WCN-05-1930

WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

PUBLISHED SEMI-MONTHLY
VOLUME V NUMBER 10

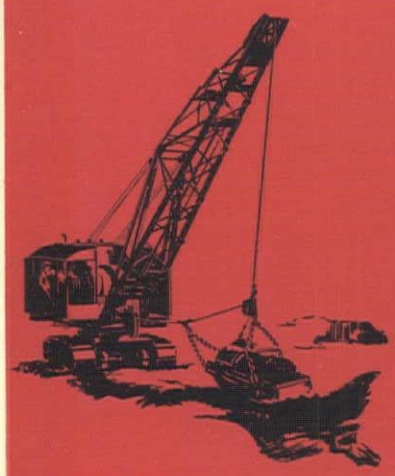
SAN FRANCISCO, MAY 25, 1930

25 CENTS A COPY
$3.00 PER YEAR

BLAST IN QUARRY FOR SALT SPRINGS ROCK-FILL DAM, MOKELUMNE RIVER PROJECT, CALIFORNIA, FOR PACIFIC GAS & ELECTRIC CO., AT INSTANT GASES WERE RELEASED FROM 116,250 LB. OF DYNAMITE, WHICH SHATTERED A GRANITE FACE 160 FT. HIGH, 45 FEET DEEP, AND 750 FT. LONG, INTO 231,700 CU.YD OF BROKEN STONE

This half-yard shovel is bigger than its rating

READILY CONVERTIBLE TO CRANE DRAGLINE SKIMMER OR HOE



HERE is a half-yard excavator that will do a bigger job than you ordinarily expect from a half-yard machine.

The reason is simple. The 300-A is built like the larger units in the P & H Line. It has the famous P & H unit cast-steel construction . . . all main frames cast in one piece . . . longer life and perfect alignment. Alloy steels are generously employed. It is the heaviest half-yard shovel built, weighing 47,200 lbs.

The 300-A is gasoline powered. It has fast line, swing and travel speeds. It can be operated and maneuvered as easily as any excavator built. The patented P & H chain crowd insures the most positive digging action known. Rated at only 75 per cent of tipping load, it has great reserve capacity.

There are many other superior structural and operating details of the 300-A . . . details which are seldom found in half-yard excavators. Write for Bulletin GH-3.

HARNISCHFEGER SALES CORPORATION
Established 1884
3890 National Ave., Milwaukee, Wis.
32 Beale St., San Francisco 2025 Santa Fe Ave., Los Angeles

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

P&H

A COMPLETE LINE

½ cu. yd. to 3½ cu. yds.

EXCAVATORS

A-522

LEADITE

Trade Mark Registered U.S. Pat. Office

Laying 36 in. c.i. pipe with LEADITE Joints. Note that back-filling is immediately following the laying

"The City of Tulsa Water Department has *Standardized* upon LEADITE for Joints in all cast iron construction"

We quote from a letter of March 29th, 1929, signed by Mr. W. F. Anderson, Superintendent of Water Department, City of Tulsa, Oklahoma, as follows:

"We have in service the following sizes and length of mains with Leadite Joints:

Length Feet	Size Inches	In Service Years	Pressure Pounds
17,000	36	3	45 to 125
5,600	30	3	45 to 125
25,000	24	3	45 to 125
2,700	20	4	45 to 100
45,000	16	3	45 to 100
9,000	12	4	45 to 100
3,000	10	4	45 to 100
1,800	8	4	45 to 100
85,000	6	4	45 to 100

"The above lines were constructed by Water Department forces and no leakage test was required, however, pressure tests showed practically no leakage."

"All joints were tight and, we consider it quite an accomplishment for our department, and very commendable for material used to construct approximately 37 miles of mains without apparent leakage. The City of Tulsa Water Department has standardized upon LEADITE for joints in all cast iron construction."

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

WATER WORKS SUPPLY COMPANY

501 Howard Street, San Francisco 2326 E. 8th St., Los Angeles
Water Works & Power Equipment Co., White Building, Seattle
THE LEADITE COMPANY—LAND TITLE BLDG., PHILADELPHIA, PA.

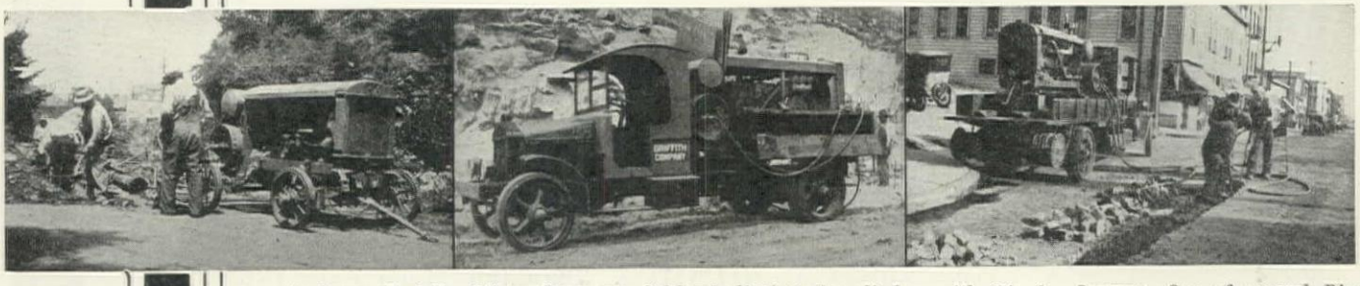
No Caulking

RIX

PORTABLE AIR COMPRESSORS

The best proof of what a RIX will save you is what it has been saving others . . SINCE 1877

SEVEN RIX SIX Compressors purchased in a single order by one buyer. Chosen from the field after exhaustive competitive tests. Picked because they *proved* their absolute dependability, their superior efficiency, their real economy—in *actual performance*. The explanation is simple. This sturdy rig is equipped with a patented *Super-Charger* perfected by RIX pioneer Engineers. This *Super-Charger* utilizes the back stroke of the piston, so you get just that much *extra* working air without paying for a higher rating. If you are interested in cheap power and quick service, get acquainted with RIX. Write for Bulletin 3-E.



AT LEFT: East Bay Water Company, Oakland, digging pipe ditches with *Rix* 6. CENTER: One of several *Rix* sixes operated by Griffith Company, Los Angeles, in road construction. AT RIGHT: Pacific Gas & Electric Co., San Francisco, breaking paving with *Rix* power.

The Compressor with the SUPER-CHARGER

COMPRESSED AIR MACHINERY R RIX X SAN FRANCISCO LOS ANGELES

SINCE 1877

RIX COMPANY, Inc.

400 Fourth St., San Francisco

PORTLAND LOS ANGELES SEATTLE

The *Pioneer* RIX line includes compressors of *all* sizes for *all* purposes. Rix Co. are also agents for COCHISE Drills, and exclusive distributors for THOR Pneumatic Tools in Los Angeles and Seattle territories.

When writing to RIX COMPANY, INC., *please mention Western Construction News*

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ASSOCIATE EDITOR

DEVOTED TO CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

VOLUME V — MAY 25, 1930 — NUMBER 10

CONTENTS

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WHY THE 1020 GIVES YOU MORE FOR YOUR MONEY!

All the operating machinery is back of the center pin—giving the crane an extra margin of counterbalance for heavy lifting. Also, as a shovel, more stability in hard digging.

Tapered drums prevent fouling of cable—the cable winds smoothly and lays up evenly, outside to center. The taper also gives greater power at the start—then increased speed.
Note how these drums are split at the center for easy removal.

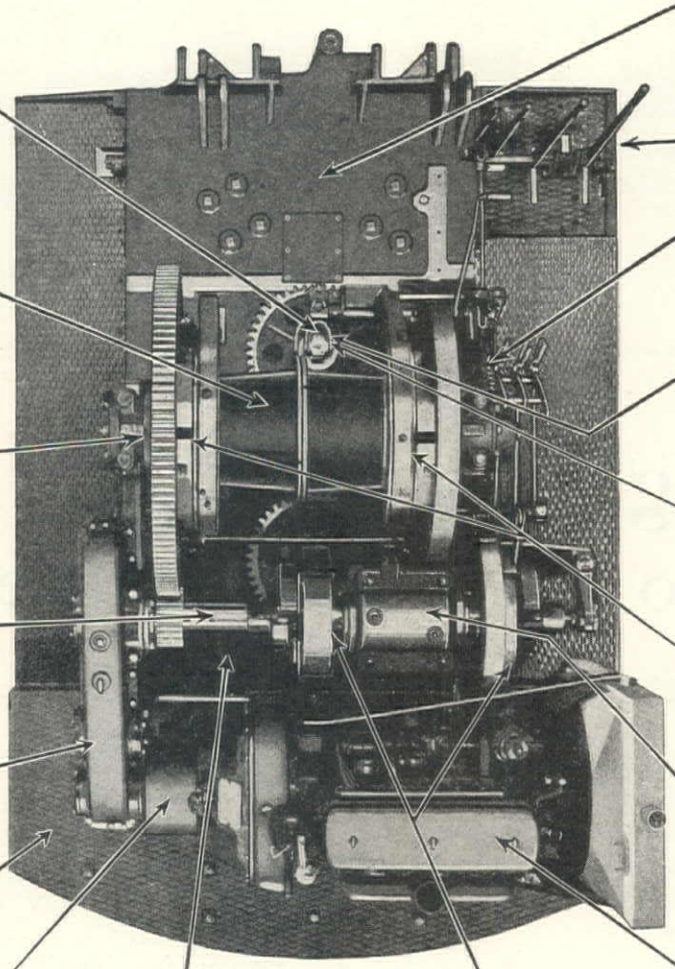
Contracting-band hoist control clutch engaged by means of auxiliary clutch — *lightens the operator's work for speedier operation.*

All shafts are greatly oversize—and every shaft above the deck runs on ball bearings. Double ball bearings on vertical take-off swing shaft. Also on fan shaft.

Transmission running in oil — keeping the oil at correct level gives complete lubrication of all power take-off shafts.

Clear deck all the way around the machine, on both sides and rear—giving complete accessibility to the machinery.

Flexible couplings between motor shaft and transmission—act as shock-absorbers, taking up any strain between these units.



Boom hoist — alloy steel machine-cut worm, and bronze machine-cut wheel, recessed in the revolving frame and running in oil.

Reversing clutches for the swing are greatly oversize — and a large brake is provided for use when the machine is on a grade.

One-piece steel turntable casting provides a rigid base for machinery—keeps all parts in *permanent alignment.* The same type of steel casting is used for the one-piece truck frame.

BUCYRUS-ERIE three-lever control.

Convenient controls for the operator — with handy push-button electric starter for the motor at reasonable extra charge.

Steering control rod runs through the center shaft, which permits complete steering control with the cab in any position.

Center shaft is adjustable from the top, and can be removed without interfering with drum shaft.

Oversize contracting-band hoist clutch and brake, with extra large wearing surfaces that insure long trouble-proof service.

Swing gears held in positive alignment by a box housing, and run in oil.

High horsepower motor gives this *BUCYRUS-ERIE* surplus power. Equipped with vacuum gas feed, air cleaner, automatic throw-out on starter. (Extra.)

A glance tells the story! Every arrow points to an outstanding feature. And taken as a whole they mean that the Bucyrus-Erie 1020 is not just another half yard rig but is a ½-yard machine with real guts! . . . From base to boom sheave every part is built to stand the gaff of steady hard work. Speedy, powerful and dependable is a short-story description of the 1020. Designed for easy accessibility, real mobility and simplicity of control, it gains your respect and regard at once. And because it is Bucyrus-Erie built, you know that operating and maintenance costs are at a minimum.

Easily convertible from Shovel to Crane, Dragline, Clamshell or Dragshovel.

Let us send you facts in full on the 1020—and on Bucyrus-Erie Service. Representatives throughout the U. S. A. Offices or distributors in all principal countries. *Branch Offices:* Boston, New York, Philadelphia, Atlanta, Birmingham, Pittsburgh, Buffalo, Detroit, Chicago, St. Louis, Dallas, San Francisco.

A-99 5-25-30—WCN

BUCYRUS-ERIE COMPANY

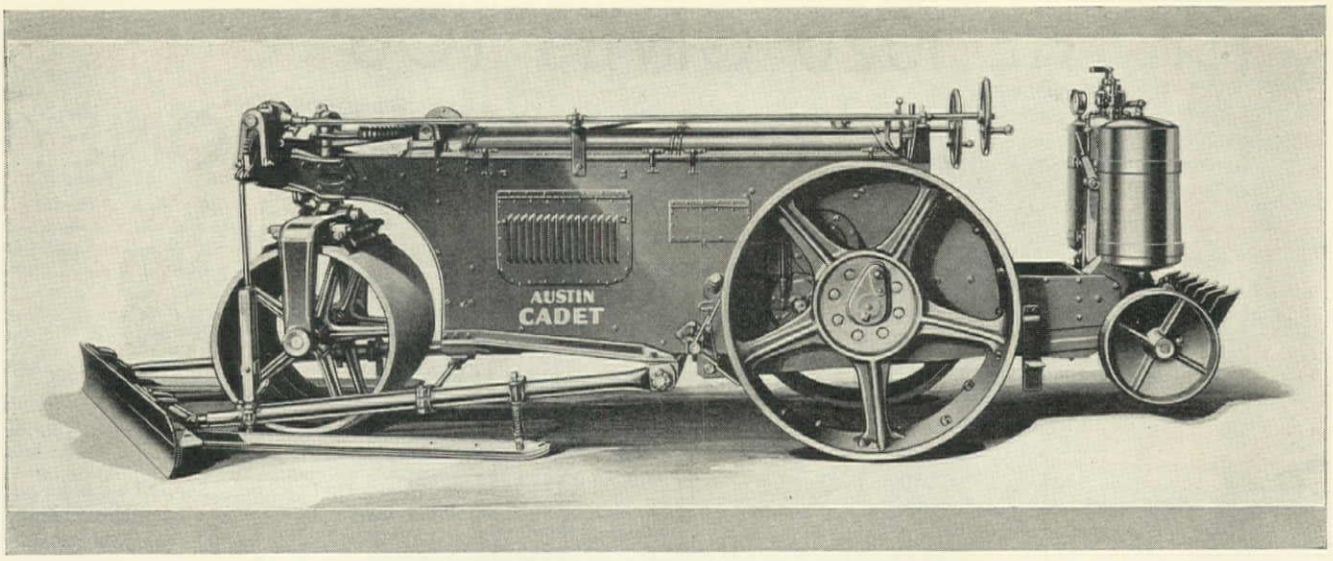
manufacturers of the only complete line—all sizes, types and powers. *Plants:* South Milwaukee, Wis., Erie, Pa., Evansville, Ind. *General Offices:* South Milwaukee, Wis.
West Coast Branch Office: 989 Folsom Street, San Francisco.

CLYDE EQUIPMENT COMPANY
Portland, Ore. Seattle, Wash.

CONCRETE MACHINERY AND SUPPLY COMPANY
Los Angeles, Calif.

BUCYRUS ERIE

When writing to BUCYRUS-ERIE COMPANY, *please mention Western Construction News*



The Austin Cadet equipped with front planing blade and with the powerful pneumatic scarifier attachment

Bringing Full-size Roller Features
to the small roller field

THE Austin Cadet is a completely factory built roller patterned after the famous 10-ton Autocrat Roller. It comes in 5, 6 and 7-ton sizes. It brings to the small or pup roller field convenient operating features that have heretofore been available only in the finest of the large rollers.

Add the advantages of a three speed transmission, both forward and reverse, to a roller with a short enough wheel base to operate between the forms of concrete roads and other "tight spots" and you have a pretty fair idea of what the Cadet has done to the small roller field.

Its streamline design gives the operator an unobstructed view of his work at all times. Construction is rugged enough to stand severest service. The 4-cylinder, heavy duty motor cranks from either side and provides ample power for leveling and scarifying as well as for rolling.

Write for complete information and booklet. The Austin-Western Road Machinery Co., 435 Brannan Street, San Francisco, Calif. Chicago Office: 400 North Michigan Ave.

Austin-Western
ROAD MACHINERY

FOR SUCCESSFUL PERFORMANCE · A.G.C.—A.

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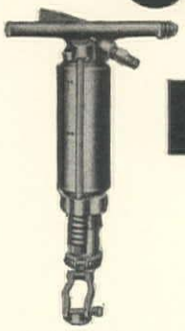
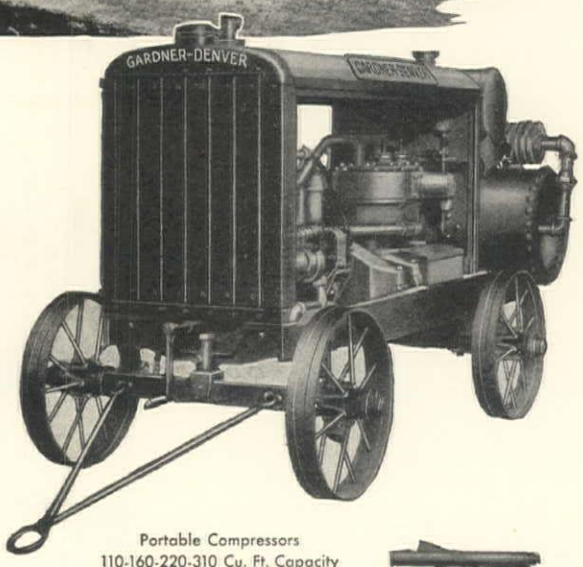
Denver Hoist
Models 3-5-6-8-10

G-D Contracting Equipment

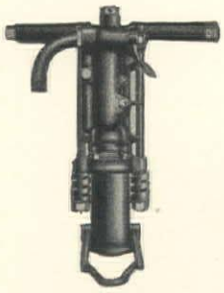


Paving Breakers
Models 415-15-15H



Portable Compressors
110-160-220-310 Cu. Ft. Capacity

Sheeting Driver
Model 15HS



Hand Sinkers
Models 411-95-11

Clay Diggers
Models 28-28A-128B

In these times of constantly increasing competition in contracting of all kinds, it is not enough to supply your men with labor-saving tools and equipment, but these also must be the most efficient and dependable that can be obtained. Gardner-Denver Portable Compressors and Industrial Tools meet the most rigid specifications and exacting demands and they are earning increased profits for contractors, everywhere. Our representatives will be glad to demonstrate them and prove our claims.

GARDNER-DENVER COMPANY

QUINCY, ILL. DENVER, COLO.

SALES OFFICES THROUGHOUT THE WORLD

GARDNER-DENVER

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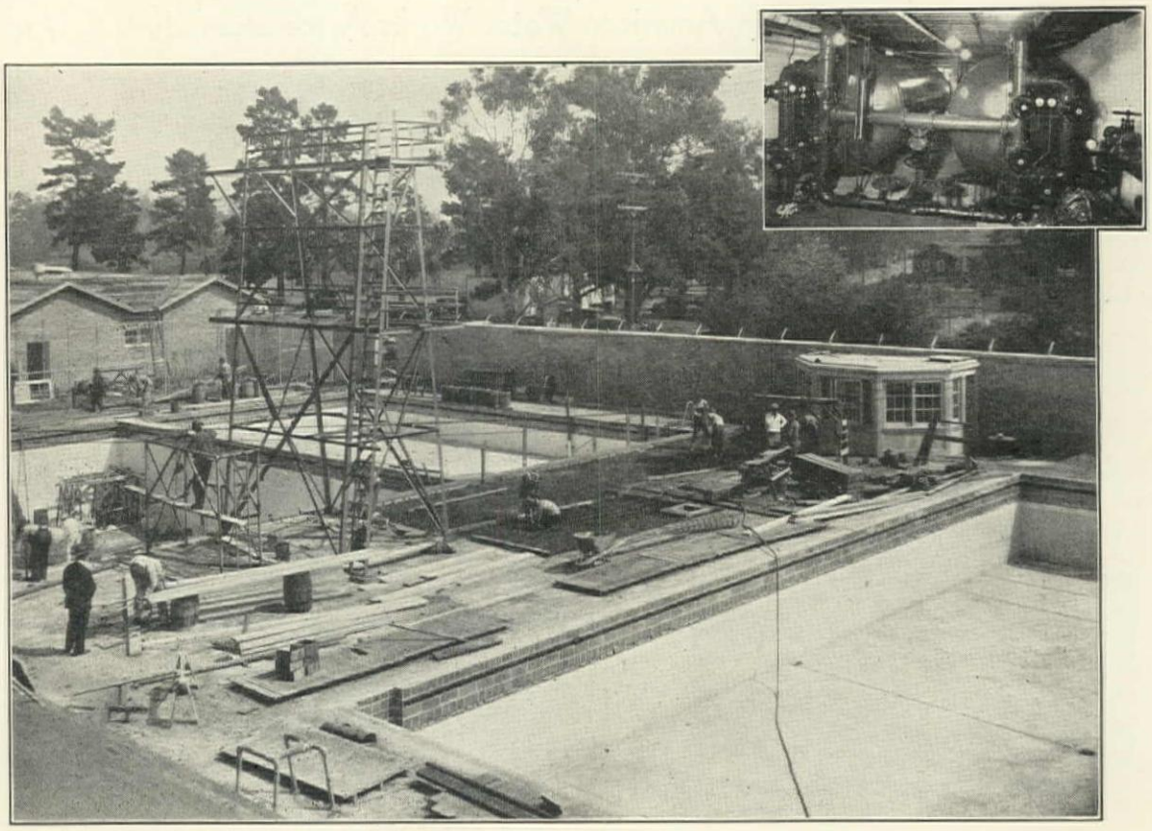


Califilter Goes Collegiate In Latest Pool Development

STANFORD UNIVERSITY'S new swimming plant, pictured above, is composed of three pools to permit the most efficient handling of candidates for the three classes of water sports. The large pool in the foreground is for varsity races and water polo; the smaller pool to the left is for diving, and the shallow pool in the background is for swimming instruction. The three pools have a combined capacity of 454,000 gallons, and it is estimated that between 300 and 400 students will use the pools daily. Accommodations are possible for 2200 spectators.

In this latest development in specialized pool planning, complete mechanical equipment was furnished by California Filter Company, and includes three pumps, one for each pool, and two horizontal pressure Califilters of the type shown in the inset, each 8 ft. in diameter by 16 ft. long. The pump and filter capacities are designed for a complete turnover of each pool in 7½ hours.

This new Stanford swimming plant is one of the finest in the country, and marks a great step in the refinement of swimming pool planning for specialized purposes. The choice of California Filter Company to supply complete mechanical equipment for the plant is a tribute to the sustained high calibre and dependability of Califilter performance.

CALIFORNIA FILTER COMPANY, Inc.

981 Folsom Street

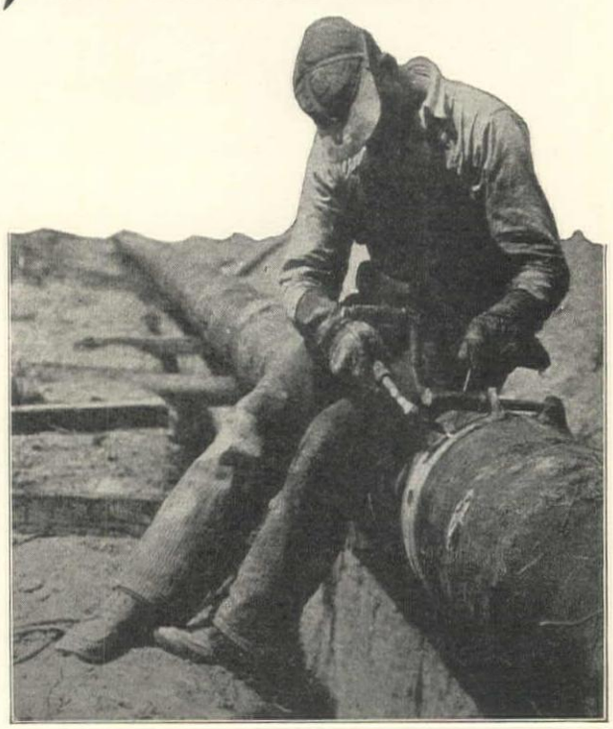
SEATTLE **SAN FRANCISCO** **LOS ANGELES**

ARMCO
INGOT IRON
...it backs your specifications with *proved performance*

WHEN you specify Armco INGOT IRON, you know beforehand that the job will endure. For this highly refined iron has behind it the longest record of *actual service* of any low-cost, rust-resisting sheets and plates.

And this is not all. With time-proved durability go such important plus-values as exceptional workability and weldability and consistent uniformity.

Armco INGOT IRON sheets and plates are available in all standard sizes, gages and thicknesses. If you have a job on the board, a member of our service organization will be glad to help you select the right material. He is as close to you as the nearest district office shown below.



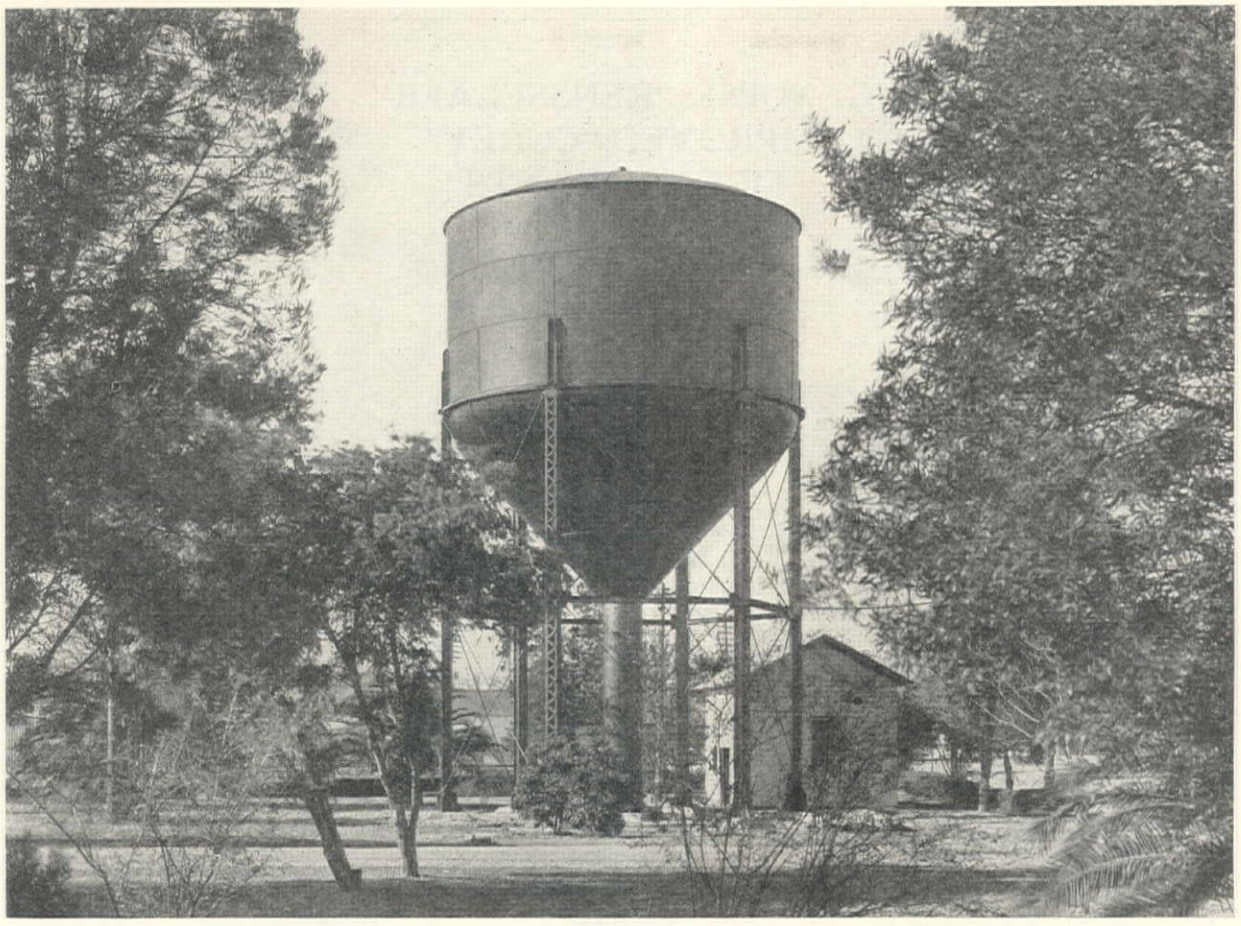
The welder is joining two sections of an Armco INGOT IRON pipe line installed for the cities of Woods Cross and Scipio, Utah. Pipe of four different diameters was used: 14-inch, 12-inch, 10-inch and 8-inch. Fabricated by the Burnham Manufacturing Company.

The AMERICAN ROLLING MILL COMPANY
OF CALIFORNIA
540 Tenth Street, San Francisco
32 Connecticut Street, Seattle

ARMCO

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

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



200,000-gallon conical-bottom steel tank, built for the Southern Pacific at Davis, California

The age of steel tanks

THIS is the age of steel tanks. Railroads and other leading industries which determine the trend of the times are using them for water service, oil storage and fire protection.

Steel tanks always present a pleasing appearance. They are well designed and well proportioned structures. They retain their original condition. Regular painting keeps them like new. Accessories and portions of the structure such as the roof do not become loose or sag to give the structure a dilapidated appearance.

Engine districts have been lengthened, and heavy traffic has increased water needs. Steel tanks in large capacities are not only practical, but economical.

Elevated steel tanks for roadside delivery service are built with conical or ellipsoidal bottoms. Either type has a large steel riser, usually six feet in diameter. When muddy water is encountered, the sediment settles and collects in the bottom of the riser. From there it is easily flushed out of the tank through a quick-opening wash-out valve without taking the tank out of service.

Elevated steel tanks are also used for general water service and fire protection at terminals. They are built the proper height to give the required gravity pressure. Such a supply is always dependable, even though power may be interrupted or pumps shut down for repairs at intervals.

Installations for the Pacific Coast are erected complete with our own experienced field crews. They are under the supervision of our headquarters in San Francisco. Write us for information on our products or estimating prices on installations you contemplate making.

CHICAGO BRIDGE & IRON WORKS
1013 Rialto Building, San Francisco

HORTON TANKS

A Roster of the Companies we represent exclusively

This is a partial list of the firms we represent exclusively. In addition, we stock the equipment of many other companies. Complete information on any type of construction equipment on request, without obligation.

J. D. ADAMS COMPANY
Leaning Wheel Graders

BARNES MANUFACTURING CO.
Road Pumps

BURCH CORPORATION
Stone and Asphalt Spreaders

BYERS MACHINE COMPANY
Gas Shovels, Cranes, Draglines

TED CARR & COMPANY
Subgraders

EASTERN CAR AND CONST. CO.
Industrial Cars

FOOTE CO., Inc.
Multifoote Pavers

FREEMAN MFG. COMPANY
Truck Turntables

A. W. FRENCH & CO.
Ord Finishers—Ball Wagon Graders

HOMELITE CORPORATION
Portable Pumps

HOTCHKISS STEEL PROD. CO.
Steel Road Forms

HERCULES MOTORS CORP.
Power Units

HUBER MANUFACTURING CO.
Road Rollers

INDIANA SHOVEL COMPANY
Hand Shovels

INTERNATIONAL HARVESTER CO.
McCormick-Deering Ind. Tractors

IOWA MANUFACTURING CO.
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JAEGER MACHINE COMPANY
Concrete and Plaster Mixers

C. S. JOHNSON CO.
Measuring Hoppers and Bins

JONES SUPERIOR MACHINE CO.
Wood Working Machinery

MADSEN IRON WORKS
Asphalt Plants

MASTER EQUIPMENT CO.
Revolving Scrapers

McKIERNAN-TERRY DRILL CO.
Pile Hammers

MOHAWK ASPHALT HEATER CO.
Asphalt Heaters

NORTHERN CONVEYOR COMPANY
Material Handling Equipment

ROTARY SNOW PLOW COMPANY
Snow Plows

SACRAMENTO ENG. & MACHINE WKS.
Road Oil Distributors

TOLEDO PRESSED STEEL CO.
Toledo Protection Torches

WESTERN MACHINERY COMPANY
Belt, Gas and Electric Hoists

Speed up your Mixing and you speed up your Job . . . . . .

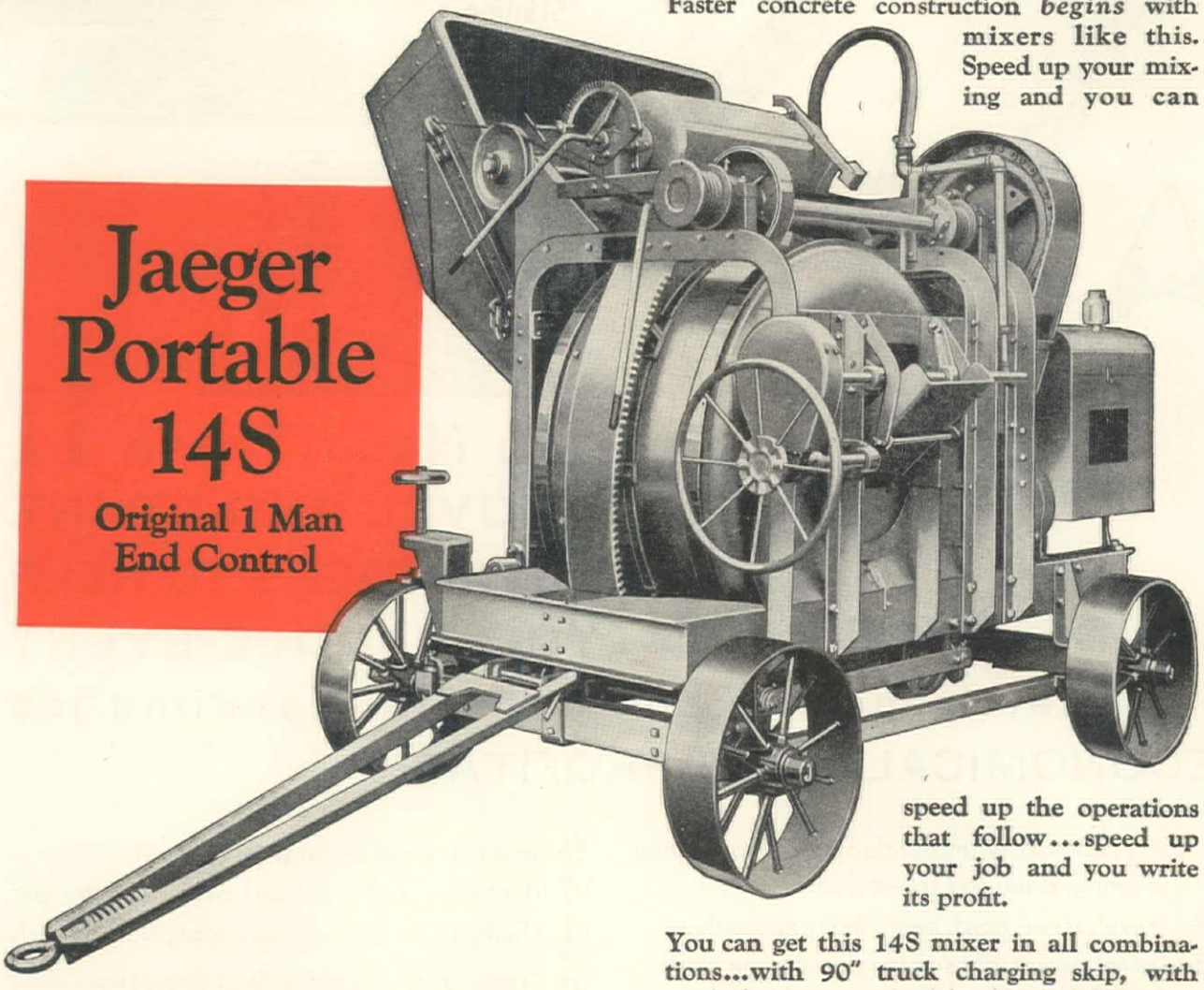
When you're mixing half-yard batches Jaeger speed means *money!*

That unbeatable Patented Skip Shaker loader, that clock-like travel of machined steel tracks on chilled and face ground car wheel rollers, that rush of concrete that clips discharging time to 12 seconds average, that short coupled, roller bearing, pivot axle truck, that thousand pounds lighter steel and ball bearing construction...they're Jaeger's way of paying you out with a profit on your 1930 concrete.

Faster concrete construction *begins* with mixers like this. Speed up your mixing and you can speed up the operations that follow... speed up your job and you write its profit.

