in oil; a 200-gal. gasoline tank assures ample fuel supply.

LA PLANT-CHOATE 6-YD. DUMP WAGON

La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa, has developed a new 6-yd. hydraulic operated 'road layer' dump wagon for use with Caterpillar tractors. This all-steel wagon has a hydraulic door-winding hoist; it is equipped with La Plant-Choate 10-ton track so as to operate with a minimum of friction. The wagon is adaptable for most earth-



La Plant-Choate Hydraulic Operated 6-yd. Dump Wagon

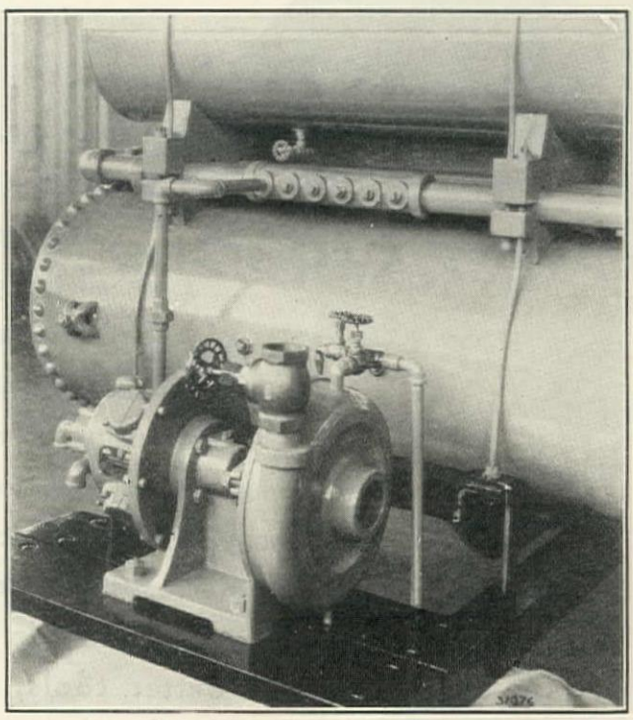
moving jobs—it can be used with elevating graders or for shovel loading, a flareboard being attached in the latter case. The sides and doors are doubly reinforced, the axles and pins heat-treated, and the draw-bar specially constructed. Its cart-type construction enables the wagon to make a right-angled turn in a minimum space of 26 ft. A Caterpillar '60' can handle one or more of these loaded wagons in high gear, as the tracks follow in the path of the tractor and there is ample track-bearing surface to prevent miring or jack-knifing.

Besides several sizes of 'road layer' dump wagons, including a 3-way wagon, the company manufactures 6-yd. round wheel wagons, bulldozers, backfillers, and snow plows.

INGERSOLL-RAND AIR-MOTOR-DRIVEN PUMP

The Ingersoll-Rand Co., New York City, has announced an air-motor-driven pump, known as the 'ACV'. The pump is a Cameron single-stage, single-suction, open-impeller, volute type, and is driven by a 4-cylinder air motor. Its capacity, with 60 lb. pressure at 1000 r.p.m., is 130 g.p.m. against 28 ft. head. With 80 lb. pressure at 1200 r.p.m., the capacity is 125 g.p.m. against 43 ft. head. (These figures are based on a suction lift of 20 ft.)

The unit is positive in action and useful for dewatering trenches and other excavations that have become filled overnight. It will also keep the workings free from water caused



Ingersoll-Rand 'ACV' Air-Motor-Driven Pump

by surface drainage or seepage during the time men are in them. This pump can be mounted on a shelf at the rear of a portable air compressor, in which position the connecting pipe between the air receiver and motor will not interfere with operation of the hose line supplying air to the drills.

INDUSTRIAL BROWNHOIST SELLS ITS STEEL FOUNDRY

The Ohio Steel Foundry Co., Lima and Springfield, Ohio, has purchased the steel foundry department and steel casting business of the Industrial Brownhoist Corp., Cleveland, Ohio, and Bay City, Michigan. The steel foundry, which is located at Bay City, will be extensively improved by installation of a modern 15-ton open-hearth furnace, etc.

While 26,000 Vehicles Passed Overhead

an Armco Conduit was Jacked into Place

WITH an open manhole from which jacking operations were carried on as the only evidence of construction work being in progress, an Armco Corrugated Iron Pipe Conduit was installed 24 feet under one of the busiest intersections of downtown Cleveland by the Armco Jacking Method.

Traffic, which amounts to 26,000 vehicles daily in addition to that on three car lines, sped by unhindered. There was no damaged pavement or settling fill to be replaced and maintained. Both the time and cost of construction were much lower than that required by any alternative method of installation.

The above instance is indicative of the many advantages to be gained from the use of the Armco Jacking Method. Hundreds of installations under streets, railways and high fills have proved the economy and convenience of this up-to-date method of conduit installation and culvert placement.

The experience our engineers have gained on many Armco jacking jobs is available to you upon request.

ARMCO Ingot Iron

ADDRESS

Armco Culvert Manufacturers Association

Middletown, Ohio

OR THESE MEMBERS

The Burnham Mfg. Co.
WOODS CROSS, UTAH—BOISE, IDAHO

Colorado Culvert & Flume Co.
PUEBLO, COLO.

Pure Iron Culvert & Mfg. Co.
763-769 GLADSTONE AVENUE, PORTLAND, ORE.

California Corrugated Culvert Co.
WEST BERKELEY—LOS ANGELES

The R. Hardesty Mfg. Co.
DENVER, COLO.—MISSOULA, MONT.

Spokane Culvert & Tank Co.
SPOKANE, WASH.

Western Metal Manufacturing Co.
HOUSTON—DALLAS—SAN ANTONIO—EL PASO

The ARMCO JACKING METHOD

CHAIN BELT SELF-PRIMING PUMP

Chain Belt Co., Milwaukee, manufacturer of Rex chain, concrete mixers, pavers, saw rigs, central mixing plants, water screens, elevating and conveying equipment, etc., recently put on the market a self-priming centrifugal pump which is said to take practically all the air out of the chambers and to keep its prime regardless of depth of hole (within the vacuum limit) or amount of water. The pump vacuum is automatically maintained, even when the water drops below the end of the hose. Ordinarily, air pockets occur at the hub of the vanes on a centrifugal pump, interfering with and often destroying the prime. In the Rex pump, developed by C. I. Longenecker, these air pockets are removed before they can be sealed. The pumping unit is powered by a Le Roi engine.

SMITH-INSLEY PAVER TOWER UNIT

The Smith-Insley paver tower unit, a product of the National Equipment Corp., Milwaukee, is designed for placing concrete on jobs spread over large areas. For retaining walls —as one example—equipment is needed which will move quickly along the forms and at the same time chute the concrete directly where it is needed. This NEC unit consists of a standard T. L. Smith 27-E paver with boom and bucket removed and an Insley tower mounted at the discharge end. A receiving hopper delivers the concrete onto chute sections. All operations are controlled by centralized levers on the paver platform. The 'A'-frame construction and low center of gravity on the paver are said to adapt it to the support of heavy placing equipment. The tower is hinged directly above the paver frame so that it can be folded back when moving the equipment off the job. The unit can be easily changed back to a standard paver for road work and the tower placing equipment used independently by the addition of a hoist.

Smith-Insley Paver Tower Unit

CLETRAC DISTRIBUTOR AT YAKIMA MOVES TO NEW BUILDING

The Lindeman Power Equipment Co., Yakima, Washington, distributor for Cletrac crawler tractors for farm and industrial uses, recently moved into a new brick and concrete building having 22,500 sq.ft. of floor space, including a display room 50 by 140 ft., parts and service space, shops, etc.

HARNISCHFEGER ADDS TO FAR WEST BRANCH SALES OFFICES

The Harnischfeger Sales Corp., Milwaukee, distributor for P&H construction and industrial equipment, has opened three new branch sales offices in its Far West territory, raising the total to seven. All of these offices are under R. M. Taylor, vice-president of the sales corporation, at San Francisco. One of the new offices is at 200 Symons bdg., Spokane, Washington, and is in charge of J. L. Farrell, district representative. J. M. Taylor, district representative, is in charge of the two other new offices, one being at 603 Boston bdg., Salt Lake City, Utah, and the other at 501 Security bdg., Phoenix, Arizona.

BYRON JACKSON CO. MAIN OFFICE AT BERKELEY

Byron Jackson Co., manufacturer of centrifugal and deep-well pumps, has discontinued its San Francisco office and will transact all business through a main office at the foot of Carlton st., Berkeley, California. Eck L. Baugn will be in charge of city sales at the main office.

LINK-BELT CO. ADDS TWO REPRESENTATIVES IN TEXAS

The crane and shovel division of the Link-Belt Co., Chicago, announces the substantial enlargement of its sales organization so as to better cope with increasing demand for its shovels, cranes, and draglines. Recent appointments of direct sales representatives include S. G. Hawkins Co., Houston, Texas, and Lewis-Patten Co., San Antonio, Texas.

RYERSON ALL-STEEL HIGHWAY CROSSING

Joseph T. Ryerson & Son., Inc., Chicago, manufacturer of iron and steel machinery, has developed a new type, all-steel highway crossing to solve the problem of railroads, contractors, highway departments, and municipalities requiring a crossing that will indefinitely withstand the heaviest traffic loads. This crossing is made of ¼-in. steel plates riveted to steel channels and zees. Four men can install an 8-ft. section of the crossing in less than 30 minutes, using four simple operations.

Ryerson All-Steel Highway Crossing

Where the two rails must be electrically insulated, a 1-in. creosoted wood strip is bolted between two rolled steel channels and the channels are set on the centerline between the tracks. The ends of the crossing are bent down to prevent chains or air hose from catching; ample circulation of air protects wooden ties against rotting; the plates are treaded to prevent skidding and are set level with both the highway and tracks.

TRACKSON CO. APPOINTS DENVER DISTRIBUTOR

The H. W. Moore Equipment Co., 6th and Acoma, Denver, Colorado, has recently been appointed distributor for the Trackson lines of tractor equipment for the McCormick-Deering industrial tractor. This new distributor will cover the Denver territory, and will carry complete Trackson stocks.

UNIT BID SUMMARY

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

BRIDGES AND CULVERTS

SACRAMENTO, CALIF.—STATE—MONTEREY COUNTY—STEEL AND CONCRETE

H. E. Doering, Yreka, who bid $256,563, low bid to California Division of Highways for steel and concrete bridge over Salinas River at Bradley, MONTEREY COUNTY. Bids from:

(1) H. E. Doering, Yreka $256,563
(2) Rocca & Caletti, San Rafael 257,380
(3) R. H. Travers, Los Angeles 262,915
(4) Geo. Pollock Co., Sacramento 265,328
(5) M. B. McGowan, San Francisco 267,967
(6) Ward Eng. Co., San Francisco $268,897
(7) J. F. Knapp, Oakland 269,216
(8) Siems-Helmers, Inc., S. F. 308,146
(9) Healy-Tibbitts Const. Co., S. F. 314,267
(10) Jasper Stacy Co., San Francisco 336,178

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
250 cu.yd. roadway excav.	1.00	1.00	.50	.50	1.00	.85	1.00	.45	2.00	1.00
3,000 cu.yd. struc. excav.	4.50	3.95	7.00	6.00	7.60	4.50	5.00	7.10	6.00	10.00
12,000 ft. fur. fir piles	.26	.28	.40	.35	.30	.32	.32	.40	.50	.40
363 drive piles	18.00	12.75	17.65	14.00	25.00	12.50	15.00	15.00	20.00	16.00
5,000 ft. rein. conc. piles	2.50	2.65	3.80	3.00	3.00	3.00	3.50	3.70	1.50	4.00
420 cu.yd. A conc. tremie	20.00	14.25	16.75	30.00	20.00	16.20	16.00	20.00	20.00	20.00
3,340 cu.yd. A conc. struc.	18.50	20.00	17.90	20.00	20.00	21.50	20.00	26.00	33.00	31.00
1,235 cu.yd. B conc.	21.00	20.00	17.70	19.00	18.00	19.00	18.00	24.00	23.00	22.00
280 cu.yd. E conc.	30.00	35.00	42.00	30.00	25.00	43.00	50.00	36.00	50.00	60.00
700,000 lb. reinf. steel	.05	.044	.0425	.045	.045	.047	.0425	.04	.05	.04
1,230,000 lb. struc. steel	.06	.06	.06	.06	.06	.061	.065	.069	.058	.065
30,000 lb. cast steel	.10	.13	.095	.10	.13	.13	.12	.12	.12	.13
17,600 lb. cast iron	.09	.07	.06	.06	.07	.08	.06	.09	.045	.10
4,500 lb. bronze exp. plates	.50	.45	.40	.40	.40	.50	.35	.45	.50	.40
1 lot miscel. work	$500	$5,000	$1,887	$500	$580	$2,200	$1,500	$2,950	$1,000	$4,000

SACRAMENTO, CALIF.—STATE—SAN JOAQUIN COUNTY—REINF. CONC. AND TIMBER

J. S. Metzger & Son, 20 N. Sutter St., Stockton, $84,379 low bid to California Division of Highways, Sacramento, for reinforced concrete and timber bridge over Mokelumne River near Lodi, SAN JOAQUIN COUNTY. Bids from:

(1) J. S. Metzger & Son, Stockton $84,379
(2) Jacobs & Pattiani, Oakland 88,703
(3) Fredrickson & Watson, Oakland 89,297
(4) Ward Eng. Co., San Francisco 92,552
(5) Lord & Bishop, Sacramento 94,822
(6) Rocca &.Caletti, San Rafael 95,372
(7) M. B. McGowan, San Francisco ..... $ 96,644
(8) Butte Constr. Co., San Francisco 103,249
(9) Utah Constr. Co., San Francisco 103,732
(10) Bodenhamer Const. Co., San Diego 105,201
(11) Healy-Tibbitts Constr. Co., S. F. 110,781
(12) A. W. Kitchen, San Francisco 113,509

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1 detour bridge	$2695	$3180	$2695	$2000	$3300	$3000	$3105	$2900	$5183	$4000	$3326	$4478
1 remove existing bridge	$5000	$1510	$2150	$3000	$1000	$2600	$2600	$2485	$4000	$4000	$7000	$6902
1,850 cu.yd. structure excavation	2.50	5.45	4.75	6.75	5.00	5.81	6.50	5.00	7.50	5.00	5.50	3.00
4,500 ft. furnish douglas fir piles	.22	.30	.45	.27	.30	.28	.30	.42	.23	.30	.30	.455
10,000 ft. furnish redwood piles	.58	.55	.62	.52	.60	.53	.49	.70	.55	.50	.50	.57
408 drive timber piles (each)	16.00	9.00	9.00	3.75	8.00	12.00	11.00	12.00	12.00	18.00	13.00	15.00
180 MBM redwood timber (dense select, all heart structural)	78.00	85.00	90.00	87.00	80.00	94.90	98.00	86.00	83.00	87.00	80.00	103.25
86 MBM redwood (sel. all ht. struct.)	74.00	80.00	80.00	87.00	80.00	80.40	96.00	82.00	83.00	86.00	80.00	113.25
260 cu.yd. 'A' concrete (tremie)	16.50	12.00	13.00	12.15	21.00	14.84	14.00	18.00	14.00	26.00	16.00	33.75
490 cu.yd. 'A' concrete (structures)	19.00	19.00	21.00	20.00	22.00	17.40	20.00	21.00	30.00	22.00	24.00	25.00
475 cu.yd. 'A' concrete (pavement)	10.00	12.50	12.00	14.00	13.00	12.10	12.00	12.00	14.00	14.00	12.00	14.70
74 cu.yd. 'A' concrete (slope pavement)	12.00	14.50	15.00	14.00	14.00	14.00	16.00	18.00	14.00	16.25	15.00	23.50
890 cu.yd. 'B' concrete	14.00	14.50	13.50	14.00	19.50	17.40	15.00	20.00	15.00	19.00	18.00	16.70
170,000 lb. reinforcing steel	.04	.043	.045	.045	.045	.042	.045	.05	.045	.045	.05	.045
6,150 lb. cast steel rockers and bearings	.13	.12	.12	.15	.15	.15	.14	.14	.15	.15	.15	.19
1 lot miscellaneous items of work	$1000	$835	$500	$1000	$300	$750	$300	$850	$400	$1000	$3000	$959

SALINAS, CALIF.—COUNTY—STEEL AND CONCRETE—SALINAS RIVER BRIDGE AT GONZALES

Contract awarded to Jacobs & Pattiani, 337 17th St., Oakland, who bid $114,990 for construction of a bridge over the Salinas River at Gonzales. Bids on:

(1) 200 cu.yd. structure excavation
(2) 8,420 ft. reinforced concrete piles
(3) 1,270 cu.yd. class 'A' concrete
(4) 9½ cu.yd. class 'E' concrete
(5) 166,000 lb. reinforcing steel
(6) 1,132,000 lb. struc. st. (lump sum)

	(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
Jacobs & Pattiani, Oakland	3.55	2.85	19.20	60.00	.045	$58,170	$114,990
Ben C. Gerwick	2.50	1.00	23.00	72.00	.05	70,000	117.114
M. B. McGowan	1.00	1.50	26.00	80.00	.052	62,634	117,876
Rocca & Caletti	1.00	2.50	21.30	120.00	.045	61,950	119,621
Ward Engineering Co.	1.00	1.75	21.80	48.00	.05	72,000	122,377
Healy-Tibbitts Constr. Co.	2.00	2.00	23.00	100.00	.05	67,980	123,680
A. W. Kitchen	1.80	2.10	13.70	54.50	.049	75,311	125,753
H. E. Doering	4.00	2.30	25.00	50.00	.05	68,000	128 691
Geo. Pollock Co.	3.50	2.15	25.50	5.00	.05	72,560	133,665
E. Nommensen	3.40	3.00	24.20	65.00	.045	64,684	134,566
Pan-Pacific Pile & Constr. Co.	2.42	3.33	24.85	150.00	.056	65,544	136,347

STREET AND ROAD WORK

PORTLAND, ORE.—GOVT.—GRADING AND SURFACING—GLACIER NATIONAL PARK, MONT.