Jaeger Portable 14S

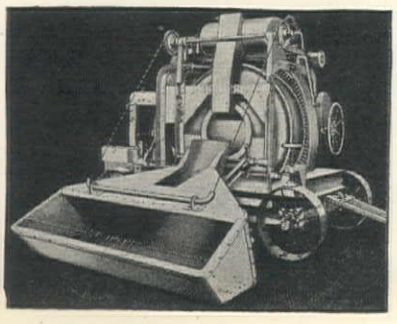
Original 1 Man End Control

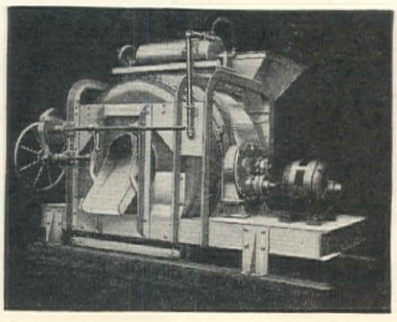


TRUCK CHARGING 90" SKIP permits batching direct from any proportioning plant to mixer... weighed, controlled concrete mixed cheaper than you can buy it.

DIRECT MOTOR DRIVE regularly furnished on or for electric power. Same gear reduction can be used for gas engine running 1100 to 1200 RPM.

You can get this 14S mixer in all combinations...with 90" truck charging skip, with track loader, standard loader or batch hopper, on wheels or skids, gas or electric drive. Send this slip for detailed specifications and low prices. Jaeger offers all sizes, types mixers and pumps, Timken Roller Thrust Hoists.





JAEGER MIXERS... PUMPS and HOISTS...

Carried in stock by

Edward R. Bacon Co., San Francisco
Smith Booth Usher Co., Los Angeles
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Clyde Equipment Co., Portland—Seattle
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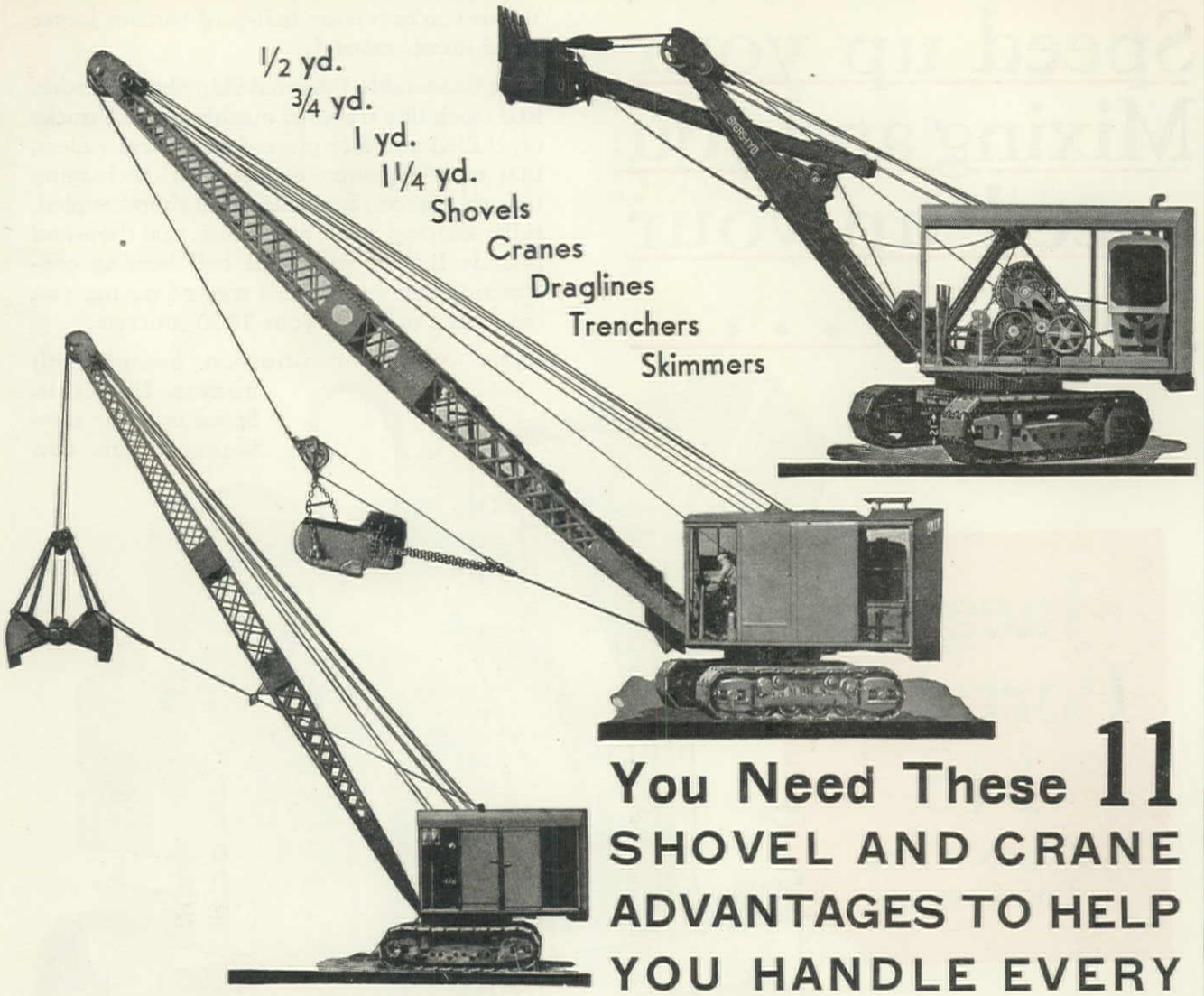


You Need These 11 SHOVEL AND CRANE ADVANTAGES TO HELP YOU HANDLE EVERY earth-moving and material-handling job ECONOMICALLY and PROFITABLY—

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

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

DISTRIBUTED BY THE

Edward R. BACON CO.

FOLSOM AT 17TH STREET, SAN FRANCISCO, CAL.

BYERS

Charge – Mix – Discharge – Spread – and Move On

◆

That is MultiFoote's Continuous, Daily Performance

◆

No Paver can be a Profitable Investment unless every part has been tested and proven equal to the task of day-after-day performance and no calls for unfortunate repairs and expensive hold-ups.

Become a MultiFoote User—understand why many of the largest and most successful contractors continue to use MultiFootes.

THE 1930 MULTI FOOTE PAVER

for Speed-Service-Success

Experienced Operators say—

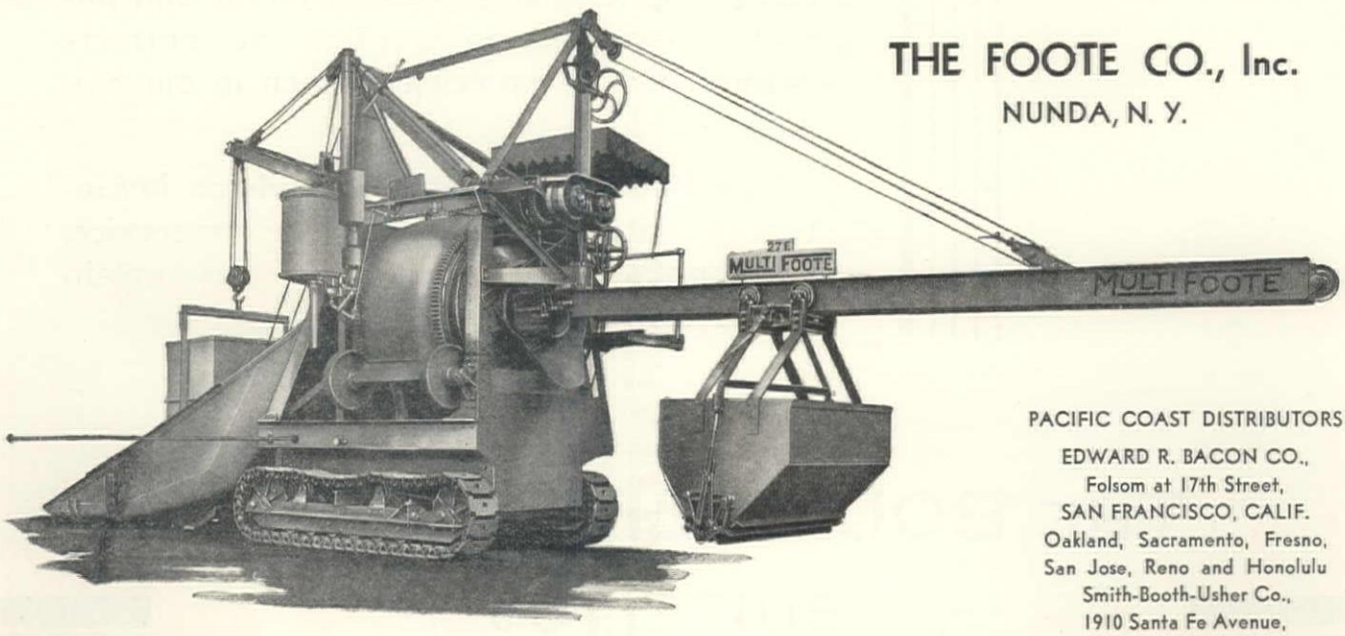
"This 1930 MultiFoote Paver is the best Paver we ever had"

◆

MULTIFOOTE'S

Power Boom Swing
Stream-Line Skip
No-Pressure Water Tank
Fast Power Discharge
Powerful Motor

The result of 26 years of constructive engineering



THE FOOTE CO., Inc.
NUNDA, N. Y.

PACIFIC COAST DISTRIBUTORS
EDWARD R. BACON CO.,
Folsom at 17th Street,
SAN FRANCISCO, CALIF.
Oakland, Sacramento, Fresno,
San Jose, Reno and Honolulu
Smith-Booth-Usher Co.,
1910 Santa Fe Avenue,
Los Angeles, Calif.

World's Largest Exclusive Builders of Road Pavers

When writing to THE FOOTE COMPANY, INC., *please mention Western Construction News*

IT'S BACON IN SAN FRANCISCO

ASPHALT Preserved these bones for 100,000 years...

Now it Protects the Highways of the West

FROM twenty-five to two hundred thousand years ago the plains of Southern California were inhabited by Giant Ground Sloth, Sabertooth Tigers, Imperial Elephants, and many other historic animals, whose bones have been taken from the famous La Brea Asphalt Pits in Los Angeles.

These bones, hermetically sealed in Asphalt...perfectly protected from moisture and other disintegrating elements, are as sound today as when they sank into the black ooze a thousand centuries ago.

And today, the same properties of asphalt that preserved these ancient bones, are now prolonging the life of the highways of the West.

Note these advantages of Union D Grade Asphaltic Pavements:

1. They resist moisture...water can't reach the subgrade.

2. Smooth surface. No traction resistance.

3. No surface buckling.

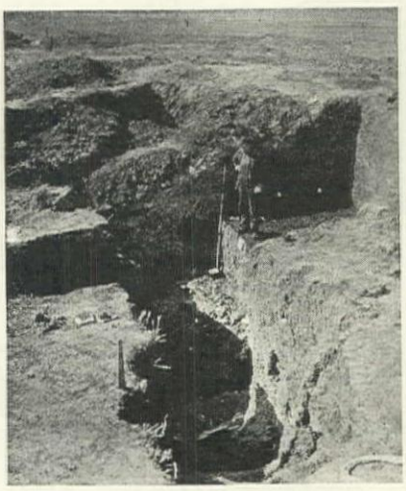
4. Will not sag under fast, heavy traffic.

5. Easiest to resurface and replace.

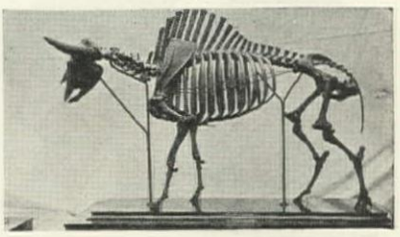
6. Noiseless, dustless, easily cleaned.

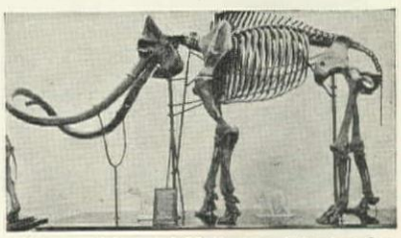
7. Lower original cost.

Preserved bones of Giant Ground Sloth at the bottom of one of the La Brea Pits.



General view of La Brea Pits.





Skeletons of Imperial Elephant and Ancient Ox, perfectly preserved for 100,000 years in Asphalt.

Communicate with Asphaltic Division, Union Oil Company, Los Angeles, or the nearest Union Oil Distributing Station for complete details concerning Union D Grade Asphalt.

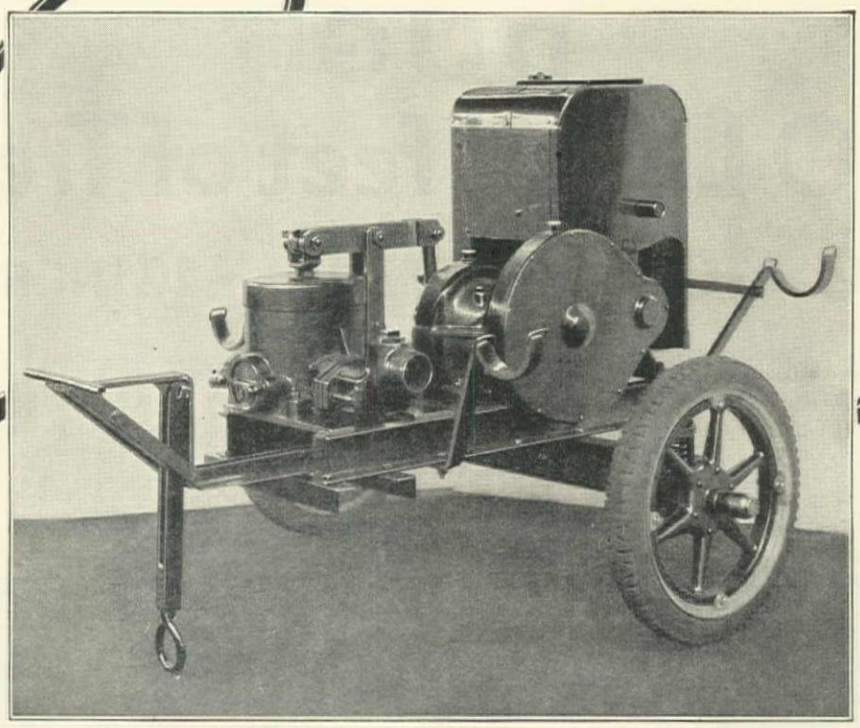
UNION D GRADE

ASPHALT

UNION OIL COMPANY

New in Principle
New in Design
New in Performance

No Diaphragm
No Packing
No Oil Seal



Novo Roller Ring Pump mounted on special rubber tired trailer with combination tongue and prop

There is no pump anywhere like this new Novo Roller Ring Pump. It has no packing—no glands—no oil seal—no diaphragm to require attention.

Yet the single, vertical pump has a capacity of 3500 to 5000 gallons per hour—and develops a 75′ head. Other sizes, available later, will have even greater capacities.

The principle of this Novo is entirely new. Two rubber Roller Rings on the plunger roll with the action of the piston—making an absolutely liquid-tight seal.

A Rolling Surface Defies Wear

As the rings *roll*, they are subjected to *no sliding* friction. Wear is minimized to a point where it need not be considered. The Roller Rings are guaranteed for a season's work without replacement.

Straight Line Flow—High Velocity

Due to the short, rapid strokes of the plunger—and the *straight line flow from suction to discharge*—water is forced through the pump at twice the velocity of the ordinary diaphragm or plunger diaphragm. This permits the handling of more foreign matter in suspension without damaging the pump.

For the same reason, this pump more nearly approaches a perfect vacuum than other types, making it ideally suited for handling well points.

Novo Roller Ring Pumps are self-priming, compact, and light in weight. They are fitted with steel hinge valves faced with special composition rubber. Valve seats are set at an angle.

The pumps are applicable to all kinds of de-watering jobs, replacing centrifugals, diaphragms, and plunger pumps. On certain jobs they also replace pressure pumps.

Write for the special folder and complete details on this greatest modern pump development.

NOVO ENGINE CO., 256 Porter Street, Lansing, Mich.

Clarence E. Bement, Vice-President and General Manager

NOVO ROLLER RING PUMP

West Coast Distributors:

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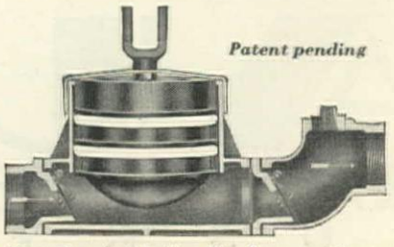
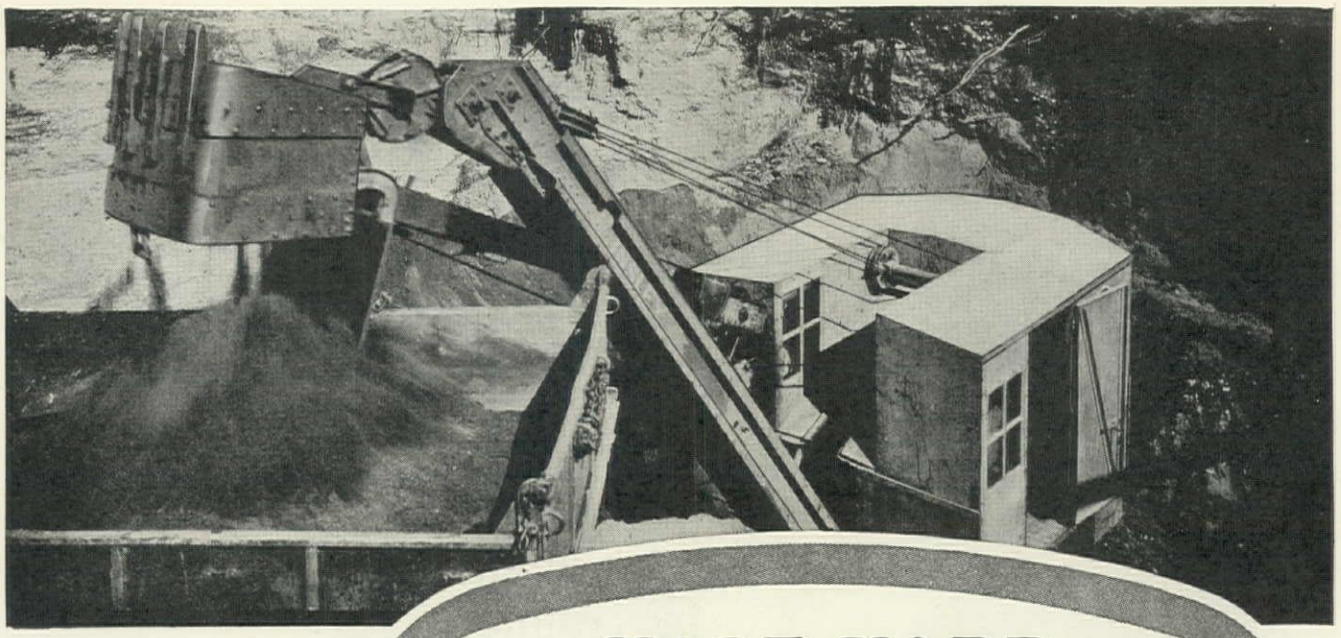


Patent pending

Note the straight line flow from suction to discharge—and the liquid tight seal produced by the two roller rings on the plunger of the new Novo Roller Ring Pump.

When writing to NOVO ENGINE CO., *please mention Western Construction News*



HALF-YARD INSLEY

No longer a question of profit and economy of half-yarders for grading, sewers, ditching, basements, etc.

Now your greater profit possibilities are in the *right* half-yarders!

There's where N.E.C. engineering, Insley reliability and extra profit performance give you greater profit certainty. Write us! Let us tell you all about the Half-Yard Insleys!

N. E. C. LINES

KOEHRING
Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.

INSLEY
Excavators; Concrete Placing Equipment, Cars, Buckets, Derricks.

T. L. SMITH
Tilting and Non-tilting Mixers, Pavers, Weigh-Mix.

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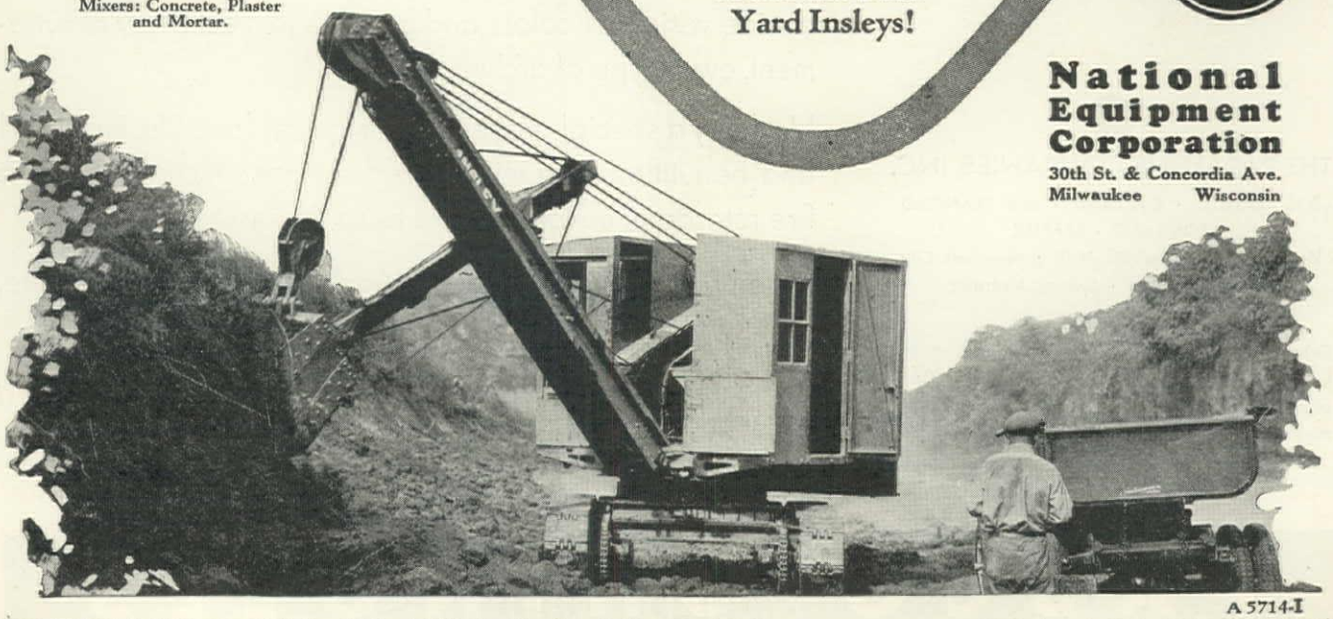

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Harron, Rickard & McCone Co., 1600 Bryant St., at 15th, San Francisco, Calif.
Harron, Rickard & McCone Co.....2205 Santa Fe Ave., Los Angeles, Calif.
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Northwest Equipment Co., Inc.....Great Northern Tracks, Great Falls, Montana
L. A. Snow Company, 1082 Sixth Ave., S., Seattle, Wash., Portland, Spokane

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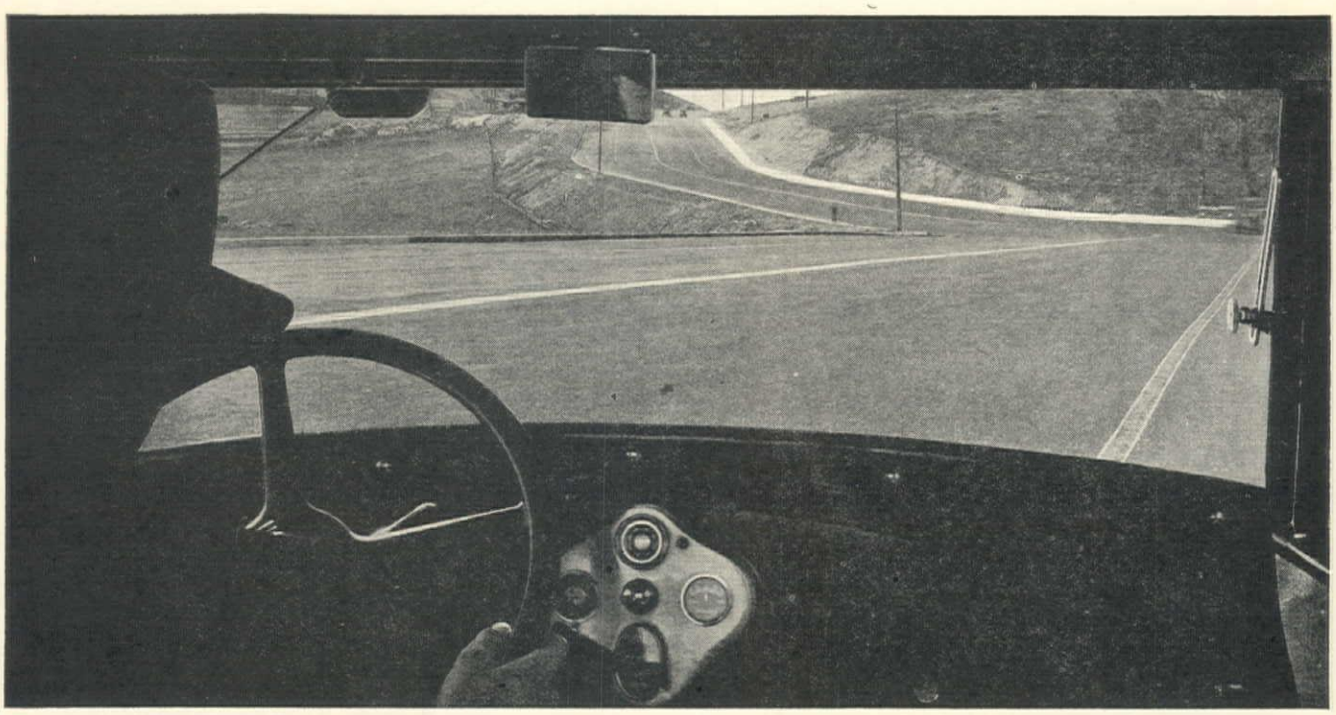

WHAT'S UNDERNEATH THESE NEW FAST CARS?

SAFETY — *when your paving is really non-skid*

Take the road with any high-compression car—and you're out to *get* someplace! Your rear wheels will stay where they belong—you'll be safer at any speed—in any weather on Non-Skid Asphaltic Concrete.

Ten million square feet of pavement surfaced with asphalt-coated stone chips pressed right into Asphaltic Concrete make scores of Western roads safe for fast traffic—rain or shine! This pavement's tiny surface indentations grip your tires with firm, positive traction. It is really non-skid.

A Non-Skid surfacing on new construction or old is built to last and does not wear off under heavy traffic. In addition, you get all of Asphaltic Concrete's durability and low maintenance cost—proven for ten, fifteen, twenty years—and more—in over sixty-five Pacific West communities.

CALOL ASPHALT
A Standard Oil Product
FOR BEST RESULTS

Asphaltic CONCRETE
NON-SKID PAVEMENT

STANDARD OIL COMPANY OF CALIFORNIA

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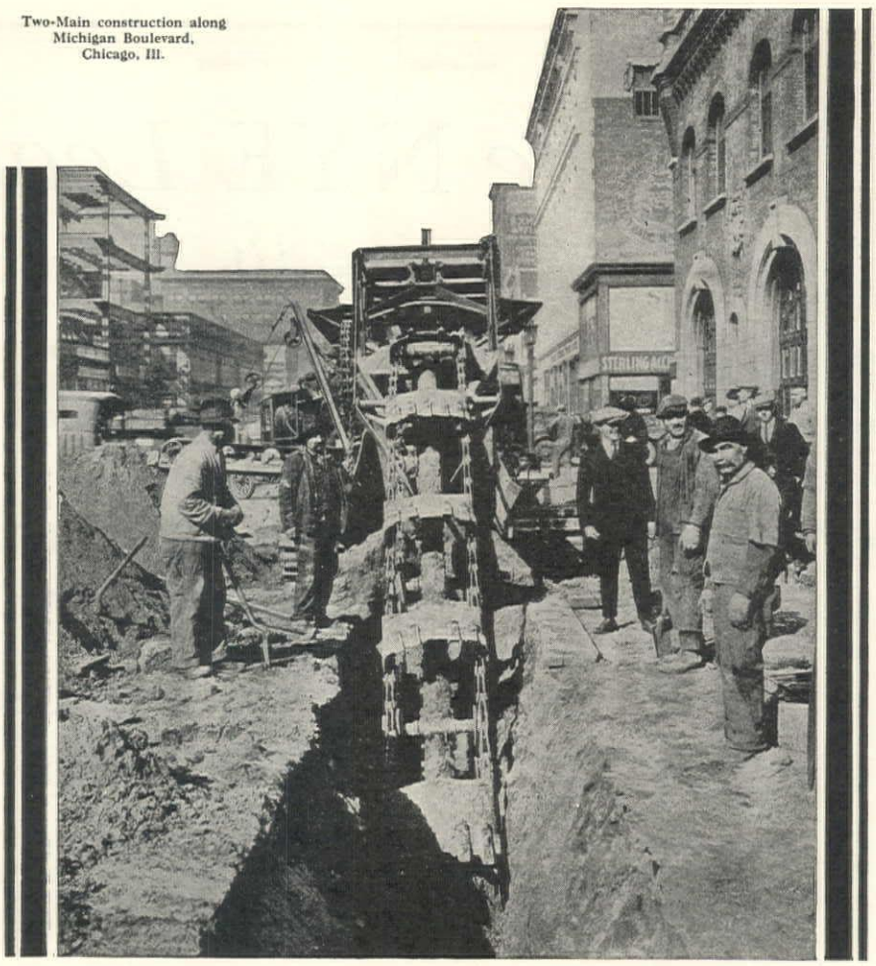
Two-Main construction along Michigan Boulevard, Chicago, Ill.



Two-Main System Popular

As an engineering proposition, the two-main system for water lines is now being advocated by many consulting engineers. The two-main system simply is an improved design of water main construction. Its merits can not be talked out of existence.

The two-main system costs no more and often costs less than one main. It is the solution to the problems arising out of wide and heavy-traffic streets in modern city building. It takes the grief out of maintenance problems and service line installations. Write us for additional information.

Clow-National furnishes everything for a pipe system—from the cast iron pipe and fittings to the calking tools.

If you have not received your copy of our "Pipe Economy" catalog, send your name and address.

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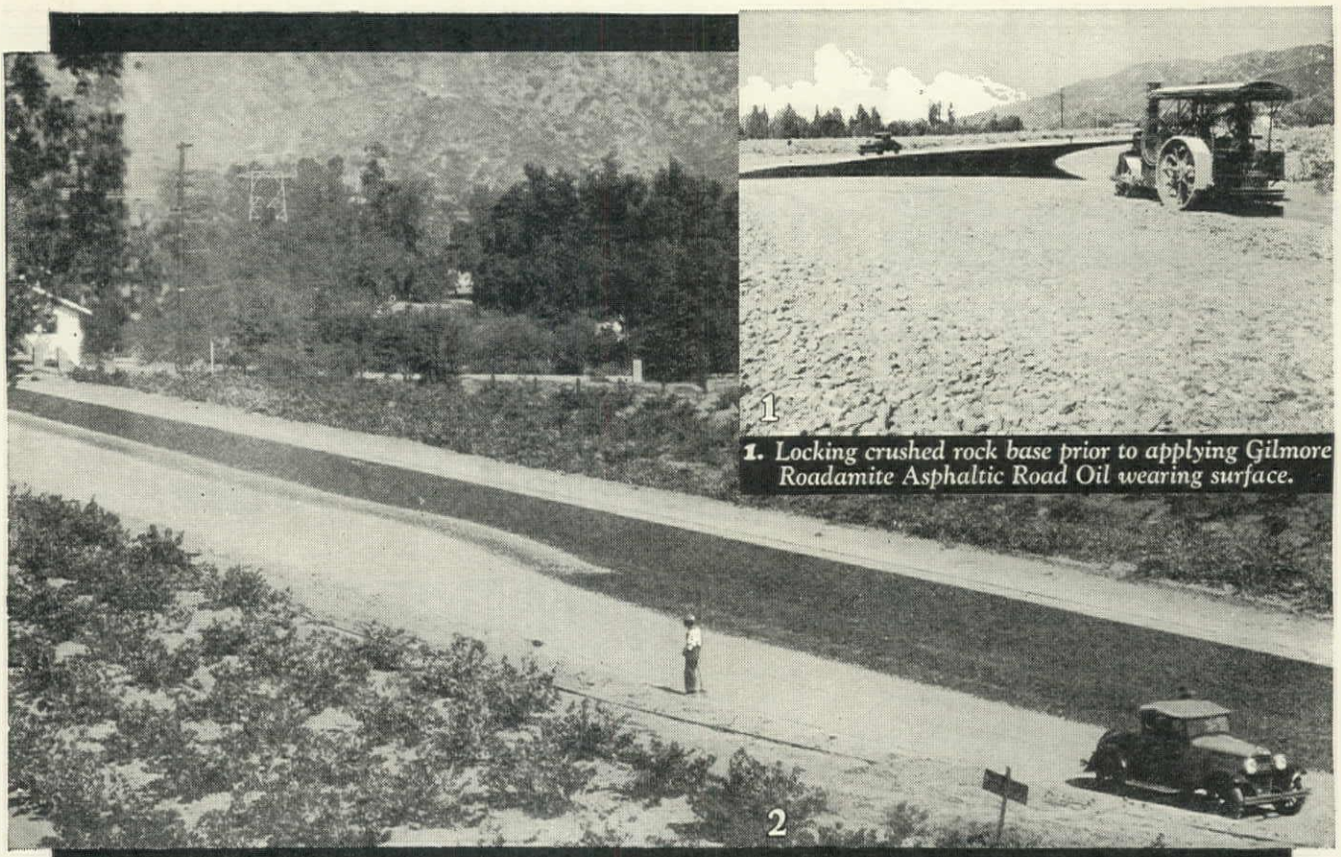

1. *Locking crushed rock base prior to applying Gilmore Roadamite Asphaltic Road Oil wearing surface.*

2. *Descanso Drive—Los Angeles to Flintridge cut-off—after oil surfacing and partial covering of fine crushed rock.*
A. O. NELSON, Contractor

Greater Resiliency Increases Durability

Highways constructed of water bound macadam and Gilmore 90-95% Roadamite Road Oil withstand the constant pounding of heavy traffic because they are the most resilient type of highway.

Gilmore Roadamite Road Oils are refined from special crudes. They are not the residue from gasoline and lubricating oil distillation. Hence, they are best suited for road construction purposes.

Ask Gilmore Oil Engineers to help you solve your road building problems.

Gilmore Oil Company
2423 East 28th Street, Los Angeles

GILMORE OIL PRODUCTS
MONARCH OF ALL

GILMORE *Roadamite* ROAD OIL

5937

WHERE TRUCKS CANNOT OPERATE THE LINN MAKES MONEY

Sure-footed and with an over abundance of power, the Linn wastes no time between shovel and dump. Watch its patented *flexible* traction grip into the rubber-like gumbo and carry on with the certainty of a wheel truck on a good road.

See the shovel deliver tons of heavy earth or rock into its wide body, and then . . . watch the Linn move away without a protest, over "tough going" to its destination. In a moment it is on its return, backward if the distance is short or the space narrow. Forward or reverse, it travels with equal speed and ease of handling.

Day after day, regardless of the job's demands, weather or ground conditions, the Linn carries on where trucks could not turn a wheel . . . and makes money for its owner. Learn more about Linn performance and profits. Write or wire for data.

HAULS PAY LOAD AS IT LAYS ITS OWN ROAD

The amazing performance of the LINN is the direct result of its patented flexible traction, Not a pound of weight is carried on axles or axle bearings.