A. R. Douglas, Kalispell, Mont., who bid $124,959, recommended award of contract for 4 miles Babb-Many Glacier Project No. 3, A1, B1, in Glacier National Park, Montana. Bids from:

(1) A. R. Douglas, Kalispell, Mont. $124,959
(2) L. T. Lawler, Butte, Mont. 163,272
(3) Jas. Crick, Spokane, Wash. 166,807
(4) W. L. Geist, St. Maries, Idaho $170,049
(5) Morrison-Knudsen Co., Boise, Idaho 174,170

	(1)	(2)	(3)	(4)	(5)
25 acres clearing	75.00	75.00	140.00	85.00	125.00
16 acres grubbing	75.00	100.00	140.00	230.00	200.00
39,000 cu.yd. unclassified excavation	.60	.80	.55	.85	.95
25,600 cu.yd. unclassified excavation (Type B)	1.30	1.95	2.70	1.65	1.85
1,200 cu.yd. unclassified excavation for structures	2.00	3.00	2.00	4.00	3.50
700 cu.yd. unclassified excavation for borrow	.60	1.00	.70	.70	.95
18,000 sta.yd. overhaul	.03	.05	.04	.08	.05
1.1 mi. fine grading	500.00	200.00	250.00	400.00	300.00
5,500 cu.yd. crushed rock or crushed gravel bottom course	2.00	2.50	1.50	2.50	2.40
4,600 cu.yd. crushed rock or crushed gravel top course	2.00	2.50	1.50	2.70	2.40
900 cu.yd. supplemental crushed rock or crushed gravel	2.00	2.50	1.40	2.70	2.40
1,300 cu.yd.mi. binder haul	.25	.25	.25	.25	.25
600 M. gal water	1.50	2.00	1.25	3.00	1.00
10 sq.yd. cement rubble paving	10.00	10.00	10.00	5.00	20.00
190 lin.ft. hitch rail	1.00	3.00	8.00	2.00	2.50
295 cu.yd. class 'B' concrete	35.00	37.00	30.00	38.00	42.00
17,000 lb. reinforcing steel	.07	.10	.10	.10	.11
4 each structural steel gratings	15.00	20.00	15.00	15.00	35.00
70 cu.yd. cement rubble masonry	15.00	20.00	15.00	25.00	18.00
930 cu.yd. cement rubble masonry overpasses	23.00	25.00	18.00	37.00	35.00
1,600 mi.yd. haul on sawdust pile covering	.40	.30	.25	.25	.40
165 lin.ft. 12-in. corr. galv. metal pipe	2.00	2.00	1.75	2.20	2.25
154 lin.ft. 15-in. corr. galv. metal pipe	2.50	2.50	2.25	2.40	2.50
900 lin.ft. 18-in. corr. galv. metal pipe	3.00	2.75	2.75	3.00	3.00
220 lin.ft. 24-in. corr. galv. metal pipe	4.00	3.00	3.50	4.00	3.25
80 lin.ft. 30-in. corr. galv. metal pipe	5.00	4.00	5.00	5.00	4.00
32 lin.ft. 42-in. corr. galv. metal pipe	7.00	6.00	8.50	6.00	7.00
50 cu.yd. hand-laid riprap	4.00	4.00	5.00	4.00	3.00
900 cu.yd. hand-laid rock embankment	2.00	5.00	18.00	4.50	3.00
250 lin.ft. 6-in. porous tile underdrain	1.00	.50	.50	1.00	1.00
275 cu.yd. stone guard rail	23.00	30.00	18.00	37.00	35.00

PHOENIX, ARIZ.—GOVT.—GRADING—SWIFT TRAIL FOREST ROAD

H. J. Hagan, Globe, Arizona, who bid $38,824, submitted low bid to Bureau of Public Roads, 508 Ellis Bdg., Phoenix, Arizona, for grading Section 2B, Swift Trail Forest Development Road, in Crook National Forest, Graham County, Arizona, 2.717 miles grading. Bids from:

(1) H. J. Hagan, Globe, Arizona $38,824
(2) General Const. Co., Phoenix 41,602
(3) R. S. Black, Clifton, Arizona 42,482
(4) Skousen Bros., Santa Fe, N. M. 45,571
(5) Canion & Francis, Phoenix $47,363
(6) O. F. Fisher, Phoenix, Arizona 48,785
(7) Engineer's estimate 43,179

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
12 acres clearing	$250	$300	$100	$400	$500	$675	$175
29,288 cu.yd. excavation	.95	.95	1.13	1.10	1.10	.90	1.10
660 cu.yd. excavation (struc.)	.75	1.25	1.25	1.50	1.75	3.00	1.75
300 cu.yd. excavation (borrow)	.95	.95	.50	1.10	.35	.75	.75
200 sta.yd. overhaul	.10	.05	.05	.10	.04	.03	.05
2.717 mi. finish earth gr. road	$200	$200	$200	$50	$200	$550	$200
80 cu.yd. cem. rubble masonry	10.00	9.00	10.00	15.00	10.00	12.00	15.00
1,048 ft. 18-in. corr. pipe	2.20	3.00	2.00	2.00	2.50	2.50	2.00
314 ft. 24-in. corr. pipe	3.00	4.00	3.00	3.00	3.50	3.50	2.75
72 ft. 30-in. corr. pipe	4.00	4.50	3.80	3.60	4.00	4.25	4.30
166 ft. 36-in. corr. pipe	5.00	6.50	5.50	5.60	6.00	6.05	4.75
140 cu.yd. rock embank. (handlaid)	3.00	3.00	2.00	2.00	4.00	7.70	3.50
10,000 ft. protection ditch	.05	.10	.06	.08	.04	.30	.07
36 ft. 48-in. corr. pipe, haul and place	2.00	2.00	1.50	2.00	2.00	1.50	1.50
Reconstruct pipe-line	$500	$500	$500	$500	$500	$500	$500

SAN MATEO, CALIF.—CITY—CONCRETE—SAN MATEO HOMESTEAD

Contract awarded to Union Paving Co., Call Bdg., San Francisco, who bid $84,821 for improvement of streets in San Mateo Homestead east of State Highway, work for the City of San Mateo, San Mateo County. Bids received on:

(1) 12,700 cu.yd. grading
(2) 114,000 sq.ft. 5-7-in. conc. pave.
(3) 172,000 sq.ft. 6-8-in. conc. pave.
(4) 14,920 lin.ft. concrete curb
(5) 77,100 sq.ft. cement sidewalk
(6) 385 ft. 12-in. concrete sewer
(7) 16 catchbasins
(8) 5,900 lin.ft. 4-in. vitrified sewer
(9) 920 ft. reinf. conc. box culvert
(10) Per ft. 6-in. cast-iron pipe

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	TOTALS
Union Paving Co.	.20	.17	.194	.25	.14	1.10	35.00	.50	12.00	1.00	$84,821
W. A. Dontanville	.25	.16	.18	.32	.17	1.00	30.00	.54	13.50	1.50	86,775
Hanrahan Co.	.30	.16	.188	.35	.15	1.00	28.00	.55	14.00	.95	88,165
N. M. Ball	.50	.19	.21	.40	.17	1.00	34.00	.55	4.00	1.00	91,095
M. J. Bevanda	.50	.16	.18	.40	.15	2.00	40.00	1.00	12.00	2.00	91,505
A. J. Raisch	.05	.16	.19	.38	.15	1.00	30.00	.50	16.00	1.00	91,170
Fay Improvement Co.	.05	.205	.228	.47	.149	1.00	13.20	.57	13.20	1.50	97,872
Peninsula Paving Co.	.20	.185	.215	.40	.16	1.30	35.00	.50	16.40	1.25	98,057
Fredrickson & Watson	.35	.17	.21	.36	.16	1.00	30.00	.50	20.00	1.25	99,912

Work under 1911 Improvement Act and the Bond Act of 1915.

SAN MATEO, CALIF.—CITY—ASPHALT—EASTERN SECTION OF CITY

Contract awarded to Union Paving Co., Call Bdg., San Francisco, who bid $90,582 for improvement of streets in the eastern section of the City, work for City of San Mateo. Bids received from the following concerns:

(1) Union Paving Co., S. F. ..... $ 90,582
(2) Hanrahan Co., San Francisco 95,708
(3) A. J. Raisch, San Francisco 100,514
(4) Peninsula Paving Co., S. F. $107,977
(5) S. M. McGaw, Stockton 104,666
(6) Fay Improvement Co., S. F. 114,663

	(1)	(2)	(3)	(4)	(5)	(6)
12,500 cu.yd. grading	.20	.30	.35	.30	.50	.01
15,800 ft. conc. curb	.25	.30	.38	.40	.35	.50
99,200 sq.ft. 6-in. gutter	.21	.20	.19	.20	.195	.22
77,700 sq.ft. cem. sidewalk	.14	.15	.15	.16	.16	.149
156,000 sq.ft. 5-in. asph. base 3-in. rock cushion	.14	.145	.165	.178	.15	.204
97,700 sq.ft. 6-in. asph. base 3-in. rock cushion	.16	.169	.185	.28	.17	.23
Per ft. 2x6-in. header	.01	.08	.10	.10	.10	.11
10,800 sq.ft. mac. pave.	.05	.10	.11	.11	.13	.115
690 ft. 18-in. conc. sewer	2.00	1.65	2.00	2.25	2.00	1.78
50 ft. 12-in. conc. sewer	1.10	1.05	1.00	1.20	1.00	1.03
770 ft. 10-in. conc. sewer	.80	.90	.80	1.00	.80	.83
30 catchbasins	35.00	30.00	30.00	35.00	60.00	25.00
2,740 ft. 10-in. vitr. sewer	.80	.95	.75	.85	.90	1.47
1,850 ft. 8-in. vitr. sewer	.62	.65	.60	.70	.80	.68
3,900 ft. 6-in. vitr. sewer	.55	.58	.55	.60	.70	.54
Per ft. 4-in. vitr. sewer	.50	.52	.40	.50	.60	.52
Per 8x6-in. Y	.50	.60	1.00	1.00	.75	.81
Per 6x4-in. Y	.50	.45	1.00	.70	.70	.53
40 manholes	50.00	55.00	60.00	60.00	70.00	72.00
Pumping unit complete	$1100	$1580	$1500	$1700	$3000	$1900
40 tons asphalt	6.00	8.00	8.00	6.00	8.00	7.50

PORTLAND, ORE.—STATE—SURFACING

Awards as follows by Oregon State Highway Commission for surfacing various State highways:

(A) LINCOLN COUNTY—Awarded to Edlefson-Weygandt Co., Portland, Ore., $165,861 for 13 miles broken stone surfacing Waldport & Waldport, Lane County Line Section of Roosevelt Coast and Alsea Highways. Bids on:

(1) 9,250 cu.yd. subbase materials (surf.)
(2) 25,000 cu.yd. base materials (surf.)
(3) 3,300 cu.yd. top materials (surf.)
(4) 8,000 cu.yd. 2-1½-in. material (stockpiles)
(5) 4,400 cu.yd. 1½-1-in. materials (stockpiles)
(6) 3,700 cu.yd. 1-1½-in. materials (stockpiles)
(7) 4,500 cu.yd. ½-in.-¼-in. materials (stockpiles)
(8) 8,000 cu.yd. filler
(9) 2,950 cu.yd. 1½-in.-¼-in. materials (stockpiles)
(10) 16,000 yd.mi. filler haul
(11) 55,000 yd. miles haul broken stone
(12) 8,500 cu.yd. screenings

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	TOTALS
Edlefson-Weygandt Co.	2.37	2.37	2.43	1.70	1.70	1.70	1.70	.40	1.70	.18	.18	2.43	$165,861
A. C. Greenwood, Portland	2.80	2.75	3.00	1.40	1.50	1.60	1.70	.45	1.55	.20	.22	3.00	184,892
C. L. Camp, Medford, Ore.	2.90	2.90	2.90	1.60	1.60	1.60	1.80	.40	1.60	.20	.20	2.90	189,525
E. Hefty, Portland, Ore.	3.18	3.18	3.18	1.70	1.70	1.75	1.75	.30	1.75	.18	.19	3.18	202,761
Newport Con. Co., Portland	3.25	3.25	3.25	2.26	2.26	2.26	2.26	.30	2.26	.20	.20	3.25	219,485

(B) DOUGLAS COUNTY—Contract awarded to A. S. Wallace, Roseburg, Ore., $135,290 for 10 miles broken stone surfacing Red Bridge-Drain Section of the Umpqua Highway. Bids on:

(1) 7,000 cu.yd. subbase materials (surfacing)
(2) 18,700 cu.yd. base materials (surfacing)
(3) 2,500 cu.yd. top materials (surfacing)
(4) 6,500 cu.yd. screenings (surfacing)
(5) 6,000 cu.yd. 2-in.-1½-in. materials (stockpiles)
(6) 3,300 cu.yd. 1½-1-in. materials (stockpiles)
(7) 2,800 cu.yd. 1-in.-½-in. materials (stockpiles)
(8) 3,400 cu.yd. materials (stockpiles) ½-in.-¼-in.
(9) 5,500 cu.yd. materials 1½-in.-¾-in. (stockpiles)
(10) 2,000 cu.yd. materials ¾-in.-¼-in. (stockpiles)
(11) 6,000 cu.yd. filler
(12) 24,000 yd.mi. filler haul
(13) 95,000 cu.yd. haul broken stone pile measure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	TOTALS
A. S. Wallace, Roseburg	2.45	2.45	2.45	2.45	1.25	1.25	1.25	1.25	1.50	1.50	.30	.15	.15	$135,290
A. C. Greenwood, Portland	2.70	2.60	2.85	2.85	1.30	1.40	1.50	1.60	1.45	1.55	.45	.20	.22	154,705
C. L. Camp, Medford, Ore.	2.95	2.95	2.95	2.95	1.40	1.40	1.40	1.80	1.60	1.60	.30	.20	.20	163,015
E. Hefty, Portland	3.20	3.20	3.20	3.20	1.70	1.70	1.75	1.79	1.75	1.78	.30	.18	.18	174,207
Milne & Dussault	3.20	3.38	3.38	3.38	1.90	1.90	1.90	1.90	2.25	2.25	.40	.18	.18	186,171
S. S. Schell, Oakland, Ore.	3.25	3.25	3.25	3.25	2.10	2.10	2.10	2.10	2.50	2.50	.40	.20	.18	188,375

SACRAMENTO, CALIF.—STATE—HUMBOLDT COUNTY—GRADING AND SURFACING

J. P. Holland, Inc., 1834 McKinnon St., San Francisco, $51,480, low bid to California Division of Highways, for 5.2 miles of highway (involving 2.6 miles grading and 5.2 miles surfacing), between Loleta and 2 miles north of Beatrice, HUMBOLDT COUNTY. Bids from:

(1) J. P. Holland, Inc., S. F. $51,480
(2) E. C. Coats, Sacramento 59,200
(3) C. W. Wood, Stockton 63,409
(4) W. C. Colley, Berkeley 64,723
(5) Geo. Pollock Co., Sacramento 69,155
(6) Hemstreet & Bell, Marysville $69,698
(7) Engelhart Paving & Construction Co., Eureka 71,200
(8) Larsen Bros., Galt 74,859
(9) Jasper-Stacy Co., San Francisco 79,952

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
86,000 cu.yd. road. excav.	.27	.35	.30	.36	.39	.36	.37	.36	.43
1,230,000 sta.yd. overhaul	.005	.005	.01	.0075	.005	.01	.005	.01	.006
400 cu.yd. excav. struc. river run gravel	.75	.80	1.00	1.00	1.25	1.00	1.00	.80	1.40
20,500 cu.yd. surfacing	.78	.80	.95	.90	1.15	1.00	1.30	1.25	1.40
1,320 M gal. water app. to sur.	2.50	2.50	2.00	2.00	2.00	2.00	2.25	2.25	2.00
15 cu.yd. 'A' conc. (struc.)	30.00	25.00	25.00	25.00	22.50	25.00	30.00	30.00	32.00
500 lb. reinf. steel (struc.)	.07	.05	.06	.07	.06	.06	.07	.06	.08
66 ft. 12-in. corr. pipe	.50	.50	.50	.50	.50	.50	.50	.50	.40
362 ft. 18-in. corr. pipe	.60	.60	.50	.60	.60	.75	.60	.60	.60
58 ft. 24-in. corr. pipe	.75	.80	.50	.75	.90	1.00	.80	.75	.70
78 ft. 30-in. corr. pipe	1.00	1.00	1.00	1.00	1.20	1.00	1.50	1.00	.80
58 ft. 36-in. corr. pipe	1.00	1.30	1.00	1.50	1.50	1.25	1.75	1.50	1.10
120 ft. 48-in. corr. pipe	1.25	1.50	2.00	2.00	2.00	2.00	2.50	2.00	1.70
200 ft. 8-in. perf. pipe underdr.	1.00	1.80	1.25	2.00	.60	1.00	1.55	1.25	2.00
4 move and reset conc. headwall	15.00	15.00	10.00	15.00	10.00	15.00	20.00	15.00	30.00
284 sta. finish roadway	4.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	7.00
20 monuments (each)	3.00	3.00	3.00	3.00	4.00	3.00	5.00	3.00	2.50

DENVER, COLO.—GOVT.—GRADING AND SURFACING

Bids as follows by the U. S. Bureau of Public Roads, Denver, Colorado, for highway construction:

(A) MONTEZUMA COUNTY, Colorado—11 miles North and South Highway, Knife Edge and Park Point Spruce Tree Section in Mesa Verde National Park, Pioneer Construction & Engineering Co., Denver, Colo., $114,965, low bidder. Bids on:

(1) 5 acres clearing
(2) 12 acres grubbing
(3) 95,000 cu.yd. 'A' road. excav.
(4) 15,600 cu.yd. 'B' road. excav.
(5) 2,400 cu.yd. struct. excav.
(6) 1,800 cu.yd. borrow exc. sel.
(7) 15,200 cu.yd. borrow exc. unclas.
(8) 235,000 sta.yd. overhaul
(9) 11.39 mi. finishing roadway
(10) 525 cu.yd. cem. rubble masonry
(11) 1,000 cu.yd. dry rubble masonry
(12) 2,728 ft. 24-in. corr. pipe
(13) 1,220 sq.yd. stone paving

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	TOTALS
Pioneer Const. & Engr. Co.	25.00	25.00	.44	1.20	1.50	1.50	.60	.03	$250	19.00	1.50	3.50	5.00	$114,965
Cook & Ransen, Ottawa, Kansas	27.50	28.00	.58	1.00	1.25	1.60	.45	.03	150	9.00	6.00	2.50	2.50	116,870
Mt. States Const. Co., Pueblo, Colo.	50.00	$100	.80	1.00	2.00	1.00	.50	.03	200	16.00	8.00	3.50	4.00	150,366
Engineer's estimate	50.00	50.00	.67	.80	1.50	1.25	.60	.03	300	18.00	6.00	3.00	2.75	131,176

(B) YELLOWSTONE NATIONAL PARK, Wyoming—Morrison-Knudsen Co., Boise, Ida., $67,714 low for 1.6 miles grading and surfacing the Grand Canyon Rim, Artist Point Section. Bids on:

(1) 3½ acres clearing
(2) 2½ acres grubbing
(3) 34,700 cu.yd. roadw. excav.
(4) 290 cu.yd. struct. excav.
(5) 3,125 cu.yd. rock or grav. (bot. c.)
(6) 1,875 cu.yd. crushed rock or gravel (top course)
(7) 250 cu.yd. supp. surface
(8) 80 cu.yd. cement rubble mas.
(9) 372 lin.ft. 24-in. corr. pipe
(10) 120 ft. 30-in. corr. pipe
(11) 200 cu.yd. rock embankment
(12) 950 ft. wood guard rail
(13) 118 ft. 24-in. vitr. culvert
(14) 1,250 ft. 24-in. vitr. underdrain

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	TOTALS
Morrison-Knudsen Co.	$300	$300	.82	2.50	4.00	4.50	3.50	20.00	4.00	5.00	4.00	1.00	5.00	6.00	$67,714
Taggart Const. Co., Cody, Wyoming	300	300	.90	3.00	4.00	4.00	4.00	25.00	3.20	4.00	1.50	1.25	4.00	6.00	69,396
M. J. Kuney, Spokane	200	200	1.35	2.00	2.60	2.80	2.60	20.00	3.50	5.00	1.50	1.00	3.50	1.00	70,495
L. T. Lawler, Butte	200	200	1.07	3.00	4.00	4.00	4.00	30.00	2.50	4.00	4.00	1.50	4.00	4.00	73,326
Western Brg. & Const. Co., Omaha	350	350	.95	3.00	3.90	4.35	5.00	24.00	3.75	4.25	3.00	1.25	5.00	6.50	73,396
Engineer's estimate	200	200	1.00	2.25	3.75	3.90	3.90	20.00	2.60	4.00	2.00	1.50	6.00	7.25	72,376

YELLOWSTONE NATIONAL PARK, Wyoming—Morrison-Knudsen Co., Boise, Ida., $135,410 low for 9 miles grading Norris Junction-Madison Junction Sect. of the Grand Loop. Bids on:

(1) 26 acres clearing
(2) 14 acres grubbing
(3) 61,100 cu.yd. 'A' roadw. exc.
(4) 7,300 cu.yd. 'B' roadw. exc.
(5) 790 cu.yd. struct. excav.
(6) 25,600 cu.yd. borrow exc. uncl.
(7) 101,500 sta.yd. overhaul
(8) 10.27 miles finishing
(9) 33 cu.yd. 'B' concrete
(10) 600 cu.yd. cement rubble mas.
(11) 2,044 ft. 24-in. corr. pipe
(12) 134 ft. 30-in. corr. pipe
(13) 1,760 ft. rock embankment
(14) 634 ft. 24-in. vitr. culvert

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	TOTALS
Morrison-Knudsen Co.	$250	$250	.83	1.35	2.50	.70	.03	$500	40.00	20.00	3.50	5.00	3.00	5.00	$135,410
Western Brdg. & Const. Co., Omaha	225	300	.90	1.30	2.00	.80	.03	400	36.00	20.00	3.50	4.00	3.00	6.00	142,469
Max J. Kuney Co.	200	200	.95	1.50	2.50	.95	.03	500	35.00	20.00	3.50	5.00	1.50	3.50	144.056
L. T. Lawler, Butte	100	200	.90	2.50	3.00	.80	.03	200	40.00	31.00	3.00	5.00	1.90	4.00	146,407
Engineer's estimate	200	200	.90	1.25	1.50	.60	.03	200	35.00	20.00	3.00	4.25	1.50	6.00	127,202

SACRAMENTO, CALIF.—STATE—SAN JOAQUIN COUNTY—GRADING AND ASPHALT PAVING

Heafey-Moore Co., 344 High St., Oakland, $51,144 low bid to California Division of Highways, Sacramento, for 1.9 miles grading and asphalt paving between South Banta Road and East Banta Road, SAN JOAQUIN COUNTY. Bids from:

(1) Heafey-Moore Co., Oakland $51,144
(2) Valley Paving & Constr. Co. 56,508
(3) J. E. Johnson, Stockton $57,688
(4) C. W. Wood, Stockton 58,484

	(1)	(2)	(3)	(4)
6,100 cu.yd. roadway excavation	.37	.32	.35	.25
89,500 sta.yd. overhaul	.025	.02	.01	.02
19,400 cu.yd. imported borrow	.55	.35	.50	.60
126 cu.yd. structure excavation	1.00	1.50	1.50	1.00
4,000 sq.yd. subgrade for pavement	.09	.11	.07	.10
13,860 sq.yd. asphaltic paint binder	.015	.02	.045	.02
7,100 tons asphalt concrete	4.69	6.07	5.90	5.75
1 cu.yd. cement concrete (structures)	30.00	30.00	25.00	30.00
34 lb. reinforcing steel (structures)	.10	.06	.07	.10
192 ft. 12-in. corrugated metal pipe	.50	.50	1.00	.50
44 ft. 18-in. corrugated metal pipe	.50	.75	1.25	.50
72 ft. clean and relay corr. metal pipe	1.50	1.50	1.50	1.00
9 move and reset headwalls	10.00	15.00	25.00	10.00
1.2 mi. new hog-tight prop. fence	$800	$500	$600	$650
0.8 mi. move and reset prop. fence	$200	$375	$200	$300
101 stations finishing roadway	4.50	6.00	4.00	5.00
21 monuments	3.00	3.00	4.00	3.00

PHOENIX, ARIZ.—GOVERNMENT—GRADING—TUSAYAN NATIONAL FOREST

Henry Galbraith, Jerome, Arizona, who bid $66,494, low bid to Bureau of Public Roads, Office of Park Superintendent, Grand Canyon, Arizona, for grading Section D of Route 2, Grand Canyon-Old Trails National Forest Highway, in Tusayan National Forest, COCONINO COUNTY, Arizona, 17.57 miles. Bids from:

(1) Henry Galbraith, Jerome, Ariz. $66,494
(2) R. S. Black, Clifton, Arizona 71,196
(3) Pearson & Dickerson, Riverside 75,864
(4) Canion & Francis, Phoenix, Ariz. $77,009
(5) Mountain States Constr. Co. 87,613
(6) Engineers' estimate 75,015

	(1)	(2)	(3)	(4)	(5)	(6)
13,000 cu.yd. excavation	1.25	.95	1.26	1.60	1.75	1.25
600 cu.yd. excavation (struc.)	1.50	1.50	1.45	1.50	2.00	1.50
98,000 cu.yd. borrow excavation	.35	.39	.423	.40	.50	.40
13,400 sta.yd. overhaul	.03	.05	.03	.03	.04	.05
67 cu.yd. 'B' concrete	30.00	35.00	31.25	23.50	26.00	30.00
30 cu.yd. 'C' concrete	25.00	34.00	30.00	19.00	24.00	28.00
6,800 lb. reinforcing steel	.07	.10	.07	.07	.08	.07
100 cu.yd. cement rubble masonry	15.00	17.00	10.85	15.00	16.00	18.00
1,194 ft. 18-in. corr. pipe	2.00	2.15	1.93	2.20	2.00	2.00
650 ft. 24-in. corr. pipe	3.00	3.50	2.80	3.40	3.00	3.00
260 ft. 30-in. corr. pipe	3.50	4.10	3.80	3.75	4.00	4.00
136 right-of-way monuments	3.00	3.50	4.35	5.00	10.00	3.50
330 cu.yd. subbase for grav. dips	1.50	2.50	4.35	1.00	3.00	2.00
170 cu.yd. sel. mater. for dips	1.50	3.50	1.60	1.00	3.00	1.50
15,500 ft. protection ditch	.05	.06	.07	.04	.08	.10
9 cattle guards	$300	$500	$400	$450	$500	$500

SALINAS, CALIF.—COUNTY—GRADING AND SURFACING—PACIFIC GROVE—CARMEL ROAD

Contract awarded to J. L. Conner, Box 86, Monterey, who bid $39,636 for grading and surfacing approximately 7 miles of Pacific Grove-Carmel Road for County. Bids on:

(1) 105,000 cu.yd. road excavation
(2) 110,000 sta.yd. overhaul
(3) 496 cu.yd. structure excavation
(4) 9,050 cu.yd. decomp. granite surfacing
(5) 1,062 ft. 15-in. corrugated pipe
(6) 684 ft. 18-in. corrugated pipe
(7) 860 ft. 24-in. corrugated pipe

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
J. L. Conner, Monterey	.33	.01	.50	.33	.25	.25	.25	$39,636
W. C. Colley	.29	.015	.75	.70	.30	.50	.50	39,897
Larsen Bros.	.33	.01	1.00	.79	.50	.60	.75	44,981
Geo. Pollock Co.	.30	.01	1.50	1.25	.75	1.00	1.50	47,427
Peninsula Paving Co.	.36	.01	1.25	.716	.50	.60	.70	47,666
W. A. Dontanville	.375	.01	1.25	.70	.60	.70	.90	49,215
L. W. Hesse	.38	.02	1.00	.60	.50	.60	1.00	49,827
Granfield, Farrar & Carlin	.45	.01	1.25	.85	.75	1.00	1.25	59,219
O. A. Lindberg	.45	.02	1.25	1.00	.50	.60	.75	60,706
P. L. Burr	.42	.01	1.00	1.25	1.25	1.50	2.00	61,082
J. P. Holland	.50	.02	1.00	.63	.50	.50	.60	62,286
Bodenhamer Constr. Co.	.43	.02	1.50	2.00	.50	.60	.85	67,866
Jasper-Stacy Co.	.62	.015	1.50	.40	.40	.60	.80	72,637

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

Award recommended to Dimmitt & Taylor, 815 E. 59th St., Los Angeles, who bid $41,751 to Bureau of Public Roads, 461 Market St., San Francisco, for grading a portion of Section 'A' of Route 73, Laguna National Forest Highway, in Cleveland National Forest, San Diego County, 6.76 miles. Bids received on the following items for this project:

(1) 75,500 cu.yd. excavation
(2) 610 cu.yd. structure excavation
(3) 15,000 sta.yd. overhaul
(4) 6.76 mi. finish earth graded road
(5) 39 cu.yd. cem. rubble masonry
(6) 1,824 ft. 18-in. corr. metal pipe
(7) 280 ft. 24-in. corr. metal pipe
(8) 18 ft. 36-in. corr. metal pipe
(9) 102 ft. 42-in. corr. metal pipe
(10) 20 ft. 60-in. corr. metal pipe
(11) Maintenance of existing road, etc.
(12) 558 ft. remove, haul, pile 12-in. culv.
(13) 308 ft. remove, haul, and pile 18, 24, 36-in. culverts
(14) 180 right-of-way monuments

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	TOTALS
Dimmitt & Taylor, Los Angeles	.38	2.00	.03	$350	12.50	2.00	2.45	4.83	6.71	10.15	$500	2.00	3.00	3.50	$41,751
Bert Calvert, Los Angeles	.475	2.00	.01	300	12.00	2.25	3.25	5.50	7.90	11.10	500	.60	1.10	3.50	47,690
J. C. Gist & Bell, Arcadia	.47	1.50	.04	500	10.00	2.00	2.50	5.00	7.00	10.00	500	1.00	3.00	3.00	48,674
Watson & Sutton, San Diego	.52	1.35	.025	225	15.00	2.00	2.75	7.00	8.00	12.00	500	.50	1.00	3.00	49,806
Yglesias Bros., San Diego	.53	1.00	.02	300	14.00	2.25	3.25	5.00	9.00	18.00	500	.50	1.00	4.00	51,703
C. J. Willis & Sons, Los Angeles	.54	1.25	.02	400	8.00	2.25	2.90	5.00	6.00	8.25	500	1.25	1.75	3.50	53,035
Basich Bros., Los Angeles	.59	1.50	.03	200	6.00	1.65	2.40	4.70	6.80	10.00	500	.30	.55	3.00	53,662
Isbell Constr. Co., Fresno	.58	1.50	.02	250	18.00	1.85	3.00	6.00	7.00	14.00	500	1.00	1.50	3.50	54,893
R. E. Hazard Contr. Co., San Diego	.61	1.50	.03	100	7.00	2.00	2.42	4.20	4.74	9.25	500	1.00	2.00	3.50	55,772
Monarch & Breen, San Diego	.63	1.50	.04	250	15.00	2.00	3.00	6.00	9.00	15.00	500	1.00	3.00	3.00	59,721
A. R. & C. O. Bodenhamer, Carpint	.65	1.50	.02	300	14.00	3.25	3.50	5.00	9.00	11.00	500	1.00	1.75	3.00	63,497
Engineer's estimate	.60	2.00	.03	250	18.00	2.00	2.50	6.50	7.25	11.50	500	.30	1.25	3.50	56,487

SAN FRANCISCO, CALIF.—GOVERNMENT—GRADING—TULARE COUNTY

Award recommended to Monarch & Breen, Live Oak Springs, via Campo P. O., San Diego County, California, who bid $139,869 to Bureau of Public Roads, 461 Market St., San Francisco, for grading Sec. D-2 of Route 1, Generals Highway, in Sequoia National Park, 2.70 miles. Bids from:

(1) Monarch & Breen $139,869
(2) W. A. Bechtel Co., San Francisco 177,707
(3) Isbell Constr. Co., Fresno $187,865
(4) Engineers' estimate 173,386

	(1)	(2)	(3)	(4)
19.9 acres clearing	$600	$300	$660	$600
95,133 cu.yd. excavation	.94	1.25	1.35	1.20
19,475 cu.yd. B excavation	1.20	1.60	1.60	1.50
694 cu.yd. excavation (structures)	2.00	3.00	2.00	2.00
20,917 sta.yd. overhaul	.04	.05	.04	.03
2.70 miles finishing earth graded road	$350	$300	$500	$250
360 cu.yd. cement rubble masonry, arch culvert	13.00	20.00	16.00	20.00
54 cu.yd. cement rubble masonry for pipe headwalls	15.00	20.00	18.00	20.00
234 ft. 18-in. corrugated metal pipe	2.00	3.06	1.50	2.00
918 ft. 24-in. corrugated metal pipe	3.00	3.83	2.25	3.00
96 ft. 30-in. corrugated metal pipe	5.00	4.38	2.60	4.00
208 ft. 36-in. corrugated metal pipe	6.00	6.22	4.00	5.00
4,500 cu.yd.mi. haul backfill material	.25	.60	.25	.50
390 ft. haul and place Government furnished corrugated metal pipe	1.00	2.00	.50	.50

CARSON CITY, NEVADA—STATE—WHITE PINE COUNTY—OILING

Contract awarded to Jack Casson, 8 St. James Court, Hayward, California, who bid $99,415 for furnishing asphaltic fuel oil, applying and mixing with crushed rock or crushed gravel surface in WHITE PINE COUNTY, from McGill to north county line, 52.31 miles, for State Department of Highways, Carson City, Nevada. Bids received on the following items:

(1) 966,645 gal. asph. oil app. to surface
(2) 52.31 mi. mix oil with cr. rock or gravel
(3) 52.31 miles rebuilding and finishing shoulders

	(1)	(2)	(3)	TOTALS
Jack Casson, 8 St. James Ct., Hayward	.072	$540	$ 30	$ 99,415
A. D. Drumm, Jr., Fallon, Nevada	.075	575	50	105,192
Stevens Bros., St. Paul, Minnesota	.0795	595	50	110,588
Dodge Bros., Inc., Fallon, Nevada	.0815	600	50	112,783
Skeels & Graham, Roseville, Calif.	.0895	625	100	124,439
Engineer's estimate	.08	550	50	109,267

PHOENIX, ARIZ.—STATE—OILING—FLORENCE-TUCSON HIGHWAY

Contract awarded to Bruce Bros., Route 1, Box 167, Huntington Beach, California, who bid $121.827 for surfacing and oil processing of Florence-Tucson Highway, F.A.P. 94-C, from Coolidge south 17 miles toward Picacho for State. Bids on:

(1) 32,006 cu.yd. subgrade stabilizer.
(2) 66,168 cu.yd.mi. haul subgr. stabilizer.
(3) 21,337 cu.yd. mineral aggregate.
(4) 192,033 sq.yd. prepare subgrade.
(5) 288,050 gal. oil applied to roadway.
(6) 16,366 mi. mix, lay, and finish.