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Division of LaFRANCE-REPUBLIC Corporation

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105 direct distributors located throughout United States and 49 distributors located in 30 foreign countries. Canadian Linn Distributor: Mussens Limited, Montreal

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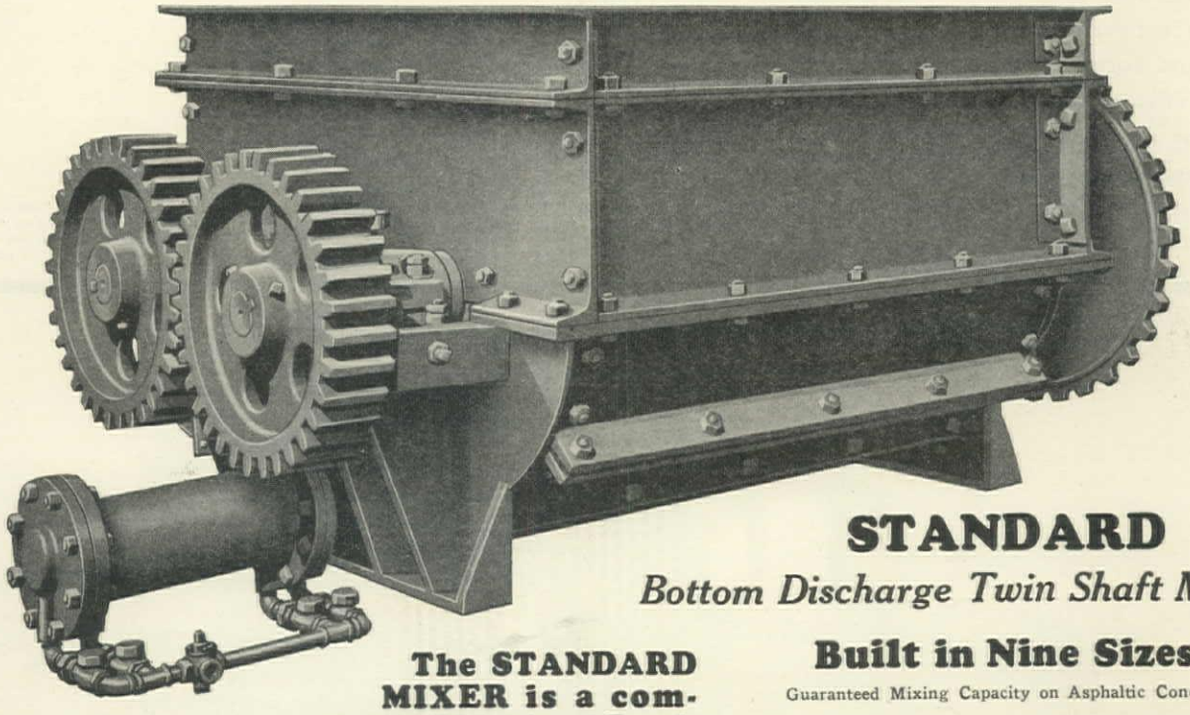
STANDARD

TWIN SHAFT ASPHALT MIXERS Bottom Discharge Type



STANDARD

Bottom Discharge Twin Shaft Mixer

Improvements

Larger Gears
Larger Shaft
Longer Bearings
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Larger Cylinder
Quicker Discharge
Heavier Construction

The STANDARD MIXER is a completely Machined Product, all parts being interchangeable. Bolts throughout are one size. Steel Mixer Shanks have removable tips. Cylinder is automatically cushioned. All working parts adjustable.

Built in Nine Sizes

Guaranteed Mixing Capacity on Asphaltic Concrete

Size	Mixer Area	Weight	Shaft Sizes	Price Factory
No. 10	10 cubic ft.	500 lbs.	3 " sq.	$ 650
No. 15	15 " "	1000 lbs.	3½" sq.	750
No. 20	20 " "	1500 lbs.	3½" sq.	800
No. 30	30 " "	2000 lbs.	4 " sq.	1200
No. 40	40 " "	3000 lbs.	4½" sq.	1500
No. 50	50 " "	4000 lbs.	4½" sq.	1700
No. 60	60 " "	5000 lbs.	5 " sq.	2200
No. 70	70 " "	6000 lbs.	6 " sq.	2600
No. 80	80 " "	7000 lbs.	6 " sq.	3200

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VOLUME V | MAY 25, 1930 | NUMBER 10

Only those who keep a close tab on highway building appreciate the magnitude of this largest division of the construction industry. Some idea of the extent of this work may be gleaned from 'Construction Review —Highway Grading', in this issue, which covers 50 of the major contracts underway in the Far West, of which 38 are over $100,000.

Magnitude of Highway Construction

The gasoline tax has provided a method for continuous construction, free from the vicissitudes of bond elections, politics, and financial depressions. In a period of depression such as we have been going through and which fortunately is on the mend, a dependable source of revenue for the continuance of construction on an even scale cannot be over-valued.

Another example of uninterrupted construction progress is the $40,000,000, five-year project of the Pacific Gas & Electric Co., the Mokelumne hydro-electric development, described in detail in this issue.

We have from time to time advocated the adoption by cities, counties, and states, of a ten-year budgeted program of improvements, revised, of course, from year to year to meet changing conditions. A predetermined source of revenue can thus be provided, which, together with the ten-year programs of the private utilities and the gasoline-tax uniform revenues for highway construction, would do much toward stabilizing engineering construction and maintaining it on an even keel from year to year.

We are making rapid strides in the design of more efficient types of sewage treatment plants, but we are not keeping pace in the development of efficient operators. The situation is much like our national reclamation projects where we have hundreds of thousands of acres of irrigable land, but few farmers trained to utilize them.

Better Operation of Sewage Works

There have been recently organized a number of sewage works associations throughout the United States, under a central clearing house. These organizations should devote more of their time and energy toward educating the municipal authorities and public at large to the necessity for spending more money in training their sewage works operators, or managers, and in research for more efficient operation of their plants.

The opportunity has been afforded municipalities and industries in California of securing efficient assistance from the recently created State-aid sewage research laboratory. This laboratory is exactly what its name implies—State-aid—and it is not the intention of the State to finance the solutions of all problems. Nevertheless, with this assistance and an expenditure of a few hundred dollars, municipalities and industries have the chance to improve their operating conditions.

One of the biggest problems today confronting municipalities and transportation utility companies is rapid transit to and from industrial, business, and shopping centers. As pointed out by Alfred J. Lundberg, president of the Key System Transit Co. of the East Bay Cities on San Francisco Bay, the transition from horse cars to cable cars to electric cars has been faster than the amortization of investments, which together with the doubling of operation and maintenance costs, has hog-tied the street car systems. Even with an average increase in fares throughout the United States from 5 cents to 7½ cents, street car utilities are hard put to make expenses. Capital, therefore, for extensions, modern equipment, and better maintenance is impossible to get. The mental adherence of the public to the idea that the 5-cent fare is all they should pay for rapid transportation must be changed.

Rapid Transit Within Municipalities

The automobile is rapidly decentralizing the business and shopping districts of large cities, and Lundberg predicts that business men will soon awaken to the fact that the street car system—and not automobiles or even busses—is the only solution for the rapid transportation of masses of people to and from industrial centers, and, therefore, that rapid transit utilities will soon come back into their own.

Even in these days of great engineering works, the Boulder dam project, in the minds of most people, is looked upon as the peer of all. There is no question but that, regardless of cost, the construction of this dam is a huge undertaking, fraught with many difficulties. It was easy for Paul Bunyan to dig the Grand Canyon—it will be a battle for man to dam it.

Engineer Promoted to Important Post

For this responsible task Uncle Sam has selected Walker R. Young, a comparatively youthful engineer, who has grown up with the Bureau of Reclamation, each year superintending the construction of larger and more difficult projects. He is thoroughly familiar with the Colorado river and fully appreciative of the difficulty of harnessing it.

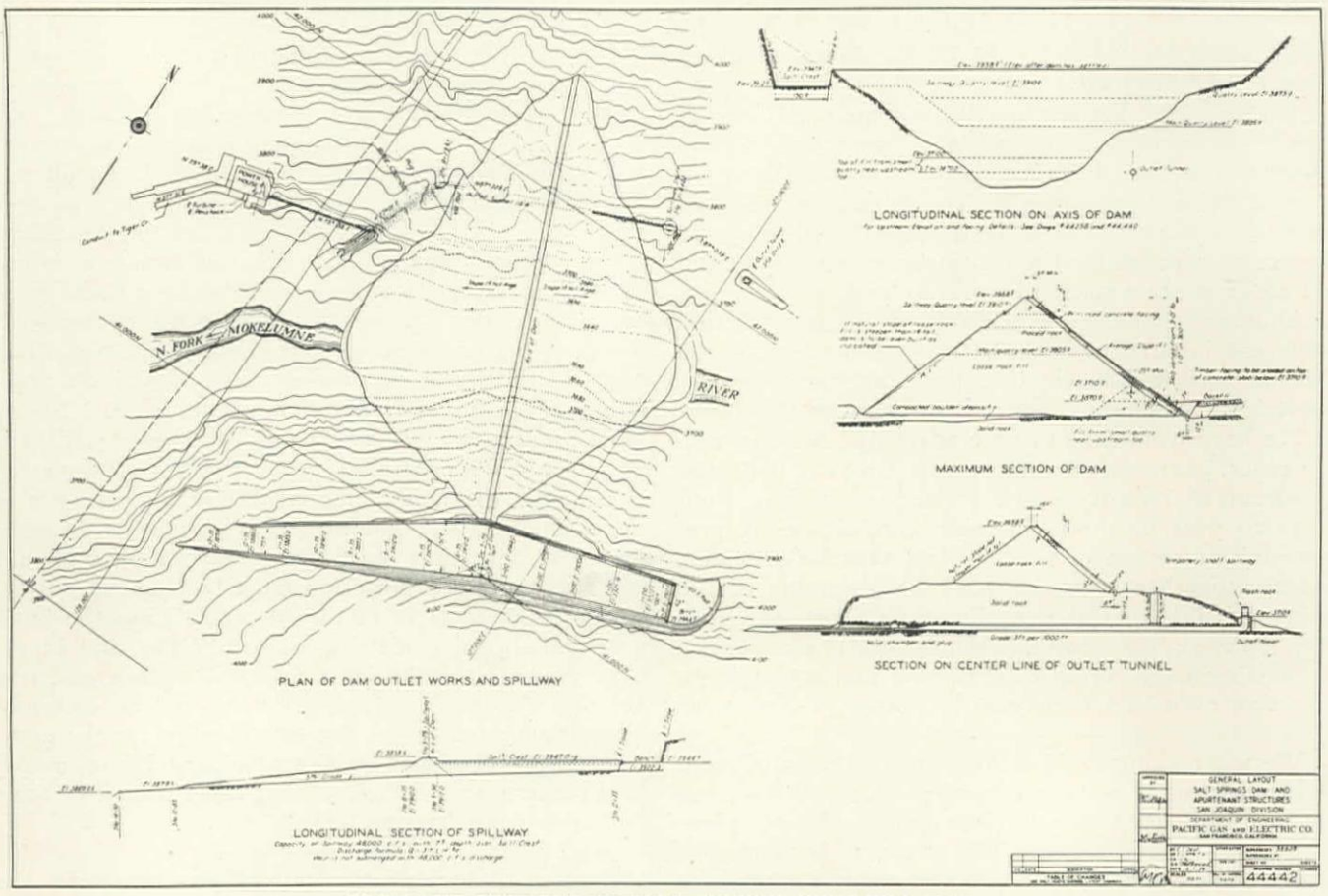
Mokelumne Hydroelectric Project, California, of the Pacific Gas & Electric Company

By PHILIP SCHUYLER

The Pacific Gas & Electric Co. of San Francisco, serving Northern California, is constructing various works pertinent to the full economic hydroelectric development of the Mokelumne river, on the western slope of the Sierra Nevada, about 75 miles northeast of Stockton, California; at an ultimate cost of $40,000,000.

The Mokelumne project involves the following major works (See map, plan, and isometric profile):

No. 1—Blue Lakes and Adjacent Reservoirs—These water rights were acquired by purchase several years ago, and will be utilized without further development to insure a full stream flow into the Salt Springs reservoir.



PLAN AND SECTIONS OF SALT SPRINGS ROCK-FILL DAM

No. 2—Salt Springs Reservoir (65% complete)—This is the basic unit of the Mokelumne development, and is being formed by the construction of a 328-ft. rock-fill dam, which will impound 130,000 ac-ft.

No. 3—Salt Springs Powerhouse—A 1200-ft. tunnel (completed) under the Salt Springs dam will feed a powerhouse of 11,000 kva. capacity (soon to be constructed) at the base of the dam on the right bank of the river.

No. 4—Bear River Supply—This is the largest tributary (from the north) to the Mokelumne river (junction six miles below the Salt Springs dam). The P. G. & E. Co. controls the water rights and will later supplement its present reservoir of 6712 ac-ft. capacity with another, just below, of 34,000 ac-ft. by the construction of a concrete dam 200 ft. high; the water to be diverted through a 2½-mile tunnel to a point 2000 ft. above the Salt Springs powerhouse (the waters of Cold creek to be picked up en route), where a high-head, 30,000-hp. impulse wheel will be installed.

No. 5—Tiger Creek Flume—From the Salt Springs powerhouse, 550 c.f.s. will be conveyed through a concrete flume and several tunnels (under construction) 18 miles to a regulating reservoir of 175 ac-ft. capacity on Tiger creek, to be formed by a concrete dam 100 ft. high (to be built soon).

No. 6—Tiger Creek Powerhouse—From the Tiger creek regulating reservoir, the water will be conveyed in a concrete flume 2½ miles to a forebay and then through a penstock with a 1219-ft. head to the Tiger creek powerhouse (construction started), where 60,000 kva. will be developed.

No. 7—West Point Powerhouse—A diversion dam (100 ft. high) will be built just below the Tiger creek

powerhouse and the water conveyed by concrete flume, 4 miles to a powerhouse to be built later at West Point, of 15,000 kva. capacity.

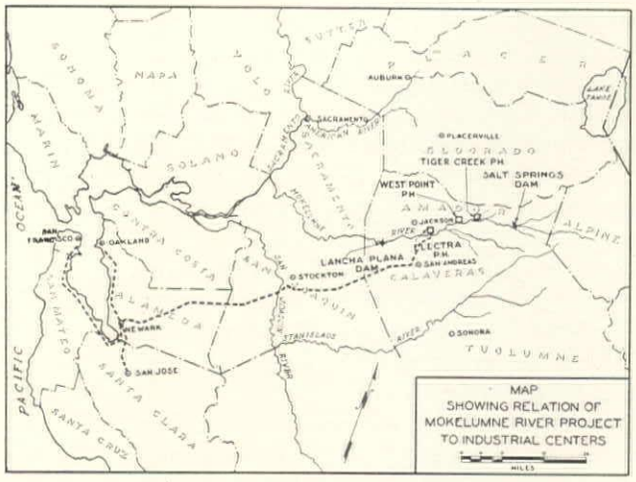
No. 8—Electra Powerhouse—From the West Point powerhouse the water will be diverted into a canal and conveyed 13 miles to the company's powerhouse at Electra (11 miles east of Jackson), which will be reconstructed to develop 60,000 kva. From here the water will be returned to the Mokelumne river and will flow into the Pardee reservoir (12 miles below) of the East Bay Municipal Utility District.

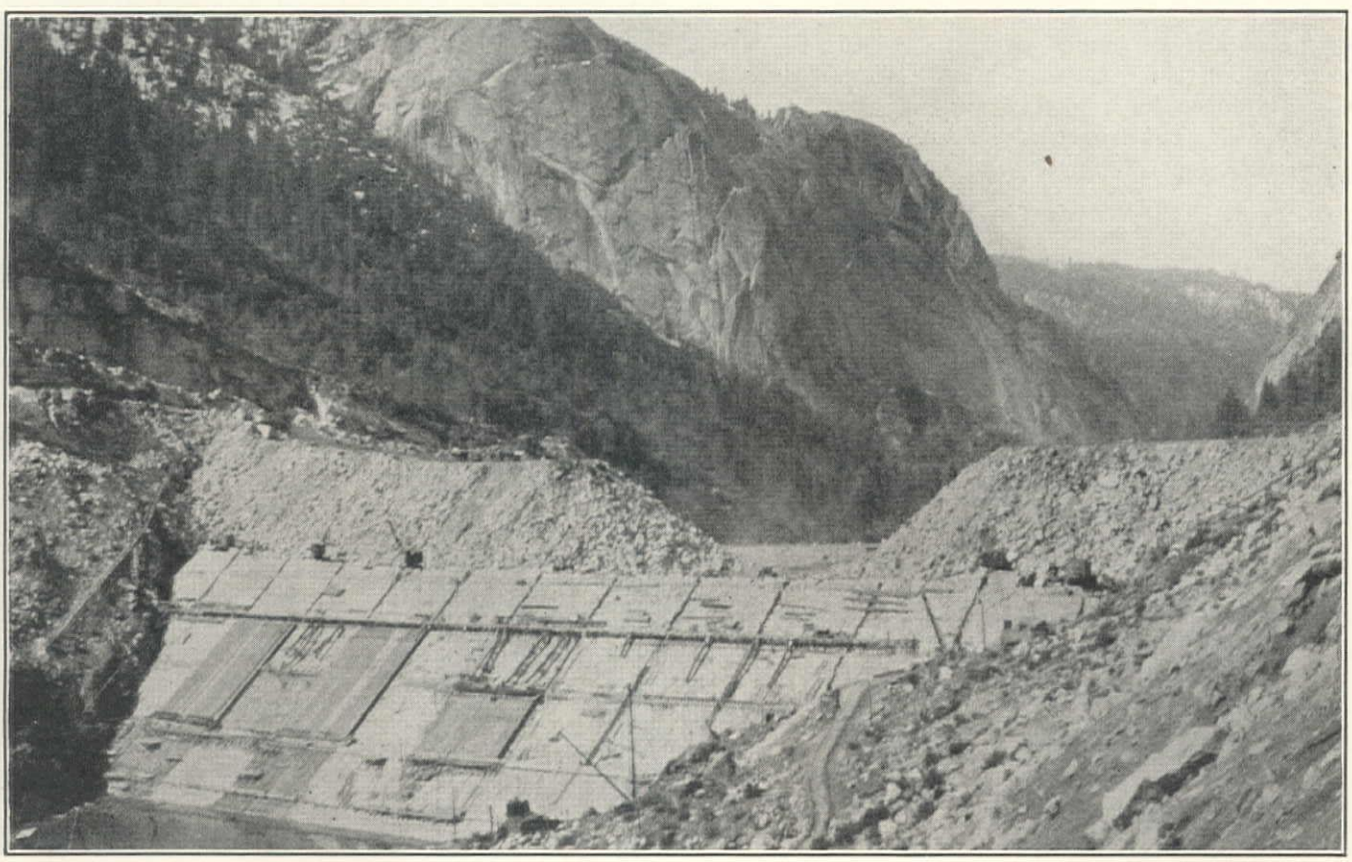
No. 9—Transmission Lines—For construction purposes, a 45-mile transmission line, on wood poles, was built from Electra powerhouse to the Salt Springs dam; of 60,000 volts to Tiger creek, and 17,000 volts to Salt Springs dam. A steel tower line for 110,000-volt transmission, will be built from Salt Springs to Tiger creek, and for 220,000-volt transmission, through Electra to Newark on San Francisco bay. Prior to the development of the Bear river auxiliary supply, a total of 123,000 kw. will be transmitted to Newark, and 144,000 kw. thereafter.

Personnel—The Mokelumne project is being designed and constructed by P. G. & E. forces.

The engineering features are under the supervision of A. H. Markwart, vice-president in charge of engineering; I. C. Steele, chief of the division of civil engineering; Walter Dreyer, office engineer; G. C. Green, field engineer; with J. D. Galloway, as consultant on design of Salt Springs dam; J. P. Jollyman, chief of the division of electrical engineering; and E. A. Crellin, chief assistant.

Construction of the project is under the supervision of O. W. Peterson, engineer of general construction; Hector Keesling, chief assistant; P. I. Kurtz, field superintendent of Salt Springs dam and works westerly to Bear river; G. M. Wehrle, field superintendent from Bear river to and including the corporation yard at Martell, the railroad terminus; J. E. Cooney, assistant superintendent in charge of concrete flume construction; R. D. Reeve, resident engineer; and E. H. Steele, engineer of transmission line construction.





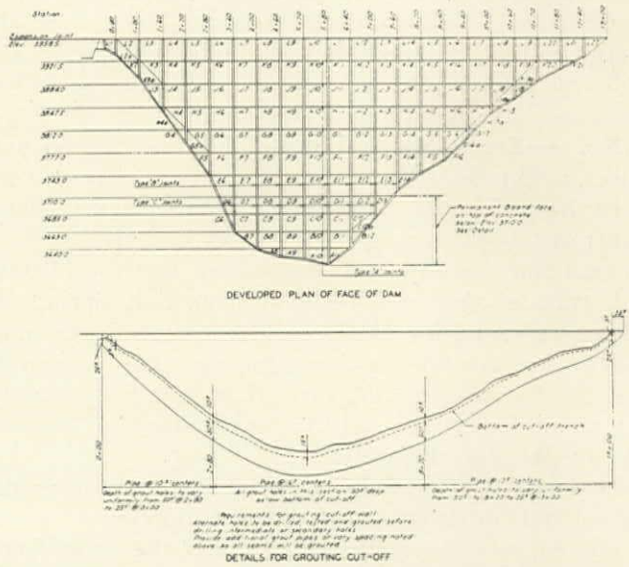
SALT SPRINGS DAM LOOKING DOWNSTREAM ON APRIL 16, 1930. TOP OF CRANE-PLACED ROCK IS JUST ABOVE 150-FT. ELEVATION. THERE WILL BE ANOTHER 75-FT. LIFT OF LOOSE FILL ON TOP OF 75-FT. LIFT NOW BEING DUMPED. EXCAVATION FOR SPILLWAY AT LEFT

Roads and Transportation—The upper Mokelumne river is a wild and inaccessible region, through which few roads or trails were built by miners or timbermen. It is heavily wooded and has precipitous slopes. The problem of transportation of equipment, materi-

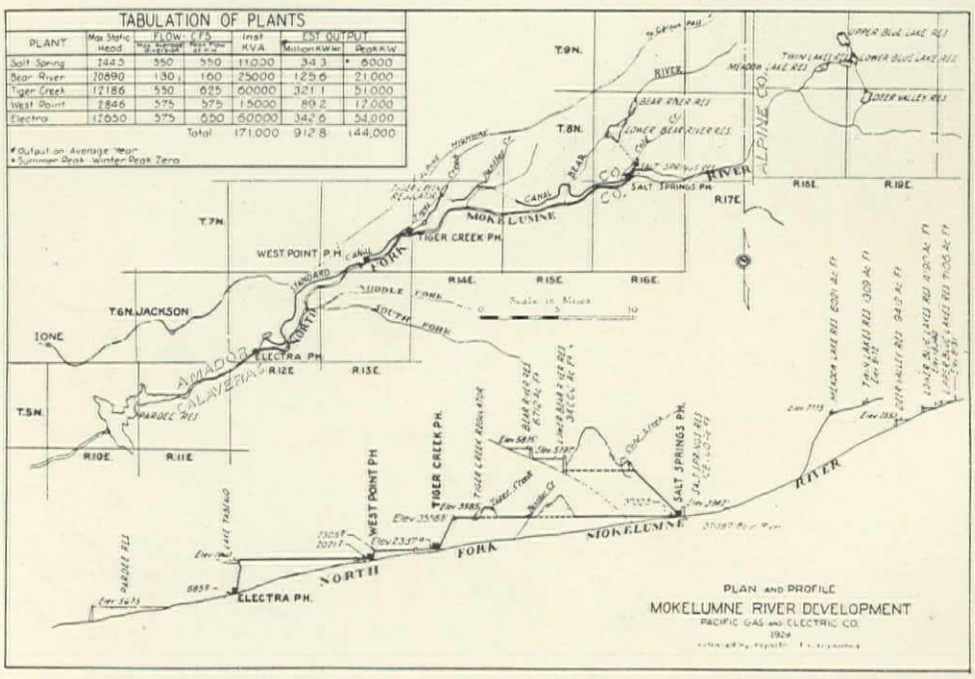
als, and supplies was carefully studied and it was decided that motor truck roads would be more economical and would serve the purpose better than a railroad. Accordingly, during the summer of 1926, the company graded and rock surfaced a road from the 'Lumber Yard' forest ranger station (elevation 6500 ft. 30 miles northeasterly and upgrade from Martell, the nearest railroad terminus), 13 miles easterly to the Salt Springs damsite (elevation 3620 ft.). This road enabled construction and camp equipment and supplies to be hauled in so that excavation of the diversion and power tunnel, stripping of foundations, etc., could be started in the fall of 1926. In the spring of 1926, construction was started on another road from the Barton ranch (on the Alpine highway, at elevation 3300 ft. 20 miles northeasterly of Martell), 30 miles long to a junction with the first road near Salt Springs dam. This road was located to roughly parallel (most of the way above) the Tiger creek conduit. The road attains a summit of only 4500 ft., and the maximum grade is 8%, except for a few steep pitches of 10% down-grade in the direction of load haul. This road, including rock surfacing from small quarries developed along the route, required two years to construct, and must be maintained in good condition as more than 50,000 tons of cement, steel, powerhouse and transmission line equipment, construction equipment, and supplies, must be hauled over it. A Russell patrol grader, a Universal gas shovel, and Caterpillar tractor with Bulldozer are used on maintenance.

During the construction of a short section of the Tiger creek concrete flume, where its alignment interferes with this road, the upper or first road constructed will be used. Short spur roads from the main road are being built to service the Tiger creek conduit, Tiger creek powerhouse, etc. Hercules and Giant powder was used on road construction. The construction of these roads, as well as erection of camps, has been under the supervision of W. H. Allison, 'Pioneer' construction superintendent. The two roads required about 1,000,000 cu.yd. of excavation and 50,000 cu.yd. of rock surfacing. On the work Allison used a Marion 1¾-yd., model 37; a Marion model 21, and a Marion model 32, power shovels; a Russell heavy-duty grader; Caterpillar tractors, and motor trucks.

Practically all the hauling of equipment, materials, and supplies is being done on a contract basis by Piccardo Bros., Jackson. This outfit is using a number of four-wheel, rear-drive, cushion-tired, motor trucks, hauling a maximum of 10 tons per truck, and operates a total of 20 trucks of the following makes: one 10-ton and one 3-6-ton Fageols; two 10-ton Sterlings; one 10-ton and one 3-6-ton Moreland; one 10-ton, two 3½-6-ton, six 3-6-ton, one 2½-5-ton, and one 1½-3-ton Macks; one 3-6-ton White; and one 3-6-ton International.



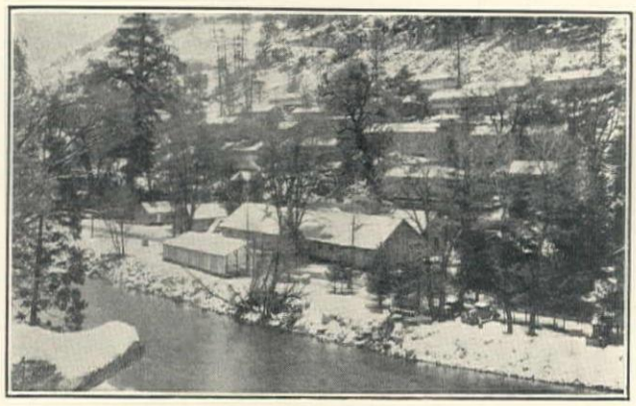
Salt Springs Dam. Plan for Placing 60-ft. Concrete Panels for Upstream Facing; and, Profile of Cut-off Wall and Grouting of Foundations



PLAN AND ISOMETRIC PROFILE OF MOKELUMNE RIVER HYDROELECTRIC PROJECT

Camps and Shops—To construct this project eight camps are required, as follows: a 600-man camp at

Salt Springs dam; a 150-man camp at the upper sawmill at Cold creek, 3 miles below Salt Springs dam, for construction of sections of Tiger creek conduit and transmission line; a 75-man camp at Bear river, for the concrete flume; a 75-man camp at the summit, for the Panther creek tunnel and the transmission line; a 100-man camp at Panther creek for the Tiger creek



Camp at Salt Springs Dam

conduit; a 60-man camp at Deer creek for the flume; a 125-man camp at the sawmill on Tiger creek for the regulating reservoir, tunnel, and conduit; a 300-man camp at Tiger creek powerhouse; one at West Point; and one at Electra.

The camp and shops at Salt Springs were built first, of lumber milled from the timber cleared from the reservoir site. The office, store, hospital, mess house, dormitories, and the few family houses were erected on the narrow flat and the steep slope of the left bank, downstream from the dam just far enough to be safe from quarry blasting. The water supply is from springs, supplemented by pumping from the river. There is a complete sewerage system, including septic tank and sprinkling aeration filter. Similar camps have been built at the mouth of Tiger creek, upper sawmill at Cold creek, at the 'Summit' and at the sawmill on Tiger creek. The remaining camps will be built soon.

Owing to the inaccessibility of the project, the shops are well equipped to repair and remodel equipment.

The company charges the men $1.25 per day for board and sleeping quarters, but the men furnish their own blankets. The wages paid are: $4.00 for common laborers, $6.40 for carpenters, and $6.00 to $8.00 per 8-hr. day for mechanics. The men work two shifts of 8½ hours each, with every other Sunday off.

Salt Springs Dam Design—A brief description of the Mokelumne project and construction progress of this dam, was published in the April 10th, 1929, issue, pp. 183-4, and additional progress recorded in the August 25th, 1929, issue, p. 434-5.

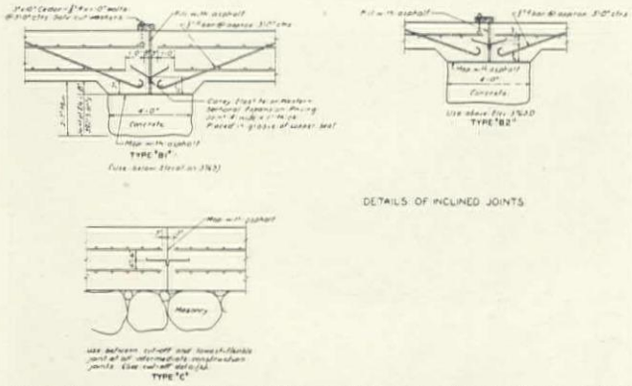
Salt Springs Dam, Looking Downstream

The economic development of the Mokelumne project depended on the cost of water storage at the Salt Springs damsite. Geologically, the damsite is about as good as could be desired, as the formation—side slopes and base—is solid granite.

A rock-fill dam was selected in preference to a gravity type concrete dam for several reasons. The cost would be $1,500,000 less; abundance of excellent granite convenient for quarrying; reduction in tonnage

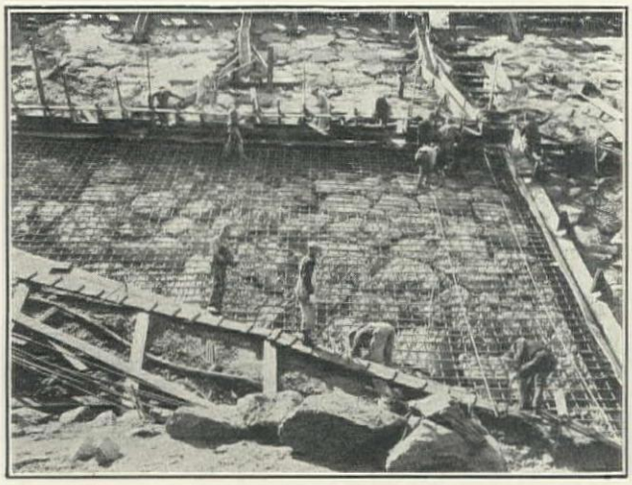
SALT SPRINGS DAM, LOOKING DOWNSTREAM, IN MARCH, 1928, SHOWING CUT-OFF WALL, BASE COURSE OF CRANE-PLACED ROCK SET IN CEMENT MORTAR, AND GROUT HOLE PIPES

of cement to be transported 50 miles (about 150,000 tons less), involving less road maintenance; opportunity to continue construction throughout the winter, although at reduced speed. Other factors, such as power lines, construction equipment, roads, camp, would cost about the same for either type. The design of the dam was subject to the approval of the Federal Power Commission and also the State engi-



Salt Springs Dam. Details of Up and Down Inclined Joints Between 60-ft. Concrete Panels of Upstream Facing; Showing 1-in. Asphalt Filler and Soft Copper Expansion and Water-Tight Seals, Over Concrete Footings

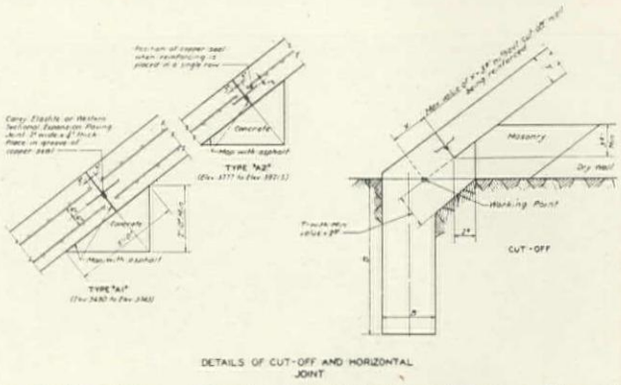
neer of California. Unusual consideration was given to the cross-section, slopes, facing, probable settlement, and methods of construction, as this will be the highest and largest rock-fill dam in the world. The dam was designed by the engineering department of the company (see 'Personnel' on p. 249).



Salt Springs Dam. Placing Reinforcing Steel for Lowest Tier of Concrete Panels for Upstream Facing; Also, Pouring Footings Along Edges of 60-ft. Panels

It is interesting here to note that the safe yield from this watershed, 1000 ac-ft. per sq-mi., corresponds with the average of streams on the west slope of the Sierra Nevada, as does also the estimated regulated stream flow of 500 to 600 c.f.s.

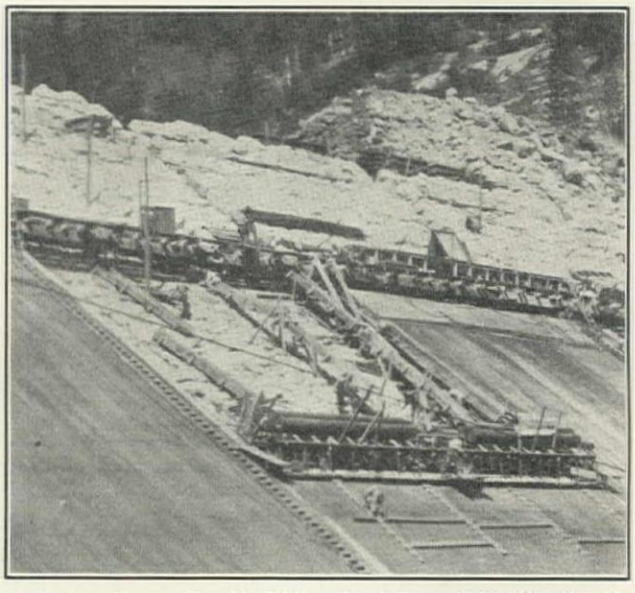
The dam will be 328 ft. high above foundation, 1300 ft. long on crest, 15 ft. wide on top, 900 ft. wide (maximum) at the base, with an average upstream slope of 1.3 (horizontal) to 1 (vertical), and downstream slope of 1.4 (horizontal) to 1 (vertical), about conforming to the angle of repose of dumped rock. The dam will require nearly 3,000,000 cu.yd. of rock. The upstream slope is faced (as the dam is constructed) with a layer, 15 ft. thick, of crane-placed rock (lower 10 ft. being laid in cement mortar), over which is placed a final facing of reinforced concrete, in 60-ft. squares, separated by a 1-in. space filled with asphalt and a soft-copper expansion and water tight seal. The concrete facing is 12 in. thick at the crest, tapering to 36 in. near the base, where it ties into the concrete cut-off



Salt Springs Dam. Details of Horizontal Triangular Expansion Joints Between 60-ft. Concrete Panels, and Junction of Concrete Facing with Cut-Off Wall

wall, which is 6 ft. thick and extends 6 to 20 ft. into solid rock. Grout holes, 2 in. diam., 50 ft. deep, and 6 ft. apart, were drilled along the bottom of the cut-off trench where the height of the dam is greater than 200 ft., and from 10 to 25 ft. apart up the abutment slopes.

Settlement of the loose rock fill in a dam of this height and cross-section can only be estimated. As unusually large pieces of rock (many pieces weighing 25 tons) are used and as the rock is exceptionally



Salt Springs Dam. Special Sliding Steel Form, 8 ft. Wide by 62 ft. Long, Used in Placing 60-ft. Panels of Concrete Facing

hard (six samples tested from 14,000 to 19,000 lb. per sq.in.), a minimum of settlement is anticipated. Nevertheless, an ultimate settlement of 6 ft. has been provided for in the design. For comparison, the total settlement of the Dix river rock-fill dam, in Kentucky, which is 275 ft. high, has been 1.7 ft. in four years, or 0.62%. (See discussion paper on Salt Springs dam by L. F. Harza, presented at spring meeting of American Society of Civil Engineers, Sacramento, April 23 to 26, 1930.)