	(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
Bruce Bros., Huntington Beach	.70	.16	2.70	.015	.07	$500	$121,827
Miracle Const. Co., Sar Diego	.70	.15	2.83	.01	.07	525	123,389
Southwest Paving Co., L. A.	.70	.20	2.69	.015	.085	450	127,763
Schmidt-Hitchcock Contr. Co., Phoenix	.26	.16	2.23	.0125	.07	600	130,879
Phoenix-Tempe Stone Co., Phoenix	.80	.155	3.50	.02	.07	650	145,182

SAN FRANCISCO, CALIF.—CITY—HARRISON ST.—GRADING AND PAVING

Fay Improvement Co., Phelan Bldg., S. F., $64,757, low bid to Board of Public Works for improvement of Harrison St., from Second to Third Sts., and portions of Hawthorne and Vassar Place. Bids on:

(1) 61,538 cu.yd. cut
(2) 1,376 lin.ft. 12-in. vitr. pipe
(3) 1,850 ft. 6-in. vitr. pipe
(4) 80 6-in. Y branches
(5) 9 brick manholes
(6) 4 brick catchbasins
(7) 160 ft. 10-in. vitr. culvert
(8) 2,741 ft. armored concrete curb
(9) 28,843 sq.ft. cement sidewalk
(10) 57,109 sq.ft. 8-in. 'E' conc. base, 1½-in. asph. surface, and 1½-in. asphalt binder.
(11) Conform work at Hawthorne and Harrison

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	TOTALS
Fay Improvement Co.	.59	1.75	.94	1.25	$90	$90	1.62	.80	.13	.29	$270	$64,757
E. J. Treacy	.66	2.85	.98	1.50	$105	$105	1.45	.80	.12	.2575	$100	68,526
Chas. L. Harney	.58	2.50	.90	1.00	$90	$80	2.00	.85	.16	.32	$200	67,746
J. P. Holland	.695	3.50	2.00	1.00	$120	$120	2.50	.85	.15	.29	$600	76,074
C. B. Eaton	.70	2.50	1.00	1.00	$100	$100	2.00	1.00	.15	.32	$200	75,608
M. Rosenberg	.73	4.00	1.25	1.45	$100	$100	1.25	.68	.11	.29	$50	76,003
MacDonald & Kahn	1.00	4.00	1.00	1.00	$90	$90	4.00	.85	.15	.32	$800	96,513

SEWER CONSTRUCTION

SAN FRANCISCO, CALIF.—CITY—FILLMORE STREET SEWER, SECTION D

MacDonald & Kahn, Financial Center Bdg., S. F., $93,002, low bid to Board of Public Works for improvement of Section D of the Fillmore St. Main Sewer. Bids from

(1) MacDonald & Kahn, San Francisco $93,002
(2) Clinton Const. Co., S. F. 95,184
(3) C. C. W. Haun, San Francisco 95,755
(4) Peter J. McHugh, San Francisco $108,651
(5) E. J. Treacy, S. F. 110,008

	(1)	(2)	(3)	(4)	(5)
2,698 ft. 6 ft. 6-in. circ. reinf. conc. sewer	26.40	26.80	27.00	30.90	32.00
515 ft. 6-ft. circ. reinf. conc. sewer	24.90	25.00	25.00	28.00	28.00
115 ft. 3'x4'6" reinf. concrete sewer	18.00	18.00	23.00	22.00	20.00
111 ft. 2'6"x3'9" reinf. concrete sewer	15.00	16.00	17.50	17.00	15.00
10 ft. 3x5-ft. brick sewer	26.00	22.50	20.00	20.00	15.00
25 ft. 21-in. vitrified sewer	5.00	11.00	9.00	5.00	4.00
35 ft. 15-in. vitrified sewer	4.00	10.00	7.50	4.50	4.00
90 ft. 10-in. vitrified culvert	2.00	6.00	5.00	2.00	3.00
15 manholes on concrete sewer	80.00	42.00	60.00	75.00	80.00
3 manholes on existing brick sewer	80.00	55.00	100.00	90.00	80.00
2 manholes on existing vitr. sewer	90.00	110.00	175.00	100.00	100.00
1 taper connection	300.00	380.00	250.00	450.00	350.00
Alter auxiliary pipes	400.00	540.00	500.00	500.00	500.00
215 ft. 12-in. vitrified underdrain	1.25	1.25	1.00	1.75	1.00
430 ft. 10-in. vitrified underdrain	1.10	1.00	.80	1.50	1.00
850 ft. 8-in. vitrified underdrain	.70	.90	.70	1.00	.75
1,710 ft. 6-in. vitrified underdrain	.50	.80	.50	.80	.50

IRRIGATION AND RECLAMATION

RIVERSIDE, CALIF.—WEIR, HEADWORKS AND CONDUIT

John Strona, Chino, who bid $59,679, submitted low bid to Water Conservation District, 3596 Main St., Riverside, for constructing diversion weir, headworks, and conduit at the mouth of the canyon of the Santa Ana River in San Bernardino County. Bids received from the following concerns:

(1) John Strona, Chino $59,679
(2) Bent Bros., Los Angeles 65,724
(3) Carpenter Bros. 66,805
(4) A. L. Nelson 66,861
(5) R. H. Travers 67,760
(6) Oberg Bros. 72,106
(7) R. A. Wattson 72,815
(8) Thos. Haverty $73,379
(9) H. H. Lienau 78,199
(10) Dimmitt & Taylor 78,994
(11) Chas. H. Johnston 82,748
(12) Gist & Bell 82,836
(13) Geo. Gardner 86,680
(14) W. D. Bohan 76,655

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
WEIR														
7,500 cu.yd. excavation	.70	1.55	.97	.70	.80	1.90	1.04	.88	.75	2.00	.80	.55	.70	.80
6,900 cu.yd. rubble masonry	4.25	4.15	4.90	6.00	4.20	4.10	5.00	5.15	6.70	5.50	6.90	7.40	7.00	7.25
HEADWORKS														
600 cu.yd. excavation	.80	.60	1.33	1.00	1.60	1.25	2.00	1.35	1.00	1.30	.90	1.50	.85	1.00
Rock excavation, per cu.yd.	3.00	5.00	2.66	1.75	4.50	5.00	3.50	5.00	10.00	3.00	4.00	3.40	10.00	10.00
300 cu.yd. concrete	12.00	10.00	12.00	9.50	18.00	14.00	14.00	14.40	13.50	10.00	12.65	13.40	25.00	17.50
10,500 lb. reinforcing steel	.04	.04	.035	.035	.05	.0375	.04	.045	.04	.04	.04	.04	.04	.05
9,000 lb. rails	.05	.06	.025	.05	.05	.05	.04	.04	.015	.04	.10	.05	.03	.03
3,000 lb. structural steel	.05	.08	.06	.09	.10	.10	.04	.09	.04	.11	.10	.075	.05	.07
4 M ft. Oregon pine	55.00	60.00	48.00	45.00	90.00	80.00	50.00	75.00	55.00	68.00	80.00	90.00	60.00	60.00
1 M ft. redwood	65.00	80.00	50.00	75.00	$100	90.00	65.00	$100	60.00	78.00	$100	$120	$100	85.00
400 cu.yd. rubble masonry	4.25	5.20	4.90	7.00	5.00	4.10	6.00	6.00	9.70	8.00	6.90	7.65	8.00	7.25
CONDUIT														
3,000 cu.yd. excav. (conduit)	.80	1.30	1.05	.45	.70	2.50	1.68	1.50	.50	1.25	1.00	1.00	.50	.60
Rock excavation, per cu.yd.	3.00	5.00	2.50	1.75	4.50	5.00	3.50	5.00	10.00	3.00	4.00	3.60	10.00	10.00
820 cu.yd. concrete	12.00	10.00	11.00	8.50	18.00	10.50	13.90	14.15	13.50	10.00	12.65	12.60	18.00	17.50
77,000 lb. reinforcing steel	.04	.04	.04	.035	.05	.0375	.04	.045	.04	.04	.04	.04	.04	.05
700 lb. structural steel	.05	.08	.06	.09	.10	.10	.04	.09	.04	.11	.10	.075	.05	.07
0.6 M ft. redwood	65.00	80.00	50.00	75.00	$100	90.00	65.00	$100	60.00	78.00	$100	$120	$100	80.00
200 cu.yd. excavation (pipe)	1.25	.70	1.00	1.00	1.60	.50	.50	1.35	.40	.75	1.00	.80	.40	.35
50 ft. 48-in. concrete pipe	8.00	8.00	7.50	7.00	8.75	8.00	7.00	9.00	5.00	7.00	8.00	7.50	12.00	7.50
1 48-in. control gate	$135	$150	$150	$140	$167	$150	$135	$150	$125	$150	$175	$150	50.00	$200
2,300 cu.yd. excavation ditch	.80	1.10	1.00	.35	.40	.50	.60	.50	.30	.50	1.15	.38	.25	.35

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.

TABULATION OF AWARDS

Awards for the month of May, 1930, for Engineering Construction projects in the Far Western States, total $19,463,315, as follows:

Paving	$ 5,692,000
Grading, highways	5,297,486
Bridges	2,192,486
Sewer construction	892,417
Water supply systems	452,650
Irrigation	500,000
Power development	1,000,000
River and harbor work	651,000
Lighting systems	485,276
Railroad construction	2,300,000
	$19,463,315

LARGE WESTERN PROJECTS

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

WORK CONTEMPLATED

Reservoirs, pipe lines, pumps, etc., for City of Phoenix, Ariz.; $2,364,000.

Conduits, reservoirs, mains, etc., for City of Los Angeles; $39,000,000.

Power plant for City of Sandpoint, Idaho; $300,000.

Pier for Neptune Pier Co. at Long Beach, Calif.; $1,500,000.

Reinf. conc. storm drains in Olive St. and Twenty-third St. Impr. Dist. for City of Los Angeles; $375,000.

BIDS BEING RECEIVED

Levees and Jetties for Santa Clara River Protection project, Los Angeles; $400,000; bids to June 12.

Earth-fill dam and tunnel for El Dorado Irrigation Dist., Placerville; $400,000; bids to June 12.

Concrete paving and grading Manchester Ave. for County of Los Angeles; bids to June 23; $517,950.

Concrete paving 11 miles in San Diego County for California Division of Highways; bids to June 25.

BIDS RECEIVED

Steel and concrete bridge over Salinas River at Bradley, Monterey County, for California Division of Highways; H. E. Doering, Yreka, Calif. $256,563, low.

Hospital for City of Palo Alto, Calif.; K. E. Parker, San Francisco, $341,650, low.

STREET and ROAD WORK

WORK CONTEMPLATED

SAN LUIS OBISPO, CALIF—Plans by City Engineer, protests June 16 for improving Garden, Pacific and Pismo Sts., grading 6-in. concrete paving, curbs, culverts and catch basins. 6-2

SAN RAFAEL, CALIF.—Plans by H. K. Brainerd, City Engr., for improving Taylor, First St., etc., involving 174,735 sq.ft. 5-in. concrete paving, vitr. sewers, corr. culverts, etc. Bids after June 10. 5-27

DENVER, COLO.—Plans by City Engr. for: (1) Improving streets in Paving Dist. 152, to cost $118,000; and (2) Improving streets in Dist. 7, to cost $60,000.

GALLUP, N. M.—Plans by City Engr. for paving various streets, to cost $154,650, paving to be concrete, asphalt macadam and Warrenite Bit.

KLAMATH FALLS, ORE.—Plans by City Engineer, protests June 23 for improvement of Manzanita St., Fremont St., LeRoy St., etc., by paving with concrete, Warrenite-Bit. or asphalt, installing storm sewers, etc.; $42,304. 6-3

SALT LAKE CITY, UTAH—Plans by City Engr. for paving streets in Dist. 22, to cost $130,000.

BIDS BEING RECEIVED

LONG BEACH, CALIF.—Bids to 2 p.m., June 13, by City Clerk for (1) Improving 67th St., involving 26,890 ft. concrete curb, 142,918 sq.ft. cement walk, 16,148 ft. 8-in. vitr. sewer, water mains, etc.; (2) Granada Court, involving 11,500 sq.ft. 6-in. concrete paving; (3) Alley east of Cedar Ave., involving 6070 sq.ft. concrete paving; (4) Fashion Ave., involving 1245 ft. concrete curb, 6297 sq.ft. sidewalk; and water mains, and (5) Alley from Covina Ave. to Artesia, involving 28,337 sq.ft. 6-in. concrete paving. 5-31

LOS ANGELES, CALIF.—Bids to 2 p.m., June 23, by County for improving Manchester Ave. from Inglewood to Playa Del Rey, etc., involving 178,437 cu.yd. excavation, 31,305 ft. 6 by 16 by 8½-in. Monolithic concrete curb and gutter, 29,987 ft. 6 by 15 by 8½-in. Monolithic cement concrete curb and gutter, 815,410 sq.ft. 9-7-in. concrete pavement, 198,430 sq.ft. 8-in. cem. conc. pavement, 1,029,300 sq.ft. 6-in. dis. rock subbase, 202,026 sq.ft. oiled subgrade, 258 ft. 18-in. double rein. conc. pipe, 138 ft. 20-in. rein. conc. pipe, 2223 ft. 27-in. heavy rein. conc. pipe, 66 ft. 12-in. corrugated metal pipe, 199 ft. 18-in. corr. metal pipe type A, 4480 ft. 8-in. and 1670 ft. 6-in. vitrified pipe, 15 manholes, 10 junction chambers, 15,860 ft. 8-in. cast-iron pipe, 17,120 ft. 6-in. cast-iron water pipe, 51 2-in. cast-iron water pipe connections, 2462 ft. 1½-in. conduit. Cost $517,950. 5-28

REDDING, CALIF—Bids to 2 p.m., June 16, by Department of Public Works, District Engineer, Redding, for 21 miles heavy fuel oil to be furnished and applied as dust layer in SISKIYOU COUNTY, between Shasta River and Walker. 6-3

SACRAMENTO, CALIF.—Bids to 2 p.m., June 25, by California Division of Highways for (1) FRESNO COUNTY—6.7 miles from Fowler Switch Canal to Fancher Creek, involving 38,800 cu.yd. roadway excavation, 61,400 cu.yd. imported borrow, 43,840 tons asphalt, corr. pipe, conc. structures, etc.; (2) SAN DIEGO COUNTY—11 miles from Viejas Creek to Pine Valley, involving 27,520 cu.yd. 'A' concrete paving and 630,000 lb. reinf. steel, etc.; and (3) PLACER AND NEVADA COUNTIES—7.2 miles from Airport to Yuba Pass, involving 41,100 tons crusher run base, 16,340 tons untreated gravel or stone surf., 2815 M gal. water. 5-28

SACRAMENTO, CALIF.—Bids to 2 p.m., June 18, by California Division of Highways for: (1) SAN JOAQUIN COUNTY—1.8 miles from French Camp to Stockton, involving 46,300 cu.yd. imported borrow, 8000 tons gravel or stone surfacing, etc.; (2) SAN JOAQUIN COUNTY—3 miles from Houston School to Forest Lane, involving 16,000 cu.yd. roadway excavation, 2875 tons crusher run base, 1040 cu.yd. concrete, 48,000 lb. reinf. steel, 1510 bbl. fuel oil; and (3) SANTA CRUZ COUNTY—2.6 miles from Waterman Switchback to Saratoga Gap, involving 120 stat. clearing and grubbing, 243,000 cu.yd. roadway excavation, 10,480 cu.yd. broken stone (waterbound macadam base), 140 tons emulsified asphalt, etc. 5-21

SAN FRANCISCO, CALIF.—Bids to 2 p.m., June 17, by Bureau of Public Roads, 461 Market St., S. F., for 4 miles Strawberry-Phillips Sect. Placerville-Lake Tahoe Forest Highway, ELDORADO COUNTY, involving 10,300 cu.yd. crushed rock surface, etc. 5-26

SAN FRANCISCO, CALIF.—Bids to 2 p.m., June 12, by Bureau of Public Roads, 461 Market St., S. F., for 6 miles surfacing Sect. A and D Lassen Volcanic National Park, TEHAMA COUNTY, involving 11,620 cu.yd. crushed rock surfacing, etc. 5-20

SAN JOSE, CALIF.—Bids to 11 a.m., June 16, by County for: (1) Improvement of Story Road, involving 39,600 sq.ft. oil macadam paving; (2) Improvement of the Trimble Road, involving 91,000 sq.ft. oil macadam paving; and (3) Improvement of the Yerba Buena Road, involving 78,500 sq.ft. oil macadam paving. 5-20

BOISE, IDAHO—Bids to 2 p.m., June 10, by State for 4 miles North Side Highway from Jerome West in JEROME COUNTY, involving 14,600 cu.yd. earth excavation, 11,000 cu.yd. gravel surfacing, concrete structures, etc.

CARSON CITY, NEV.—Bids to 2 p.m., June 11, by State Dept. of Highways for 31 miles ELKO COUNTY from Elko to Deeth, involving 166,500 cu.yd. excavation, 73,500 cu.yd. rock or gravel surfacing, concrete structures, corr. pipe, etc. 5-27

OLYMPIA, WASH.—Bids will be received up to 10 a.m., June 24, by State Highway Commission, for paving with concrete about 1.4 miles of state road No. 12 in the City of Raymond, Pacific County, Washington. 6-2

SEATTLE, WASH.—Bids to 10 a.m., June 23, by County for (1) Concrete paving 1 mile of Sixth Ave northwest; and (2) Concrete paving 1 mile of 20th Ave. northeast.