To provide for settlement, the dam, in plan, is arched upstream 6½ ft. at the crest and decreasing downward; as determined by the weight of the fill combined with that due to water pressure and allowance for slight convexity after final settlement. In addition, provision has been made in the design for a slight ultimate concavity in the upstream face along a vertical section in the center of the dam. By this design, it is hoped to eliminate tension cracks and the tendency to buckle, as the lateral thrust due to the weight of the concrete will be against the rock backing at all times.

The edges of the 60-ft. square concrete slabs rest on concrete footings poured into grooves left in the crane-placed rock facing; the vertical grooves, or recesses, being rectangular and 4 ft. wide by 2½ ft. deep, and the horizontal grooves triangular in shape, with a vertical face of 3 ft. and horizontal face of 4 ft. The triangular shape, selected for convenience in con-

Salt Springs Dam. (Upper) Two Bucyrus-Erie 120-B, 4-yd. Electric Shovels Loading Clark Side-Dump 30-yd. Cars in Main Quarry. (Lower) Clark Side-Dump 30-yd. Car

struction and safety of workmen, also serves as a walkway and support for construction tracks across the face of the dam. The top face of these concrete footings is painted with asphalt before the 60-ft. square concrete slab is poured. In this way, and with the soft copper seals around the periphery of each slab, it is hoped that the concrete face will have sufficient flexibility to offset the tendency to crack or buckle as the rock fill settles. The 60-ft. concrete slabs are reinforced with two layers of 1-in. round steel bars, on 9-in. centers in the lowest course, reducing to a single layer, spaced 12 in., in the top course. A concrete mix (all aggregates crushed from granite), designed for maximum density, and using 5 sacks of cement per cubic yard, gives a strength of 3000 lb. at 28 days.

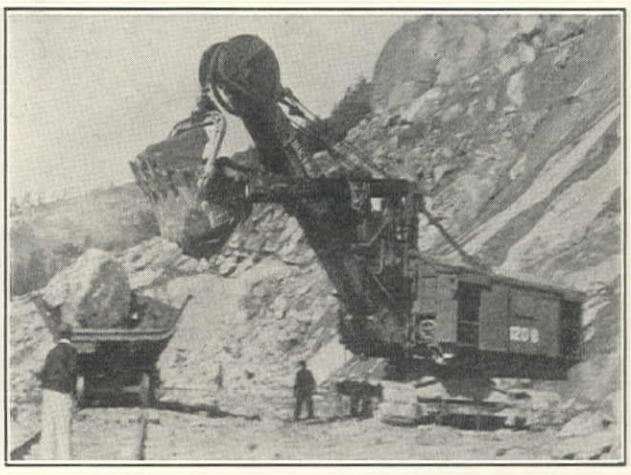
Outlet Tunnel—To provide a by-pass for the river during construction of the dam, the pressure outlet tunnel was constructed first; 920 ft., 19 ft. diam., concrete lined; 280 ft., 22 ft. diam., unlined. The upper end is rectangular and terminates in a concrete tower, topped with a steel trash rock, 21 ft. square, 25 ft. high. The lower end is enlarged to provide for two 11-ft. diam. butterfly valves to control the flow into two 10-ft. diam. steel pipes, 200 ft. long, at the ends of

One of Five Armstrong Churn-Drill Rigs Drilling 5¾-in. Holes 150 ft. Deep in Main Quarry for Salt Springs Dam

which will be installed 6½-ft. diam. free discharge butterfly valves.

These discharge valves, together with the powerhouse outlet, will provide emergency unwatering of the reservoir at the rate of 6500 c.f.s.; and the inlet butterfly valves will provide an emergency shut-off. An 8-ft. diam. branch pipe will supply water for the Salt Springs powerhouse and Tiger creek conduit.

The spillway, excavated through solid granite, is of



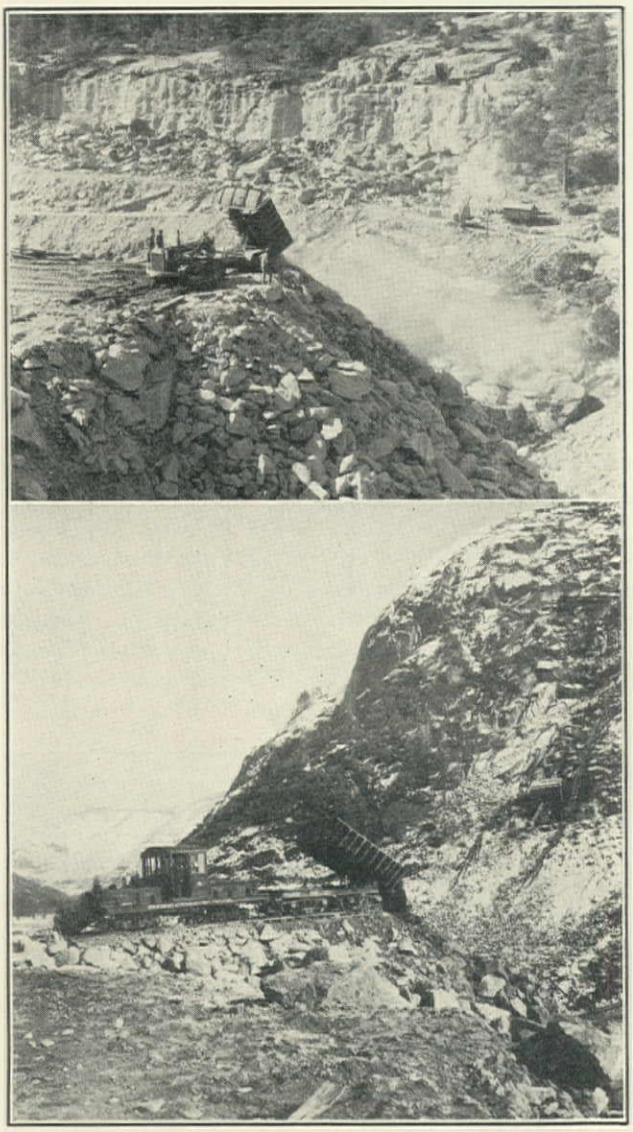
Salt Springs Dam. Bucyrus-Erie 120-B, 4-yd. Electric Shovel in Main Quarry Loading Railroad Car Equipped with End-Dump Body

the side channel type, 650 ft. long, 15½ ft. lower than the crest of the concrete facing of the dam, and has a capacity of 48,000 c.f.s., with 8 ft. freeboard, corresponding to a runoff of 300 c.f.s. per sq.mi. over the 160 sq.mi. of drainage area. The maximum recorded flood, in March, 1928, averaged 12,500 c.f.s. for a 24-hour period, with a peak of 14,500 c.f.s.

The spillway is continued as a channel through rock

on a 5% grade to a point 750 ft. below the dam. The excavation will total 500,000 cu. yd. of rock, most of which is being utilized in the dam.

Although considerable of the construction equipment on the Mokelumne project was used previously on the Pit river and other projects, a good deal is new. Additional equipment to that mentioned elsewhere in this article includes: Caterpillar 60's and 30's (total on project 13); five (new) Mack BC 3½ to 5-ton trucks, Mack AC trucks, Fageols, Dodges, GMC's, Ford AA's, and Whites (used by E. C. Coates, the subcontractor who hauled the material from the excavation for the Tiger creek powerhouse); Plymouth



Salt Springs Dam, November, 1929. (Upper) Athey End-Dump Car Drawn by Caterpillar 60 on End of 75-ft. Lift of Loose-Rock Fill from Left Bank. Big Quarry Across River on Right Bank. (Lower) Special 30-ton End-Dump Car Drawn by Electric-Battery Locomotive on End of Loose-Rock Fill from Right Bank

and Milwaukee gas locomotives; also lathes, presses, forges, and other repair-shop equipment.

Construction of Salt Springs Dam—Although construction of the dam by contract was considered, it was decided preferable to utilize the construction organization (including considerable equipment) which had so ably completed the Pit river and other projects.

The entire reservoir area, embracing over 900 acres, has been cleared of all timber (estimated at 2,500,000 f.b.m.) and brush.

Practically the entire area of the damsite was stripped to bedrock, with power shovels, trucks, and tractors, the amount excavated being 312,000 cu.yd., much of which was hauled ¾ mile downstream. A good deal of the material in the streambed required loosening with powder; material on the slopes was sluiced down. As soon as an area in the river bottom was stripped, boulders and fragments of rock from the stripping operations were dumped into the loose

Salt Springs Dam. Marion 2-yd. Electric Shovel Loading Athey 20-ton End-Dump Trailer Truck Drawn and Powered by Caterpillar 60 Tractor, in Spillway-Cut Quarry

rock-fill section of the dam; 67,000 cu.yd. being salvaged in this manner. The following equipment was used on this work: Three Marion electric shovels 1¼, 1, and ¾-yd.; one Bucyrus-Erie 1-yd. air-steam; and White trucks on contract with E. C. Coates.

A 75-ft. lift (the maximum safe height for construction) of loose rock fill was first built along the upstream toe, so that construction of the crane-placed rock could be started as early as possible. Rock for this fill was obtained from a small quarry on the left bank upstream. As soon as the fill, of minimum working width and on the semi-circular plan, was extended across the damsite, construction of the crane-placed facing was started and widening of the loose rock-fill on the downstream side was begun.

As the semi-circular plan of carrying a fill across a canyon is not practicable when the dam narrows in width, the engineers on construction developed a special end-dump car for this purpose. Excellent service had been secured from the seven special 20-ton end-dump Athey trailer trucks (drawn by Caterpillar 60 tractors), and on short-haul work from the quarries. These end-dump bodies (all steel) are equipped with 6-in., 3-sleeve, twin cylinder Commercial hoists (Commercial Shearing & Stamping Co., of Youngstown, Ohio), having a geared oil pump and powered from the tractors.

It was, therefore, decided to apply this type of hoist to standard-gauge railroad cars. Four of these cars were built of 30 tons capacity each, with bodies similar to the Athey trailers. The trucks are of 80,000-lb. capacity, with 5 by 9-in. journals, M. C. B. automatic couplings, and Tuftus steel wearing strips (as on the Athey trucks) on the bottom and sides of the body. The bodies weigh 15,000 lb. (the entire car, 34,000 lb.) and are normally loaded with 20 cu.yd. of rock. The cars have no brakes, as the electric locomotives have

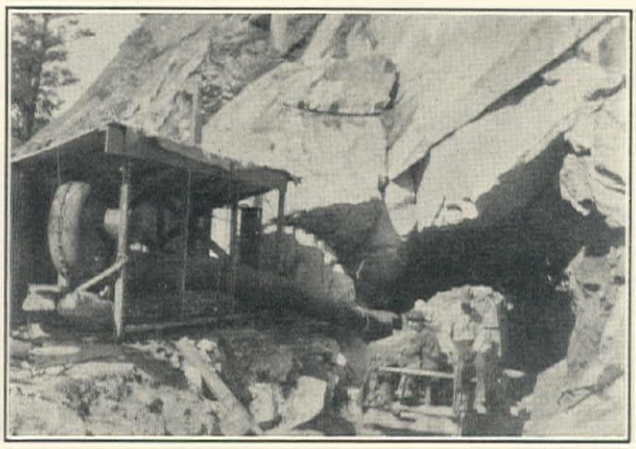
air brakes of sufficient power for both. Power for the hoists is supplied through a 3-conductor flexible cable to a 220-volt, 3-phase, 1200-r.p.m. motor direct connected to the geared oil pump, which operates the Commercial 8-in., 2-sleeve, twin-cylinder hoists (7-in., 3-sleeve hoists were first used).

The design of these cars and the application of the Commercial hoists to both cars and Athey trucks, was worked out by P. F. Schneider of The Mutual Engineering Co., South San Francisco, and O. W. Peterson, P. I. Kurtz, and Hector Keesling, of the P. G. & E. Co.

The four 20-ton electric locomotives were likewise built specially for this job, utilizing equipment (G. E. motors and Exide batteries) salvaged from eight 8-ton locomotives formerly used on the Pit river project. The car bodies were built by the Mutual Engineering Co., of South San Francisco, which company also built the bodies for the Athey trailer trucks and end-dump railroad cars.

Both of these units—Athey trailer trucks hauled by Caterpillar 60's and railroad cars hauled by electric locomotives—have proved very satisfactory, and have permitted the rapid construction of the rock fill by the end-dump method without the use of trestles.

Considerable of the rock fill—especially widening of the 75-ft. lifts—is made with the Clark 30-yd., standard gauge, drop-door, side-dump cars; of which there are eight in use, drawn by the 20-ton electric locomotives

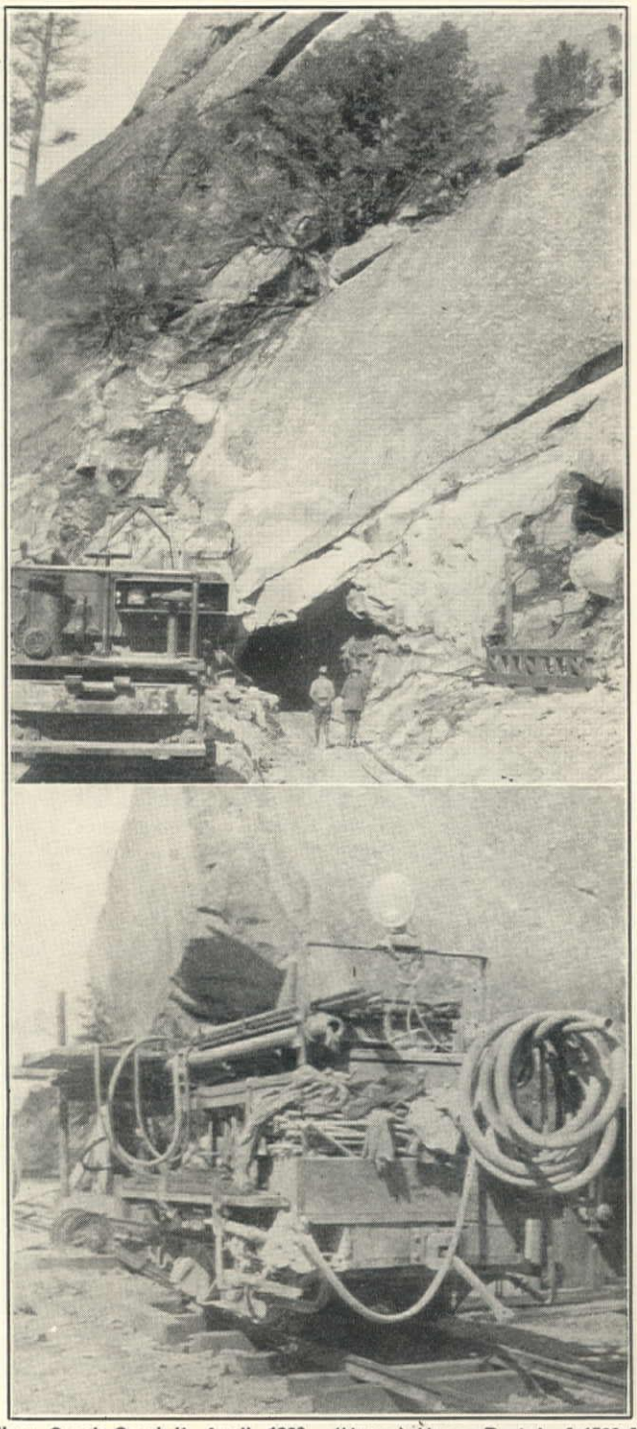


Tiger Creek Conduit. Upper Portal of Tunnel Below Salt Springs Dam, Showing Conway Electric Locomotive Hauling Rock from Tunnel. Exhaust and Fresh Air Blower at Left

which are also equipped with air compressors for tipping the car bodies. The average length of haul is 1500 ft. A Nordberg track shifter is used to good advantage in the moving of tracks.

Rock is obtained from three main quarries, at different levels, near the north or right abutment of the dam, and from the spillway cut on the left bank. The largest quarry, midway in elevation between streambed and crest of dam, will provide 1,300,000 cu.yd. This quarry permitted the shooting of several unusually large blasts. Two Armstrong electrically operated, churn-drill rigs were used to put down a row of 5¾-in. vertical holes, 30 to 45 ft. back from the face of the quarry (700 to 1000 ft. long), 60 to 180 ft. deep, on 18 to 22½-ft. centers. These holes are loaded on the average with 35 boxes of 40% Hercules gelatine for each hole. At the same time, 2-in. horizontal toe holes, on 8-ft. centers, were drilled into the base to a depth of 24 ft. with Leyner drills; an average of 100 lb. of 40% Hercules gelatine being used in each hole.

On November 5, 1929, a total of 44 vertical holes 158 ft. deep, and 99 toe holes 24 ft. deep, was loaded with 116,250 lb. of Hercules dynamite. This 'shot'



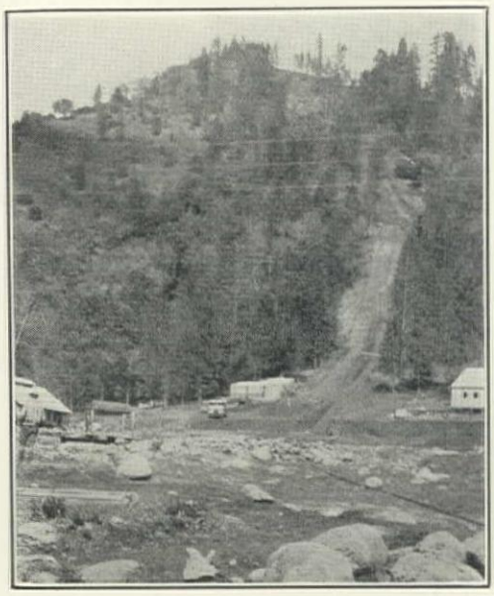
Tiger Creek Conduit, April, 1930... (Upper) Upper Portal of 1500-ft. Tunnel Through Granite Dome Just Below Salt Springs Dam; R. D. Reeve and O. W. Peterson Approaching Portal. This Illustration Shows Sloping Laminated Formation of Granite Dome. (Lower) One of Special Drill Carriages Used in Tunnel Excavation

broke down 231,700 cu.yd. of granite at ½ lb. of powder per cubic yard of solid rock. The 'Front Cover' illustration, a remarkable photograph, shows this 'shot' at the instant the powder gases were released. A previous 'shot' on August 8 broke down 330,000 cu.yd. of loose rock for which 84,700 lb. of powder was used (Aug. 25, 1929, issue).

Nearly all the drilling equipment is Ingersoll-Rand. On the Salt Springs dam there are six I. R. type 10 electric-driven compressors of various sizes, of a total

capacity of 3000 c.f.m.; fifty I. R. type S49 Jackhamers; eight I. R. type X-70 and S-80 heavy drifters; and six I. R. 'Little Tuggers'.

Much of the rock breaks in enormous blocks, requiring secondary drilling with Ingersoll-Rand Jackhamers, and shooting. This raises the average quantity of powder used per cubic yard to nearly one pound. In the big quarry, two Bucyrus-Erie, 120 B, 4-yd., full-revolving, electric-drive (2200 volts), shovels on crawler trucks, have been used to load the Clark side-dump cars and special end-dump cars. These



Clearing for Tiger Creek Penstock; Powerhouse Site in Foreground

shovels load an average of 45,000 cu.yd. of rock per month per shovel, not including 5% waste. Rock is loaded without the use of slings, 50% being so large that it is handled by the shovels without passing through the bucket.

In the other quarries, there are two smaller shovels, one Bucyrus-Erie 2½-yd. electric, and one Marion 2-yd. electric, loading into the Athey end-dump trailer trucks on crawler treads. There is also a Marion ¾-yd. electric shovel in the quarry for concrete aggregates.

Rock in the fill varies from quarry fines to 25-ton pieces, and averages over 3 tons. The average length of haul is 1500 ft. Water is supplied by five 1200-g.p.m. pump units, and is used liberally for washing the fines into the voids. A layer of fine material accumulates from hauling operations on the surface of each lift. This is loosened by digging small pits 6 ft. apart, in the bottom of which a small charge of low-strength powder is shot. The surface is then heavily sluiced with water. There is a small berm left on the downstream slope at each lift, which, it is anticipated, will be 'smoothed out' by the dumped rock sliding down from the upper lifts.

On May 1, over 2,000,000 cu.yd. of rock fill was in place. The actual 'swell' has not been measured, but is estimated at 35% as against 40% for the Dix river dam.

The 15-ft. layer of crane-placed rock (total quantity 220,000 cu.yd.) is handled economically and rapidly with five electrically operated (440-volt) cranes. Two cranes were used to start with; now there are five: three Marion ¾-yd. model 21; one Bucyrus-Erie 1¼-yd., model 25B; one Marion 1¼-yd., model 32. These cranes were converted from full-swing shovels on crawler treads, and have 35 to 40-ft. booms and front drum attachments. Rock up to 10 tons is handled by means of wire-rope slings. Each crane moves back and forth a distance of 200 to 300 ft., on a roughly leveled roadway on the top of the course being laid, using spalls from the roadbed to fill up chinks in the placed rock. Each course is full width and 6 ft. deep, thus making a 12-ft. lift constructed from each road level. Each crane works two shifts of 8½ hours, with a crew of six men, and places 3000 cu.yd. per month.

As it works out, an interval of several months elapses between the dumping of loose rock and building of placed rock facing against it.

A rock crushing and concrete mixing plant was built on the steep left bank upstream from the spillway. Rock is quarried and crushed (2½-in. maximum size) by an Allis-Chalmers primary jaw crusher and two 5K and one 3K Gates gyratory crushers. Sand is produced with a No. 3 Symons sand cone-crusher. The conveying and screening equipment is Link-Belt Meese & Gottfried and Bodinson. Concrete is mixed in a Ransome type 1-yd. mixer, made by the Mutual

Tiger Creek Conduit, April, 1930. Drilling Base of Slope on 18-ft. Bench for Concrete and Side-Casting with Marion Type 450 Gas Shovel Near Tiger Creek

Engineering Co., South San Francisco. Calaveras cement in Bates valve paper bags is being used on the Mokelumne project.

Concrete is delivered along the face, using the horizontal triangular recesses as bases for track platforms, in 2-yd. side-discharge cars hauled by Plymouth gasoline locomotives.

The portion of the facing below the top of the intake tower (elev. 3710 ft.) was constructed with wooden forms, consisting of two layers of 1½-in. planking, which is being left to serve as a permanent protection sheathing. For the panels above this elevation, sliding steel forms are being used. These were designed by the same men who developed the end-dump cars. They are 8 ft. wide, 62 ft. long, and are stiffened and supported by two latticed steel trusses; water ballast

in cylinders being used for additional weighting down. Each 60-ft. square panel is completed at one pouring, the steel form being gradually raised as the concrete placing progresses.

The powerhouse will be of structural steel and concrete construction, and of pleasing architecture in conformity with the policy of the P. G. & E. Co. to incorporate 'Beauty with Strength' in all its structures. The equipment will consist of: one Westinghouse 11,000-kva. generator direct-connected to a Pelton 13,500-hp. vertical reaction turbine operating at 300 r.p.m. The turbine is designed to pass 550 c.f.s. between heads of 240 and 175 ft. A 54-in. diam. by-pass valve will divert water directly into the Tiger creek conduit when the power plant is shut down or the turbine does not pass sufficient water for the needs of the Tiger creek conduit. Space will be left in the powerhouse for a future 2000-ft. head, 30,000-hp. impulse unit to be installed when the Bear river development is built. This unit will have a rating of about 25,000 kva.

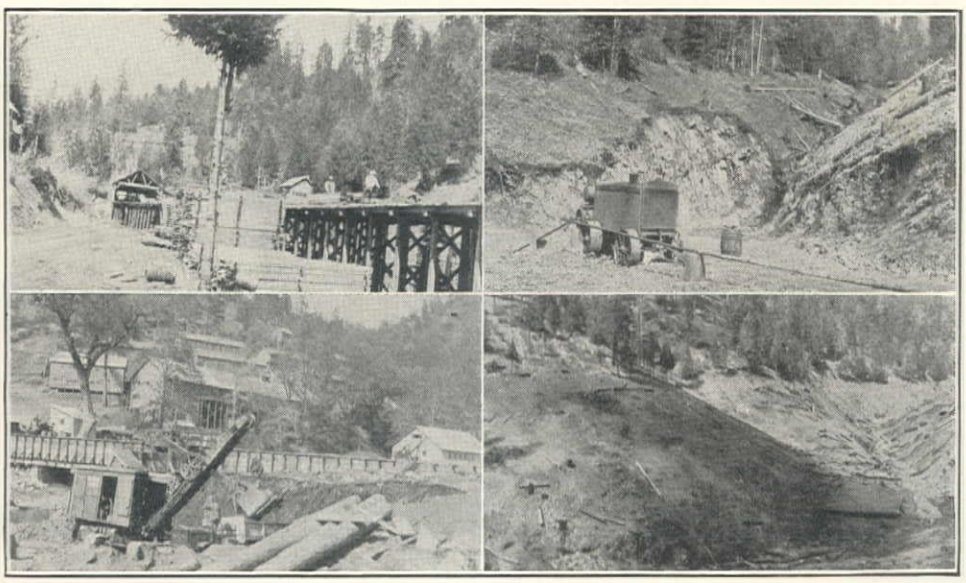
For construction purposes, the connected horsepower load at the dam is 4000. It is expected that the dam and powerhouse will be completed early in 1931.

The Tiger creek conduit is to convey 550 c.f.s. from the Salt Springs dam powerhouse 18 miles to Tiger creek, where 60,000 kva. will be developed. Most of this conduit will consist of a reinforced concrete flume approximately 14 ft. wide and 7 ft. high (inside measurements) on slopes of 0.0008 and 0.001 built with concrete ties (incorporated in concrete floor) on a solid-bottom bench, 18 ft. wide, cut into the hillside. There are seven tunnels through promontories subject to slide and two siphons. The first tunnel, just below Salt Springs dam, is through the huge granite dome on the right bank, and is 1500 ft. long. A tunnel was decided upon in preference to a flume, to preclude any tie-up from slides which might result from cutting a bench into the laminated rock of this dome. This tunnel, as well as the others below, is horseshoe-shaped, 10 ft. 9 in. high by 10 ft. wide. Comparatively little lining will be required in any of the tunnels. The main tunnels are being driven by company forces.

The principal equipment includes 2 Conway tunnel shovels, 3 drill carriages (designed and built by company forces), 4 Baldwin-Westinghouse 8-ton locomotives, Ingersoll-Rand N75 drifters, tunnel muck cars, etc.

J. C. Hansen, Service Engineer for Ingersoll-Rand Co., Watching Driller Using I.R. Jackhamer on Foundation for Tiger Creek Powerhouse

The Salt Springs dome tunnel is 60% excavated; all from the upper portal. The Panther creek tunnel, 9600 ft. long, is through a gneiss formation, and is about 65% excavated, 2700 ft. from upper portal and 3500 ft. from lower portal; about 150 ft. at each end will require concrete lining.



(UPPER LEFT) SAWMILL ON TIGER CREEK. (UPPER RIGHT) I.R. PORTABLE COMPRESSOR AT LOWER PORTAL OF 2800-FT. TUNNEL WHICH DISCHARGES INTO TIGER CREEK REGULATING RESERVOIR. (LOWER LEFT) MARION TYPE 7 GAS-ELECTRIC SHOVEL EXCAVATING FOUNDATION FOR TIGER CREEK POWERHOUSE. FLUME ON STANDARD CANAL LEADING TO ELECTRA POWERHOUSE. CAMP IN BACKGROUND. (LOWER RIGHT) TIGER CREEK REGULATING RESERVOIR, DAMSITE IN FOREGROUND

At the Summit camp above the Panther creek tunnel, a rock crushing plant has been built, equipped with an Allis-Chalmers 15 by 24-in. primary crusher, two no. 5 Gates, one Wheeling no. 3½ secondary crushers, a Symons No. 3 cone crusher for sand, Link-Belt Meese & Gottfried and Bodinson rotary screens and belt conveyors. Concrete for lined portions of this tunnel and for a section of the Tiger creek flume will be produced at this plant.

The Tiger creek tunnel, 2800 ft. long, is through a

metamorphic formation which may necessitate concrete lining. Excavation will be started about July 1.

Excavation of 12 miles of the bench for the flume, including 3 tunnels totaling 500 ft., and involving 500,000 cu.yd., was awarded to Bechtel & Palmer, of San Francisco. This contract is under the supervision of W. A. Bechtel, Jr., with P. A. Hansen as field superintendent. The job is 50% completed, and is being handled on schedule in a very satisfactory manner. Bechtel & Palmer are using two of the company camps as bases—Sawmill camp on Tiger creek and Summit camp above Panther creek. The equipment on the job includes: one P&H 1-yd. gas shovel, one Northwest 1-yd. gas shovel, one Osgood, No. 39, 1¼-yd. steam shovel, five Sterling and Autocar dump trucks, five Ford dump trucks, one Caterpillar 60 and one Caterpillar 30 tractors, four Ingersoll-Rand portable gas-driven compressors, two Ingersoll-Rand stationary electric-driven compressors, I.R. S-49 Jackhamers, and I.R. sharpeners, 1-in. Swedish steel, and Giant powder.

The remaining 6 miles of the bench for the flume, at the lower end, and involving 150,000 cu.yd. excavation, is being graded by company forces, and will be completed during the present year. On this work a Marion, model 450, is being used, as well as Giant and Hercules powder.

Concrete Flume—Consideration was given to many factors in the design of the Tiger creek conduit, continuity of operation without interruption from slides and maintenance being foremost. A reinforced concrete flume on a solid bench, 2 ft. away from the inside slope, was decided upon as the best type of conduit. The inside wall of this flume is designed to withstand the pressure of slide material from the outside when the flume is empty as well as the pressure of water from the inside.

The flume will be built with three outfits working simultaneously. Special equipment has been developed by the same group who designed and built the end-dump cars, afore-described. The construction of this flume will be described in detail in a later article. Briefly, the equipment and method is as follows: Concrete ties, 6 by 8 in. and 15 ft. long, are first poured in place; rails and planking laid; and concrete aggregates hauled in pneumatic-tired (32-in. wheels) end-dump batch trucks of 26 cu.ft. capacity, pulled in trains by McCormick-Deering industrial tractors, cushion-tired, and equipped with Joshua-Hendy auto-cranes. These trains will travel at high speed, and will run under the traveling concrete mixing plants, of special design. The mixing plants are electric driven, with high speed mixer drums, and will chute concrete to the floor and each way to the sides of the flume. There will be three of these traveling mixer plants (built by the Mutual Engineering Co.), six of the McCormick-Deering tractors, and fifty of the aggregate trailers.

Tiger Creek Powerhouse—As aforesaid, the Tiger creek conduit will empty through a tunnel into a regulating reservoir of 175 ac-ft. capacity (surface elevation 3585 ft.) formed by a concrete arch dam 100 ft. high (design not completed). The reservoir has been cleared (see illustration), and Geo. C. Louderback, professor of geology, University of California, is investigating the geology of the damsite. From this reservoir the water will flow through 2½ miles of additional flume to a forebay (to be constructed). The penstock will be a single pipe 4750 ft. long (static head, 1218.6 ft.) tapering from 102 in. to 72 in. at the bottom where it branches first into two 52-in. pipes and then into four 36-in. pipes leading to the four impulse wheels in the powerhouse.

The upper 4000 ft. is riveted steel; countersunk rivets being used on the inside of all butt-strap pipe. This pipe, together with the pipe in the branching system at the lower end, will be furnished by the Western Pipe & Steel Co., of San Francisco. The lower 740 ft. of the main penstock will be seamless pipe, forged and rolled, with all round seams riveted, to be furnished by the M. W. Kellogg Co., of Jersey City; the Y branches by Joshua Hendy Iron Works.

The Tiger creek powerhouse, at the junction of Tiger creek with the Mokelumne river, will be of structural steel and concrete and the generating equipment will consist of: two 30,000-kva. Westinghouse generators, direct connected to two double-overhung, 36,000-hp. (each), Pelton impulse wheels operating at 225 r.p.m. Excavation for the foundation is about completed, a Marion type 7, gas-electric shovel being used on this work.

An afterbay dam will be built, about two miles below the Tiger creek powerhouse on the Mokelumne river, to regulate the diversion of water to the West Point powerhouse, four miles below, and to the Electra powerhouse 13 miles farther downstream.

The conduit to the forebay above the West Point powerhouse, and the new conduit from there to Lake Tabeaud (the present forebay for the Electra powerhouse), will be of similar construction to the Tiger creek concrete flume.

The West Point powerhouse will have a static head of 285 ft.; a supply of 575 c.f.s.; and 15,000 kva. will be installed.

Electra Powerhouse—The existing Electra powerhouse will continue to operate until after the new Electra powerhouse (to be built adjacent thereto) is completed. Then the old powerhouse will be wrecked; following which the West Point powerhouse will be constructed. Lake Tabeaud at present is served by the upper and lower Standard canals. The upper canal diverts about ½ mile above Tiger creek powerhouse, and the lower canal diverts just below the proposed afterbay dam. The head on the new Electra powerhouse from Lake Tabeaud will be 1275 ft. The generating equipment of 60,000 kva. rating will be similar to that to be installed at Tiger creek.

Transmission Lines—Construction of the permanent transmission line from the Salt Springs powerhouse to Newark, on San Francisco bay, will soon be started under the supervision of E. H. Steele, engineer of line construction. From the Salt Springs powerhouse to the Tiger creek powerhouse, the line will be 110,000-volt on single circuit steel towers. At Tiger creek the voltage will be stepped up to 220,000, and transmission to Mokelumne hill, just below the Electra powerhouse, a distance of 16 miles, will be by two lines on single circuit, Snow type, steel towers. From Mokelumne hill to Newark, 94 miles, transmission will be by two lines on double circuit steel towers. A large transformer station will be built at Newark under direction of M. C. McKay, assistant engineer of general construction.

Los Angeles to Spend $39,000,000 for Water Works

On May 20, the citizens of Los Angeles approved, by a vote of 189,753 to 22,046, a bond issue of $38,800,000 for imperatively needed improvements to the water works. The interest and redemption charges will be paid out of water revenues. The vote was 56% of the registration.

The failure of the St. Francis dam in March, 1928, deprived the city of 38,000 ac-ft. of local storage out of a total of 73,000 ac-ft.—a serious curtailment. The Board of Water Commissioners thereupon employed Louis C. Hill, R. E. McDonnell, and Robert T. Hill to report and recommend necessary improvements to the distribution system and local storage. (See September 10th and October 10th, 1928, issues.) In conformity with their recommendations, a bond issue was submitted to the voters for approval, but being 'tied up' with other proposed bond issues, was defeated.

The improvements proposed under the present bond issue, and from other funds available, include:

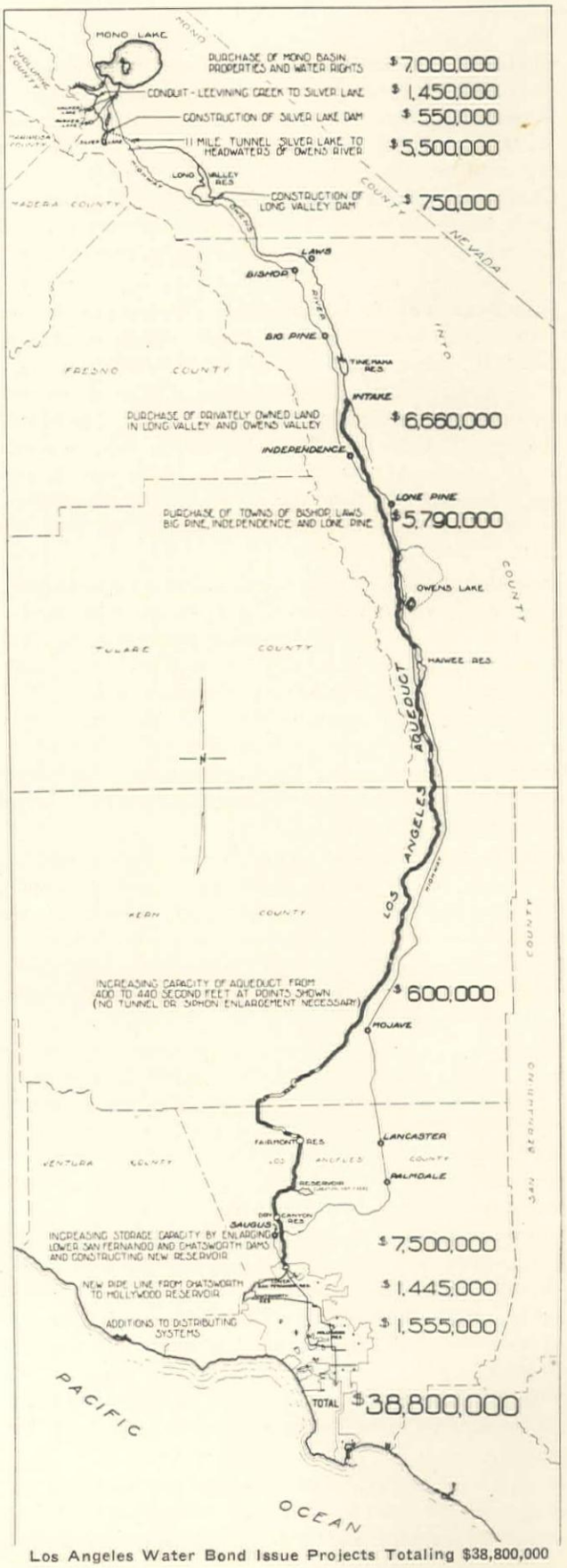
Owens Valley—A cycle of years of abnormally low snowfall has made it imperative to acquire all the lands and water rights in this valley; purchase of the towns of Bishop, Laws, Big Pine, Independence, and Long Pine, involving 2348 acres, $5,790,000; purchase of lands in Long valley, Owens gorge and Owens valley, including two power plants of 8000 hp. from Southern Sierras Power Co., for $6,660,000.

The city has 100 pumping wells in Owens valley, from which 250 c.f.s. is being pumped into the Owens aqueduct, which amounts to 50% of the entire flow from Haiwee reservoir. The city's hydroelectric plants in the valley cannot furnish enough power for this pumping, and 2000 kw. additional is purchased from the Southern Sierras Power Co.

Mono Basin Diversion—For purchase from Southern Sierras Power Co. of properties and water rights, $7,000,000; conduit from Leevining creek (outlet to Mono lake) to Silver lake on Rush creek, $1,450,000; construction of Silver lake dam, $550,000; an 11-mile tunnel from Silver lake to headwaters of Owens river, $5,500,000; construction of Long valley dam, $750,000. The average flow of the Mono Basin streams for the past 20-year period has been 180 c.f.s.; and only 138 c.f.s. during the last 12 years.

Owens Aqueduct—The capacity of the aqueduct is to be increased from 400 c.f.s. to 440 c.f.s. by enlarging some of the conduit sections through the desert; cost $600,000.

Local Storage—The minimum draft on the Owens aqueduct (February) is 44.5% of average annual flow, and the maximum, (July) 191%. Large local storage is therefore imperative. During the summer of 1929, there was a period when the local storage was reduced to 20 days' supply. The longest interruption to date in aqueduct service has been 16 days. The local storage capacity (below the end of the Owens aqueduct)



Los Angeles Water Bond Issue Projects Totaling $38,800,000

is to be increased from 35,000 ac-ft. to nearly 105,000 ac-ft. by the following improvements:

Lower San Fernando reservoir is being enlarged by raising the earth-fill dam (2400 ft. long) 12 ft.; thus increasing the capacity from 14,672 ac-ft. to 20,500 ac-ft.; cost $265,000, to be paid for out of water revenues.

Chatsworth reservoir is to be enlarged from 8208 ac-ft. to 42,155 ac-ft.

A new reservoir near San Fernando, with a capacity of 30,000 ac-ft. The Chatsworth reservoir improvements and new reservoir will cost $7,500,000.

Chatsworth-Hollywood Conduit—This pipe-line will convey water from the Chatsworth reservoir to Hollywood reservoir (Mulholland dam); it will cost $1,445,000.

Distribution System Additions—The amount allotted in the bond issue for the major improvements is $1,555,000. These include some large connecting feeders to equalize supply and pressure. There are several lines under construction, such as: a 36-in. lap-welded bell and spigot steel pipe-line, 1¼ miles long, as a new inlet to Stone canyon; and 3 miles of 24-in. c.i. pipe along Figueroa st. from Michael st. to Sunset blvd. The city lays on an average 15 miles of c.i. pipe per month.

Investment—When the Owens aqueduct was started, the per capita indebtedness was $160; on February 1, 1930, with $44,236,700 of outstanding bonds, the per capita indebtedness was $34.03; and with the additional bond issue of $38,800,000 it will be $63.56. The total assets of the Bureau of Water Works and Supply on June 30, 1929, were $118,000,000, of which $105,000,000 represents plant and equipment, $33,000,000 being contributed from surplus earnings. The average water rate per 100 cu.ft. is 13 cents.

Supply and Demand—The present safe yield of water from Owens valley (Haiwee reservoir and wells less evaporation losses and local uses) is 286 c.f.s. Increased yield from purchase of additional lands and water rights will be 50 c.f.s. The safe yield from Mono Basin will be 135 c.f.s. The total dependable supply will be 471 c.f.s.

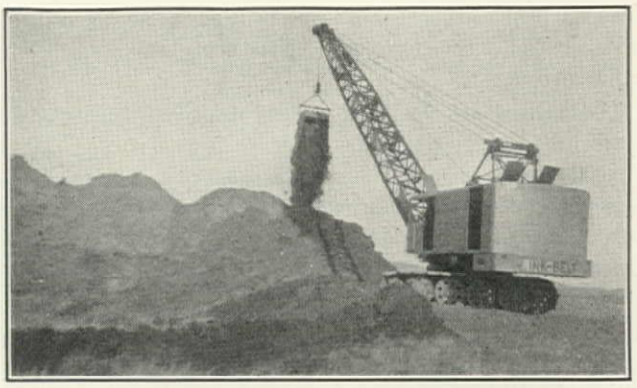
The average supply during 1929 through the Owens aqueduct was 262 c.f.s. The estimated consumption for 1936 is 455 c.f.s. The improved Owens aqueduct will deliver 440 c.f.s. which, added to the supply of 116 c.f.s. from local sources, gives 556 c.f.s. It is apparent that the Colorado river will be required as soon as the aqueduct can be constructed.

It should be mentioned that the Walker river supply was carefully investigated recently for the city by F. H. Fowler, consulting engineer, San Francisco. Considerable water, about 100 c.f.s., is diverted from the East and West Walker rivers for irrigation, leaving at best only 105 c.f.s. available, which is too small an amount to justify the expenditure of $16,000,000 for the aqueduct required to divert these waters to Mono Basin.

H. A. Van Norman is chief engineer and general manager of the Bureau of Water Works and Supply, city of Los Angeles, and Wm. W. Hurlbut is engineer of distribution and operation.

CREED STATION-VACAVILLE BRANCH, SACRAMENTO NORTHERN RAILWAY

The Utah Construction Co. will complete its contract about June 5, 1930, for 7½ miles of grading, bridging, tracklaying, and ballasting of the Sacramento Northern Railway between Creed and Vacaville Junction. The grading involved 200,000 cu.yd.



Link-Belt 2-yd. Dragline on Utah Construction Co. Contract for 7½ Miles of Sacramento Northern Railway Between Creed and Vacaville Junction, California

and was completed early in May. Bridging includes several small pile bridges and an overhead crossing for the Southern Pacific main line and a county road at Vanden, using one 80-ft. and one 50-ft. girder spans on concrete piers. Equipment includes one 2-yd. Link-Belt dragline, one 1½-yd. Thew-Lorain dragline, one 1¼-yd. Bucyrus-Erie gas+air shovel, two McMillan scrapers, and two Caterpillar tractors, a concreting outfit, a pile driver, and miscellaneous tools.

STREET CROWNS

A table used by the Department of Improvements & Parks, City and County of Denver, Colorado, and based on the formula $C=\frac{W(100-6f)}{4000}$, where: C=crown in feet, W=distance in feet between curbs, and f=grade of street per 100=%. (Drop quarters ⅓ of crown instead of ¼.)

f	30-ft. Roadway C	f	36-ft. Roadway C
0.0	0.75	0.0	0.90
1.0	0.71	1.0	0.85
2.0	0.66	2.0	0.79
3.0	0.62	3.0	0.74
4.0	0.57	4.0	0.68
5.0	0.53	5.0	0.63
6.0	0.48	6.0	0.59

f	40-ft. Roadway C	f	42-ft. Roadway C
0.0	1.00	0.0	1.05
1.0	0.94	1.0	0.99
2.0	0.88	2.0	0.92
3.0	0.82	3.0	0.86
4.0	0.76	4.0	0.80
5.0	0.70	5.0	0.74
6.0	0.64	6.0	0.67

f	45-ft. Roadway C	f	48-ft. Roadway C
0.0	1.125	0.0	1.20
1.0	1.06	1.0	1.13
2.0	0.99	2.0	1.06
3.0	0.92	3.0	0.98
4.0	0.86	4.0	0.91
5.0	0.79	5.0	0.84
6.0	0.72	6.0	0.77

Editor's Note—The above table was submitted by C. H. Draney, superintendent in charge of plant and paving operations, Department of Improvements & Parks, Denver. It is hoped that it may be of value to practicing engineers, particularly in the smaller municipalities.

BOOK REVIEWS

AMERICAN CIVIL ENGINEERS' HANDBOOK

THADDEUS MERRIMAN, *Editor-in-Chief*

John Wiley & Sons, Inc.—2263 pages—4½ x 7—Flexible—$8.00

The new fifth edition of this standard and authoritative handbook closely follows the plan and scope of the first four editions, for which the late Mansfield Merriman was editor-in-chief. It has been revised, brought up to date, material added, and entirely reset. The handbook is offered under one cover at the price shown above or in two volumes at $10.

The two-volume edition is for convenience in field work. The first eleven sections present general principles and materials, the second eleven sections treat of principles, design and application in the several fields of civil engineering—a division being possible between the two sets of sections.

The sections follow: mathematical tables; mathematics and mechanics; chemistry, physics, meteorology, weights, and measures; steam engineering; electric engineering; surveying, geodosy, railroad location; materials of construction; foundations and earthwork; timber structures; masonry structures; plain and reinforced concrete; steel structures; hydraulics, pumping, waterpower; water supply; dams, aqueducts, canals, shafts, tunnels; irrigation and drainage; sewerage and sewage disposal; refuse collection and disposal; harbor and river works; highway engineering; steam railroads; electric railroads. Several sections desirable from the standpoint of the practicing engineer have been omitted, probably due to lack of space.

Thomas H. Wiggin is associate editor-in-chief and there are nineteen associate editors.

REINFORCED CONCRETE CONSTRUCTION

Volume II—Retaining Walls and Buildings

By GEORGE A. HOOL, S.B.

McGraw-Hill Book Co., Inc.—700 pages—6 x 9—Boards—$6.00

As the entire series is prepared to meet the needs of students having varying qualifications, this volume is more comprehensive than the ordinary text; information on design being given in considerable detail. The volume is divided into three sections—retaining walls and buildings, construction, and estimating. Section I includes: theory of stability, design, and construction of retaining walls; floors, design of slab, beam, and girder floors, design of flat slab floors, roofs, columns, eccentric load conditions in columns, foundations, walls and partitions, stairs, elevators and elevator shafts, provision for expansion and contraction, wind stresses, earthquake stresses, design of a factory building, typical reinforced concrete building design specifications. Section II contains information on: materials, forms, bending and placing of reinforcement, proportioning, mixing, and placing of concrete, finishing concrete surfaces, waterproofing of concrete, concrete construction plant. Section III includes estimating quantities of materials, estimating labor, estimating costs; and is followed by standard specifications for plain and reinforced concrete.

FLOOD FLOWS—A STUDY OF FREQUENCIES AND MAGNITUDES

By ALLEN HAZEN, ScD.

John Wiley & Sons, Inc.—199 pages—6 x 9—Boards—$4.00

For over 20 years the consulting office of which the author is senior partner has studied the size and recurrence of flood flows, a subject on which much effort has been spent by the profession at large in gathering statistics and interpreting probability data. 'Flood Flows' was written to offer in one compact presentation those methods previously published which seem most helpful, to arrange in form convenient for reference some basic data, to add some information not generally known, and to offer Hazen's philosophy on the interpretation of data and application of results. Graphic methods are largely depended on—mathematical methods being referred to papers and texts otherwise obtainable.

The following subject matter is covered: introduction; definitions of flood quantities; method of plotting annual floods; data available for study; coefficient of flood; coefficient of variation; coefficient of skew; drawing a smooth curve; tables and plottings; effect of one large flood; three coefficients and flood ratio factors; duration curve as a method; extreme flood method; seasonal distribution of flood flows; local and other factors; effects of great storms; effects of storage, forests, and land drainage; obstructions, debris, and sediment; changes in climate; methods of flood protection; conclusion; appendix.

REINFORCED CONCRETE CONSTRUCTION

Volume III—Bridges and Culverts

By GEORGE A. HOOL, S.B.

McGraw-Hill Book Co., Inc.—688 pages—6 x 9—Boards—$6.00

This work is said to be sufficiently comprehensive to enable the reader to analyze and design properly any form of reinforced concrete arch. It is divided in seven parts, namely: arch bridges; slab and girder bridges; culverts; notes on construction plant; notes on estimating; the artistic design of concrete bridges; the construction in detail of several types of concrete bridges; European concrete bridges.

THE FLOW OF WATER IN RIVETED STEEL AND ANALOGOUS PIPES

By FRED C. SCOBEY

The United States Department of Agriculture has recently published Technical Bulletin No. 150 (136 pages, price 30 cents), on 'The Flow of Water in Riveted Steel and Analogous Pipes', by Fred C. Scobey, Senior Irrigation Engineer, Division of Agricultural Engineering. This is an unusually comprehensive and valuable treatise, and is the culmination of many years of personal observations, experiments, and tests by the author, who is an acknowledged authority on the measurement of water. This bulletin covers the results obtained from 98 tests on 29 pipes from 4 to 168 in. diam., made by the Division of Agricultural Engineering, and 1080 observations on 169 reaches of pipe, from new to 47 years of age, made by other agencies. There are included numerous tables and graphs; a comparison of well-known formulas, including the Scobey formula, and a comparison of the carrying capacities of pipes of various types and materials.

"This bulletin has been prepared for the use of engineers and other officials designing and operating metal pipe-lines (except cast-iron) for irrigation, power, municipal, mining, dredging, or other purposes, and for courts and attorneys-at-law interested in cases involving the carrying capacities of such metal pipes."

LIST OF BOOKS REVIEWED SINCE JULY, 1929

Agg—Construction of Roads and Pavements	3-10-30, p. 145
Babbitt—Sewerage and Sewage Treatment	9-10-29, p. 478
Bennett—Roadside Development	9-10-29, p. 478
Creager—Engineering for Masonry Dams	8-10-29, p. 62
Davis, Foote & Rayner—Surveying	9-10-29, p. 478
Dingman—Construction Job Management	12-10-29, p. 658
Ellms—Water Purification	12-10-29, p. 658
Folwell—Sewerage	2-10-30, p. 89
Gaum & Graves—Report Writing	12-25-29, p. 679
Hool—Reinforced Concrete Construction, Vol I	3-10-30, p. 145
Hubbard—Our Cities Today and Tomorrow	2-10-30, p. 89
Huntington—Building Construction	9-10-29, p. 478
Imhoff—Arithmetic of Sewage Treatment Works	8-10-29, p. 62
Ives—Highway Curves	12-10-29, p. 658
Ives—Seven Place Natural Tables	12-10-29, p. 658
Jacoby & Davis—Foundations of Bridges and Buildings	12-25-29, p. 679
Jacoby & Davis—Timber Design and Construction	3-10-30, p. 145
King—Handbook of Hydraulics	2-10-30, p. 89
Searles & Ives—Field Engineering	9-10-29, p. 478
Steinman—Suspension Bridges	12-25-29, p. 674
Tracy—Stresses Statically Determined	3-10-30, p. 145
Wiley—Principles of Highway Engineering	12-25-29, p. 679
Whitney—Bridges: A Study in Their Art, Science and Evolution	3-10-30, p. 145
Young—Elementary Structural Problems in Steel and Timber	2-10-30, p. 89

Construction Review

HIGHWAY GRADING

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

Progress is being made on important projects as follows:

ARIZONA STATE HIGHWAY PROJECTS

Ashfork-Kingman Highway—Henry Galbraith, Jerome, Arizona, will complete his contract about July 1, 1930, for grading and constructing an overpass and a concrete bridge on 6 miles of the Ashfork-Kingman highway, F.A.P. 80-C, beginning at Ashfork and extending west toward Crookton. On schedule 1, the overpass, grading is over 95% and the bridge over 15% completed. Schedule 2, which includes about 6 miles of roadway, is at the same stage of completion. The concrete bridge was 50% complete on May 1.

The contract price, $82,635, includes the following principal items: 36,359 cu.yd. borrow at $0.30; 7837 cu.yd. roadway excavation at $0.75; 16,002 cu.yd. roadway surface at $0.75; 49,065 cu.yd.mi. surface haul at $0.20; 96,653 lb. reinforcing steel at $0.07; 18 cu.yd. 'AA' concrete at $50; 811 cu.yd. 'A' concrete at $25.

(Upper) Northwest 1-yd. Shovel Loading Kleiber 5-yd. Dump Truck on Detour Near Calaveritas Creek, Larsen Bros. Contract, California Division of Highways. (Lower) Caterpillar '60' and Le Tourneau Scarifier on Larsen Bros. Contract in Calaveras County

R. C. Perkins is construction engineer of the northern district and H. Pinney is resident engineer on F. A. P. 80-C for the Arizona Highway Department.

Florence-Tucson Highway—Hodgman & MacVicar, Pasadena, California, have completed their contract for 17 miles of grading on the Florence-Tucson highway, F.A.P. 94-C, schedule 1, from Coolidge to Pichacho. Grading was started December 5, 1929, and was 100% completed with only 80% of the total time elapsed.

The contract price, $103,204, included 2182 cu.yd. roadway excavation at $0.25; 141,254 cu.yd. borrow at $0.18; 2574 cu.yd. stream excavation at $0.60; 1778 cu.yd. 'A' concrete in fords at $14; 715 cu.yd. 'B' concrete at $14.50; 108,055 lb. reinforcing steel at $0.055; 852 cu.yd. structure excavation at $1.00; 26 cu.yd. 'AA' structure concrete at $70; 702 cu.yd. 'A' structure concrete at $21; 700 lin.ft. concrete piling at $4.50; and other items.

Equipment consisted of one Caterpillar '60' and one '30'; one '60' elevating grader; one 12-ft. blade; one 7-point scarifier; 6 fresno outfits; one 10-S, two 7-S, and one 4-S mixers.

T. S. O'Connell is construction engineer for the southern district and Joe DeArozena was resident engineer on F.A.P. 94-C.

Holbrook-Lupton Highway—F. D. Shufflebarger, Albuquerque, New Mexico, has completed over 33% of his contract for grading 22.5 miles and constructing a 300-ft. steel viaduct on the Holbrook-Lupton highway, F.A.P. 83-A, from 2 miles west of Sanders northeast of the Arizona-New Mexico state line. Clearing, grubbing, and grading were materially delayed by cold weather, but satisfactory progress is now being made. Structure concrete, which was also delayed, is now well along. Concrete abutments and pedestals for steel towers on the Querino canyon viaduct have been completed, but a structure over Black canyon had not been started May 1. The entire project, which does not include surfacing, will be completed about August 15, 1930.

The contract price is $174,003. Principal items include 70,114 cu.yd. roadway excavation at $0.465; 107,995 cu.yd. borrow at $0.23; 3122 cu.yd. structure excavation at $0.80; 53,582 sta.yd. overhaul at $0.015; 157,790 lb. reinforcing steel at $0.055; 1992 cu.yd. bridge excavation at $1.25; 13 cu.yd. 'AA' concrete at $65; 1073 cu.yd. 'A' concrete at $25; 342,515 lb. structural steel at $0.082.

W. W. Lane is state highway engineer, W. R. Hutchins is office engineer, R. A. Hoffman is bridge engineer, R. C. Perkins is construction engineer of the northern district, and C. E. Perkins is resident engineer on F.A.P. 83-A for the Arizona Highway Department.

CALIFORNIA STATE HIGHWAY PROJECTS

Calaveras County—Beerman & White, Stockton, California, have begun operation of a crushing plant for rock surfacing from Murphy to Big Trees, contract price $67,956. The contract includes 15,200 cu.yd. rock surfacing at $3.33 and 6000 cu.yd. rock and screenings in stockpiles at $2.89. The project will be completed about September 1, 1930.

Calaveras County—Larsen Bros., Galt, California, will complete their contract about September 1, 1930, for 2.8 miles of grading and surfacing in the vicinity of Calaveritos creek, contract price $45,494. All corrugated metal pipe and some of the concrete culverts have been placed; the grading is over 30% complete; surfacing has begun. Equipment includes one 1-yd. Northwest gas shovel; five 5-yd. Kleiber dump trucks; one Caterpillar '30' with bulldozer; one tractor with 1¾-yd. hydraulic scraper; one 12-ton Austin road roller; one 8 by 9 Ingersoll-Rand compressor; one Adams No. 8 road grader; one Byers ½-yd. truck crane. A. R. Maistielti, grading subcontractor, Stockton, California, is using two Caterpillar '60' tractors with 7-yd. electric scrapers and one heavy-duty scarifier. The Adams Construction Co., Angels Camp, California, subcontractor on rock crushing, has one Cedar Rapids portable crushing outfit and a dragline. John Cogo, El Verano, California, is subcontracting a cattle pass, culvert pipes, and the fencing. G. J. Ulrich has been awarded a separate contract for a reinforced concrete bridge over Calaveritas creek.

R. E. Pierce is district engineer of district X, California Division of Highways, at Sacramento.

El Dorado County—Nate Lovelace, Sacramento, California, will complete his contract about December 1, 1930, for 1.8 miles of grading from Bay View Rest to 1 mile north of Eagle Falls, contract price $179,936. Masonry construction was closed down over the winter but grading was continued through this period except during heavy snowfalls. The contract is over 15% completed. Equipment includes one ¾-yd. P&H and one ¾-yd. Northwest power shovels, three portable compressors, six 4-yd. dump trucks, and one '30' tractor.

Main items in the work are: 91 sta. clear and grub at $20; 17,850 cu.yd. excavation at $1.10; 27,000 cu.yd.

Rock Slope on T. E. Connelly Contract Between Airport and Indian Springs, Nevada and Placer Counties, for California Division of Highways

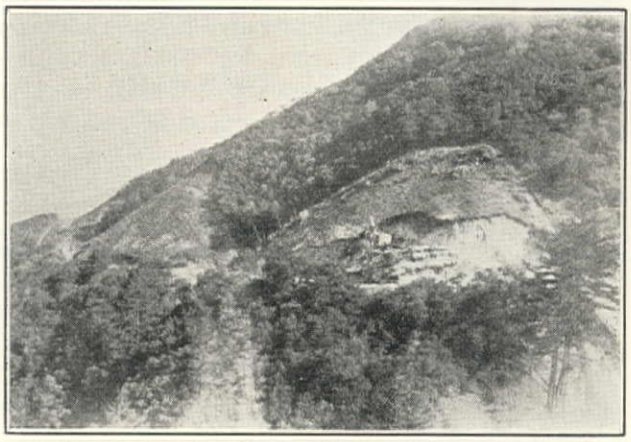
excavation at $0.90; 42,700 cu.yd. excavation at $0.80; 955,200 sta.yd. overhaul at $0.02; 5950 cu.yd. structure excavation at $2.00; 1876 lin.ft. perforated metal pipe underdrain at $1.25; 3925 cu.yd. rubble masonry at $11.90; 1250 cu.yd. dry rubble retaining wall at $5.00.

C. H. Whitmore is district engineer of district III, California Division of Highways, at Sacramento.

Humboldt County—Chigris & Sutsos, San Francisco, are opening up work on their contract for 1.4 miles of grading and rock surfacing from the southerly line of Humboldt county to Richardson Grove.

Humboldt County—H. H. Boomer, San Francisco, has completed about one-third of his contract for 1.2 miles of grading and rock surfacing from Garberville to Bluff Creek. Grading is being done by J. B. Dillon under subcontract, using one ¾-yd. Northwest gasoline shovel and one 1½-yd. P&H diesel shovel. Two power shovels are in operation on this project. The contract price, $74,997, includes 12 acres clear and grub at $40; 119,600 cu.yd. roadway excavation at $0.42; 1,096,200 sta.yd. overhaul at $0.005; 725 cu.yd. structure excavation at $1.75; 3200 cu.yd. rock surfacing at $2.00; 220 cu.yd. 'A' concrete in structures at $25; and other items.

Humboldt County—E. C. Coats, Loleta, California, has completed over 50% of his contract for grading



Excavating for La Canada-Mt. Wilson Highway, T. M. Morgan Paving Co. Contract, Los Angeles County, California Division of Highways

and rock surfacing 2.9 miles from Fish Creek to Stephens Grove. It is expected that his work will be far enough advanced so that it will not interfere with tourist travel during the coming summer. Three P&H gasoline power shovels are operating continuously on the work.

The contract price, $130,767, includes 26 acres clear and grub at $250; 226,700 cu.yd. roadway excavation at $0.37; 491,250 sta.yd. overhaul at $0.01; 1230 cu.yd. structure excavation at $1.00; 8350 cu.yd. rock surfacing at $2.30; 1280 lin.ft. 8-in. perforated metal pipe underdrain at $1.65; and other items.

F. W. Haselwood is district engineer of district I, California Division of Highways, at Eureka.

Inyo County—Allied Contractors, Inc., Ludlow, California, will complete a contract for 21.3 miles of grading and oil-treated surfacing from Coso Junction to Olancha about September 20, 1930. Rough grading has been completed and crushed rock base is being placed. Major equipment includes one 1¼-yd. and one 1-yd. Northwest shovels; ten 4-yd. dump trucks; two '60' and two '30' tractors; two 12-ft. graders; McMillan scrapers; Ball wagon graders; a crushing and mixing plant with 1000 tons per day capacity.

The contract price is $239,792. Main items are: 122,000 cu.yd. excavation at $0.43; 251,400 sta.yd. overhaul at $0.02; 48,250 tons crusher-run base at $1.56; 35,650 tons oil-treated rock surfacing; and other items.

F. G. Somner is district engineer of district IX, California Division of Highways, at Bishop.

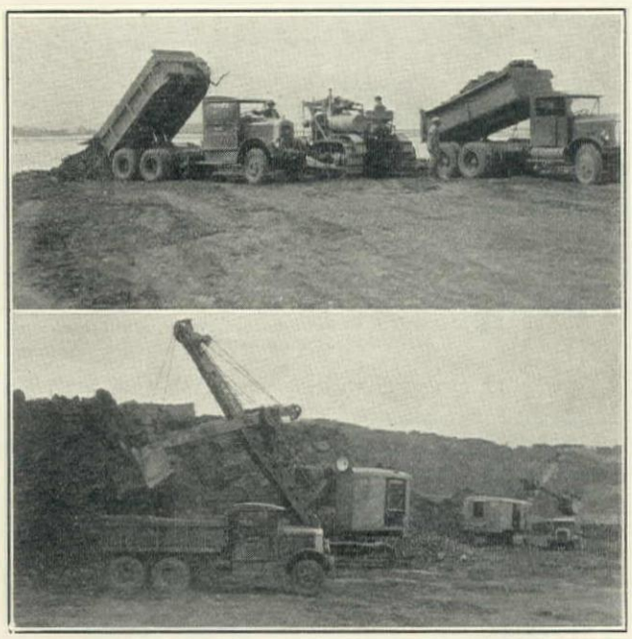
Kern County—George Herz Co., San Bernardino,

California, will complete a contract about February 1, 1931, for 15 miles of grading and oil-treated surfacing from Cinco to 7 miles north of Ricardo, contract price $247,768. Rough grading is well under way between Cinco and the north end of Red Rock canyon, mostly on new alignment. Major equipment includes one 1½-yd. P&H and one 1-yd. Northwest power shovels; one Monarch '75' tractor; one '30' tractor; eight 4-yd. dump trucks; four 4-horse fresnoes.

The contract includes 228,000 cu.yd. excavation at $0.37 and $0.55; 33,400 tons crusher-run base at $1.55; 24,600 tons oil-treated surface at $1.83; and other items.

F. G. Somner is district engineer of district IX, California Division of Highways, at Bishop.

Los Angeles County—The T. M. Morgan Paving Co., Los Angeles, started March 1, 1930, and will complete its contract about April 15, 1931, on 1.5 miles of grading on the La Canada-Mt. Wilson highway northerly from La Canada. This is the second con-



(Upper) Fageol 6-Wheel, Pneumatic-Tired Dump Trucks and Caterpillar Tractor with McMillan Grader on Dump for San Mateo-Redwood City Section, Bayshore Highway, California. (Lower) Two Northwest 1½-yd. Shovels Loading into Fageol Trucks on Bayshore Highway, Fredrickson & Watson & Fredrickson Bros. Contract

tract on that highway, the first being nearly completed by H. W. Rohl Co. The following equipment is being used on the Morgan contract: one 1½-yd. Koehring and one 1-yd. Northwest shovels; one Caterpillar '60' with bulldozer; one 300-c.f.m. Ingersoll-Rand and one 110-c.f.m. Sullivan portable compressors; five 5-yd. dump trucks.

The contract price, $272,790, includes 78 sta. clear and grub at $25; 460,000 cu.yd. roadway excavation at $0.35; 3,000,000 sta.yd. overhaul at $0.007; 5220 cu.yd. structure excavation at $1.25; 950 cu.yd. 'A' concrete in structures; and other items, including reinforced concrete cribbing.

S. V. Cortelyou is district engineer of district VII, California Division of Highways, at Los Angeles.

Nevada and Placer Counties—Callahan Construction Co. will complete its contract about July 1, 1930, for grading from Indian Springs to Soda Springs. Work was suspended December 12, 1929, on account of snowfall and grading was resumed April 25. The contract is over 85% completed.

Nevada and Placer Counties—T. E. Connelly, San Francisco, will complete his contract about November 15, 1930, for 9.3 miles of grading from Airport to Indian Springs. Work was suspended January 4 due to heavy snow fall and resumed April 4. The contract is now over 45% complete. Principal equipment includes one 1¼-yd. Lorain-75, one 1¼-yd. Lima-101, one 1-yd. Erie steam, and one 1¼-yd. Northwest power shovels; four portable compressors; one '60' and one '30' tractor; and six 4-yd. dump trucks.

The contract price is $396,385. Main items are as follows: 475 sta. clear and grub at $30; 57,000 cu.yd. excavation at $0.56; 275,000 cu.yd. excavation at $0.70; 81,500 cu.yd. excavation at $1.22; 1,498,000 sta.yd. overhaul at $0.01; 3300 cu.yd. structure excavation at $1.50; 120 cu.yd. 'A' concrete in structures at $25; 2350 cu.yd. rubble masonry at $12; 575 lin.ft. parapet at $3.00.

C. H. Whitmore is district engineer of district III, California Division of Highways, at Sacramento.

San Mateo County—Fredrickson & Watson, Oakland, & Fredrickson Bros., Stockton, California, are making rapid progress on their contract for 7.3 miles of grading on the Bayshore highway from San Mateo to Redwood City. Bids were opened January 8 and work started February 8, headquarters being established at Belmont. The roadbed is 60 ft. wide.

Major items in the $406,501 contract are as follows: 315,500 cu.yd. imported borrow from Belmont hill at $0.43; 321,000 cu.yd. hydraulic fill at $0.28 and $0.50; 108,000 cu.yd. roadside borrow at $0.24; 3200 cu.yd. 'A' concrete in structures at $17.50; furnish and drive 735 untreated douglas fir piles (22,050 lin.ft. at $0.27 plus driving at $7.00). Over 50% of the imported borrow has been placed in the fill and 50% of the hydraulic fill and all of the roadside borrow have been completed.

Imported borrow is being hauled in a fleet of 25 Fageol 6 and 4-wheel pneumatic-tired trucks, by H. Simon, of San Francisco. Two 1½-yd. Northwest model 6 power shovels are used for loading into trucks. Drilling is done with four Ingersoll-Rand S-49 Jackhamers, the air being furnished by a stationary angle compound Sullivan compressor with a capacity of 740 c.f.m. at 100-lb. pressure. The compressor is belt-driven from a 125-hp. motor. A model 105 Northwest, equipped with 40-ft. boom, is driving piles and doing dragline and clamshell work. Two Caterpillar '60s' with bulldozers are used for cleaning pits and on the dump. One Caterpillar with McMillan grader attachment, an Austin 'Ripsnorter' blade, and heavy drag are used to keep the road in shape. The Standard Dredging Co., of Oakland, is doing the hydraulic work with a 24-in. Nevada no. 7 dredge. A Brownhoist, equipped with dragline and clamshell, is used to throw up the levees.

J. H. Skeggs is district engineer of district IV, California Division of Highways, at San Francisco. H. S. Payson is resident engineer and A. Walsh is assistant

resident engineer. Dow is superintendent for the contractors.

Siskiyou County—Wren & Greenough, Portland, Oregon, are opening up work on 7 miles of grading and surfacing from Yreka to the Klamath river. The first two miles of this contract is in comparatively light work and the 5 miles of canyon section is very heavy work, including 600,000 cu.yd. of rock excavation. There are nearly 2 miles of detour road to be constructed under this contract on the opposite side of the Shasta river from the present and new highway. Also, there are five large bridges to be built under separate contracts on this length of project, one of which has been finished and two of which are in the process of construction. Excepting one mile at the Klamath river, the Wren & Greenough contract has been all sublet.

Construction began February 7 when drilling was commenced on the upper detour, a 1-yd. Bucyrus-Erie steam shovel moving in February 13. Two bridges were under contract at this date, so the adjacent cuts had to be shot early to avoid damage to them. Subcontractors were accordingly concentrated on this feature of the work. The main effort on the new highway was begun April 1 when three 1½-yd. shovels (one Marion steamer and two Bucyrus-Erie diesels) arrived on the work. Concrete box culverts are over one-fourth completed. Additional equipment includes one Gardner-Denver no. 540 electric air compressor; eight 1 to 4-hammer portable compressors; three Sullivan tool sharpeners; one Caterpillar '60' with McMillan scraper and two Caterpillar

Completed Bosworth St. Bridge in MacDonald & Kahn Contract for Bernal Cut, City of San Francisco

'30s'; one sheepsfoot roller, and two small concrete mixers.

The contract price, $571,626, includes the following main items: 649,500 cu.yd. roadway excavation at $0.70; 1,223,700 sta.yd. overhaul at $0.01; 6850 cu.yd. structure excavation at $1.50; 8890 cu.yd. crusher-run base at $1.50; 9560 cu.yd. untreated gravel or stone surfacing at $1.50; 1075 cu.yd. dry rubble retaining wall at $6.00; 1760 cu.yd. rubble masonry retaining wall at $9.00; 1340 lin.ft. parapet at $3.00; 2675 sq.yd. rock slopes at $0.75.

H. S. Comly is district engineer of district II, California Division of Highways, at Redding, and C. F. Waite is resident engineer on this contract.

C. H. Purcell is state highway engineer, L. V. Campbell is office engineer, Fred J. Grumm is engineer of surveys and plans, C. S. Pope is construction engineer, and Chas. E. Andrew is bridge engineer for the California Division of Highways, at Sacramento.

COLORADO STATE HIGHWAY PROJECTS

El Paso County—J. L. Busselle, Colorado Springs, has completed over 83% of his contract for 10 miles of grading on State Highway No. 1 south of Colorado Springs. Equipment on this contract includes three Fordson tractors; six 1½-yd. trucks; one Caterpillar '60' with 12-ft. blade; one 1-yd. Koehring mixer; Johnson sand and rock bins; and a sand screening plant.

The contract price, $221,389, includes: 53,600 cu.yd.

Northwest ¾-yd. Shovel and Drilling Equipment on Nate Lovelace Contract Near Bay View Rest, El Dorado County, California Division of Highways

common, 4400 cu.yd. rock, and 4000 cu.yd. detour excavation, all at $0.19; 104,800 cu.yd. borrow at $0.18; 3700 cu.yd. detour surfacing at $1.10; 3288 cu.yd. 'A' and 402 cu.yd. 'B' concrete at $16.50; 444,450 lb. reinforcing and 852,800 lb. structural steel at $0.05.