BIDS RECEIVED

PHOENIX, ARIZ.—H. J. Hagan, Globe, Ariz., $38,824 low to Bureau of Public Roads for grading Sect. 2B, Swift Trail Road, Crook National Forest, GRAHAM COUNTY, Ariz. (See Unit Bid Summary.) 5-26

PHOENIX, ARIZ.—Henry Galbraith, Jerome, Ariz., $66,494 low for 17 miles grading Grand Canyon-Old Trails National Highway, Tusayan National Forest, COCONINO COUNTY, for Bureau of Public Roads. (See Unit Bid Summary.) 5-29

FRESNO, CALIF.—Low bids as follows by Dist. Engr., California Division of Highways: KERN COUNTY—G. M. Duntley, 772 So. San Pedro St., Los Angeles, who bid $8235, submitted low bid for fuel oil to be furnished and applied to the shoulders and roadbed, between Grapevine and Delano, and between 7.7 miles and 2.7 miles west of Maricopa, about 69.1 miles in length. FRESNO AND KING COUNTIES—Stewart S. Nuss, 400 Thorne St., Fresno, who bid $14,363, submitted low bid for about 45 miles in length, between Coalinga and Hanford, light fuel oil to be furnished and applied to the shoulders. MADERA, FRESNO, TULARE, AND KING COUNTIES—G. M. Duntley, 772 S. San Pedro St., Los Angeles, low at $11,620 for 102.6 mi. light fuel oil for shoulders. 5-27

REDDING, CALIF.—A. Teichert & Sons, 1846 37th St., Sacramento, $13,727 low bid to Dist. Engr., California Division of Highways, for 51 miles oiling TEHAMA, LASSEN AND PLUMAS COUNTIES from Dales to Coppervale. 5-28

SACRAMENTO, CALIF.—Low bids as follows by California Division of Highways: (1) SAN BERNARDINO COUNTY—Gilmore Oil Co., Los Angeles, $18,484 low for 71 miles oiling from Oronese to east boundary; (2) LASSEN AND MODOC COUNTIES—Jack A. Casson, Hayward, $20,330 low for 57 miles oiling from Hillside to Alturas; (3) SHASTA AND TRINITY COUNTIES—Basalt Rock Co., Napa, $19,126 low for 57 miles oiling; (4) RIVERSIDE COUNTY—California Road Oil Service Co., Wilmington, $42,167 low for 29 miles oiling from Whitewater River Bridge to Indio; and (5) SAN JOAQUIN COUNTY—Heafey-Moore Co., 344 High St., Oakland, $51,144 low for 2 miles grading and asphalt paving from S. Banta to E. Banta Road. (See Unit Bid Summary.) 5-29

SAN BERNARDINO, CALIF.—Low bids as follows by Dist. Engr., California Division of Highways: (A) G. M. Duntley, 722 S. San Pedro St., Los Angeles, who bid $3758, low bid for about 20.7 miles in length, furnishing and spreading fuel oil on shoulders, between westerly boundary of San Bernardino County and city of San Bernardino, SAN BERNARDINO COUNTY. (B) Gilmore Oil Co., Los Angeles, who bid $9455, low bid for about 35.4 miles in length, furnishing and spreading fuel oil on roadway, between Essex and Klinefetter, SAN BERNARDINO COUNTY. 5-27

SAN FRANCISCO, CALIF.—Low bids as follows by Dist. Engr., California Div. of Highways: (1) MENDOCINO COUNTY—A. Teichert & Sons, 1846 37th St., Sacramento, $6975 low for 12 miles oiling from Cloverdale to Hopland and (2) SONOMA COUNTY—A. Teichert & Sons, Sacramento, $2280 low for 4 miles oiling from Beltone to Shellville. 5-28

SAN LUIS OBISPO, CALIF.—Granite Const. Co., Watsonville, $5744 low bid to Dist. Engr., California Division of Highways, for 6 miles oiling from Estrella River to Sacramento Ranch, SAN LUIS OBISPO COUNTY. 5-29

DENVER, COLO.—Low bids as follows by U. S. Bureau of Public Roads: (1) MONTEZUMA COUNTY, Colo.—Pioneer Const. & Engr. Co., Denver, Colo., $114,965 low for 11 miles grading North and South Highway, Knife Edge and Park Point Spruce Tree Section, Mesa Verde National Park; (2) YELLOWSTONE NATIONAL PARK, Wyoming—Morrison-Knudsen Co., Boise, Ida., $67,714 low for 1.6 miles grading and surfacing Grand Canyon Rim, Artist Point Sect., and $135,410 low for 9 miles grading Norris Junction-Madison Junction Sect. of Grand Loop. (See Unit Bid Summary.)

HELENA, MONT.—Low bids as follows by State Highway Comm.: (1) S. C. & B. Const. Co., Billings, Mont., $56,320 low for 9 miles grading STILLWATER COUNTY—Columbus Reed Point Road; (2) J. Crick, Spokane, Wash., $115,540 low for 16 miles grading LAKE COUNTY—Pablo Rolling Road; (3) M. Kuney, Spokane, Wash., $158,490 low for 15 miles grading POWELL COUNTY—Barmouth Deer Lodge Road and (4) J. L. McLaughlin, Livington, Mont., $20,175 low for 22 miles oiling Livington-Bozeman Road and Livingston-Gardner Road.

PORTLAND, ORE.—J. C. Compton, McMinnville, Ore., who bid $101,443, low bid to State for La Grande Bituminous Macadam Project, construction of 22.73 miles of bituminous macadam surface on State Highway, near La Grande, Baker, and Enterprise, in UNION, WALLOWA, AND BAKER COUNTIES, Oregon. 5-26

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Phoenix-Tempe Stone Co., Phoenix, Ariz., $7063 for paving Mitchell St. for City.

PHOENIX, ARIZ.—To Bruce Bros., Rt. 1, Box 167, Huntington Beach, Calif., at $121,830 for surfacing and oil processing of Florence-Tucson Highway, FAP. 94-C, from Coolidge south 17 miles toward Picacho. (See Unit Bid Summary.) 5-28

WINSLOW, ARIZ.—To Southern California Roads Co., 530 W. Sixth St., Los Angeles, who bid $171,000 to City for improvement of streets by asphalt paving, concrete curb, etc. 5-28

BISHOP, CALIF.—Awards as follows by California Division of Highways: MONO COUNTY—To Leonard C. Pulley, 1960 Alamitos St., Long Beach, who bid $8987 for 16.3 miles oiling from Devils Punch Bowl to Leevining and at Bridgeport Road; MONO COUNTY—To Leonard C. Pulley, 1960 Alamitos St., Long Beach, $11,464 for 24 miles oiling from summit of Sherwin Hill to Devils Punch Bowl. 5-20

BURLINGAME, CALIF.—To Hanrahan Co., Standard Oil Bdg., S. F., $4.70 per ton for 1600 tons asphalt paving California Drive for City. 5-20

CLAREMONT, CALIF.—To Griffith Co., Los Angeles Railway Bdg., Los Angeles, $92,242 for improving Mesa Ave. for City.

HAYWARD, CALIF.—To Jack Casson, 8 St. James Court, Hayward, $11,325 for improving Soto, Peralta Sts., etc., paving with penetration emulsified asphalt macadam for City. 5-23

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bdg., L. A., who bid $84,136 to Board of Public Works for improvement of Gaffey St., from Anaheim St. to Channel St., by grading, asph. conc. paving, oiled roadway, culverts, water system. 5-23

LOS ANGELES, CALIF.—To Geo. H. Oswald, 366 E. 58th St., Los Angeles, $61,302 for improving D St. from Dominguez Ave. to Broad Ave. for City, grading, concrete paving, storm drain, sanitary sewer and water system.

LOS ANGELES, CALIF.—To Kovacevich & Price, 1553 Loma Ave., Long Beach, who bid $293,104 to County Supervisors for improvement of Main St., north of Wilmington, from S St. to Olive St., 6.12 miles, by excavation, concrete pavement, asphalt concrete surface, asphalt concrete base, corrugated metal pipe, etc. 5-28

OAKLAND, CALIF.—To Jack Casson, Hayward, who bid .0163 per sq.ft., total bid $5150, for oiling streets in town of Niles for County, involving 316,000 sq.ft. emulsified asphalt oiling. 5-20

PALO ALTO, CALIF.—To N. M. Ball, 1889 Yosemite Road, Berkeley, $188 for concrete paving Kingsley Ave. for City. 5-22

REDDING, CALIF.—To Jack Casson, Hayward, who bid $12,594 to California Division of Highways for 52 miles fuel oiling in LASSEN AND SIERRA COUNTIES from 2 miles west of Milford to State Line. 5-20

REDDING, CALIF.—To A. Teichert & Son, 1846 37th St., Sacramento, who bid $13,727 for about 51.1 miles in TEHAMA, PLUMAS AND LASSEN COUNTIES, between Dales and Coppervale, by furnishing heavy fuel oil and applying as a dust layer, for Division of Highways, District Engineer, Redding. 6-3

REDWOOD CITY, CALIF.—To L. A. Bachelder, 1152 Fulton St., Palo Alto, $21,193 for improving Minnie and George Sts. for City, concrete paving, sewers, and electrolier system. 5-20

RIVERSIDE, CALIF.—To Pearson & Dickerson, 4485 Cypress Ave., Riverside, $35,983 for oiling surfacing Ave. 50 and other streets for County. 5-27

SALINAS, CALIF.—To J. L. Conner, Box 86, Monterey, $39,636 for 7 miles grading and surfacing Pacific Grove-Carmel Road for County. (See Unit Bid Summary.) 6-2

SACRAMENTO, CALIF.—To C. G. Willis & Sons, 2119 E. 25th St., L. A., $15,019 for 0.8 mile grading at Mojave River, SAN BERNARDINO COUNTY, for California Division of Highways. 5-20

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: COLUSA AND GLENN COUNTIES—To Lilly, Willard & Biasotti, 40 W. Clay St., Stockton, $6421 for drainage ditch from Hunters Creek to county line; HUMBOLDT COUNTY—To J. V. Galbraith, P.O. Box B2, Petaluma, $148,707 for 4.3 miles grading and concrete paving at Scotia and from Fortuna to Loleta; DEL NORTE COUNTY—To Smith Bros. Co., Eureka, $32,650 for 15.2 miles gravel or stone surfacing from Smith River to Patricks Creek; SAN JOAQUIN COUNTY—To D. McDonald, P.O. Box 170, Sacramento, $22,147 for 0.7 mile grading and rock or gravel surfacing from Lodi to ½ mile west of Mokelumne River. 5-20

SACRAMENTO, CALIF.—To J. P. Holland, Inc., 1834 McKinnon St., San Francisco, at $51,480 to California Division of Highways, for 5.2 miles highway, involving 2.6 miles grading and 5.2 miles surfacing, between Loleta and 2 miles north of Beatrice, HUMBOLDT COUNTY. (See Unit Bid Summary.) 5-24

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways, District Engineer, Fresno: KERN COUNTY—To G. M. Duntley, 772 So. San Pedro St., Los Angeles, who bid $8235 for fuel oil to be furnished and applied to the shoulders and roadbed, between Grapevine and Delano, and between 7.7 miles and 2.7 miles west of Maricopa, about 69.1 miles in length. FRESNO AND KINGS COUNTIES—To Stewart & Nuss, 400 Thorne St., Fresno, who bid $14,363 for 45 miles in length, between Coalinga and Hanford, light fuel oil to be furnished and applied to the shoulders. MADERA, FRESNO, TULARE AND KING COUNTIES—To G. M. Duntley, 772 S. San Pedro St., Los Angeles, who bid $11,620 for 102.6 miles light fuel oil for shoulders, to be furnished and applied. 6-3

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: (1) To Heafey-Moore Co., 344 High St., Oakland, who bid $51,144 for 1.9 miles grading and asphalt paving between South Banta Road and East Banta Road, SAN JOAQUIN COUNTY. (2) To California Road Oil Service Co., Wilmington, who bid $42,167 for 29 miles oiling from Whitewater River Bridge to Indio, RIVERSIDE COUNTY. (3) To Gilmore Oil Co., 2423 E. 28th St., Los Angeles, who bid $18,484 for 71.8 miles oiling from Cronese to easterly boundary, SAN BERNARDINO COUNTY. (See Unit Bid Summary.) 6-3

SAN BERNARDINO, CALIF.—Awards as follows by California Division of Highways: (A) To G. M. Duntley, 722 S. San Pedro St., Los Angeles, who bid $3758 for about 20.7 miles in length, furnishing and spreading fuel oil on shoulders, between westerly boundary of San Bernardino, SAN BERNARDINO COUNTY. (B) To Gilmore Oil Co., Los Angeles, who bid $9455 for about 35.4 miles in length, furnishing and spreading fuel oil on roadway, between Essex and Klinefetter, SAN BERNARDINO COUNTY. 6-2

SAN BERNARDINO, CALIF.—To Gilmore Oil Co., Los Angeles, who bid $2283 for surfacing with fuel oil 7 miles from Fawnskin to County Road, SAN BERNARDINO COUNTY, for California Division of Highways. 5-20

SAN DIEGO, CALIF.—To Bert Noble, 1231 Myrtle St., San Diego, $135,961 for concrete paving of Marron Canyon Road for County. 5-28

SAN FRANCISCO, CALIF.—Award recommended to Dimmitt & Taylor, 815 E. 59th St., L. A., $41,751 for 6.76 miles grading Sect. A, Route 73, Laguna National Forest Highway, Cleveland National Forest, SAN DIEGO COUNTY, for California Division of Highways. (See Unit Bid Summary.) 5-22

SAN FRANCISCO, CALIF.—To A. J. & J. L. Fairbanks, South San Francisco, $108,967 for 4.65 miles San Pedro Mt. (First Unit), Ocean Shore Blvd., from Rockaway Beach to Faralone City, for Joint Highway Dist. 9. (See Unit Bid Summary.) 5-20

SAN FRANCISCO, CALIF.—To P. S. Harless, P.O. Box 594, San Rafael, who bid $15,885 for improvement of portions of G and Ida Sts., by excavation, asphalt paving, stone base, gutter, curb and gutter, vitrified pipe, corrugated pipe, concrete sewer protection, etc. 5-23

SAN FRANCISCO, CALIF.—To Fay Improvement Co., Phelan Bdg., San Francisco, $64,757 for improving Harrison St., from 2nd to 3rd Sts., by grading, vitrified sewers, 8-in. concrete base, 1½-in. asph. binder, and 1½-in. asphalt surface. (See Unit Bid Summary.) 5-28

SAN FRANCISCO, CALIF.—Award recommended to Monarch & Breen, Live Oak Springs, via Campo P.O., San Diego County, $139,869 for 2.7 miles grading Sect. D-2, Route 1, Generals Highway, Sequoia National Park, for Bureau of Public Roads. (See Unit Bid Summary.) 5-27

SAN GABRIEL, CALIF.—To Hall-Johnson Co., 905 Westminster St., Alhambra, $88,140 for improving Alhambra Road for City, grading, Durite paving, lighting system, storm drain, etc.

SAN JOSE, CALIF.—Awards as follows by County: (1) To A. J. Raisch, Burrell Bdg., San Jose, $26,818 for surfacing and $3.57 ton for base for asphalt paving Santa Clara-Los Gatos Road; and (2) To A. J. Raisch, San Jose, $1995 for improving 2nd and 3rd Sts. in town of Campbell. 5-20

SAN MATEO, CALIF.—To S. M. McGaw, 425 Lexington Ave., Stockton, $14,895 (plus $35,775 for the Improvement Bonds) for improvement of B St. from Baldwin Ave. to Tilden St., 6-in. concrete base with 2-in. asphalt surface, vitrified sewers, electroliers. 6-3

SAN MATEO, CALIF.—Awards as follows by City: (1) To Union Paving Co., Call Bldg., S. F., $84,821 for streets in San Mateo Homestead, grading, concrete paving, vitr. and concrete sewers; and (2) To Union Paving Co., Call Bldg., S. F., $90,582, for paving streets in eastern section of city, asphalt paving, concrete and vitr. sewers, pumping unit. (See Unit Bid Summary.) 6-3

SAN MATEO, CALIF.—To Union Paving Co., Call Bdg., San Francisco, who bid $2518 for grading and asphalt and macadam paving and corrugated culverts on Bell St. crossing of the S. P. Railroad for the City. 5-20

SANTA CRUZ, CALIF.—To Granite Const. Co., Watsonville, $4942 for oil macadam paving on Coast Highway from City to Davenport Landing for County. 5-24

SANTA CRUZ, CALIF.—To Granite Const. Co., Watsonville, who bid $16,995 for improvement of Windsor St., etc., by conc. paving, curbs, catchbasins, conc. drains, vitr. sewers, etc., for City. 5-27

BOISE, IDA.—Awards as follows by State: (1) To Sutherland & Burns Const. Co., Missoula, Mont., $56,630 for gravel surfacing and grading 7 miles from Bonners Ferry to Canadian Line, BOUNDARY COUNTY; and (2) To Sutherland & Burns Const. Co., Missoula, Mont., $21,584 for 4 miles grading from Pleasantview to Holbrook, ONEIDA COUNTY.

CARSON CITY, NEV.—Awards as follows by State: (1) To A. D. Drumm, Jr., Fallon, Nev., $11,959 for 4 miles grading and surfacing CHURCHILL COUNTY south of Fallon; and (2) To A. D. Drumm, Jr., Fallon, Nev., $22,008 for oil surfacing in CHURCHILL COUNTY 11.7 miles from Salt Wells to Sand Springs. 5-22

CARSON CITY, NEV.—To Jack Casson, 8 St. James Court, Hayward, Calif., who bid $99,415 for furnishing asphaltic fuel oil, applying and mixing with crushed rock or crushed gravel surface in WHITE PINE COUNTY, from McGill to north county line, 52.31 miles, for Nevada State Department of Highways. (See Unit Bid Summary.) 5-29

ASTORIA, ORE.—To Johnston, Hanson & Johnston, Birkenfeld, Ore., $29,400 for grading Nehalem Highway; and to Astoria Crushed Rock Co., Astoria, Ore., $20,600 for rock surfacing Nehalem Highway.