Ernest Montgomery is division engineer of division 5, Colorado Highway Department, at Colorado Springs.

El Paso and Pueblo Counties—M. E. Carlson, Denver, Colorado, has completed his contract for 15.5 miles of grading from Pueblo to Buttes, contract price $218,277. Construction began May 10, 1929, and completion was required within 250 working days.

Equipment included two Osgood steam shovels, one with a 1-yd. dipper and the other with leads for pile driving; one Galion gravel screening plant; one Western elevating grader; one Caterpillar '60'; one 4-yd. White truck; one 4-yd. and one 5-yd. International trucks; one 5-yd. Mack truck; four Chevrolet and four Ford trucks; one 10-ft. Russell and one 6-ft. Galion blades; one Model 75 Jaeger, one Marsh-Capron, and one no. 5 Lansing mixers; ten Western dump wagons.

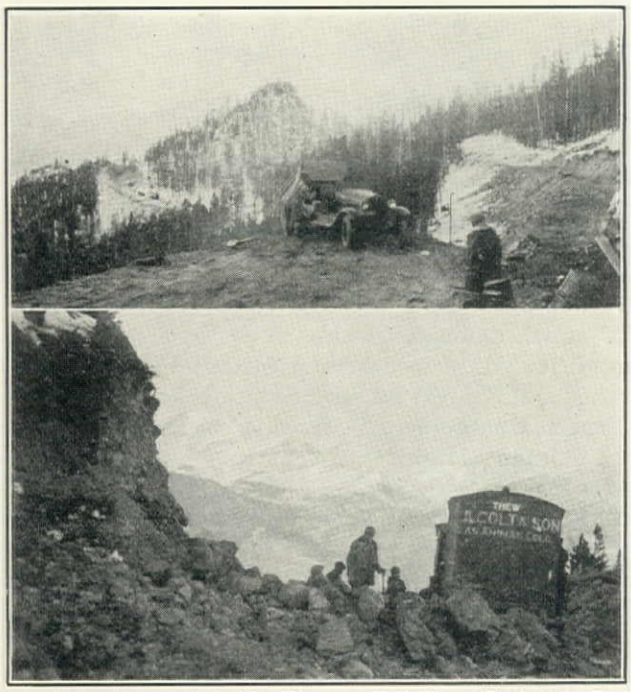
James D. Bell is division engineer of division 4, Colorado Highway Department, at Pueblo, and P. C. Thurmond was resident engineer on this contract with Chas. Funk superintendent for M. E. Carlson.

Mesa County—Hinman Bros. Construction Co., Denver, Colorado, has completed over 52% of a contract for 10 miles of grading and gravel surfacing in the Colorado river canyon southwest of De Beque. Construction began July 11, 1929, and completion is required within 250 working days. Equipment includes one 1½-yd. Lorain-75 gas shovel; one 1¼-yd. Koehring gas shovel; two Ingersoll-Rand type 20

portable air compressors operating six Jackhamers; drill sharpeners; three 2½-ton White trucks; two 2½-ton and five 2-ton G.M.C. trucks; two Caterpillar '30' tractors; two Twin City stationary engines on crushing plant; two Universal crushers; a crushing plant designed by the contractor.

The contract price, $312,453, includes $2500 for clearing and grubbing; 253,000 cu.yd. unclassified excavation at $0.73; 55,300 cu.yd. borrow at $0.33; 158,000 sta.yd. overhaul at $0.02; 3700 yd.mi. special overhaul at $1.00; 600 cu.yd. dry rock excavation at $1.75; 600 cu.yd. wet rock excavation at $5.00; 22,500 gravel surfacing at $1.60; 101,000 yd.mi. overhaul surfacing at $0.20; 386 cu.yd. 'A' and 'B' concrete at $21; 65.6 M f.b.m. douglas fir untreated and treated timber at $100 and $108; 3006 lin.ft. creosoted douglas fir piling at $1.20; and other items.

John J. Vandermoer is division engineer of division 2, Colorado State Highway Department, at Grand



(Upper) Grading at 10,000 ft. Elev. on Fall River Project in Rocky Mountain National Park, W. A. Colt & Sons, Contractors. (Lower) Thew Shovel Excavating First Lift on Thorough Cut for Fall River Project, Colorado

Junction. The project is in charge of R. E. Cowden, locating engineer, who reports direct to J. E. Maloney, assistant engineer at Denver. Wallace Hinman is in charge for the contractor.

L. D. Blauvelt is state highway engineer, O. F. Reedy is senior assistant state highway engineer, Roy Randall is office engineer, and Paul Bailey is bridge engineer for the Department.

IDAHO STATE HIGHWAY PROJECTS

Ada and Elmore Counties—C. A. Robinson, Twin Falls, Idaho, will complete his contract about June 1, 1930, for 23 miles of grading and 9.9 miles of surfacing on the Old Oregon Trail from Regina to Mountain Home, contract price $113,910. Grading and culverts have been completed and surfacing is under way. The 9.9-mile surfaced portion will be oiled by state forces immediately after its completion. The remainder of the project will be sand-surfaced and oiled during the coming summer. Three Caterpillar '30s' with 3-yd. tumble-bug scrapers and one Caterpillar '60' with 7-yd. tumble-bug scraper and one ¾-yd. gas shovel are in use on this contract.

J. D. Wood is commissioner of public works, R. H. Shoemaker is office engineer, M. L. Mook is construction engineer, C. A. Kyle is bridge engineer, and A. W. Belt is district engineer for the Idaho Bureau of Highways at Boise.

NEW MEXICO STATE HIGHWAY PROJECTS

Colfax County—Veater & Davis, El Paso, Texas, will complete their project about February 1, 1931, for 13 miles of grading and surfacing and constructing a steel and timber bridge between Raton and Springer, F.A.P. 1-B, Reo. The work to date has consisted of grading about 50 stations with fresnoes only, and excavating concrete pier footings for a 100-ft. steel span across the Red River. Equipment includes one 12-ft. Adams blade, one Caterpillar '60', three 1-ton trucks, one 1-sack mixer, a blacksmith shop, thirty-two head of stock, nine fresnoes, three road plows, and one 1-yd. dragline.

Principal items in this $137,277 contract are: 61,467 cu.yd. unclassified excavation at $0.19; 115,019 cu.yd. common borrow at $0.19; 13.7 miles scarify and reshape surface course at $75; 621 cu.yd. culvert and siphon concrete at $20; 91,681 lb. reinforcing steel at $0.05; 1286 cu.yd. structure excavation at $0.80; 333 cu.yd. 'A' concrete in substructure at $19; 142.5 M f.b.m. treated bridge timber at $140 and $135; 2865 lin.ft. treated timber piling at $1.40; 24,688 cu.yd. crushed base course oil-processed at $1.20.

P. M. Bowen is district engineer of district 4, New Mexico State Highway Department, at Springer, and F. M. Limbaugh is project engineer at Raton.

Dona Ana County—A. O. Peabody, Deming, New Mexico, is opening up work on 10 miles of grading and surfacing and a timber bridge from Garfield to Hatch, F.A.P. 107-E. A grading crew with eight fresnoes and one plow began work on the south end of the project April 5. Construction of a pile bridge across the Rio Grande began April 25, using a Vulcan No. 3 hammer.

The contract price, $147,334, includes 7227 cu.yd. unclassified excavation at $0.20; 134,530 cu.yd. common borrow at $0.17; 28,965 sta.yd. overhaul at $0.03; 6904 mi.yd. overhaul at $0.40; 10.1 mi. scarifying and reshaping surface course at $50; 9072 cu.yd. surface plating course; 18,324 cu.yd. crushed gravel base course and oil-processed surface at $1.25; 118,887 lb. reinforcing steel at $0.055; 215.3 M f.b.m. treated bridge timber at $135 and $140; 7390 lin.ft. piling at $1.50; 599 cu.yd. brush and rock bank protection at $2.25; and other items.

G. D. Hardaway is district engineer of district 1, New Mexico State Highway Department, at Deming, and O. D. Cowart is project engineer at Deming.

McKinley County—E. J. Maloney, Gallup, New Mexico, will complete his contract about May 30, 1930, for 12 miles of grading and oil surfacing from the Arizona-New Mexico line to 9 miles west of Gallup, F.A.P. 76-A., Reo. Surfacing was begun April 12 and

a night crew was put on this work April 24. All concrete box culverts have been completed and all corrugated metal culverts excepting a few in a rock cut at Manuelito. There are two bridges in the contract.

The contract price is $180,772, and includes 29,895 cu.yd. common excavation at $0.19; 38,021 cu.yd. rock excavation at $1.25; 136,922 cu.yd. borrow at $0.18; 117,451 sta.yd. overhaul at $0.03; 12 mi. scarify and reshape surface course at $50; 29,844 cu.yd. base course for oil surface at $1.50; 3955 cu.yd. binder at $0.75; 155 cu.yd. 'A' concrete at $25; 19,070 lb. reinforcing steel at $0.06; 3073 cu.yd. mortar rubble masonry at $8.50; 25.3 M f.b.m. treated bridge timber at $170.

Equipment includes one No. 12 giant Russell elevating grader and one Stroud elevating grader, powered by Caterpillar '60s', capacities 3000 cu.yd. on straight cast work; one 1¼-yd. Osgood gas shovel and one 1¼-yd. Northwest gas shovel, average outputs 850 cu.yd. per day; two 2-gun Ingersoll-Rand compressors; one 9-36 Russell pioneer crusher with 650 cu.yd. average output per 10 hours; ten 5-yd. Mack trucks; eight 5-yd. International trucks; eighty head of stock; four Caterpillar '60s' on miscellaneous work. The rock cut at Manuelito is the main item in the contract and, as it lies 130 ft. above a railroad, precaution must be taken to prevent covering the tracks.

Frank Kimball is district engineer of district 3, New Mexico State Highway Department, at Albuquerque, and A. J. Gilbert is project engineer at Gallup.

Sandoval County—Veater & Davis, El Paso, Texas, are getting under way with their contract for grading and surfacing 7.5 miles from Algdones to Domingo and construction of three steel bridges on F.A.P. 88-D. Progress has been slow as the contractors have been organizing and establishing camp while waiting for materials to construct concrete box culverts ahead of grading. Under this plan, when the grade has been once begun it can be carried on without leaving out any places on account of culvert construction.

The contract price, $193,002, includes 158,067 cu.yd. unclassified excavation at $0.20; 65,277 cu.yd. common borrow at $0.20; 288,824 sta.yd. overhaul at $0.03; 7.3 mi. scarifying and reshaping surface course at $100; 10,562 cu.yd. base course for oil-processed surface at $1.30; 1000 cu.yd. 'A' concrete in box culverts and siphons at $20; 400,650 lb. reinforcing steel at $0.05; 4732 cu.yd. structure excavation at $0.75; 2191 cu.yd. 'A' concrete in sub-and superstructure at $18 and $20; 512,911 lb. structural steel at $0.045; 3450 lin.ft. piling bank protection at $1.35; and other items.

Equipment on the work includes thirty head of stock; ten 5-ft. fresnoes; two large and one small rail road plows; six model 51A White trucks; one 1-yd. Northwest dragline with 1¼-yd. shovel dipper and pile-driver leads; one 7-S Smith mixer; one 3500-lb. steam hammer for footing piles.

Frank Kimball is district engineer of district 3, New Mexico State Highway Department, at Albuquerque, and F. E. Barlow is resident engineer at Albuquerque.

Santa Fe County—Veater & Davis, El Paso, Texas, began work March 25, 1930, and will complete their contract about December 1, 1930, for 5.7 miles of grading and surfacing and two concrete and steel bridges between Santa Fe and Canoncito, F.A.P. 3, Reo. and State Connection. On May 1, grading and structures on the state connection were 30% complete and F.A.P. 3, Reo. was 2% complete. Fresnoes are the only equipment now on the work.

The contract price is $148,926. Principal items include 53 acres clearing and grubbing at $30; 82,252 cu.yd. unclassified excavation at $0.55; 12,544 cu.yd. common excavation and 63,472 cu.yd. common borrow at $0.21; 46,185 sta.yd. overhaul at $0.03; 5.74 mi. scarify and reshape surface course at $100; 2060 cu.yd. binder at $0.85; 10,425 cu.yd. crushed base course at $1.60; 1192 cu.yd. 'A' concrete in culverts and siphons at $21; 1625 cu.yd. structure excavation at $1.00; 718 cu.yd. 'A' concrete in structures at $19 and $20; 132,679 lb. structural steel at $0.045.

Frank Kimball is district engineer of district 3, New Mexico State Highway Department at Albuquerque and V. H. Henderson is project engineer at Santa Fe.

Union County—Everly & Allison, Las Vegas, New Mexico, will complete their contract about December 1, 1930, for 18 miles of grading and surfacing from Des Moines to Greenville, F.A.P. 157-C. Construction started March 1, 1930, and to date over 25% of the concrete has been placed; all culverts have been placed; and about 30% of the roadway excavation has been made. Surfacing will be started by July 1.

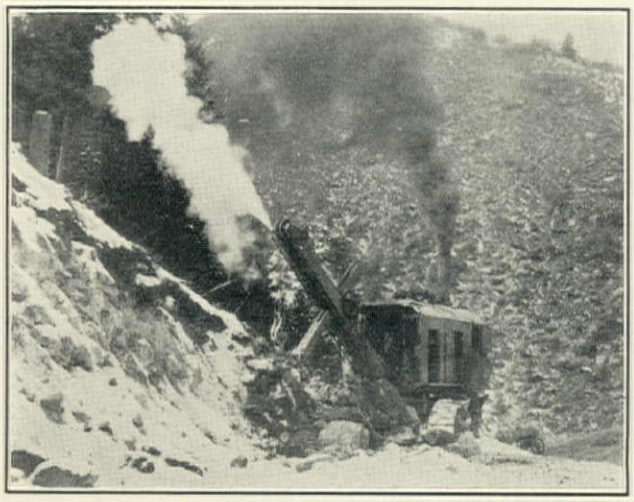
The contract price, $193,029, includes 23,685 cu.yd. unclassified excavation at $0.40; 221,996 cu.yd. common borrow at $0.24; 179,068 sta.yd. overhaul at $0.03; 8166 mi.yd. overhaul at $0.20; 18.4 miles scarify and reshape surface course at $40; 38,860 cu.yd. crushed surface course at $1.55; 902 cu.yd. 'A' and 'B' concrete

DENNY HILL REGRADE LOOKING NORTHEAST FROM FOURTH AVE. AND BLANCHARD ST., CITY OF SEATTLE, GEO. NELSON & CO., CONTRACTORS

at $22; 118,961 lb. reinforcing steel at $0.055; and other items.

Grading equipment includes one Caterpillar '30'; three 1-yd. model 'A' Warco wheeled scoop; one No. 8 Adams and one No. 8 Russell blade graders; fourteen 5-ft. fresnoes. On concrete work the equipment includes one 14-36 Cedar Rapids crusher; one 1-sack Jaeger mixer; one 1¼-ton International truck; and one Caterpillar '60' tractor. The following equipment will be added when surfacing starts; one Cedar Rapids 9-36, 3-36 crusher and screening plant with 120-hp. Waukesha engine; one Caterpillar '60'; and one 2½-yd. Killifer fresno.

P. M. Bowen is district engineer of district 4, New Mexico State Highway Department, at Springer, and L. B. Tyson is project engineer at Des Moines.



Morrison-Knudsen Co. Grading Between Nolan and Beaver Creek, Carbon and Utah Counties, for Utah State Road Commission

W. C. Davidson is state highway engineer, E. B. Bail is construction engineer, E. B. Van De Greyn is bridge engineer, and R. W. Bennett is office engineer of the New Mexico State Highway Department.

OREGON STATE HIGHWAY PROJECTS

Baker County—Quinn-Robbins Co., Boise, Idaho, will complete its contract about August 1, 1930, for regrading and resurfacing 21.4 miles of the Pleasant Valley-Durkee section of the Old Oregon Trail. The excavation is over 44% and the culverts are over 47% complete. Equipment includes one shovel, two trucks, two compressors, etc.

Main items in the $157,919 contract are: 65,500 cu.yd. common excavation at $0.85; 92,000 sta.yd. overhaul at $0.04; 14,000 yd.mi. truck haul at $0.20; 51,800 cu.yd. base and top course and stockpiled surfacing at $1.22; 65,000 yd.mi. haul truck-measure broken stone at $0.18; 44,000 yd.mi. haul stockpile-measure broken stone at $0.17; 25,000 yd.mi. haul rock shoulder and filler at $0.18.

Douglas County—Peck & Einerson, Hoquiam, Washington, will complete their contract about October 1, 1930, for 10.1 miles of grading on the Red Bridge-Drain section of the Umpqua highway. Clearing has been over 75% completed, excavation about 30% completed, and culverts are over 60% completed. Principal items in the $155,972 contract are: $9000 for clearing and grubbing; 117,300 cu.yd. common and 52,000 cu.yd. intermediate excavation at $0.33; 77,500 cu.yd. rock excavation at $0.85; 210,400 sta.yd. overhaul at $0.015; 19.470 yd.mi. truck haul at $0.22; 280 cu.yd. 'A' concrete at $18.

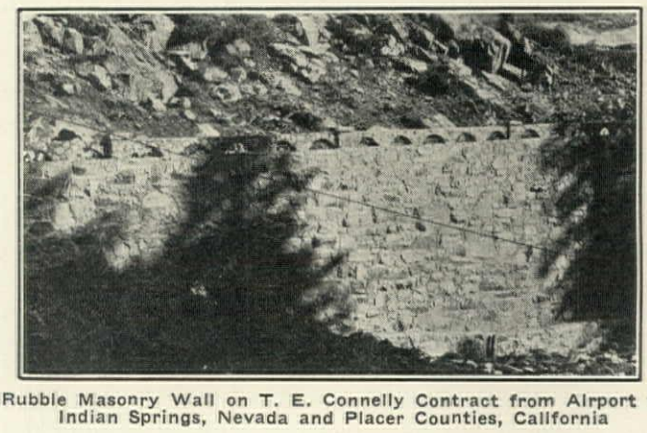
Jackson County—Washburn & Hall, Portland, will complete their contract about September 30, 1930, for 6.6 miles of grading on the Jenny Creek-Keno section of the Green Springs highway. The clearing is over 90% complete, excavation over 70% complete, and culverts are over 80% completed. Equipment on the work includes one gas-electric shovel, three tractors, and five trucks.

Jackson and Klamath Counties—Wren & Greenough, Portland, started work April 3 on a 27.1-mile roadway widening and broken stone surfacing project on the Jenny Creek-Keno section of the Green Springs highway. The equipment includes one gas shovel and two trucks.

The contract price, $155,537, includes 22,000 cu.yd. common excavation and imported borrow at $0.30; 5000 cu.yd. solid rock excavation at $1.50; 50,000 sta.yd. overhaul at $0.02; 25,000 yd.mi. haul selected borrow at $0.18; 24,000 cu.yd. base material and 8000 cu.yd. top material at $2.60; 7000 cu.yd. screenings at $2.50; 13,600 cu.yd. 'A' and 'B' stockpiled material at $2.25.

Lincoln County—The Edlefsen-Weygandt Co., Portland, will complete its contract about August 1, 1930, for 8.8 miles of grading on the Waldport-Yachats section of the Roosevelt Coast highway. On April 23, clearing and grubbing was 90% complete, excavation about 70% complete, and culverts were 95% complete. Equipment in use includes one P&H power shovel, one '20' and one '30' Caterpillar tractors, two trucks, one 'Iron Mule'.

The contract price, $126,987, includes major items



Rubble Masonry Wall on T. E. Connelly Contract from Airport to Indian Springs, Nevada and Placer Counties, California

as follows: $15,400 for clearing and grubbing; 146,000 cu.yd. common excavation at $0.27; 14,000 cu.yd. rock excavation at $1.00; 190,000 sta.yd. overhaul at $0.02; 9000 yd.mi. truck haul at $0.18; 1600 cu.yd. rubble masonry at $15.50; 200 cu.yd. riprap at $5.00; 60 M f.b.m. lumber at $58; 6300 lin.ft. timber piling at $0.54.

Lincoln County—Wren & Greenough, Portland, will complete their contract about November 1, 1930, for 2.85 miles of grading on the Yachats-Lane county

line section of the Roosevelt Coast highway. The clearing is over 50% complete, excavation over 3% complete, and culverts are over 25% complete. Equipment includes two shovels, two Ford trucks, and three 'Iron Mules'.

The contract price, $162,882, includes $7000 for clearing and grubbing; 65,000 cu.yd. common excavation at $0.32; 158,000 cu.yd. rock excavation at $0.64; 200,000 sta.yd. overhaul at $0.02; 55,000 yd.mi. truck haul at $0.25; 420 cu.yd. 'A' concrete at $27; and other items.

Lincoln and Tillamook Counties—Milne & Dussault, Portland, will complete their contract about November 1, 1930, for 10.9 miles of grading and resurfacing on the Neskowin-Otis section of the Roosevelt Coast highway. The clearing is over 80% complete, excavation about 70% complete, and culverts about 70% complete. One gas shovel is being used on the work.

Main items in the $128,792 contract are: $7000 for clearing and grubbing; 60,000 cu.yd. 'A' excavation at $0.50; 10,000 cu.yd. 'B' excavation at $0.55; 17,500 cu.yd. subbase, 8200 cu.yd. base, and 5000 cu.yd. top course at $1.05; 13,300 cu.yd. 'A' to 'C' stockpiled materials at $1.00; 4500 cu.yd. earth filler at $0.30; 116,000 yd.mi. haul truck measure at $0.16; 40,000 yd.mi. haul stockpile measure at $0.18.

ing main items: $1400 for clearing and grubbing; 27,000 cu.yd. common excavation at $0.25; 36,000 cu.yd. intermediate excavation at $0.40; 91,000 cu.yd. rock excavation at $0.85; 96,000 sta.yd. overhaul at $0.02; 190 cu.yd. 'A' concrete at $30; 37 M f.b.m. lumber at $70.

Wheeler and Grant Counties—J. W. Feak Construction Co., Tacoma, Washington, will complete a contract about December 1, 1930, for 10 miles of grading on the Barnhouse Ranch-Picture section of the Ochacho highway, contract price $187,656. The clearing is over 35% complete, excavation about 10% complete, and the culverts are over 16% complete. Equipment includes one shovel, five trucks, and five compressors.

Main items are 69,900 cu.yd. common excavation at $0.30; 73,300 cu.yd. intermediate excavation at $0.41; 142,200 cu.yd. solid rock excavation at $0.82; 284,000 sta.yd. overhaul at $0.15.

Roy A. Klein is state highway engineer, C. B. McCullough is bridge engineer, and S. H. Probert is office engineer of the Oregon State Highway Commission.

UTAH STATE HIGHWAY PROJECTS

Carbon and Utah Counties—Morrison-Knudsen Co., Boise, Idaho, has completed about 70% of its contract

DENNY HILL REGRADE, CITY OF SEATTLE, ON MARCH 12, 1930, LOOKING SOUTH FROM SIXTH AVE. AND BATTERY ST.

Union and Umatilla Counties—E. L. Gates, South Beach, Oregon, will complete his contract about September 1, 1930, for 14.5 miles of grading on the Kamela-Hilgard section of the Old Oregon Trail. On this contract the clearing is 100% complete, excavation about 70% complete, and culverts are over 60% complete. A gas shovel is being used on the work.

The contract price, $172,591, includes $1500 for clearing and grubbing; 41,000 cu.yd. common excavation at $0.35; 74,000 cu.yd. intermediate excavation at $0.45; 138,000 cu.yd. rock excavation at $0.75; 128,000 sta.yd. overhaul at $0.01; 16,500 mi. truck haul at $0.20; and other items.

Wheeler County—H. E. Cornell, Boise, Idaho, will complete his contract about August 1, 1930, for grading 6.95 miles of the Fort Creek-Barnhouse Ranch section of the Ochacho highway. The clearing is over 50% complete, excavation about 40% complete, and culverts are over 50% complete. Equipment includes one power shovel, three trucks, and two compressors.

The contract price is $117,645, including the follow-

for 6.1 miles of grading from Nolan to Beaver creek, contract price $183,276. A crew of 46 men, two teams, one steam and one gas shovel, two compressors, three 3-ton and three light trucks are in use. Principal items include 212,000 cu.yd. excavation at $0.59; 29,000 cu.yd. borrow at $0.40; 123,000 sta.yd. overhaul at $0.03; 1760 cu.yd. structure excavation at $2.00; 887 cu.yd. 'A' and 'B' concrete at $22.50; 1090 cu.yd. cement rubble masonry.

Utah County—Morrison-Knudsen Co., Boise, Idaho, has completed about 10% of its contract for grading 5.8 miles from Red Narrows to Thistle. Rock excavation has been the main item in the work to date. A crew of 31 men, eleven teams, one 1-yard shovel, two compressors, and three 3-ton trucks are in use.

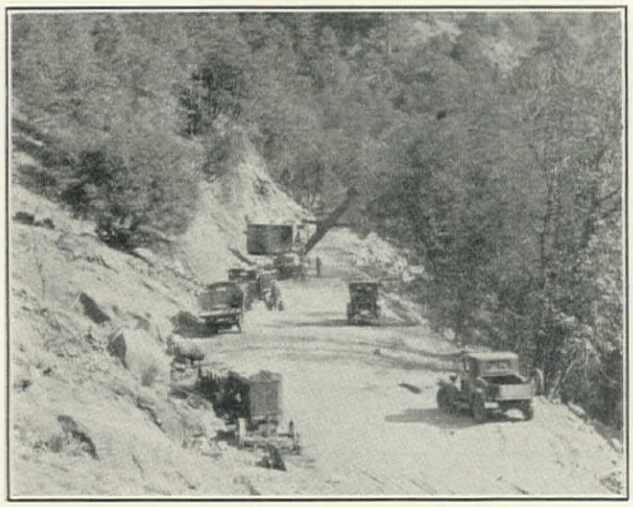
H. S. Kerr is chief engineer of the Utah State Road Commission.

UNITED STATES BUREAU OF PUBLIC ROADS

Arizona—Hodgman & McVicar, Pasadena, California, will complete their contract about November 1, 1930, for 9.97 miles of grading on the Bright Angel

Springs-North Entrance project, north rim, Grand Canyon National Park. Due to snow, work on this contract will not be started until June 1, although the award of contract was recommended in December. The equipment will include one 1-yd. gas shovel, four 5-ton trucks, one '60' and one '30' tractors, 74 head of stock, one 8-ft. blade; the crew will consist of 50 men. Main items in the contract are: 17.5 acres clear and grub at $300; 83,450 cu.yd. roadway excavation and 3200 cu.yd. borrow at $0.60; 17,700 sta.yd. overhaul at $0.08; 9.97 mi. finish earth-graded road at $200.

Arizona—Lord & Bishop, Sacramento, California,



Osgood Shovel on G. E. Finnell Contract for Section C, Route 32, Placerville-Lake Tahoe Highway, Eldorado National Forest, California

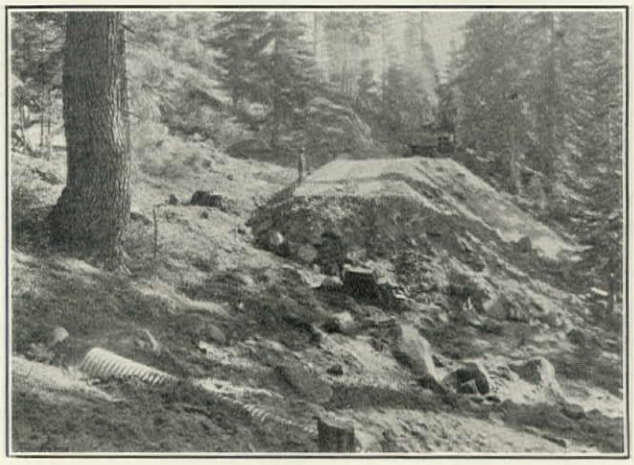
will start work June 1, 1930, and will complete their contract about November 1, 1931, for 25.85 miles of oil-treated surfacing on route 3, Bright Angel Point-Cape Royal highway, Grand Canyon National Park. The first course will consist of 3 in. of crushed rock and there will be 3 in. of plant-mix oil-treated wearing course. Equipment will include a rock crushing plant, two 320-c.f.m. compressors, fifteen 5-ton trucks; the crew will consist of 50 men. The contract price is $251,552, and includes 2000 cu.yd. borrow at $1.00; 5000 sta.yd. overhaul at $0.05; 25.85 miles fine grading, subgrade, and shoulders at $400; 30,700 tons crushed rock base course at $2.75; 34,550 tons oil-treated crushed rock at $4.25; 1000 tons supply oil-treated crushed rock at $4.25; 2300 lin.ft. stone guard rail at $1.50.

C. H. Sweetser is district engineer of district 2, Bureau of Public Roads, at San Francisco. Forest and park roads are under Levant Brown, with F. B. Lessman as assistant. G. L. McLane is in charge of the branch office of the district in Phoenix, Arizona. George D. Whittle is bridge engineer.

California—Contoules Construction Co., San Francisco, began work May 12 on a contract for grading 2.19 miles from Grouse creek to Turtleback dome on the Valley-Southern boundary section of Wawona road, route 2, Yosemite National Park. The equipment includes one Northwest power shovel, two Sterling dump trucks, two Rix compressors. The contract price is $89,900 on proposition 2 using corrugated metal pipe (bid was $94,112 on concrete pipe alternate). Main items include 57,640 cu.yd. unclassified excavation at $0.84; 27,360 cu.yd. type 'B' excavation at $1.05; 38,000 sta.yd. overhaul at $0.05; 2.19 mi. finish earth-graded road; 1284 lin.ft. 24-in. corrugated pipe at $3.10; 1200 cu.yd. hand-laid rock embankment.

California—G. E. Finnell, Sacramento, resumed work March 24 and is now about 70% complete on his contract for 5.75 miles of grading and rock surfacing on section C, route 32, Placerville-Lake Tahoe highway, Eldorado National Forest. On December 16, 1929, when work was discontinued for the winter, the contract was 62% completed. Equipment includes three 1¼-yd. and one 1-yd. Osgood gas shovels; one ½-yd. Orton gas shovel; four Caterpillar '60' tractors; eight 5-ton trucks; four 7-yd. crawler dump wagons; six compressors; one No. 2 and one No. 5 Telsmith gyratory crushers powered by a '75' Caterpillor motor. The contract price is $243,529 and includes 207,000 cu.yd. roadway excavation at $0.73; 3540 cu.yd. structure excavation at $2.00; 145,000 sta.yd. overhaul at $0.02; 9000 cu.yd. crushed rock surfacing at $3.05; 2882 cu.yd. rubble masonry at $12; 805 lin.ft. parapet at $3.50; 4283 lin. ft. 18 to 36-in. corrugated pipe culvert.

California—Welsh & Murdock, Oakland, resumed work April 21 and will complete their contract about December 3, 1930, for 6.6 miles of grading on the Elevenmile-Grouse creek section of the Wawona road, route 2A3, Yosemite National Park. Equipment includes one 1-yd. P&H diesel shovel; one Lorain-60 power shovel; two 4-yd. Sterling dump trucks; three 4-yd. Autocar dump trucks; one Fageol 4-yd. dump

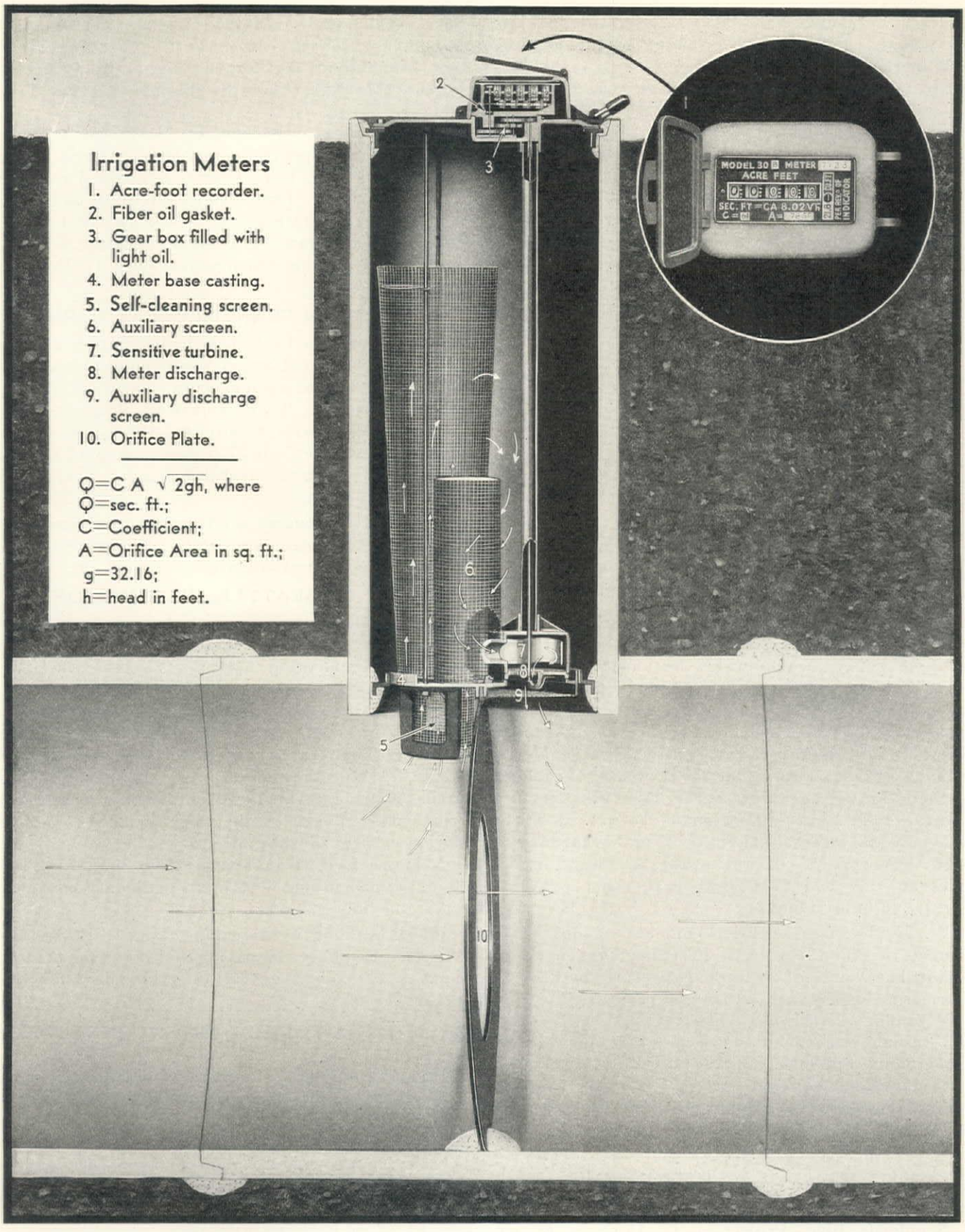


P&H Diesel Shovel on Welsh & Murdock Contract for Wawona Road, Yosemite National Park, California

truck; one Reo flat body truck; one Caterpillar '30' with bulldozer; one blade; four compressors; one drill sharpener and oil furnace. A new Lima shovel has recently been shipped on the work. The contract price is $189,882, and includes 230,000 cu.yd. unclassified excavation at $0.63; 16,000 cu.yd. type 'B' excavation at $1.10; 32,200 sta.yd. overhaul at $0.02; 6.59 miles finish roadway at $325; and other items.

C. H. Sweetser is district engineer, Bureau of Public Roads, at San Francisco.

Colorado—W. A. Colt & Sons, Las Animas, Colorado, will complete a contract about August, 1931, for grading 17.2 miles of the Fall River project, section



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B, Rocky Mountain National Park Highway, in Larimer county. Pioneer work—clearing 8 miles of line, building a pioneer road amounting to 40% of the final excavation, and building 4 miles of the road—required all of the past winter. One end of the project is at elev. 11,800 ft. and is inaccessible except for four months of the year. The other end of the project and the one on which the contractors have been at work, is at elev. 9000 ft. The project is accessible only from the two ends; about 9 miles of the work is above timber line. Two 1¼-yd. and one ⅝-yd. Thew-Lorain gas shovels are in use and a fourth shovel may soon be added to the work.

The contract price is $393,674 and includes: 70 acres clearing at $250; 50 acres grubbing at $100; 267,500 cu.yd. unclassified excavation at $0.83 and 64,000 cu.yd. unclassified excavation at $1.40; 4000 cu.yd. unclassified structure excavation at $1.50; 77,000 sta.yd. overhaul at $0.03; 17.2 miles finish earth-graded road at $200; 144 cu.yd. 'B' concrete at $30; 12,760 lb. reinforcing steel at $0.07; 700 cu.yd. cement rubble masonry at $25; 4500 cu.yd. hand-laid rock embankment at $1.50; 3500 yd.mi. overhaul at $0.25; etc.

A. E. Palen is acting district engineer of district 3, Bureau of Public Roads, Clyde E. Learned is in charge of forest and park roads, and Lyman Copeland is bridge engineer.

Oregon—Morrison-Knudsen Co., Boise, Idaho, began work February 12, 1930, on 7.7 miles of grading on three sections of the Siuslaw National Forest highway. Three camps are in operation and about 115 men are now employed. Five 1 and 1¼-yd. power shovels, mostly gas+air and including a Bucyrus-Erie and a Thew-Lorain, are in use. The contract price, $517,472, includes 68 acres clearing at $150; 51 acres grubbing at $100; 332,000 cu.yd. excavation at $1.05; structure excavation at $4.00; 70,000 cu.yd. borrow at $0.85; 287,000 yd.mi. overhaul at $0.16; 7.7 miles finishing at $400; 355 cu.yd. 'B' concrete at $40; 8200 lin.ft. timber piles at $0.95 and $1.60; 970 lin.ft. cedar piling at $1.10; and other items.

W. H. Lynch is district engineer of district 1, Bureau of Public Roads, at Portland, Oregon. J. A. Elliott has charge of all forest road work, with H. D. Farmer as his assistant on Oregon projects.

Wyoming—Morrison-Knudsen Co., Boise, Idaho, will resume work about June 1 on a 15.9 mile contract for grading and surfacing the East Entrance Project in Yellowstone National Park. This project has been closed down for the winter and will be completed about October, 1931. The contract price is $340,991.

A. E. Palen is acting district engineer of district 3, Bureau of Public Roads, at Denver, Colorado.

CITY OF LOS ANGELES, CALIFORNIA

Sepulveda Blvd. Project—J. G. Donovan & Son, Glendale, have completed over 75% of the roadway excavation, all of the storm drains and culverts, about 50% of the tunnel, and nearly 75% of the entire contract for 7.65 miles of grading and 655 lin.ft. of tunnel on Sepulveda blvd. The completion date is November 3, 1930. Five shovels have been used on roadway grading, working in diversified material—loam, clay, gravel, shale, soft sandstone, and hard rock. About 500,000 cu.yd. of roadway excavation is required and the overhaul totals 1377 sta.yd. The contract price on the entire project (roadway grading and tunnel) is $536,929.

J. J. Jessup is city engineer, H. P. Cortelyou is superintendent of general construction, Merrill Butler is bridge engineer, J. T. Thomas is division engineer at Sawtelle, D. M. True is office engineer, and L. E. Meidroth is resident engineer for the city of Los Angeles. T. M. McDaniel is general superintendent and H. B. Howard is general foreman for J. G. Donovan & Son.

CITY OF SAN FRANCISCO, CALIFORNIA

Bernal Cut—MacDonald & Kahn, San Francisco, completed Bernal cut and it was opened to traffic on April 15. Principal equipment on this $504,729 contract included one 1-yd. Northwest dragline, three Marion power shovels, twenty-two 5 and 8-yd. trucks, one Austin trencher, one 27-E paver, one Ord finisher on cement concrete and asphaltic concrete paving, one Carr subgrader.

M. M. O'Shaughnessy is city engineer of San Francisco and Clyde Healy is assistant city engineer. Emil Muheim was resident engineer on Bernal cut.

CITY OF SEATTLE, WASHINGTON

Denny Hill Regrade—Geo. Nelson & Co., Seattle, had the Sixth ave. et al regrade, L.I.D. 4818 (Denny hill) 50% complete on April 25. Sewers, house connections, and watermains are being laid in the excavated area south of Battery st. and electric conduits are being installed by the public utility companies in this area. The total yardage involved in this regrade is 4,220,000, and the time expires September 14, 1930. Paving in the excavated area will begin about June 1. Principal equipment on the work includes four 2-yd. Marion electric shovels, one 1¼-yd. Bucyrus-Erie gas shovel; one 1-yd. steam shovel; 2800 lin.ft. Link-Belt 30-in. permanent and 4000 lin.ft. temporary conveyor; 6 portable hoppers.

W. D. Barkhuff is city engineer and L. R. Andrews is assistant engineer on paving and concrete construction. A. Lincoln is general superintendent for Geo. Nelson & Co.

CALIFORNIA FORBIDS CROSS-CONNECTIONS

In conformity with the nation-wide 'drive' to eliminate cross-connections in water supply systems that may endanger public health, the State Board of Public Health adopted the following regulation April 12:

Water added to any swimming pool or swimming pool piping system anywhere along its course, from a public water supply system, shall be added overhead with a free overfall and no cross connection shall be made between the swimming pool piping and the public water supply piping.

This regulation applies equally to public and private swimming pools. A simple method of compliance is suggested in the form of a riser pipe on the circulating system (with top above operating hydraulic head in pipe-line) with a free-flow feed through the top.

Several instances of back-water contamination have helped to bring about this wise regulation.

PERSONAL MENTION

Carl L. Knight has been appointed city engineer and superintendent of streets for North Sacramento, California.

Edwards, Wildey & Dixon Co., engineering and building contractors of Los Angeles, has changed the firm name to the L. E. Dixon Co.

Charles R. Blood, assistant city engineer of Sacramento, California, has been promoted from lieut.-colonel to colonel of the 148th infantry, California National Guard, in command of the regiment.

Walker R. Young, construction engineer for the United States Bureau of Reclamation, has been selected as chief construction engineer for the Boulder dam. A biographical note on Young will be published shortly.

Quinton, Code & Hill and Leeds & Barnard, two consulting engineering firms of Los Angeles, consolidated May 1 as Quinton, Code & Hill—Leeds & Barnard. The new organization has its offices in the Standard Oil bdg., Los Angeles.

Sam P. Fulton, district engineer of district 1, New Mexico State Highway Department, Deming, resigned March 15 to join the Southwest Paving Co., of Los Angeles. Fulton had been with the department for 11 years. He has been succeeded by his former assistant, G. D. Hardaway.

Thomas Q. Ashburn, major general, U.S.A., an executive of the Inland Waterways Corp. of the Federal government, spoke to transportation leaders at San Francisco April 7 on 'San Francisco's Place in the Inland Waterway Development'. Ashburn is touring the country as the personal representative of President Hoover.

C. C. Van Valkenburgh, Jr., was appointed commissioner of public works for Fresno, California, on May 1, succeeding Andrew M. Jensen, resigned. Since graduation from the University of Michigan in 1905, Van Valkenburgh has had experience on land surveys, lighthouse work, construction, valuation, and city engineering.

John Heckathorn, senior in civil engineering at the University of Idaho, Moscow, won the first prize of $500 offered by the American Institute of Steel Construction for a competitive aesthetic design of a steel arch bridge. The problem called for the design of a bridge 650 ft. long, main arch span 325 ft., to be erected over a river separating a suburban residential section from an industrial city.

OBITUARY

George C. Black, an employee of the Arizona Highway Department, was killed in a recent motor accident in that state.

Reuel E. Anderson, 38, chief draftsman in the Denver office, Bureau of Public Roads, died March 18. Anderson had been a member of the board of managers, Colorado Society of Engineers, since January, 1930.

William F. Callahan, 75, a pioneer western grading contractor, died April 29 at Hollywood, California. Callahan developed one of the earliest heavy draglines, now known as the Monighan dragline. He is survived by his widow, two daughters, and three sons.

M. J. Smith, construction and maintenance engineer for the northern section of district 3, New Mexico State Highway Department, Santa Fe, died February 28. Smith was born in Pennsylvania, educated at Columbia University and the University of Pennsylvania, was employed by the U. S. Geological Survey, served as locating engineer for the Harriman lines, and had been for four years in New Mexico. He is survived by his widow and several children.

Drexel Lacey, 37, locating engineer for the Colorado Highway Department, died March 19 following a long illness. Lacey was born in Philadelphia, graduated from Washington University at St. Louis, worked as a draftsman for the Mountain States Telephone & Telegraph Co. and other telephone companies, served overseas as master engineer with the 115th engineers topographic section during the World War, and had been employed by the Colorado Highway Department in various capacities since 1919. Lacey made the location survey of the Mt. Evans highway from Echo lake to Shaffers crossing in the winter of 1925. He is survived by his widow.

Claude Irvin Rhodes, 53, vice-president of The Loveland Engineers, Inc., of San Francisco, died suddenly on May 11. Rhodes was born in Clarksburg, Yolo county, California; received his preparatory education in the schools of Woodland, California; and graduated with the BS (Min..E) degree from California in the class of 1902. He then secured extensive experience in California, Arizona, and Alaska, on surveys, stream gaging, drainage, mining, canal lining, water supply, etc., and was afterwards appointed engineer in charge of design, manufacture, and installation of 14 miles of transmission pipe-line for the Monterey County Water Works, California. Thereafter he located and built 23 miles of scenic highway on the Monterey peninsula. Rhodes was closely identified with the rebuilding of San Francisco after the Fire of 1906, spending more than three years on inspection of materials for, and installation of, sewers, public buildings, the high-pressure fire system, reservoirs, pavements, and other works. He had charge of construction and operation of the water supply and gas systems for the Panama-Pacific Exposition. From 1918 to 1923 he was with the hydraulic division of the California State Railroad Commission, serving as chief hydraulic engineer for the last two years of the period. He joined the staff of The Loveland Engineers, Inc., of San Francisco, being advanced to vice-president in 1925.

Rhodes was a member of the American Society of Civil Engineers, the American Water Works Association, the Engineers Club of San Francisco, and the Commonwealth Club of California. At the time of his death he was a vice-president of Western Continental Utilities, Inc., and of the Southwest Telephone Co. He enjoyed an enviable reputation for loyalty to his host of friends and to his associates. He is survived by his widow and two children.

ASSOCIATIONS

Professional Engineers of Oregon—The second annual convention of this organization was held at Corvallis, May 23 and 24.

Associated General Contractors—The next national convention of the A.G.C. will be held in San Francisco during the last week of January, 1931, as guests of the Northern California Chapter—the first time a national convention has been held in the Far West. The Northern California Chapter is well known for its lavish hospitality at its annual Christmas entertainments, and the national convention promises to excell all others.

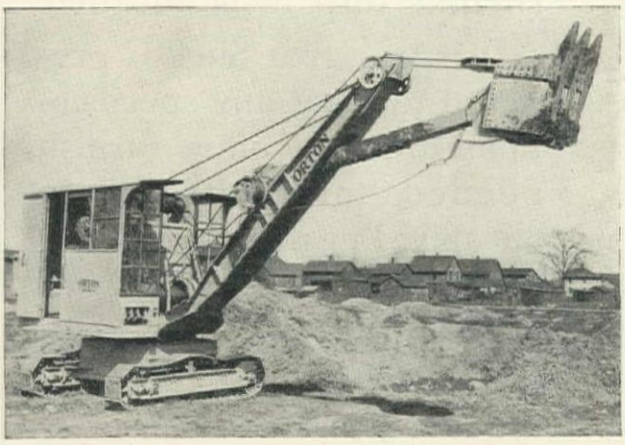
Montana Section, A.W.W.A.—The fifth annual meeting of this section was held at Missoula, April 17 to 19, with a registered attendance of 60. The first day of the meeting was spent in registration and round-table discussions. Jack J. Hinman, Jr., national president of A.W.W.A., was the principal speaker on April 18, being followed by E. S. Perry on 'The Ground Waters of Central and Eastern Montana', and R. D. Miller on 'Public Utility Accounting as it Relates to the City Water Department'. The annual banquet was held that evening. On April 19, M. H. Wolff spoke on 'Municipal Watersheds in the National Forests of Montana' and H. B. Foote gave 'The Ramblings of a State Sanitary Engineer'. An inspection of the intake dam for the water supply of Missoula closed the meeting. The 1931 convention will be held at Anaconda.

New officers include: president—J. R. Cortese, superintendent of water, Livingston; vice-president—H. M. Johnson, superintendent of water, Anaconda; national director—Eugene Carroll, vice-president and general manager, Butte Water Co.; secretary-treasurer—H. B. Foote, state sanitary engineer.

New Equipment and Trade Notes

ORTON IMPROVES ½-YD. CONVERTIBLE EXCAVATOR

The Orton Crane & Shovel Co., Chicago, has developed model 4, a ½-yd. field-convertible excavator with higher speed and greater handling ease while digging, hoisting, swinging, or traveling. The machine has a 40-hp. gas engine, provided with hand-and-foot accelerator and electric starter. A multiple-disc clutch is used and the transmission shaft is mounted on anti-friction bearings. An enclosed alloy-steel chain with floating takeup connects the transmission and double-jaw propelling



Orton ½-yd. Model 4 Convertible Excavator

clutch shafts. Travel speeds can be varied from ⅝ to 3 m.p.h. and make it possible, with increased tractive effort, for the excavator to negotiate a 25% grade. By a special main cutout clutch, all except the propelling mechanism is stopped while traveling. Treads are self-cleaning and are backed by coil springs. Steering is done by a hand wheel in the cab. The car body is electrically welded and is extra heavy. A special brake is provided to keep the shovel close to work when the dipper is being crowded. The main hoisting drum gives a single-line speed of 160 ft. per min. Sluing can be done at a speed of 4 r.p.m. The shovel has a 16-ft. heavy and electric-welded boom and a 12½-ft. electric-welded dipper stick with numerous diaphragms. A rope crowd allows the dipper to be held in the full extended position, the normal speed on the crowd being 85 ft. per min. with a thrust of 10,000 lb. on the dipper. Five trips per minute can be made in regular operation with the new model 4.

UNIVERSAL POWER SHOVEL CO. PRODUCES MODEL 512

The Universal Power Shovel Co., Milwaukee, a division of the Unit Corp. of America, has produced the 'Unit 512' which features a one-piece gear case enclosing all operating mechanism and producing positive lubrication. Disc clutches with single point adjustment assure the use of all the clutch surface. Gears are drop-forged, double heat treated, and are mounted in ball bearings. The gear case is splined and full floating, thus equalizing torque loads. With transmission case and power plant mounted on a one-piece turntable, a virtually integral unit with permanent alignment is secured. All controls are within easy reach of the operator's seat and the clutches are light in operation. The turntable is mounted on rollers equipped with roller bearings. A positive independent forward and reverse rope crowd gives complete control of the dipper stick. With a Waukesha VK, 4¼ by 5-in., 1400 r.p.m., 48-hp. motor, the turntable can be moved through 6 r.p.m., the shovel pulled through 5 trips per minute, and traction speeds of ¾ to 1¼ m.p.h. are available.

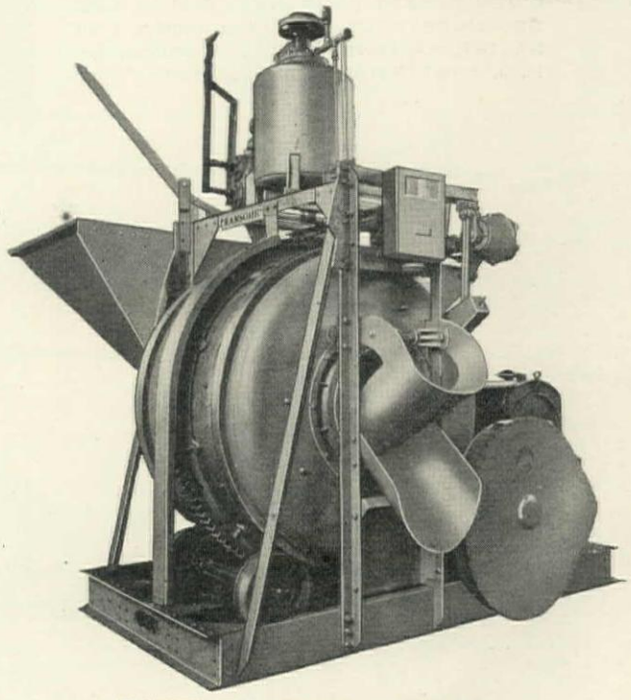
The production capacity of an excavator is said to depend

Unit 512, a Universal Power Shovel

on speed and ease of operation to even greater extent than on the volume of earth moved with each cycle. This principle is claimed to be behind the unit 512. The machine is convertible to clamshell, dragline, trench hoe, crane, or backfiller.

RANSOME 28-S STANDARD BUILDING MIXER

The Ransome Concrete Machinery Co., Dunellen, N. J., has released Bulletin 124 describing a 28-S standard building mixer with all features of its predecessor and an improvement in accurate and rapid water control through a spiral cut-off water tank. The drum rollers of this mixer are of car-wheel metal



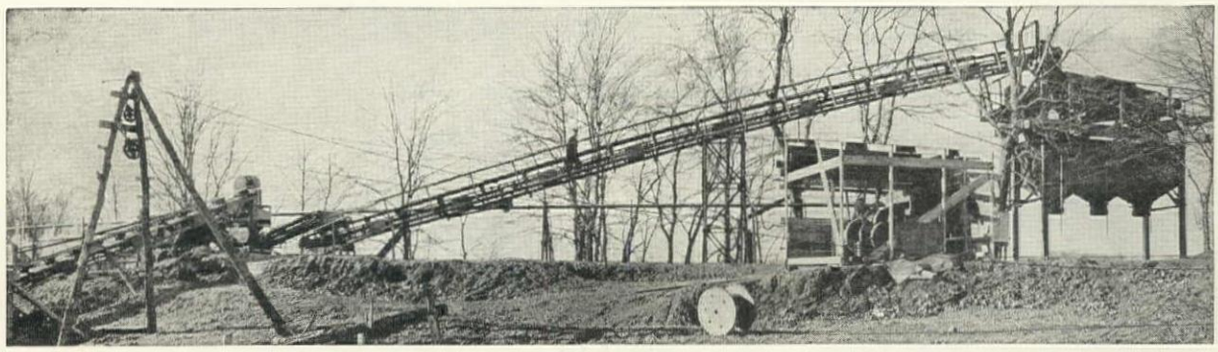
Ransome 28-S Standard Building Mixer

with chilled face and flange; dust caps protect Timken roller bearings. The drum is of all-steel construction with large radius corners, and the mixing blades are equipped with high-carbon steel renewable liners. The discharge chutes are of semicircular shape and are made in two pieces. An entire batch can be discharged in 8 to 10 seconds; a power discharge being standard equipment. The batch hopper is said to have ample capacity; it is equipped with a sliding steel gate, operated by a single lever. The gate is provided with non-clogging

slides. With the use of the Ransome spiral cut-off water tank, it is impossible to by-pass through the poppet valves. One turn of the control wheel instantly determines the discharge, no locking device being required.

DIAMOND PORTABLE CRUSHING AND SCREENING PLANT

The Diamond Iron Works, Inc., Minneapolis, manufacturer of saw mill, rock crushing, conveying, and transmission machinery, recently designed and built an all-steel portable washing and screening plant for local pit use. This type of plant is said to be of advantage to paving contractors where local pits are available, since freight on materials is eliminated and handling costs are reduced because hauls are considerably shortened. Also, the actual cost of sand and gravel—governed by pit conditions—is less than if these aggregates were purchased elsewhere.



DIAMOND ALL-STEEL PORTABLE WASHING AND SCREENING PLANT FOR LOCAL PIT USE

When the portable crushing, screening, and loading plant is not employed for scalping and washing, it can be used for dry crushing. Pit-run material is conveyed to a Diamond no. 40 portable Timken-bearing crushing and screening plant which is used as a scalping unit, sizing material as desired. It is then conveyed to the washing and scrubbing screen on a steel sectional conveyor. After the material has been washed, the sand is flumed to a settling tank and the gravel deposited into bins. Some installations do not require bins, in which case the washing screen and settling tank are mounted on a structural steel frame and the finished material is deposited on the ground for stock piling.

This and other sand and gravel equipment is described in the Diamond Iron Works 36-page 1930 catalog.

NEW CATALOGS

Belt Conveyors—The Stearns Conveyor Co., Cleveland, a division of Chain Belt Co., Milwaukee, has completed a catalog and engineering data book on the design and application of Rex-Stearns Timken idlers for all types of belt conveyors, together with allied and auxiliary equipment for complete belt conveyor installations. This book also covers briefly Rex-Stearns glass plant and silo storage systems. Rex equipment, made by Chain Belt Co., includes a broad line of chain and power transmission machinery—conveyors and conveying systems; mixers; pavers; etc.

Compressed Air Lines—Sullivan Machinery Co., Chicago, has secured the sales rights for 'Tanner-tanks' and 'Tanner-gas' for the prevention of freezing in compressed air lines and at the exhaust of compressed air tools. The device consists of a tank and by-pass piping connected to the air line near the point of use, the tank containing a liquid which forms a gas on combination with the compressed air. Gas is carried into the air lines and is the active agent which prevents freezing at the tools. In Sullivan pamphlet, form 2103, the tank and gas are briefly described, as also are the tools and appliances which may be used in connection with them.

Construction Equipment—Garlinghouse Bros., Los Angeles, an engineering service and construction and industrial equipment organization, have released catalog no. 30, a 132-page illustrated reference book for the smaller items of equipment. This firm is the exclusive Los Angeles distributor for Blaw-Knox Co., Insley Mfg. Co., Browning Crane Co., McKiernan-Terry Corp., Wemlinger, Inc., Knickerbocker Co., A. Leschen & Sons Rope Co., Domestic Engine & Pump Co., Lidgerwood Mfg. Co., Dobbie Foundry & Machine Co., Smith Engineering Works, Atlas Engineering Co., Le Roi Engine Co., Gardner-Denver Co., Black & Decker Mfg. Co., and other manufacturers.

Ground Pressure for Crawler Shovels—Northwest Engineering Co., Chicago, manufacturer of shovels, cranes, and draglines, has prepared 'Ground Pressure Data', a pamphlet dealing with the value of low ground pressure to the contractor and correcting some old theories on how the ground pressure of crawler shovels, cranes, and draglines should be computed.

Sewer Cradles—The Ric-Wil Co., Cleveland, has published a pamphlet describing the installation and mechanical advantages of its vitrified tile cradle base drain. This drain is said to save labor, field engineering, and inspection; to allow automatic grading of pipe after the trench is dug and cradle set; to increase the strength of sewer pipe 82%, giving it a solid foundation and spreading the load; and to reduce infiltration.

Steel Forms—Blaw-Knox Co., Pittsburgh, has issued its 1930 steel form catalog which, in a way, reviews the progress in concrete construction in the United States and foreign countries. This attractive catalog is a 112-page, profusely illustrated, reference book available to contractors and engineers writing for copies on their own letterheads. It covers circular, horseshoe-shaped, and rectangular conduits; tunnels, subways, and traffic tubes; walls and piers; dams and bridges; and miscellaneous structures; streets, roads, curbs, and sidewalks; clamshell and dragline buckets; standard steel buildings; concrete aggregate measuring equipment; central mixing plants; road finishing machinery and graders.

Table on Arcs, Chords, and Versines—The Chicago Bridge & Iron Works has published a 32-page book entitled 'Tables for Use in Computing Arcs, Chords, and Versines' to be used with the squares and logarithms of Inskip and Smeley for central angles between 0 and 60 deg. These tables, which eliminate much tedious work, can be purchased for $1.00 from the author, Harry Clow Boardman, C.E., at 1305 w. 105th st., Chicago.

Wagon Graders—Blaw-Knox Co., manufacturer of steel products, Pittsburgh, has released form no. 1210 describing the Ball wagon grader, a unit which combines five dirt-moving requirements—it digs, loads, transports, dumps, and spreads. This grader was designed by Charles E. Ball, a practical contractor, and has had 7 years of capable performance. It consists of a structural framework with two large rear wheels and a single front wheel, and within the framework is suspended two digging and carrying buckets of 40 cu.ft. capacity each.

Welding Rod—The Fusion Welding Corp., Chicago, has released circular no. A-43 listing its complete line of over 40 'Weldite' welding rods. Selection of the particular rod for any job is facilitated by three listings in this circular—type of application, process employed, and surface finish of the rod itself. 'Weldite' C-No. 6 fluxed, a new rod designed for carbon arc welding and particularly adaptable for mild steel plates and castings, is included in the circular listings.

UNIT BID SUMMARY

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

SEWER CONSTRUCTION

FAIRFIELD, CALIF.—COUNTY—PUMPING PLANT, CAST IRON FORCE MAIN AND VITRIFIED SEWERS

Contract awarded to M. J. Bevanda, Savings & Loan Bank Bdg., Stockton, who bid $141,460 (as stated in our issue of May 5) for sewer system covering 300 acres of land to north and south of Vallejo and along Benicia Road, for Solano County. Bids received from:

(1) M. J. Bevanda, Stockton (awarded) $141,460
(2) S. M. McGaw 141,612
(3) J. E. Johnston 146,484
(4) O. U. Miracle 165,659
(5) Heafey-Moore Co. 167,417
(6) Drainage Construction Co. $168,471
(7) Jasper-Stacy Co. 176,868
(8) P. & H. Construction Co. 182,807
(9) W. J. Tobin 211,240
(10) J. C. Hickey 234,110

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
41,853 ft. 6-in. vitr. sewer	.65	.50	.57	.84	.70	.95	.75	1.00	1.13	1.30
8,187 ft. 8-in. vitr. sewer	.80	.76	.72	.98	.85	1.05	.94	1.22	1.26	1.45
3,389 ft. 10-in. vitr. sewer	.91	.95	.92	1.15	1.00	1.20	1.17	1.38	1.55	1.80
2,514 ft. 12-in. vitr. sewer	1.20	1.27	1.15	1.37	2.00	1.40	1.47	1.50	1.67	2.10
2,292 ft. 15-in. vitr. sewer	1.69	1.73	1.90	1.90	2.50	1.75	2.06	1.75	2.41	2.90
3,274 ft. 18-in. vitr. sewer	2.27	2.21	2.15	2.40	2.15	2.30	2.36	2.82	2.93	3.30
4,893 ft. 21-in. vitr. sewer	2.50	2.73	2.88	3.17	3.30	3.30	3.44	3.50	3.78	4.75
1,790 ft. 24-in. vitr. sewer	4.05	4.35	3.85	5.04	4.35	3.40	4.63	5.00	6.51	5.60
2,933 ft. 30-in. vitr. sewer	5.95	6.50	6.00	6.90	6.80	5.20	6.73	6.00	8.06	10.00
1,903 ft. 36-in. vitr. sewer	8.00	9.25	8.30	10.23	13.45	8.00	11.58	8.25	15.00	13.00
3,090 ft. 12-in. cast-iron pressure mains	2.30	2.34	2.50	2.47	2.40	3.00	2.35	3.60	2.55	5.00
398 ft. 'A' cradle for 30-in. sewer	2.00	2.60	2.60	1.44	1.50	2.00	2.90	4.00	1.00	.75
521 ft. 'A' cradle for 24-in. sewer	1.75	2.00	2.60	1.19	1.25	1.50	2.16	2.10	.90	.50
100 ft. 'B' cradle for 30-in. sewer	1.75	2.00	1.90	.94	1.25	1.50	3.30	2.05	.60	.65
150 ft. 'B' cradle for 24-in. sewer	1.00	1.30	1.90	.76	1.00	1.20	2.30	1.50	.50	.45
120 ft. wire fence about pumping plant	3.00	3.00	2.00	2.68	3.55	3.50	10.60	1.50	4.00	1.00
1,957 ft. pile trestle for 36 and 30-in. sewer	2.75	3.25	5.40	2.88	4.00	5.50	4.00	3.00	4.00	4.00
1,974 ft. pile trestle for 21-in. sewer	2.50	2.60	2.00	2.43	3.50	5.00	3.50	2.50	3.00	4.00
122 standard manholes	90.00	78.00	70.00	86.40	70.00	70.00	$140	$125	$120	90.00
1 special drop manhole	$130	$150	$100	$272	$200	$240	$170	$300	$500	$150
6 special manholes on pile trestle	$100	78.00	65.00	93.00	$170	90.00	$108	$250	$100	$250
57 inspection holes	25.00	26.00	25.00	22.50	15.00	30.00	25.00	45.00	15.00	25.00
1 pumping plant, comp.	$5175	$5850	$9199	$6228	$6251	$5000	$5100	$5000	$7000	$5600

Geo. Wiles is Consulting Engineer.

SAN MATEO, CALIF.—CITY—VITRIFIED SEWERS AND PUMPING PLANT

Contract awarded to Oakland Sewer Construction Co., 1003 85th Avenue, Oakland, who bid $54,715 for constructing sewer system in southern portions of San Mateo, work for City of San Mateo. Bids from:

(1) Oakland Sewer Constr. Co. $54,715
(2) DeGolyer & Bruce, Oakland 56,734
(3) Oakland Constr. Co., Oakland 61,549
(4) Heafey-Moore Co., Oakland 62,587
(5) W. J. Tobin, Oakland 62,690
(6) P & H Constr. Co., San Jose 64,587
(7) H. E. Conner, Redwood City $66,408
(8) Fredrickson & Watson Const. Co. 68,391
(9) A. J. Raisch, San Francisco 73,277
(10) Pacific Pavements Co. 74,134
(11) J. C. Hickey, Berkeley 75,438

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
3,130 ft. 21-in. vitr. sewer	2.57	2.62	3.42	2.79	2.80	2.30	3.48	2.90	2.30	2.70	3.30
2,800 ft. 18-in. vitr. sewer	2.10	2.04	2.42	2.20	2.26	2.48	3.05	2.70	2.40	2.20	2.70
2,610 ft. 15-in. vitr. sewer	1.54	1.57	2.10	1.60	1.63	1.81	2.61	2.30	2.00	2.00	2.70
1,360 ft. 12-in. vitr. sewer	2.04	2.45	1.35	1.55	1.10	2.40	1.74	1.90	1.40	1.50	1.60
2,200 ft. 10-in. vitr. sewer	.86	1.07	.94	1.16	1.00	1.26	.78	1.47	1.25	1.40	1.40
13,470 ft. 8-in. vitr. sewer	.64	.65	.65	.80	.82	.75	.65	.86	1.05	1.25	1.20
12,600 ft. 6-in. vitr. sewer	.57	.56	.53	.78	.58	.65	.52	.58	.90	1.00	1.00
5,700 ft. 6-in. vitr. laterals	.54	.58	.67	.60	.58	.75	.61	.60	.70	.80	1.05
3,530 ft. 4-in. vitr. laterals	.52	.50	.54	.57	.58	.70	.48	.60	.60	.70	1.00
18 21 by 4-in. Y's	3.10	3.55	4.10	3.50	3.00	5.00	6.09	3.00	1.00	3.30	10.00
76 18 by 4-in. Y's	2.38	2.66	4.00	2.75	2.00	4.00	4.35	2.20	1.00	2.50	8.00
47 15 by 4-in. Y's	1.59	1.89	2.40	2.00	1.50	3.00	3.48	1.65	1.00	1.90	5.00
24 12 by 4-in. Y's	1.10	1.14	1.25	1.25	1.00	2.00	1.74	1.00	1.00	1.25	3.00
23 10 by 6-in. Y's	.85	.90	.81	1.10	.70	1.50	1.30	.80	1.00	.87	2.00
20 10 by 4-in. Y's	.85	.90	.81	1.10	.70	1.50	1.30	.80	1.00	.87	2.00
113 8 by 6-in. Y's	.65	.65	.75	1.00	.60	1.25	1.10	.50	1.00	.65	1.00
105 8 by 4-in. Y's	.65	.65	.75	1.00	.60	1.25	1.10	.50	1.00	.65	1.00
131 6 by 6-in. Y's	.50	.50	.45	.75	.40	1.00	.87	.50	1.00	.48	.75
140 6 by 4-in. Y's	.50	.50	.45	.75	.40	1.00	.87	.50	1.00		.75
122 manholes	55.00	58.00	79.00	64.00	75.00	65.00	81.00	75.00	70.00	70.00	70.00
1 pump. unit and sump, comp.	$3150	$3465	$2764	$3400	$5000	$4625	$3084	$4400	$2500	$750	$4000
1 pump. unit, remove	$750	$735	$450	$600	$1250	$700	$800	$1050	$2000	$1250	$925
200 ft. 4-in. cast-iron pipe	.64	.75	.75	.75	1.00	1.00	1.00	1.50	2.00	.50	2.00

San Gabriel Dam Project
Equipment and Supplies

Purchased New for Five Years' Work, and Only Used for Six Months

FOR SALE

AIR EQUIPMENT

Sullivan HA3 Tubinair Hoist
4'x 18' Riveted Steel Air Receiver
Chicago Pneumatic Drills
Chicago Pneumatic Grinders
Riveting and Chipping Hammers
Leyner Drill Sharpener
Drill Sharpener Oil Furnaces
Air Hose Coupled
Hollow Drill Steel
Jack Hammers

CONCRETE MIXERS

1—7S Ransome Power Loader on wheels—F. & J. Gas Engine
1—3½-S Ransome Tilting

ELECTRICAL

Champion Blowers
1½ KVA to 100 KVA 2300 V Transformers
Switch Boxes
2 KW 220 V Heaters
Electric Fans
Federal Steel Telephones
Testing Set
500 and 1000 W Floodlights
Couch 50 Automatic Phone System
General Electric Water Coolers

SPECIALS

120-B 4-yd. all Elec. Bucyrus Shovel

8—30-Ton Standard Gauge Plymouth Locomotives

1—Nordberg Track Shifter

18—30 cu.yd. Automatic Air Dump, Standard Gauge Cars

1—20x12x14 Sullivan Angle Compound Compressor with 225 H.P. Syn. Motor

1—8x20 Byron Jackson 4-stage Multiplex Pump, mounted between two 300 H.P. Motors

MACHINERY, TOOLS, Etc.

Curtis 4" Pipe Machine with 2" Bolt Dies, with Motor
14x8" Fay & Scott Lathe, with motor
3' Morris Radial Drill, with motor
24" Steptoe Shaper, with motor
Model 28 Weber Valve Grinder, with motor
Drill Presses, Grinders, Drills, with motor
6"x 6" Racine Power Saw, with motor
60-Ton Vickers Hydraulic Press

RAILROAD SUPPLIES

70-lb. No. 1 Relayers
Switches, Frogs, etc.
Paulis Track Drill
Standard Gauge Jordan Spreader
Casey Jones Hy-duty Car
Push Cars

WELDING EQUIPMENT

Type M 300-lb. Oxweld Generator
Welding Torches
Cutting Torches
Oxygen Gauges
Acetylene Gauges
Oxygen and Acetylene Hoses

MISCELLANEOUS

Automobiles, Trucks, Small Tools, Rigging Equipment, Blocks, Wire Rope, Blacksmith Tools, Jacks, Vises, Tanks, Electric Wire and Supplies, Pipe and Pipe Fittings up to 12 inch. Washington, Mallory, and Skookum Blocks, Rivets, H. S. Twist Drills, Phomene Fire Extinguishers, (5-Ton Shop Crane, Roller Bearing, 40' 6" span), Dredge Chain, Chain Blocks, Hydraulic Giants.

Storage Yard:
Arden Road and S. P. Tracks, EL MONTE, CALIF.

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SAN FRANCISCO, CALIF.—REINF. CONCRETE—FILLMORE ST. SEWER, SECTION C

MacDonald & Kahn, Financial Center Bdg., S. F., who bid $75,976, low bid to Board of Public Works for constructing Section C of Fillmore St. sewer from Fell St. to Van Ness Ave. and from Laguna St. to Grove St.