PORTLAND, ORE.—Award recommended to A. R. Douglas, Kalispell, Mont., who bid $124,959 to U. S. Bureau of Public Roads, Portland, for 4 miles grading and rock surfacing of Babb-Many Glacier Section, Glacier National Park, Montana. 5-23

PORTLAND, ORE.—Awards as follows by Oregon State Highway Comm.: DOUGLAS COUNTY—To A. S. Wallace, Roseburg, Ore., who bid $135,292 for Red Bridge Drain Section of Umpqua Highway, construction of 10.1 miles of broken stone surfacing and furnishing broken stone for betterment purposes. LANE COUNTY—To Earl McNutt, 351½ E. Broadway St., Eugene, Ore., who bid $81,145 for Hendricks Bridge-Doyle Hill Section of McKenzie Highway, 9.27 miles of grading. LINCOLN COUNTY—To Edlefsen-Weygandt Co., 54 Lewis St., Portland, Ore., who bid $165,861 for Waldport-Lane County Line Section of Roosevelt Coast Highway and Waldport Section of Alsea Highway, construction of 13.3 miles broken stone surfacing, and furnishing broken stone for betterment purposes. (See Unit Bid Summary.) 5-26

OLYMPIA, WASH.—Awards as follows by State (1) To A. C. Goerig, 413 Fairview North, Seattle, $14,600 for 14 miles resurfacing KING COUNTY from Ingalls Hill to Greenwater River; (2) To Hargreaves Const. Co., Spokane, Wash., $60,650 for 38 miles bituminous treated road surfacing in CHELAN AND KITTITAS COUNTIES; and (3) To S. L. Dennis Transfer Co., Raymond, Wash., $8300 for 22 miles surfacing in LEWIS AND PACIFIC COUNTIES from Walville to Willapa.

SEATTLE, WASH.—Awards as follows by County for concrete paving: (1) To C. L. Creelman, 1079 25th Ave., Seattle, $23,964 for paving Black Diamond Road; and (2) To Hans Pederson, 1105 Second Ave., Seattle, $50,802 for paving Sand Point Way.

WENATCHEE, WASH.—To C. A. Powers, Spokane, Wash., $109,594 for 6-in. concrete paving of various streets for City, in the West Central District.

BRIDGES and CULVERTS

WORK CONTEMPLATED

SAN DIEGO, CALIF.—City Council of San Diego has commissioned T. J. Allen Co., Engineers, 309 G St., San Diego, to prepare plans for bridge on First St. near Olive St., to consist of one 200-ft. steel arch with three 80-ft. steel approach spans. Estimated cost $150,000 and the bridge will probably be built under the 1911 Act. 5-20

BIDS BEING RECEIVED

EUREKA, CALIF.—Bids to June 16 by County for: (1) Steel truss bridge over Trinity River on road to Hoopa, cost $50,000. (2) Reinf. conc. culvert over Cooks Gulch, near Petrolia. 5-26

LOS ANGELES, CALIF.—Bids to 10 a.m., June 25, by Board of Public Works for Washington St. Bridge over Los Angeles River, involving 830,000 lb. reinf. steel, 6975 cu.yd. F concrete, 11,000 ft. reinf. concrete piles, storm drain, grading, paving, and lighting standards. 5-26

OAKLAND, CALIF.—Bids to 8 p.m., June 25, by East Bay Municipal Utility District for constructing bridge over Upper San Leandro Creek, Contra Costa county, one 80-ft. steel span and one 34-ft. steel approach span. District installs timber flooring and piers. 5-29

SACRAMENTO, CALIF.—Bids to 2 p.m., June 18, by California Division of Highways for: (1) PLACER COUNTY—Undergrade crossing under S.P.RR. near Emigrant Gap, involving 14,500 cu.yd. excavation, 2080 cu.yd. concrete, etc.; and (2) TEHAMA AND SHASTA COUNTIES—Undergrade crossing and 0.9 miles roadway at Cottonwood, involving 31,800 cu.yd. roadway embankment, 7500 cu.yd. structure excavation, 6070 cu.yd. concrete, 340,000 lb. reinf. steel, etc. 5-21

SACRAMENTO, CALIF.—Bids to 2 p.m., June 25, by California Division of Highways for 3 reinf. concrete bridges over Salt Creek, Freshwater Creek, Green Valley Slough, COLUSA COUNTY, involving 578 cu.yd. concrete, 80,000 lb. reinf. steel. 5-28

SACRAMENTO, CALIF.—Bids to 10 a.m., June 16, by County for 2 reinf. concrete culverts on Del Paso Blvd. 5-31

SAN JOSE, CALIF.—Bids to 11 a.m., June 16, by Clerk, Board of Supervisors, Court House, San Jose, for: (1) 40-ft. reinf. conc. bridge on Penetencia Creek; and (2) 80-ft. reinf. concrete bridge on Bloomfield Ave. over Carnadero Creek. 5-20

ST. HELENS, ORE.—Bids to 2 p.m., June 21, by County Clerk for (1) 140-ft. reinf. conc. bridge over Rock Creek at Vernonia City; and (2) 53-ft. reinf. conc. bridge over Milton Creek near St. Helens. 6-3

BIDS RECEIVED

SACRAMENTO, CALIF.—H. E. Doering, Yreka, $256,563 for steel and concrete bridge over Salinas River at Bradley, MONTEREY COUNTY, for California Division of Highways. (See Unit Bid Summary.) 5-29

SALINAS, CALIF.—Jacobs & Pattiani, 337 17th St., Oakland, $114,990, low for steel and concrete bridge for County over Salinas River at Gonzales. (See Unit Bid Summary.) 6-2

SANTA BARBARA, CALIF.—Merritt, Chapman & Scott, Box 698, San Pedro, $73,661, low bid to County for a structural steel highway bridge with wooden floor and rails, concrete footings and abutments, including painting and galvanizing, over San Roque Creek, on the Goleta Foothill Blvd. 6-3

PORTLAND, ORE.—J. F. Ward, Inc., Lyon Bdg., Seattle, $28,615 for 80-ft. concrete bridge over Klickitat Creek, PIERCE COUNTY, Wash., for Bureau of Public Roads. 5-29

CONTRACTS AWARDED

SACRAMENTO, CALIF.—To J. S. Metzger & Son, 20 N. Sutter St., Stockton, who bid $84,390 to California Division of Highways, Sacramento, for reinforced concrete and timber bridge over Mokelumne River near Lodi, SAN JOAQUIN COUNTY. (See Unit Bid Summary.) 5-24

SALINAS, CALIF.—To M. J. Murphy, Inc., Carmel, $14,084 for 2 reinf. conc. bridges on Pacific Grove-Carmel Road for County. 6-2

SEWER CONSTRUCTION

WORK CONTEMPLATED

PHOENIX, ARIZ.—Bond election will be held June 25 by City of Phoenix to vote on issuing bonds in amount of $817,000 for the construction of sewer mains and sewage disposal plant. 5-23

GONZALES, CALIF.—Plans by Burns-McDonnell-Smith Engineering Co., 422 Western Pacific Bldg., Los Angeles, for a sewer system for the Gonzales Sanitary District; $50,000. 6-2

LOS ANGELES, CALIF.—Plans by City Engineer protests June 16 for reinf. conc. 72-in. to 24-in. storm drains in Olive St. and 23rd St. Improvement Dist.; $375,000. 6-2

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 10 a.m., June 18, by Board of Public Works for: (1) SECTION 34-A, NORTH OUTFALL SEWER: TYPE No. 1 (Precast Reinf. Conc.), 5833 ft. 60-in., 5330 ft. 54-in., 2427 ft. 42-in. TYPE No. 2 (Semi-elliptical Conc.), 5833 ft. 57-in., 5330 ft. 51-in., 2427 ft. 39-in. (2) SECTION 34-B, NORTH OUTFALL SEWER: TYPE No. 1 (Precast Reinf. Conc.), 1303 ft. 60-in., 6709 ft. 54-in., 76 ft. 48-in., 2591 ft. 42-in., 2540 ft. 39-in. TYPE No. 2 (Semi-elliptical Conc.), 1303 ft. 57-in., 6709 ft. 51-in., 76 ft. 45-in., 2591 ft. 39-in., 2540 ft. 36-in. 5-31

SURETY BOND AND CASUAL TY INSURANCE DIRECTORY

LOS ANGELES, CALIF.—Bids up to 2:45 p.m., June 11, by County Sanitation District 8, Law Bdg., Los Angeles, for sewage pumping plant, consisting of two hor. centr. sewage pumps each to deliver 700 to 1100 g.p.m. of raw sewage. 5-31

REDWOOD CITY, CALIF.—Bids to 10 a.m., June 16, by County, for sewers in North Fairoaks Sanitary Dist., involving 140,000 ft. 6-in. to 12-in. vitr. pipe, 25,000 ft. 15-in. to 18-in. concrete pipe, etc.; $200,000. 1911-1915 Acts. 6-2

RENO, NEV.—Bids to 5 p.m., June 23, by City for 8500 ft. 39-in. to 24-in. centr. cast concrete sewer, 30,000 ft. 18-in. to 8-in. concrete pipe, sewage pumping station and sewage treatment plant. $350,000. C. C. Kennedy, Call Bdg., S. F., is Engr. 5-28

BIDS RECEIVED

SANTA CRUZ, CALIF.—Merritt, Chapman & Scott, P. O. Box 698, San Pedro, $14,750, only bid to City for repair and anchorage of existing outfall sewer in the Pacific Ocean. 6-3

WEST LINN, ORE.—Geo. Abrahams, Portland, Ore., $14,474 low bid to City for sewer improvements.

CONTRACTS AWARDED

DAVIS, CALIF.—To A. F. Anderson, 1093 Longridge Road, Oakland, who bid $10,635 to City of Davis, Yolo County, for outfall sewer and pumping plants. 5-27

LOS ANGELES, CALIF.—To Culjak & Zelko, 1358 S. Bonnie Beach Place, Los Angeles, who bid $111,945 to Board of Public Works for construction of sewers in 111th St. and Towne Ave. Sewer District. 5-26

LOS ANGELES, CALIF.—To R. A. Wattson, 1026 N. McCadden Pl., L. A., $97,209 to L. A. County Sanit. Dist. No. 8 for Main St. trunk sewer, using vitr. and rein. conc. pipe. 5-24

SAN FRANCISCO, CALIF.—To MacDonald & Kahn, Financial Center Bdg., S. F., at $93,002 for reinf. conc. sewers and vitr. sewers, Sec. D of Fillmore St. main sewer. (See Unit Bid Summary.) 5-23

VALLEJO, CALIF.—To L. J. Tagnon, 1735 Napa St., Vallejo, at $6300 for 300 lin.ft. of 36-in. vitrified clay pipe outfall sewer, on creosoted timber cradle and creosoted pile foundations, with outfall into Mare Island Channel, work for City. 5-29

MERIDIAN, IDAHO—To Morrison-Knudsen Co., Boise, Ida., $14,799 for constructing sanitary sewer system for City.

KLAMATH FALLS, ORE.—To W. J. Tobin, 527 Balfour Ave., Oakland, at $61,000 to city of Klamath Falls, Ore., for construction of 14th Sewer Unit. 5-27

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

PHOENIX, ARIZ.—Bond election June 25 by City to vote $2,364,000 as follows: (1) Flow line from the sand trap to reservoir, 48-in. diam., $1,300,000; (2) Flow line from the reservoir to 16th St. and Thomas Road, 48-in. diam., $500,000; (3) 42-in. pipe-line from 12th St. and McDowell Road to 16th St. and Thomas Road, $146,000; (4) 24-in. pipe-line from 16th St. and Thomas Road to 7th Ave., $140,000; (5) Belt line distribution system, $138,000; (6) Five well pumping plants at Verde River, $25,000; (7) Sump station at Verde River, $24,000; (8) Bank protection at Verde, $110,000; (9) 10,000,000-gallon reservoir, $92,000; (10) Purchase of well field, $8000; and (11) Water mains in City, $78,000. 5-23

BRAWLEY, CALIF.—Plans by Burns-McDonnell-Smith Engr. Co., Western Pacific Bldg., L. A., for filter plant of 4,000,000 gallons capacity, to cost $60,000, for City. 6-2

LOS ANGELES, CALIF.—Bonds voted, $39,000,000, as follows by City: purchase of lands, towns, etc., in Owens Valley District, $12,450,000; purchase of land and water rights in Mono Basin, $7,000,000; conduit from Leevining Creek to Silver Lake, $1,450,000; constructing Silver Lake Dam, $550,000; tunnel from Silver Lake to headwaters of Owens River, $5,500,000; constructing Long Valley Dam, $750,000; increasing capacity of Owens Aqueduct, $600,000; enlarge Chatsworth Reservoir from 8208 ac-ft. to 42,155 ac-ft., also new reservoir near San Fernando to have capacity of 30,000 ac-ft., $7,500,000; Chatsworth-Hollywood conduit, $1,455,000; installation of distribution system additions, $1,555,000. H. A. Van Norman is Chief Engineer and General Manager of the Bureau of Water Works and Supply; Wm. W. Hurlbut is Engineer of Distribution and Operating; and J. J. Jessup is the City Engineer. 5-23

SAN DIEGO, CALIF.—Plans by County protests June 30 for cast iron mains, valves and hydrants in Biona Drive, Vista St., etc. 6-2

POCATELLO, IDAHO—Bond election June 10 by City to vote $60,000 for constructing 16-in. water main on Main St.

BIDS BEING RECEIVED

FULLERTON, CALIF.—Bids to 7:30 p.m., June 17, by City for furnishing 20,000 ft. 12-in. and 430 ft. 8-in. cast iron pipe, valves and fittings. 5-26

LOS ANGELES, CALIF.—Bids to 2 p.m., June 23, by County, for water, sewer and fire lines at Olive View Sanitarium. 6-2

OAKLAND, CALIF.—Bids to 8 p.m., June 25, by East Bay Municipal Utility District, 512 16th St., Oakland, for constructing and furnishing, f.o.b. Lafayette, second pumping unit and equipment for Lafayette Pumping Plant, Mokelumne River Project, 12,000,000 gal. daily capacity, including pump, 2 gate valves, and one throttle valve. 5-29

WEISER, IDAHO—Bids to 7:30 p.m., June 24, by City for filtration plant and four pumping plants. Burns-McDonnell-Smith Engr. Co., Western Pacific Bldg., L. A., are engineers. (See "Official Bids" on Opportunity Page, this issue.) 6-2

KENNYDALE, WASH.—Bids to 8 p.m., June 10, by F. J. Friedel, Secy., Kennydale Water Co., Inc., Kennydale, Wash., for $40,000 water system for Kennydale; work includes digging a well near Cedar River, construction of a pipe-line, pumping plant, and 50,000-gallon steel or wood tank. 5-28

BIDS RECEIVED

MODESTO, CALIF.—Kimball-Krogh Pump Co., 1860 E. 15th St., L. A., $3699, low bid to City for one 2000-gpm deep well turbine pump and motor.

FT. BLISS, TEX.—Bids received as follows by Constructing Quartermaster, Fort Bliss, Texas, for construction of 600,000-gallon steel standpipe:

Ramey Brothers, El Paso, Texas	$16,662
Pittsburgh-Des Moines Steel Co.	17,250
Walter E. Deedy, El Paso	17,640
Chicago Bridge & Iron Works	18,400
R. E. McKee, El Paso	**18,650**
El Paso Foundry & Machine Co.	19,200
J. E. Morgan, El Paso	19,848
Newport Contr. & Eng. Co.	23,237

5-24

TACOMA, WASH.—Rensselaer Valve Co., Tacoma, $4400, low bid for two 48-in. throttle and control valves for City. 5-28

CONTRACTS AWARDED

BIGGS, CALIF.—To Pittsburgh-Des Moines Steel Co., Rialto Bdg., S. F., for furnishing and installing one 40,000-gallon steel tank and tower for City of Biggs, Butte County. $4800. 5-23

AMERICAN FORK, UTAH—To Mullins & Wheeler, 2839 Imperial St., Salt Lake City, $24,734 for distributing system for Cit.y

TACOMA, WASH.—To Birchfield Boiler Co., Tacoma, $91,071 for furnishing 10,898 ft. 58-in. steel pipe to City. 6-2

IRRIGATION and RECLAMATION

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 3 p.m., June 12, by Security-First National Bank, 901 Main St., Santa Paula, for the Santa Clara River Protection project, made necessary by the failure of the St. Francis Dam. Work involves: 70,000 lin.ft. of earth, gravel, and sand levee, involving about 5 cu.yd. of material to the lineal foot; 7500 lin.ft. double row 'A' creosoted timber piles and 15,000 ft. of electric welded steel wire mesh fence; 2300 ft. rail type tetrahedron jetties, using old 60-lb. rails; 38,000 ft. double row pipe piling, using 4-in. to 6-in. pipe, and 76,000 ft. of wire fencing. $400,000. Funds have been appropriated to cover the cost by the City of Los Angeles. Plans from the Engineer, H. L. Jacques, Water & Power Bdg., Los Angeles. 5-23

PLACERVILLE, CALIF.—Bids to 11 a.m., June 12, by R. W. Browne, Secretary, El Dorado Irrigation District, 685 Main St., Placerville, El Dorado County, for construction of the Webber Creek Dam, to be 1000 ft. wide at bottom, 800 ft. long at top, and 160 ft. high, hydraulic fill type, and appurtenant works, work involving 800,000 cu.yd. embankment for dam, 850 lin.ft. 6-ft. diam. concrete-lined tunnel, constructing concrete spillway. 5-22

BIDS RECEIVED

RIVERSIDE, CALIF.—John Strona, Chino, $59,679, low bid to Water Conservation Assn. for diversion weir, headwork, and conduit in canyon of Santa Ana River, San Bernardino County. Bent Bros., $65,724, next lowest bidder. 5-28

POWER DEVELOPMENT

WORK CONTEMPLATED

GARBERVILLE, CALIF.—Ambursen Dam Co., Alexander Bdg., San Francisco, and New York, N. Y., have been commissioned to prepare plans for an Ambursen type dam for the Benbow Power Co. in connection with the Benbow Resort to be located on the south fork of the Eel River in Humboldt County, 4 miles from Garberville. Dam will be 300 ft. long and 27 ft. high. 5-20

SAND POINT, IDAHO—Plans by City for constructing $300,000 power plant on Priest River.

BIDS BEING RECEIVED

PASADENA, CALIF.—Bids to 10 a.m., June 19, by City Clerk, Pasadena, for equipment for Municipal Light & Power Dept., as follows: (1) Two 15,000 sq.ft. boilers, including boiler proper, steel supporting members, superheater, water columns, valves, and appurtenances. (2) Two suitable air preheaters, including enclosing casing. (3) Two sets of tubes, headers, connections, recirculators, etc., for side, rear, and front furnace walls. (4) Two suitable automatic desuperheaters as specified, but not installed. 5-31

DENVER, COLO.—Bids to 3 p.m., July 1, by Bureau of Reclamation, Denver, Colo., for furnishing one 6000-hp. vertical hydraulic turbine with governor and governor pump; one governor-operated pressure regulator; one 66-in. motor-operated butterfly valve; one 5000-kva. alternating current generator; four 1667-kva. 2300 to 19100/33000 Y volt transformers; and one switchboard and auxiliary apparatus, for the Shoshone power plant, Shoshone project, Wyoming. 5-31

OPPORTUNITY PAGE

RATES: *Situations wanted, 5c per word,* MINIMUM CHARGE, *$1.00;* HELP WANTED, *no charge to Subscribers;* OFFICIAL BIDS, *15c per line;* ALL OTHERS, *$2.00 per column inch or fraction thereof*

BIDS RECEIVED

TACOMA, WASH.—J. E. Bonnell & Sons, Tacoma, $235,765 for sandstone or terra cotta and $161,735 for cement, low bid to City for superstructure for Cushman Power House No. 2.

FLOOD CONTROL WORK

BIDS RECEIVED

LOS ANGELES CALIF.—Low bids as follows by L. A. County Flood Control District: (1) Pelton Water Wheel Co.. S. F., $14,900 low for one 72-in. by 60-in. needle valve for Big Tujunga Dam; and (2) Chapman Valve Mfg. Co., L. A., $17,921 low for rect. slide gates. 5-21

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Awards as follows by Los Angeles County Flood Control District: (1) To D. A. Foley & Co., Grant Bdg., L. A., $10,237 for earth levees along banks of San Gabriel River from Center St. to Norwalk-Clearwater Road; and (2) To Hauser Construction Co., Security Bdg., Long Beach, $117,500 for riprap and railroad tracks on levee of Los Angeles River near Long Beach. 5-21

LOS ANGELES, CALIF.—Awards as follows by Los Angeles County Flood Control Dist.: (1) To L. A. Cement Gun Co., Union League Bdg., L. A., $35,868 for guniting levees on San Gabriel River from Center St. to Washington St.; and (2) To W. E. Sims, 742 Lyon Bdg., L. A., $16,663 for constructing reinf. conc. storm drain in Verdugo Wash. 5-21

RIVER and HARBOR WORK

WORK CONTEMPLATED

LONG BEACH, CALIF.—Plans by Neptune Pier Co., Silver Spray Pier, Long Beach, for new pier to be 1465 ft. long, and 380 ft. wide, involving: 650,000 cu.yd. hydraulic fill, 60,000 tons rock riprapping, 2000 tons of steel, 9100 ft. concrete, 70,000 ft. wooden piling, steel sheet pile bulkhead. $1,500,000. 5-31

SACRAMENTO, CALIF.—Plans by U. S. Engineers' Office, California Fruit Bldg., Sacramento; bids soon for following work on Stockton deep-water channel project: 688,000 cu.yd. clamshell dredging at east end of New York slough near Antioch. 118,000 cu.yd. clamshell dredging at West Island near Antioch Bridge. 9,000 cu.yd. clamshell dredging at mouth of Mokelumne River. 5-24

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 10 a.m., June 11, by Mgr., Harbor Dept., City Hall, L. A., for dredging Fish Harbor and entrance, involving: 185,000 cu.yd. dredging Fish Harbor, 115,000 cu.yd. dredging entrance. 5-31

OAKLAND, CALIF.—Bids to 4:30 p.m., June 23, by Oakland Port Commission, Oakland Bank Bldg., Oakland, for extension of the Outer Terminal Wharf at the foot of 14th St., to be 348 ft. long and 224 ft. wide. The outer 73 ft. will be concrete pile foundation on concrete slab deck; the inner 132 ft. will be concrete slab deck on earth-fill, and the balance is creosoted apron wharf; $200,000. 6-3

BIDS RECEIVED

SACRAMENTO, CALIF.—Daniel Contracting Co., 503 Market St., S. F., $2.65 per ton low for 3000 tons of riprap stone near Rio Vista Bridge for U. S. Engineer's Office. 5-29

CONTRACTS AWARDED

PORTLAND, ORE.—To Baker Const. Co., 333 Oak St., Portland, Ore., $95,500 for constructing pipe foundations at Municipal Terminal No. 4.

LIGHTING SYSTEMS

BIDS BEING RECEIVED

FORT MASON, CALIF.—Bids to 11 a.m., June 16, by Office Constructing Quartermaster, Fort Mason, for a Night Lighting Installation at Crissy Field, Presidio of San Francisco. 5-23

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To E. J. Treacy, Call Bdg., San Francisco, who bid $16,280 to Board of Public Works for street lighting system on Hyde St., from Market St. to California St. 5-31

TUNNEL CONSTRUCTION

BIDS RECEIVED

PORTLAND, ORE.—Lee Avery, Portland, $6140, low bid to District Forester, Portland, for 500 ft. 4x7 ft. unlined tunnel at Oregon Caves.

RAILROAD CONSTRUCTION

CONTRACTS AWARDED

MARE ISLAND, CALIF.—Subcontracts awarded as follows by MacDonald & Kahn, contractors, 315 Montgomery St., San Francisco, in connection with railroad and shell houses at Naval Yard Ammunition Depot, Mare Island: (1) To D. McDonald, P. O. Box 170, Sacramento, for grading work involving 165,000 cu.yd. excavation. (2) To Worden & Forsythe, 264 Sybil Ave., San Leandro, for the track work. 6-2

MACHINERY and SUPPLIES

BIDS BEING RECEIVED

TAFT, CALIF.—Bids to 7 p.m., June 16, by City Clerk for one Caterpillar ten motor patrol, or equal, standard equipment, 10-ft. blade with scarifier, equipped with 8-in. flat track shoes and canopy top. 5-22

BIDS BEING RECEIVED

MODESTO, CALIF.—Bids to 11 a.m., June 16, by Modesto Irrigation District, Modesto, for furnishing and delivering copper wire under Specification No. E-16. 5-31

OROVILLE, CALIF.—Bids to 2 p.m., June 23, by County Clerk, Court House, Oroville, for 35,000 tons of crushed rock for county highways. 5-29

ORANGE, CALIF.—Bids to 1 p.m., June 17, by City Clerk, for furnishing cast-iron pipe, as follows: 700 ft. 8-in. B, or Class 150, water pipe; 2500 ft. 6-in. B, or Class 150, water pipe. 5-31

CONTRACTS AWARDED

ARCADIA, CALIF.—To Pacific States Cast Iron Pipe Co., L. A., 5975 ft. for 2165 ft. 6-in. Class 150 cast iron pipe.

SACRAMENTO, CALIF.—To Crane Co., Sacramento, at $441 for 60 ft. welded dredge pipe, 21-in. diam., for U. S. Engineer's Office. 5-31

MISCELLANEOUS

CONTRACTS AWARDED

HAWTHORNE, NEV.—To Schuler & McDonald, 1723 Webster St., Oakland, who bid $82,494 to Bureau of Yards & Docks, Navy Department, Washington, D. C., for buildings, construction of beach improvements, and 16½ miles of wire fencing at Naval Ammunition depot. 5-26

BUILDING CONSTRUCTION

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 10 a.m., June 18, by L. A. City Harbor Dept., for steel and concrete transit shed to be 120 x 320 ft., at Berth 181. 6-2

OAKLAND, CALIF.—Bids to 10:30 a.m., June 24, by County, for stucco and reinf. conc. club and lodge building at Emeryville; $55,000. 6-2

SAN JOSE, CALIF.—Bids to 4 p.m., June 19, by Board of Education for: (1) 2-story frame and stucco Gardner School, to cost $60,000; and (2) Stucco and reinf. conc. addition to Roosevelt High School, $150,000. 5-23

BIDS RECEIVED

PALO ALTO, CALIF.—K. E. Parker, 135 So. Park, S. F., $341,650, low bid to City for 4-story "A" terra cotta and reinf. conc. Hospital for City. Reed & Corlett, Oakland, are architects. 6-3

CONTRACTS AWARDED

ALTURAS, CALIF.—To J. P. Brennan, 237 Butte St., Redding, at $93,181 for concrete and stucco grammar school at Alturas for Alturas Grammar School Board. 5-28

GRIMES, CALIF.—Awards as follows by Grand Island Union Grammar School District for brick school: GENERAL—To Mathews Const. Co., Forum Bdg., Sacramento, $41,000, and HEATING—To Scott Plumbing & Electric Co., 1900 M. St., Sacramento, $4069.

HAYWARD, CALIF.—To Geo. Hudson, 2558 35th Ave., Oakland, at $25,998 for rein. conc. addition to Bret Harte School for Board of Education. 5-28

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To Jacks & Irvine, Call Bdg., San Francisco, $64,126 for gymnasium at Playground Field House, on Portola Playground, Felton and Hamilton Sts., for Playground Commission. 5-23

OPPORTUNITY PAGE

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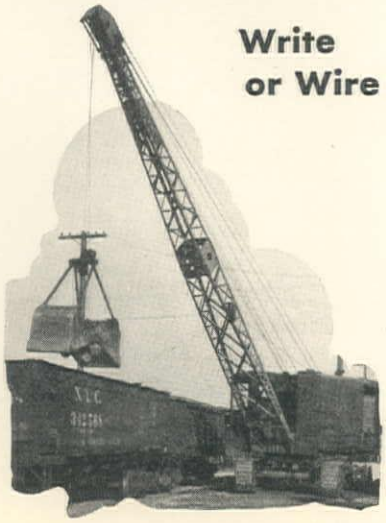

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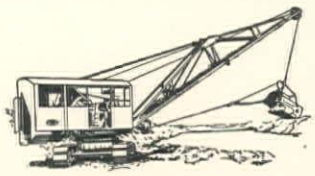

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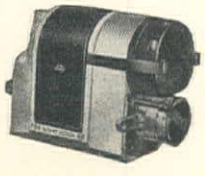

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Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.

Bonds, Surety (Continued)
Great American Indemnity Co.
Indemnity Insurance Co. of North America
Maryland Casualty Co.
Massachusetts Bonding & Insurance Co.
New Amsterdam Casualty Co.
Rolph, James Jr., Landis & Ellis

Brick, Common
Kartschoke Clay Products Co.

Bridge Plates, Bronze Expansion
Greenberg's Sons, M.
Western Iron Works, S. F.

Buckets (Elevator and Conveyor)
Bacon Co., Edward R.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Lakewood Engr. Co.
Link-Belt Co.

Buckets, Dredging
Haiss Mfgr. Co., Geo.
Harnischfeger Sales Corp.
Owen Bucket Co.

Buckets, Excavating
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co.
Haiss Mfgr. Co., Geo.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Marion Steam Shovel Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Williams Co., G. H.

Buckets, Rehandling
Bacon Co., Edward R.
Garfield & Co.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Lakewood Engr. Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Williams Co., G. H.

Cableways
American Steel & Wire Co.
Bacon Co., Edward R.
Jenison Machinery Co.
Leschen & Sons Rope Co., A.
Young Machy. Co., A. L.

Cars, Industrial
Bacon Co., Edward R.
Jenison Machinery Co.
Lakewood Engr. Co.

Carts, Concrete
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Castings, Brass and Bronze
Greenberg's Sons, M.

Castings, Iron and Steel
American Cast Iron Pipe Co.
Industrial Brownhoist Corp.
Link-Belt Co.
U. S. Cast Iron Pipe & Fdy. Co.

Castings, Street and Sewer
U. S. Cast Iron Pipe & Fdy. Co.

Cement
Portland Cement Association

Chemicals
California Filter Co., Inc.
Great Western Electro-Chemical Co.

Chlorinators
California Filter Co., Inc.
Wallace & Tiernan
Water Works Supply Co.

Chlorine
Great Western Electro-Chemical Co.

Chutes, Concrete
Bacon Co., Edward R.
Garfield & Co.
Haiss Mfgr. Co., Geo.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Lakewood Engr. Co.

Clarifiers, Water
Dorr Co., The
Wallace & Tiernan Co.

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

Concrete Buckets
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Young Machy. Co., A. L.

Concrete Curing
Concrete Curing Co.
McEverlast, Inc.

Concrete Forms
Harron, Rickard & McCone Co.

Concrete Roads
Portland Cement Association

Conveyors, Portable
Diamond Iron Works, Inc.
Haiss Mfgr. Co., Geo.
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Conveyors, Elevating and Conveying
Bacon Co., Edward R.
Bodinson Mfg. Co.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Co.

Cranes (Electric, Gasoline Locomotive)
American Hoist & Derrick Co.
Austin Machy. Corp.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co
Hackley Equipment Co., P. B.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.
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

Crushers
Austin Western Road Machy. Co., The
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

Curing—Concrete
Concrete Curing Co.
McEverlast, Inc.

Cutting Apparatus
Oxweld Acetylene Co.
Victor Welding Equipment Co.

Dams
Ambursen Dam Co., Inc.

Derricks
Bacon Co., Edward R.
Garfield & Co.
Harron, Rickard & McCone Co.

Derricks (Continued)
Industrial Brownhoist Corp.
Jenison Machinery Co.
Young Machy. Co., A. L.

Ditch Machinery
Bacon Co., Edward R.
Bucyrus-Erie Co.
Cleveland Trencher Co.
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.
Northwest Engineering Co.
Ohio Power Shovel Co., The
Orton Crane & Shovel Co.
Thew Shovel Co., The

Draglines
Austin Machy. Corp.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.
National Equipment Corp.
Northwest Engineering Co.
Ohio Power Shovel Co.
Sauerman Bros., Inc.
Spears-Wells Machy. Co.
Speeder Machinery Corp.
Thew Shovel Co., The
Universal Crane Co., The
Young Machy. Co., A. L.

Drain Tile
Gladding, McBean & Co.
Gladding Bros. Mfg. Co.
Pacific Clay Products

Drills, Rock
Bacon Co., Edward R.
Gardner-Denver Co.
Harron, Rickard & McCone Co
Ingersoll-Rand Co.
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.

Engines, Gasoline and Steam
Bacon Co., Edward R.
Continental Motors Corp.
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
Austin Western Road Machy. Co., The
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Cleveland Tractor Co., The
Excavating Equipment Dealers, Inc.
Garfield & Co.
Haiss Mfgr. Co., Geo.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Industrial Brownhoist Corp.
Jenison Machinery Co.
Link-Belt Co.
Marion Steam Shovel Co.
National Equipment Corp.
Northwest Engineering Co.
Ohio Power Shovel Co.

(Continued on page 78)

OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

Hydraulic and Electrical Equipment

Washington, D. C., May 14, 1930

Sealed bids (Specifications No. 512) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 3 o'clock p.m., July 1, 1930, and will at that hour be opened, for furnishing one 6000-horsepower vertical hydraulic turbine with governor and governor pump, one governor-operated pressure regulator, one 66-inch motor-operated butterfly valve, one 5000-kv-a. alternating current generator, four 1667-kv-a. 2300 to 19100/33000 Y volt transformers and one switchboard and auxiliary apparatus, for the Shoshone power plant, Shoshone project, Wyoming. All apparatus will be installed by the Government. For particulars, address the Bureau of Reclamation, Powell, Wyoming; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD, Commissioner.

NOTICE TO CONTRACTORS

Pumping Unit

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8:00 p.m., Wednesday, June 25, 1930, and will at that hour be opened, for constructing and furnishing, f.o.b. Lafayette, California, second pumping unit and equipment for Lafayette Pumping Plant, Mokelumne River Project.

Plans and specifications for this work may be obtained at Room 33 of the office of the District.

JOHN H. KIMBALL, Secretary.
Oakland, Calif., May 29. 1930.

NOTICE TO BIDDERS

Filtration Plant, Pumps, Etc.

Water Works Improvements, City of Weiser, Idaho

Sealed proposals will be received by the City Clerk of the City of Weiser, Idaho, up to 7:30 p.m. o'clock of the 24th day of June, 1930, for the construction of Water Works Improvements, in accordance with the plans and specifications therefor, on file with the City Clerk of Weiser, Idaho, and at the office of Burns-McDonnell-Smith Engineering Company, 455 Western Pacific Building, Los Angeles, California, and 406 Interstate Building, Kansas City, Missouri.

Separate proposals will be received as follows:

Section 1—**Filtration Plant and River Intake Construction.**

General contract for all concrete work, brick building, installation of pumps and piping, electrical wiring, etc., required for construction of 1½ million gallons per day filtration plant, and construction of intake into Snake River.

Section 2—**Filter Equipment.**

Furnishing and installing all filter equipment, piping, sand and gravel for two filter units, total capacity 1000 gallons per minute.

Section 3—**Pumping Equipment.**

Furnishing f.o.b. Weiser, Idaho, direct connected motor driven units as follows:

One (1) 1000 g.p.m. high service pump.
One (1) 1000 g.p.m. low service pump.
One (1) 500 g.p.m. low service pump.
One (1) 4000 g.p.m. wash water pump.
And required electrical control equipment.

Each proposal must be accompanied by a check certified by a responsible bank and payable to the City Clerk of the City of Weiser, Idaho, for an amount not less than ten per cent (10%) of the aggregate of the proposal, as a guarantee that the bidder will enter into contract, if his proposal be accepted by the City.

Prospective bidders may secure plans and specifications from the City Clerk or from the Engineers. A deposit of $15.00 will be required on plans and specifications for Sections 1 and 2, one-half of which will be refunded upon return of plans in good condition, within ten (10) days after date of receiving proposals. No deposit required on specifications for Section 3.

No bid will be considered unless made on regular proposal form as furnished by the City Clerk or by the Engineers. The City reserves the right to reject any and all bids, or to accept the bid deemed for the best interests of the City.

Engineers: Burns-McDonnell-Smith Engineering Company, 455 Western Pacific Bldg., Los Angeles, California; 406 Interstate Bldg., Kansas City, Missouri.

CITY OF WEISER, IDAHO.
F. S. GWILLIAM, Mayor.
JOHN J. FULLER, City Clerk.

NOTICE TO CONTRACTORS

Bridge

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8:00 p.m., Wednesday, June 25, 1930, and will at that hour be opened, for constructing and erecting the highway bridge over Upper San Leandro Creek in Contra Costa County, California.

Specifications may be obtained upon application at Room 33 of the office.

JOHN M. KIMBALL, Secretary.
Oakland, Calif., May 29, 1930.

UNITED STATES DEPARTMENT OF THE INTERIOR

NATIONAL PARK SERVICE

Oiling

Grand Canyon, Arizona, June 3, 1930

Sealed bids, in single copy only, subject to the conditions contained herein, will be received until 10:00 o'clock a.m. on the 24th day of June, 1930, and then publicly opened, for furnishing all labor and materials, except Government furnishes fuel oil, and performing all work required for constructing a plant-mixed oil treated crushed rock surfacing on Sections A3, B, C, D and F of Route No. 1, Grand Canyon-Desert View, in Grand Canyon National Park, Coconino County, Arizona. The project is approximately 18.46 miles in length and the principal items of work are approximately as follows:

Preparing roadway, 18.46 miles.

Crushed rock for subgrade, 1000 tons.

Oil treated crushed rock surfacing, 35,133 tons.

Supplemental oil-treated crushed rock, 1846 tons.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid an attested statement, on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Plans and specifications for the work are available at the office of the Bureau of Public Roads, 508 Ellis Building, Phoenix, Arizona.

Where copies of plans and specifications are requested, a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five (5) per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within one hundred fifty (150) calendar days from that date exclusive of any time which may intervene between the effective date of orders of the Government to suspend operations on account of weather conditions and the effective date of orders to resume work and subject to such extensions as may be provided for under the Special Provisions.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the contracting officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitations.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Road Construction. To be opened 10:00 a.m., June 24, 1930.

Grand Canyon National Park, Project 1-A3, B, C, D and F. Surfacing Office of Park Superintendent, Grand Canyon, Arizona.

C. H. SWEETSER,
District Engineer, Bureau of Public Roads.

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PUBLIC ROADS

Surfacing

San Francisco, California, May 24, 1930

Sealed bids, in single copy only, subject to the conditions contained herein, will be received until 2 o'clock p.m. on the 17th day of June, 1930, and then publicly opened, for furnishing all labor and materials and performing all work for surfacing Section B, Strawberry-Phillips, of Route No. 32, Placerville-Lake Tahoe National Forest Highway, located in the Eldorado National Forest, Eldorado County, California. The length of the project to be surfaced is 4.20 miles. The principal items of work are approximately as follows:

Unclassified excavation for borrow, 4000 cu.yd.
Fine grading subgrade and shoulders, 4.20 miles.
Crushed rock surfacing, 10,300 cu.yd.
Supplemental crushed rock, 800 cu.yd.
Watering, 700 M gal.
Providing and maintaining water plant, lump sum.
Maintenance of existing road and sections accepted for traffic (ext. work est. $1000).
Coarse screenings, 1060 cu.yd.
Fine screenings, 560 cu.yd.
Right of way monuments (in place), 60 each.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid an attested statement on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Where copies of plans and specifications are requested, a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five (5) per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within one hundred twenty-five (125) calendar days from that date exclusive of any time that may intervene between the effective date of orders of the Government to suspend operations on account of weather conditions and the effective date of orders to resume work and subject to such extensions as may be provided for under the Special Provisions.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the Contracting Officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Award of contract will not be made unless and until the necessary funds therefor are appropriated by Congress or otherwise made available.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Road Construction. To be opened 2 p.m., June 17, 1930.

Project 32-B1, Strawberry-Phillips Section, Placerville-Lake Tahoe National Forest Highway, 807 Sheldon Bldg., 461 Market St., San Francisco, Calif.

C. H. SWEETSER, District Engineer.

THE BUYERS' GUIDE—*Continued from Page 76*

Excavating Mchy.(Continued)
Orton Crane & Shovel Co.
Owen Bucket Co.
Sauerman Bros., Inc.
Speeder Machinery Corp., The
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 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

Hoists, Hand and Power (Continued)
Jenison Machinery Co.
Link-Belt 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 Co.

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

Hydro-Tite
Industrial & Municipal Supply Co.

Incinerators
Nye Odorless Incinerator Co.

Insurance, Casualty
Associated Indemnity Corp.
Commerce Casualty Co.
Consolidated Indemnity & Insurance 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.
Massachusetts Bonding & Insurance 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 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.
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.
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—Bell and Spigot
National Cast Iron Pipe Co.

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.
Gladding Bros. Mfg. 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

(Continued on page 80)

OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

NOTICE INVITING SEALED BIDS OR PROPOSALS

Pier Construction

In accordance with resolutions and instructions, duly passed by the City Council of the City of Huntington Beach, California, on the twelfth (12th) day of May, 1930 A. D., notice is hereby given that the City Clerk of said City of Huntington Beach will at the hour of seven-thirty (7:30) p.m. on the twenty-third (23rd) day of June, 1930 A. D., receive sealed bids for the reconstruction, extension, and repair of the municipal pier, with its appurtenances, in the City of Huntington Beach.

Said bids shall be for the furnishing of all equipment, materials, labor, and other requirements necessary for the proper construction and completion of the work in accordance with the specifications, plans, profiles and detail drawings on file in the office of the City Engineer of the said City of Huntington Beach, said plans, profiles and detail drawings are designated as "Plans of Improvement, Huntington Beach Municipal Pier" and are composed of eleven (11) sheets.

Upon a deposit of twenty-five (25) dollars, copies of plans, profiles, detail drawings, specifications, proposal blanks, and contract may be obtained by the prospective bidders from the City Engineer of said City of Huntington Beach, fifteen (15) dollars of which will be refunded if said plans, profiles, detail drawings, specifications, proposal blanks, and contract are returned in good condition to the said City Engineer of Huntington Beach on or before the tenth (10th) day of July, 1930 A. D., the remaining ten (10) dollars to be retained by the City of Huntington Beach.

All bids must be upon a form provided by the City Engineer and must be filed with the City Clerk of Huntington Beach on or before the hour of seven-thirty (7:30) p.m. on the twenty-third (23rd) day of June, 1930 A. D., and bids will be opened and examined by the City Council of said City on said date and hour.

Attached to each proposal, there shall be a Bidder's Bond or a certified check, executed in favor of the City of Huntington Beach, for ten thousand (10,000) dollars which shall be returned to the bidder should the bid not be accepted by the City of Huntington Beach. If upon acceptance of the bid, the bidder does not enter into contract within a period of ten (10) days from date of such acceptance, said bidder's bond or certified check shall be forfeited to the City of Huntington Beach as admitted damages to the said City of Huntington Beach.

The City Council of said City hereby reserves the right to reject any and all bids and to accept the bid or bids deemed for the best interest of the City of Huntington Beach.

Active work shall start within twenty (20) days after signing of contract.

By order of the City Council, this, the 22nd day of May, 1930.

C. R. FURR, City Clerk.

Grading

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PUBLIC ROADS

San Francisco, California, June 5, 1930.

Sealed bids, in single copy only subject to the conditions contained herein, will be received until 2:00 o'clock p.m. on the 26th day of June, 1930, and then publicly opened, for furnishing all labor and materials and performing all work for grading Section B of Route 1, Lake Tahoe National Forest Highway, in Tahoe National Forest, Washoe County, Nevada. The length of the project to be graded is 2.36 miles and the principal items of work are approximately as follows:

Clearing, 18 acres.
Unclassified excavation, 57,000 cu.yd.
Structural excavation, 400 cu.yd.
Overhaul, 18,500 sta.yd.
Finishing earth graded road, 2.36 miles.
Concrete in place, 122 cu.yd.
Reinforcing steel, 9500 lb.
Corr. metal pipe in place, 942 lin.ft.
Maintenance of existing road and sections accepted for traffic, extra work, estimate $1000.
Right of way monuments in place, 50 each.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid an attested statement, on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Where copies of plans and specifications are requested, a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within one hundred eighty (180) calendar days from that date, exclusive of any time that may intervene between the effective date of orders of the Government to suspend operations on account of weather conditions and the effective date of orders to resume work and subject to such extensions as may be provided for under the Special Provisions.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the Contracting Officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Award of contract will not be made unless and until the necessary funds therefor are appropriated by Congress or otherwise made available.

Envelopes containing bids must be sealed, marked, and addressed as follows:

Bid for Road Construction. To be opened 2:00 p.m., June 26, 1930.
Incline-State Line Section, Lake Tahoe National Forest Highway, Route 1, 807 Sheldon Bldg., 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

Grading

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

San Francisco, California, June 5, 1930.

Sealed bids, in single copy only, subject to the conditions contained herein, will be received until 2:00 o'clock p.m. on the 26th day of June, 1930, and then publicly opened, for furnishing all labor and materials and performing all work for grading Section "C" of Route No. 3, Glenbrook National Forest Highway, located in the Tahoe National Forest, Douglas County, Nevada.

The length of the project to be graded is 2.58 miles. The principal items of work are approximately as follows:

Unclassified excavation, 62,361 cu.yd.
Structural excavation, 230 cu.yd.
Overhaul, 12,338 sta.yd.
Finishing earth graded road, 2.58 miles.
Class B concrete, 35 cu.yd.
Class C concrete, 20 cu.yd.
Reinforcing steel, 3500 lb.
C. M. pipe (in place), 1150 lin.ft.
Maintenance of existing road and sections accepted for traffic, extra work, estimate $1000.
Hauling and piling logs, lump sum.
Right of way monuments (in place), 64 each.

Proposals will be received from capable and responsible contractors who must submit with their request for Standard Government Form of Bid an attested statement, on forms to be supplied by the District Engineer, of their financial resources and construction experience. Standard Government Form of Bid will be supplied only to contractors showing sufficient experience and financial resources to properly construct the work contemplated.

Where copies of plans and specifications are requested, a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Federal Reserve Bank of San Francisco.

Guarantee will be required with each bid as follows: In the amount of five (5) per cent of the bid.

Performance bond will be required as follows: In the amount of one hundred (100) per cent of the total contract price. Performance shall begin within ten (10) calendar days after date of receipt of notice to proceed and shall be completed within one hundred eighty (180) calendar days from that date exclusive of any time which may intervene between the effective date of orders of the Government to suspend operations on account of weather conditions and the effective date of orders to resume work and subject to such extensions as may be provided for under the Special Provisions.

Liquidated damages for delay will be the amount stated in the Special Provisions for each calendar day of delay until the work is completed and accepted.

Partial payments will be made as the work progresses for work and material delivered if such work and material meet the approval of the Contracting Officer.

Article on patents will be made a part of the contract.

Bids must be submitted upon the Standard Government Form of Bid and the successful bidder will be required to execute the Standard Government Form of Contract for Construction.

The right is reserved, as the interest of the Government may require, to reject any and all bids, to waive any informality in bids received, and to accept or reject any items of any bid, unless such bid is qualified by specific limitation.

Award of contract will not be made until and unless the necessary funds therefor have been appropriated by Congress or otherwise made available.

Envelopes containing bids must be sealed, marked and addressed as follows:

Bid for Road Construction. To be opened 2:00 p.m., June 26, 1930.
Project 3-C1, Cave Rock Section, Glenbrook National Forest Highway, 807 Sheldon Bldg., 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

NOTICE TO CONTRACTORS

Bids will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth street, Oakland, California, until 5 p.m., June 18, 1930, for 20 tons of copper sulphate.

Specifications may be obtained at the office of the District—Room 21.

(Signed) F. W. HANNA, General Manager.

THE BUYERS' GUIDE—*Continued from Page 78*

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

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., The
Bacon Co., Edward R.
Caterpillar Tractor 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
Austin Western Road Machy. Co., The
Bacon Co., Edward R.
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.
Harron, Rickard & McCone Co.
Jenison Machinery 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 Co.
Smith Engineering Co.
Young Machinery Co., A. L.

Screens, Sewage
Dorr Co., The
Link-Belt Co.

Screens, Vibrating
Harron, Rickard & McCone Co.
Link-Belt Co.
Smith Engineering Co.

Second-Hand Equipment
Atkinson Construction Co.
Contractors Mchy. Exchange
Excavating Equipment Dealers, Inc.
Fisher, Ross, MacDonald & Kahn, Inc.
Hackley Equipment Co., P. B.
Harron, Rickard & McCone Co.
Tieslau Bros.

Sewage Disposal Apparatus
Dorr Co., The
Industrial & Municipal Supply Co
Link-Belt Co.
Wallace & Tiernan
Water Works Supply Co.

Sewer Joint Compound
Ric-Wil Co., The

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 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.
Jenison Machinery Co.

Standpipes
Chicago Bridge & Iron Works
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Steel Bands
Pacific Coast Steel Co.

Steel, Drill
Gardner-Denver Co.
Ingersoll-Rand Co.
Leitch & Co.
Rix Company, Inc., The

Steel Plates
Pacific Coast Steel Co.

Steel Plate Construction
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Steel, Structural
Pacific Coast Steel Co.
Western Iron Works
Western Pipe & Steel Co.

Street Sweepers, Sprinklers, Flushers
Austin Western Road Machy. Co., The
Jenison Machinery Co.

Steel Joists
Truscon Steel Co.

Steel Windows
Truscon Steel Co.

Subgraders
Bacon Co., Edward R.
Blaw-Knox Co.
Harron, Rickard & McCone Co.
Lakewood Engineering Co.

Swimming Pool Equipment
California Filter Co., Inc.

Tanks, Air Compressor
Ingersoll-Rand Co.
Lacy Manufacturing Co.
Peerless Mchy. & Mfg. Co.
Rix Company, Inc., The
Western Pipe & Steel Co.

Tanks, Corrugated
California Corrugated Culvert Co.
Western Pipe & Steel Co.

Tanks, Elevated Steel
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

Tanks, Oil Storage
Chicago Bridge & Iron Works
Lacy Manufacturing Co.
Steel Tank & Pipe Co.
Western Pipe & Steel Co.

Tapes, Measuring, Steel and Fabric
Lufkin Rule Co., The

Testing Laboratories
Hunt Co., R. W.

Tie Plates
Pacific Coast Steel Co.

Torches (Welding and Cutting)
Oxweld Acetylene Co.

Towers, Transmission
Pacific Coast Steel Co.
Water Works Supply Co.

Tractors
Bacon Co., Edw. R.
Caterpillar Tractor Co.
Cleveland Tractor Co.
International Harvester Co.
National Brake & Electric Co.
United Tractor & Equipment Corp.
West Coast Tractor Co.

Tramways
American Steel & Wire Co.
Bacon Co., Edward R.
Leschen & Sons Rope Co., A.

Transmission Machinery, Power
Bodinson Mfg. Co.
Link-Belt Co.

Transportation, Water
American-Hawaiian Steamship Co.

Trench Excavators
Cleveland Trencher Co., The
Garfield & Co.
Harnischfeger Sales Corp.
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Jenison Machinery Co.
Link-Belt Co.
Thew Shovel Co., The

Truck Cranes
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Harron, Rickard & McCone Co.
Jenison Machinery Co.
Universal Crane Co., The

Trucks
Fageol Motors Co.
International Harvester Co.
La France Republic Corp.
Sterling Motor Truck Co.

Tunnel Shovels
Bucyrus-Erie Co.
Jenison Machinery Co.
Marion Steam Shovel Co.
St. Louis Power Shovel Co.

Turbines, Hydraulic
Pelton Water Wheel Co., The
Water Works Supply Co.

Turntables
Bacon Co., Edward R.
Harron, Rickard & McCone Co.
Jenison Machinery Co.

Unloaders, Car and Wagon
Bacon Co., Edward R.
Jenison Machinery Co.
Link-Belt Co.

Valves
California Corrugated Culvert Co.
Claussen & Co., C. G.
Industrial & Municipal Supply Co.
Pacific Pipe Co.
Water Works Supply Co.

Valves, Gate
California Corrugated Culvert Co.
Claussen & Co., C. G.
Pelton Water Wheel Co., The
Water Works Supply Co.

Valves, Hose Gate
Greenberg's Sons, M.

Valves, Hydraulic
California Corrugated Culvert Co.
Pelton Water Wheel Co.
Water Works Supply Co.

Washers, Sand and Gravel
Diamond Iron Works, Inc.
Jenison Machinery Co.
Smith Engineering Co.

Water Purification
California Filter Co., Inc.
Industrial & Municipal Supply Co.
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Water Softeners
California Filter Co., Inc.

Water Supply Installations
California Filter Co., Inc.
Industrial & Municipal Supply Co.
Wallace & Tiernan
Water Works Supply Co.

Water Transportation
American-Hawaiian Steamship Co.

Water Wheels
Pelton Water Wheel Co. The
Water Works Supply Co.

Water-Works Supplies
American Cast Iron Pipe Co.
California Filter Co., Inc.
Industrial & Municipal Supply Co.
Wallace & Tiernan
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Welding Apparatus (see Torches)
Oxweld Acetylene Co.
Victor Welding Equipment Co.

Welding Equipment
Oxweld Acetylene Co.
Victor Welding Equipment Co.

Welding Rods and Wire
Oxweld Acetylene Co.
Victor Welding Equipment Co.

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Victor Welding Equipment Co.

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Wheelbarrows
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