(1) J. Varano, S. F. $80,092
(2) C. C. W. Haun, S. F. 76,593
(3) MacDonald & Kahn, S. F. (low) 75,976
(4) Chas. L. Harney, S. F. 91,124
(5) C. B. Eaton, S. F. 81,269
(6) E. J. Treacy $76,000
(7) Rocca & Caletti, San Rafael 80,341
(8) Peter McHugh, S. F. 83,724
(9) J. McDonald 98,555

	(1)	(2)	(6)	(8)	(7)	(9)	(5)	(4)	(3)
1,408 ft. 6 by 9-ft. reinf. circ. concrete sewer	30.00	28.10	30.00	33.75	31.50	28.58	30.50	32.60	36.80
1,116 ft. 6 ft. 6-in. circular reinf. concrete sewer	29.50	27.50	26.00	32.75	29.50	28.58	29.50	29.00	36.60
50 ft. 2 ft. 6-in. by 3 ft. 9-in. reinf. conc. sewer	20.00	14.50	15.00	15.00	15.00	10.00	12.50	13.00	18.00
1 taper connection	$300	$360	$300	$400	$400	$210	$200	$400	$400
70 ft. 15-in. vitr. sewer	4.00	6.50	4.00	5.00	4.00	5.00	3.00	4.00	5.00
150 ft. 10-in. vitr. sewer	2.00	4.50	2.00	3.00	1.50	1.85	2.00	2.40	3.00
12 manholes, conc. or br.	75.00	80.00	80.00	75.00	60.00	50.00	60.00	65.00	75.00
1 manhole on brick sew.	75.00	$104	70.00	90.00	60.00	75.00	$100	90.00	80.00
3 manholes on pipe sew.	75.00	$170	70.00	$105	$100	$100	$100	$100	85.00
200 ft. vitr. underdrain	1.25	1.35	1.25	3.00	.70	.80	1.60	2.00	1.50
400 ft. 10-in. vitr. underdr.	1.00	1.15	1.10	2.50	.60	.80	1.25	1.50	1.25
700 ft. 8-in. vitr. underdr.	.75	1.00	.70	2.00	.50	.60	.75	1.25	1.00
1,200 ft. 6-in. vitr. underdr.	.50	.85	.50	.50	.40	.50	.50	.50	.80

STREET AND ROAD WORK

CARSON CITY, NEV.—STATE—GRADING AND SURFACING—WHITE PINE COUNTY

Contract awarded to Wheelwright Construction Co., Ogden, Utah, who bid $92,659 to the State Highway Commission, Carson City, Nevada, for grading and surfacing a portion of the State Highway System in WHITE PINE COUNTY, from Robinson Summit to Keystone, and from Magnuson's to North County Line, Routes 2 and 24, Sections C-1, A, and B, 47.01 miles. Bids from:

(1) Wheelwright Const. Co., Ogden, Utah $92,659
(2) J. N. Tedford, Fallon, Nevada 98,401
(3) Dodge Bros., Inc., Fallon, Nev. 99,744
(4) A. D. Drumm, Jr., Fallon, Nevada $102,702
(5) Isbell Const. Co., Carson City 106,518
(6) Engineers estimate 93,655

	(1)	(2)	(3)	(4)	(5)	(6)
64,000 cu.yd. excavation	.55	.55	.61	.60	.48	.40
59,693 sta.yd. overhaul	.04	.05	.04	.04	.04	.04
12.16 mi. prepare subgr. and should.	$100	$100	$100	$100	$100	$100
34.75 mi. building shoulders	$25.00	75.00	75.00	$150	25.00	50.00
57,600 cu.yd. cr. rock or gravel	.85	.90	.86	.88	1.15	1.00
300 cu.yd. cr. rock or grav. (stock)	.85	.90	.86	.90	1.15	1.00
75 cu.yd. B concrete	30.00	35.00	35.00	35.00	40.00	40.00
244 ft. 18-in. corr. pipe, install	.50	.50	.50	.50	.50	.60
1,002 ft. 24-in. corr. pipe, install	.50	.50	.50	.50	.50	.60
66 ft. 30-in. corr. pipe, install	.75	.60	1.00	.50	1.00	.60
38 ft. 36-in. corr. pipe, install	1.00	.75	1.00	1.00	1.25	.60
404 ft. 15-in. corr. pipe, remove	.50	.50	.50	.50	.50	.60
46 ft. 18-in. corr. pipe, remove	.50	.50	.50	.50	.50	.60
37 demolish headwalls	3.00	5.00	10.00	10.00	5.00	5.00
19 corr. pipe culvert extensions	10.00	10.00	15.00	10.00	10.00	12.00
1,400 ft. remove and reconst. fence	.05	.10	.10	.10	.10	.10
98 remove and reset monuments	2.00	2.00	3.00	2.00	2.50	1.50
2 furn. and install posts (FA marker)	2.50	10.00	5.00	20.00	5.00	5.00
485 ft. remove fence	.03	.025	.05	.10	.02	.05

SAN FRANCISCO, CALIF.—GOVERNMENT—SURFACING—LASSEN NATIONAL PARK

Award recommended to Tieslau Bros., 1315 Allston Way, Berkeley, who bid $53,279 to Bureau of Public Roads, 461 Market St., San Francisco, for surfacing Sections C-3 and C-4, and portions of Sections C-1 and C-2 of Route No. 1, Loop Route, in Lassen Volcanic National Park, 7.52 miles of surfacing. Bids received from:

(1) Tieslau Bros., Berkeley $53,279
(2) C. R. Johnson, Portland 57,355
(3) O. A. Lindberg, Stockton 60,889
(4) Hemstreet & Bell, Marysville $61,171
(5) Jasper Stacy Co., San Francisco 70,683
(6) Engineer's estimate 66,301

	(1)	(2)	(3)	(4)	(5)	(6)
3,000 cu.yd. excavation (borrow and slide removal)	.65	.90	.65	.75	.90	.60
40 cu.yd. excavation (structures)	2.00	2.00	2.50	2.00	2.50	2.50
2,000 sta.yd. overhaul	.05	.05	.02	.02	.04	.03
7.52 mi. fine grading subgrade and should.	$250	$350	$528	$250	$700	$250
14,900 cu.yd. crushed rock surfacing	2.65	2.85	2.25	3.10	3.20	3.30
1,750 cu.yd. supplemental crushed rock	2.65	2.85	2.25	3.10	3.00	3.00
6,000 cu.yd.mi. hauling binder	.25	.18	.40	.25	.25	.40
Provide and maintain water plant	$200	$500	$9000	$500	$2000	$500
900 M gal. watering	2.00	2.00	1.00	2.50	4.00	3.00
2,100 cu.yd. additional binder	.50	.40	2.25	.30	1.00	1.00
341 ft. 6-in. vitr. tile underdrain	1.75	.50	1.00	1.25	1.20	1.00

HOLLISTER, CALIF.—CITY—CONCRETE

Contract awarded to Granite Const. Co., Watsonville, $67,935 for the improvement of portions of South St., East St., Hawkins St., Third St., etc., for City. Bids on:

(1) 267,705 sq.ft. 6-in. concrete paving
(2) 54,519 sq.ft. 5-in. concrete paving
(3) 31,663 sq.ft. concrete gutter
(4) 10,806 lin.ft. concrete curb
(5) 728 lin.ft. driveway approaches
(6) 24 'A' catchbasins
(7) 9 'B' catchbasins
(8) 884 ft. 12-in. concrete culvert
(9) 530 ft. 8-in. concrete culvert
(10) 210 ft. 4-in. vitrified sewer
(11) 171 ft. 6-in. cast-iron pipe

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	TOTALS
Granite Const. Co.	.178	.163	.183	.275	.30	30.00	18.50	.90	.70	.50	1.50	$67,935
M. J. Bevanda	.19	.16	.20	.30	.30	50.00	40.00	1.75	1.00	1.00	2.00	73,566
A. J. Raisch	.185	.165	.20	.50	.75	30.00	20.00	.80	1.20	1.50	.60	73,785
F. A. Batchelder	.20	.18	.20	.34	.25	23.00	15.00	.75	.40	.25	.70	75,275
A. Teichert & Son	.202	.18	.212	.42	.40	25.00	15.00	.85	.70	.95	2.00	77,828
Central Calif. Roads	.207	.175	.22	.40	.24	31.00	27.00	.93	.66	1.30	.87	78,997

Work under 1911 Act. A. M. McCray is City Engineer of Hollister.

PHOENIX, ARIZ.—STATE—FLORENCE-TUCSON HIGHWAY—BRIDGE AND HIGHWAYS

Contract awarded to Packard & Tanner, 905 W. Latham St., Phoenix, Arizona, who bid $142,782 to Arizona State Highway Commission, Phoenix, for construction of the Florence-Tucson Highway, F. A. Project 94-F, beginning about 1 mile northwest of Rillito and extending about 15.5 miles southeast toward Tucson, consisting of grading, draining, and surfacing about 15.5 miles of road. Bids received from:

(1) Packard & Tanner, 905 W. Latham St., Phoenix (awarded) $142,782
(2) Schmidt-Hitchcock, Phoenix 157,356
(3) Rawls & Wright, El Paso $166,732
(4) Hodgman & MacVicar, Pasadena 166,933
(5) Watson & Sutton, San Diego 177,233

		(1)	(2)	(3)	(4)	(5)
130	squares clearing and grubbing	4.60	16.00	5.00	15.00	7.50
7,832	cu.yd. roadway excavation	.50	1.13	.50	.75	.35
90,665	cu.yd. borrow excav. (inc. O.H.)	.28	.26	.35	.35	.32
1,590	cu.yd. structure excavation	1.48	1.13	1.50	1.25	1.00
3.611	cu.yd. drainage excavation	.32	.40	.50	1.25	.25
70,635	sta.yd. earthwork overhaul	.02	.025	.02	.05	.03
786	cu.yd. 'A' concrete (inc. cement)	21.16	25.20	25.00	25.25	25.00
69	cu.yd. 'B' concrete (inc. cement)	21.16	23.10	25.00	24.25	24.00
47,525	lb. reinforcing steel	.059	.0525	.06	.06	.05
2,500	ft. cable guard fence	.89	1.13	1.10	.90	1.25
394	ft. 24-in. corr. metal pipe	2.93	2.60	3.00	3.00	3.00
236	ft. 30-in. corr. metal pipe	3.66	3.35	3.75	4.00	4.00
50	ft. 36-in. corr. metal pipe	5.80	5.20	5.00	5.00	5.25
20	ft. 30-in. corr. pipe, reset	1.60	.52	1.50	2.00	1.00
20	ft. 36-in. corr. pipe, reset	2.00	.63	2.00	3.00	1.50
52	cu.yd. remove old concrete	10.00	7.56	10.00	10.00	3.00
1,300	guard posts (each)	2.10	2.10	1.75	2.25	2.00
330	sq.ft. wire fabric	.12	.047	.30	.05	.25
3,108	ft. new stock fence	.057	.13	.065	.10	.08
22,600	ft. reset old stock fence	.025	.08	.03	.03	.07
	Rebuild irrigation turnout	10.00	9.50	25.00	$100	$550
	Remove entire culvert	$107	$190	$100	$100	$150
	Remove slabs from culvert	$100	$190	$100	$150	$100
	STRUCTURES OVER 20-FT. CLEAR SPAN					
1,495	cu.yd. excavation	1.48	1.13	1.50	1.25	1.50
26	cu.yd. 'AA' concrete (inc. cement)	70.00	72.50	75.00	75.00	75.00
1,277	cu.yd. 'A' concrete (inc. cement)	21.16	22.50	25.00	25.25	25.00
163,055	lb. reinforcing steel	.059	.0525	.06	.06	.05
1,820	ft. concrete piling	4.50	5.80	5.50	5.00	6.00
44	plate br. seats (each)	26.00	20.00	10.00	20.00	40.00
225	sq.ft. wire fabric	.12	.047	.30	.05	.25
29,156	cu.yd. min. aggregate surface	.59	.66	.80	.50	1.25
65.115	cu.yd.mi. min. agg. haul surf.	.17	.18	.18	.20	.18

SACRAMENTO, CALIF.—STATE-HUMBOLDT COUNTY—GRADING AND CONCRETE PAVING

J. V. Galbraith, P.O. Box B2, Petaluma, who bid $148,707, low to Calif. Div. of Highways for 4.3 mi. grading and concrete paving at Scotia and from Fortuna to Loleta, HUMBOLDT COUNTY. Bids from:

(1) J. V. Galbraith, Petaluma $148,707
(2) Engelhart Paving & Constr. Co., Eureka 158,653
(3) M. J. Bevanda, Stockton 159,352
(4) N. M. Ball, Porterville $165,998
(5) C. W. Wood, Stockton 166,209

		(1)	(2)	(3)	(4)	(5)
56,900	cu.yd. roadway excavation	.38	.40	.50	.43	.35
450,800	sta.yd. overhaul	.0085	.01	.01	.01	.015
950	cu.yd. imported borrow	.80	.70	1.20	.60	.75
1,850	cu.yd. structure excavation	.80	.75	1.00	1.50	1.00
4,190	cu.yd. salvaged surface	.40	.50	.50	1.25	1.00
4.760	cu.yd. screened gravel (subb.)	1.17	1.60	.85	1.55	1.50
5,820	cu.yd. river run gravel	.50	.85	.75	1.00	.80
50,830	sq.yd. subgrade for pave	.08	.09	.02	.09	08
9,875	cu.yd. 'A' concrete (pave.)	9.00	9.30	9.50	9.30	10.00
102	cu.yd. 'A' concrete (struc.)	20.00	20.00	25.00	25.00	20.00
240,000	lb. reinforcing steel	.05	.05	.045	.05	.05
96	ft. corr. metal pipe, 12-in.	.50	.50	.60	.50	1.00
158	ft. corr. metal pipe, 18-in.	.60	.60	1.00	.75	1.00
122	ft. corr. metal pipe, 24-in.	.75	.80	1.25	1.00	1.00
68	ft. corr. metal pipe, 42-in.	3.00	2.00	2.00	1.00	2.00
34	ft. corr. metal pipe, 48-in.	3.25	2.00	3.00	1.50	2.00
38	ft. corr. pipe, 18-in., half circ.	1.00	.80	3.00	1.00	1.00
160	ft. corr. pipe, clean and relay	1.00	1.00	1.50	1.00	1.00
1,328	ft. 8-in. perf. metal pipe underdrains	1.40	1.55	1.50	1.15	1.25
65	cu.yd. remove and disp. concrete	3.00	2.00	4.00	3.00	3.00
229	stations finishing roadway	4.00	5.00	5.00	7.00	5.00

SALINAS, CALIF.—COUNTY—ASPHALT MACADAM

Contract awarded to Granite Construction Co., Watsonville, who bid $54,541 for asphalt macadam surfacing on King City-Jolon, San Lucas-Lockwood, Lonoak, Bitterwater Roads, etc., for County. Bids from:

(1) Granite Construction Co., Watsonville (awarded contract) $54,541
(2) W. A. Dontanville, Salinas $60,753
(3) A. Teichert & Son, Sacramento 67,216

		(1)	(2)	(3)
2160	cu.yd. 1-in. rock from King City Pit (King City-Jolon Road)	1.48	1.99	2.31
1080	cu.yd. ½-in. rock from King City Pit (King City-Jo'on Road)	1.79	1.80	2.76
1650	cu.yd. 1-in. rock from Jolon Pit (King City-Jolon Road)	1.22	1.60	1.95
825	cu.yd. ½-in. rock from Jolon Pit (King City-Jolon Road)	1.54	1.40	2.40
3400	cu.yd. 1-in. rock on San Lucas-Lockwood Road	1.45	1.90	2.23
1700	cu.yd. ½-in. rock on San Lucas-Lockwood Road	1.75	1.70	2.68
970	cu.yd. 1-in. rock on Lonoak Road	1.23	1.65	1.91
485	cu.yd. ½-in. rock on Lonoak Road	1.54	1.45	2.36
1820	cu.yd. 1-in. rock on Bitterwater Road	1.14	1.45	1.81
910	cu.yd. ½-in. rock on Bitterwater Road	1.45	1.20	2.29
1710	cu.yd. 1-in. rock on King City-Metz Road	1.23	1.75	2.08
855	cu.yd. ½-in. rock on King City-Metz Road	1.54	1.55	2.53
7118	bbl. of 90-95% road oil	4.14	4.35	3.90

SAN FRANCISCO, CALIF.—GOVERNMENT—GRADING—LASSEN NATIONAL PARK

Christie & Allen, 511 Crocker Bdg., San Francisco, $55,044, low bid to Bureau of Public Roads for 7.71 mi. grading Section E of Route No. 1, Loop Route, in Lassen Volcanic National Park. Bids received from:

(1) Christie & Allen, S. F. ..... $ 55,044
(2) Mathews Constr. Co., Sacramento 83,941
(3) O. A. Lindberg, Stockton 92,124
(4) Jasper Stacy Co., S. F. 102,181
(5) C. R. Johnson, Portland $103,788
(6) A. J. & J. L. Fairbanks, South San Francisco 108,774
(7) Engineer's estimate 97,597

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
46 acres clearing	$250	$375	$300	$400	$400	$480	$300
90,050 cu.yd. excavation	.345	.58	.65	.73	.78	.795	.75
530 cu.yd. excav. for struc.	1.00	1.25	2.00	2.50	2.00	1.50	2.00
6,250 cu.yd. excav. for borrow	.345	.50	.65	.54	.50	.40	.60
25,000 sta.yd. overhaul	.01	.03	.02	.03	.04	.03	.03
7.71 mi. finish road	$300	$300	$396	$350	$300	$400	$250
63 cu.yd. cem. rubble masonry	11.50	20.00	15.00	25.00	10.00	15.00	20.00
1,836 ft. 18-in. corr. pipe	1.65	1.90	3.00	2.40	2.25	1.90	1.75
130 ft. 24-in. corr. pipe	2.45	2.80	3.67	3.50	3.00	2.60	2.70
160 ft. 30-in. corr. pipe	3.10	3.50	4.14	5.00	3.50	3.40	3.55
Maint. of exist. road	$500	$500	$500	$500	$500	$500	$500
7,200 cu.yd.mi. haul borrow	.30	.20	.42	.30	.20	.30	.40

PHOENIX, ARIZ.—STATE—SURFACING AND OILING—UTAH-NEVADA HIGHWAY

Contract awarded to General Construction Corp., 1026 McCadden Place, Los Angeles, who bid $85,744 to Arizona State Highway Commission, Phoenix, Arizona, for surfacing and oil processing of the Utah-Nevada Highway, F. A. P. 92, Schedules 1 and 3, work beginning at the Nevada State Line and extending north about 17 miles to the Utah State Line, and consisting of surfacing and oil processing by the road mix method. Bids on:

(1) 38,989 cu.yd. mineral aggregate, surf.
(2) 71,955 cu.yd. mi. haul min. agg.
(3) 177,672 sq.yd. prepare subgrade
(4) 310,926 gal. oil applied to road
(5) 16,825 mi. mix, lay, and finish
(6) 3,635 gal. oil for embankment slopes

	(1)	(2)	(3)	(4)	(5)	(6)	TOTALS
General Constr. Co., 1026 McCadden Place, Los Angeles (awarded)	.91	.15	.02	.09	$450	.10	$85,744
Pierson & Dickerson, Riverside	1.045	.205	.009	.08	$550	.08	91,511
Bruce Bros., Inc., Long Beach	1.00	.185	.025	.09	$600	.11	95,220
Hodgman & MacVicars, Pasadena	1.12	.20	.01	.09	$550	.10	97,435

CULVER CITY, CALIF.—CITY—SEPULVEDA BLVD.—ASPHALT

Contract awarded to Braun, Bryant & Austin, 8746 W. Washington Blvd., Los Angeles, who bid $382,055 to City of Culver City for improving Sepulveda Blvd., between Venice Blvd. and Centinela Ave. Bids received on the following items:

(1) 1,619,517 sq.ft. grading
(2) 8,369 lin.ft. cement curb
(3) 33,819 sq.ft. cement sidewalk
(4) 471,595 sq.ft. 2-in. Warrenite Bit. surface; 6-in. asph. conc. base
(5) 427,081 sq.ft. 2-in. Warrenite Bit. surface; 6-in. conc. base and 5-in. dec. gran. subbase
(6) 476 ft. 42-in. cem. conc. pipe
(7) 470 ft. 15-in cem. conc. pipe
(8) 292 ft. 18-in. cem. conc. pipe

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	TOTALS
Braun, Bryant & Austin	.0425	.27	.145	.30	.3225	9.70	2.20	2.70	$382,055
Hall-Johnston Co.	.04	.30	.14	.32	.333	10.00	2.30	2.80	391,602
Gibbons & Reed Co.	.04	.29	.15	.33	.345	10.25	2.50	3.00	402,007

OGDEN, UTAH—GOVERNMENT—OILING—WASHINGTON COUNTY

Ora Bundy, Ogden, Utah, $40,936 low bid to the Bureau of Public Roads, Ogden, Utah, for 3.6 miles oil surfacing on the East Rim Road, located within the Zion National Park, WASHINGTON COUNTY, Utah. Bids received on:

(1) 470 cu.yd. selected material shoulders
(2) 1,000 lin.ft. stone curb (in tunnel)
(3) 6,600 tons crushed rock or gravel
(4) 270 tons asphalt oil

	(1)	(2)	(3)	(4)	TOTALS
Ora Bundy, Ogden, Utah (low bidder)	2.80	1.25	4.75	26.00	$40.936
Reynolds-Ely Const. Co., Springville, Utah	3.00	2.00	6.15	25.00	50,750
Engineer's estimate	2.00	1.25	3.60	25.00	32,700

SAN FRANCISCO, CALIF.—GRADING—JOINT HIGHWAY DISTRICT 9—OCEAN SHORE BLVD.

Contract awarded to A. J. & J. L. Fairbanks, Ft. of Linden St., South San Francisco, $108,967 for grading 4.64 miles San Pedro Mountain (first unit) Ocean Shore Blvd. from Rockaway Beach to Faralone City for Joint Highway Dist. 9. Bids from:

(1) A. J. & J. L. Fairbanks $108,967
(2) Frank Bryant, San Francisco 129,672
(3) Granfield, Farrar & Carlin 135,898
(4) H. W. Rohl, Los Angeles $155,399
(5) P. L. Burr, San Francisco 150,710

	(1)	(2)	(3)	(4)	(5)
85.000 cu.yd. roadway excavation	.36	.52	.60	.70	.65
7,000 cu.yd. structure excavation	1.00	2.25	1.25	1.50	1.50
530 lin.ft. 12-in. corr. pipe	1.20	1.60	1.65	1.65	2.00
1,600 lin.ft. 18-in. corr. pipe	1.50	2.00	2.00	2.25	2.50
410 lin.ft. 24-in. conc. culvert	3.50	3.50	3.10	4.45	5.00
541 lin.ft. 36-in. conc. culvert	6.50	7.00	5.95	7.75	7.50
80 lin.ft. 48-in. conc. culvert	9.50	10.00	9.00	10.75	10.50
130 cu.yd. "A" concrete (bridge floor)	19.00	19.00	23.00	24.50	25.00
50 cu.yd. "A" concrete (bridge beam and girders)	22.00	20.00	23.00	27.00	25.00
35 cu.yd. "A" concrete (bridge foot)	18.00	18.00	23.00	26.00	25.00
250 cu.yd. "A" concrete (bridge walls, abutments and piers)	19.50	20.00	23.00	25.00	25.00
110 cu.yd. "A" concrete (tunnel portal)	23.00	22.00	23.00	33.00	25.00
405 cu.yd. "A" concrete (box culverts)	20.00	18.00	23.00	27.00	25.00
1,105 cu.yd. "A" concrete (ret. walls)	19.50	18.00	23.00	20.00	22.50
15 cu.yd. "B" concrete (bridge foot)	18.00	18.00	18.00	22.00	20.00
60 cu.yd. "E" concrete (bridge rail)	40.00	40.00	55.00	52.00	40.00
5,600 ft. timber guard rail	1.00	1.00	.85	1.25	1.50
4 "A" reinf. conc. drop inlets	35.00	40.00	35.00	45.00	30.00
20 cu.yd. "B" concrete (headwalls, etc.)	25.00	30.00	21.00	25.00	20.00
100 lin.ft. 24-in. concrete gutter	.80	.80	.40	1.10	.75
1,150 lin.ft. conc. curb and gutter	1.20	1.00	1.00	1.90	1.50
201,085 lb. reinforcing steel	.046	.045	.04	.05	.045
62 cu.yd. dry rubble masonry (ret. wall)	4.00	12.00	3.00	9.00	6.00
1,500 lin.ft. 6-in. open-joint drain tile	1.00	.60	.40	1.10	.50

Geo. A. Kneese, Court House, Redwood City, is Engineer of Joint Highway Dist. No. 9.

CONSTRUCTION NEWS SUMMARY

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

LARGE WESTERN PROJECTS

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

WORK CONTEMPLATED

Grading, concrete paving, cast iron mains, etc., on Manchester Ave. for County of Los Angeles; $517,950.

Pipe lines, reservoir and pumps for City of Anacortes, Wash.; $500,000.

Rock wall, redwood sewer and fill for Islais Creek Reclamation District, San Francisco; $1,520,000.

Assembly plant for Ford Motor Co. at Richmond; $2,500,000.

Paving streets in Miles City, Mont., involving 550,000 sq.yd. paving.

Widening W. 8th St. from Figueroa to Windsor Blvd. for City of Los Angeles, concrete and asphalt paving.

Filter plant, pumps, reservoir and mains for City of Grants Pass., Ore.; $400,000.

BIDS BEING RECEIVED

Steel superstructure for Lake Union Bridge in City of Seattle, for State of Washington, involving 7500 tons of steel; bids to June 24; $1,500,000.

Hospital for City of Palo Alto, Calif.; bids to June 2; $450,000.

Jr. High School for City of San Jose, Calif.; bids to June 3; $350,000.

Hotel at Eureka, Calif., for Pickwick Stage System; bids to June 2; $500,000.

Aptos Jr. High School for City of San Francisco; $600,000; bids to June 18.

Steel or concrete Bully Creek and Fairman Coulee siphons for Bureau of Reclamation, Vale, Ore.; bids to June 9.

CONTRACTS AWARDED

Fourth St. viaduct for City of Los Angeles, to Fisher, Ross, MacDonald & Kahn, Los Angeles; $1,246,535.

Pier 15 for State at San Francisco, to Healy-Tibbetts Const. Co., San Francisco; $323,240.

Railroad, 27 miles from Lebanon, Ore., to Sweet Home for Oregon Electric Railway Co., to Hauser Const., Portland, Ore.

STREET and ROAD WORK

WORK CONTEMPLATED

EMERYVILLE, CALIF.—Plans by City Engr., R. S. Hawley, Emeryville, Alameda County, and bids will be called for soon for improvement of Powell St., from Oakland city limits to Tide Lands, involving: 3960 lin.ft. conc. curb and gutter, 100,000 sq.ft. Willite asphalt paving, 100,000 sq.ft. grading; 12 invert. siphons. 5-13

LOS ANGELES, CALIF.—Plans by County Surveyor, protests May 26, for improvement of Manchester Ave., between Inglewood and Playa Del Rey, from Freeman Ave. to Pershing Drive, work involving the following approximate quantities: 178,437 cu.yd. excavation, 31,305 ft. 6x16x8½-in. Monolithic concrete curb and gutter, 29,987 ft. 6x15x8½-in. Monolithic cement concrete curb and gutter, 815,410 sq.ft. 9-7-in. conc. 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. vitrified pipe, 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 connect., 2462 ft. 1½-in. conduit. $517,950. 5-9

LOS ANGELES, CALIF.—Plans by City Engr., J. J. Jessup, for widening W. 8th St. from Figueroa St. to Windsor Blvd., involving 700,000 sq.ft. concrete paving, 82,000 tons asphalt, water, sewer and storm drain systems. 5-19

MARTINEZ, CALIF.—Plans by Engineer, E. A. Hoffman, Richmond. protests Mar. 19 by County for improving Lowell Ave., 36th St. in Richmond, paving with Durite asphalt concrete, vitr. sewers, etc. 5-13

OAKLAND, CALIF.—Plans by City Engr., protests May 22, for improving Plymouth St., 99th Ave. and Cherry St., involving 42,178 sq.ft. macadam paving, grading, curbs, vitr. pipe, corr. and concrete culv. 5-17

RICHMOND, CALIF.—Plans by E. A. Hoffman, City Engr., protests June 2, for improving Pennsylvania Ave., paving with 4½-in. asphalt, curbs, etc. 5-17

SAN DIEGO, CALIF.—Plans by City Engr., protests June 2 for improving La Jolla Mesa Drive, involving 375,000 sq.ft. 6-in. asphalt paving, 7605 ft. 8-in., 5242 ft. 6-in. and 756 ft. 4-in. cast iron pipe, 15 hydrants, 86 lighting standards, concrete and reinf. concrete sewers. 5-9

SAN DIEGO, CALIF.—Plans by City Engr., protests June 9, for improving 46th and Norwood Sts., involving 50,470 sq.ft. 6-in. asphalt paving, 477 ft. 4-in. and 934 ft. 6-in. cast iron pipe, etc. 5-17

BOISE, IDAHO—Plans by J. D. Wood, Commissioner of Public Works, State of Idaho, Boise, Idaho, for the following projects: F. A. Project No. 115-A, by grading, draining and surfacing about 8 miles of the Yellowstone Park Highway, between Ashton and Chester, FREMONT COUNTY. F. A. Project No. 36-C, by grading, draining and surfacing about 5 miles of the Yellowstone Park Highway, between Preston and the Utah State line, FRANKLIN COUNTY. F. A. Project No. 121-A, by grading, draining and surfacing about 10 miles of the Sawtooth Park Highway, between Shoshone and the BLAIN COUNTY line. F. A. Project No. 128-A, by grading, draining and surfacing about 6 miles of the Sawtooth Park Highway, between Timberman Hill and LINCOLN COUNTY line. 5-13

MILES CITY, MONT.—Plans by City Engr., J. W. Hall, bids soon for: Special Impr. Dist. No. 81, alley pavement, involving about 4539 sq.yd. paving. Special Impr. Dist. No. 82, alley pavement, involving about 2956 sq.yd. paving. Special Impr. Dist. No. 85, South Side St., 93,400 sq.yd. paving. Special Impr. Dist. No. 86, E. Main St., involving about 21,880 sq.yd. paving. Special Impr. Dist. No. 87, Bridge and 8th Sts., involving about 42,516 sq.yd. paving. Special Impr. Dist. No. 88, North Side, involving about 96,606 sq.yd. paving. Special Impr. Dist. No. 89, North Seventh St., involving the following approximate quantities: 288,877 sq.yd. paving, 121,000 cu.yd. excavation, 119,000 lin.ft. curb and gutter, 3.7 miles 8 and 12-in. sewer. 5-13

ELY, NEVADA—Plans by City Engr. for improving streets, paving with oil macadam. Bonds voted $35,000. 5-12

SALT LAKE CITY, UTAH—Plans by City Engr. for paving various streets on portions of Lake and 8th Sts., etc., $128,700.

SEATTLE, WASH.—Plans by Thos. Hunt, County Engr., for concrete paving 6 miles of 15th Ave. northeast. $125,000.

BIDS BEING RECEIVED

PHOENIX, ARIZ.—Bids to 2 p.m., May 26, by Arizona State Highway Commission for surfacing and oil processing with either plant or road mix method of 17 miles of Florence-Tucson Highway from Coolidge southerly. 5-7

PHOENIX, ARIZ.—Bids to 2 p.m., June 5, by U. S. Bureau of Public Roads, Phoenix, Ariz., for 6.1 miles grading Sect. H, Clifton-Springerville Highway, Apache National Forest, Arizona, involving 37,200 cu.yd. excavation, 7025 cu.yd. borrow, timber structures, etc. 5-15

FRESNO, CALIF.—Bids to 2 p.m., May 26, by Dist. Engr., California Division of Highways, PO Box 1353, Fresno, for: KERN COUNTY, between Grapevine and Delano, and between 7.7 miles and 2.7 miles west of Maricopa, about 69.1 miles in length, fuel oil to be furnished and applied to the shoulders and roadbed. FRESNO AND KING COUNTIES, between Coalinga and Hanford, about 45 miles in length, light fuel oil to be furnished and applied to the shoulders. MADERA, FRESNO, TULARE AND KING COUNTIES, various portions, about 102.6 miles in length, light fuel oil to be furnished and applied to the shoulders. 5-13

GLENDALE, CALIF.—Bids to 10 a.m., June 5, by City for improving 8th, Granview Ave., etc., involving 102,000 sq.ft. 4-in. Durite asphalt paving, vitr. sewers, water system, etc. 5-12

HOLLISTER, CALIF.—Bids to 2 p.m., June 2, by County for improving Paicines and New Idria Road. 5-9

RIVERSIDE, CALIF.—Bids to 11 a.m., May 26, by County for improving Ave. 50, Ave. 48, etc., involving 8500 cu.yd. grading, 876,675 sq.ft. gravel oil treated surfacing, corr. pipe, etc. 5-17

SACRAMENTO, CALIF.—Bids to 2 p.m., June 4, by California Division of Highways, Sacramento, for: NEVADA AND PLACER COUNTIES—10.8 miles from South Fork of Yuba River to Soda Springs, involving: 52,200 tons crusher run base, 29,000 tons untreated gravel or stone surfacing, 3416 M gallons watering. LASSEN COUNTY—22 miles from Susanville to 2 miles west of Milford, involving: 7600 cu.yd. screenings, 465 tons asphalt road oil. SHASTA AND LASSEN COUNTIES—17.9 miles from Fall River Mills to Big Valley, involving: 480 stations clearing and grubbing, 211,800 cu.yd. roadway excavation (Loc. A), 12,800 cu.yd. roadway excavation (Loc. B), 649,200 sta.yd. overhaul, 2500 cu,yd. structure excavation, 50,400 cu.yd. untreated gravel or stone surfacing, 1400 M gal. watering, 375 cu-yd. 'A' concrete (structures), 33,000 lb. reinforcing steel. BUTTE COUNTY 1.8 miles from Bardees Creek to Pulga, involving: 97 stations clearing and grubbing, 245,600 cu.yd. roadway excavation, 6200 cu.yd. structure excavation, 255 cu.yd. A concrete (struct.), 81,000 lb. reinforcing steel, 3210 cu.yd. rubble masonry (ret. walls). MARIN COUNTY—4.4 miles from San Rafael to Alto, surfacing wtih bituminized macadam, involving: 4000 cu.yd. roadway excavation, 100,000 sta.yd. overhaul, 28,900 tons crusher run base, 9450 tons broken stone (Bit. mac. surf.), 650 tons emulsified asphalt. 5-7

SACRAMENTO, CALIF.—Bids to 2 p.m., June 14, by California Division of Highways for: (1) SANTA CLARA COUNTY—4.9 miles from San Antonio Ave. to Sunnyvale, involving 7800 cu.yd. concrete paving, 1370 cu.yd. concrete structures, 13,700 tons asphalt concrete, 255,000 lb. reinf. steel, corr. pipe, etc.; (2) SANTA BARBARA AND SAN LUIS OBISPO COUNTIES—26.2 miles from third crossing of Cuyama River to east boundary, involving 96,700 cu.yd. roadway excavation, 46,800 tons crusher run base, 39,000 tons oil-treated gravel or stone surfacing, 60 M ft. b.m. redwood timber, etc.; and (3) LOS ANGELES COUNTY—1 mile from Citrus Ave. to Glendora, involving 6450 tons asphalt paving, etc. 5-14

SALINAS, CALIF.—Bids to 10 a.m., June 2, by County for 7 miles Pacific Grove-Carmel Road, involving 105,000 cu.yd. roadway excavation, 9050 cu.yd. decomposed granite surface, corr. pipe. 5-15

SAN FRANCISCO, CALIF.—Bids to 2 p.m., June 10, by Bureau of Public Roads for 3.3 miles Sect. C&D, Route 23, Quincy-Beckwith Nat. Forest, PLUMAS COUNTY, involving 41,200 cu.yd. excavation, 21,255 cu.yd. rock or gravel surfacing, conc. structures, etc. 5-19

SAN FRANCISCO, CALIF.—Bids to 2 p.m., May 28, by California Division of Highways, District Engineer, State Office Bdg., San Francisco, for: (1) 12.5 miles oiling from Cloverdale to Hopland, MENDOCINO COUNTY, work involving: 300 tons furnish and apply asphalt road oil (90-95); (2) 4 miles oiling from Beltone to Shellville, SONOMA COUNTY, work involving: 100 tons asphalt road oil (90-95). 5-16

SAN GABRIEL, CALIF.—Bids to 7:30 p.m., June 3, by County Clerk for improving Mission Drive, involving 147,000 sq.ft. 4-in. asph. base with 2-in. Warrenite Bit. surface, lighting systems, etc. 5-17

SAN LUIS OBISPO, CALIF.—Bids to 10 a.m., May 28, by District Engineer, L. N. Gibson, District V, Division of Highways, Bank of Italy Bdg., San Luis Obispo, for 5.9 miles seal coat to be applied to existing bituminous macadam surfacing in SAN LUIS OBISPO COUNTY, between Estrella River and Sacramento Ranch. 5-13

SAN RAFAEL, CALIF.—Bids to 11 a.m., June 10, by County for surfacing Lower Novato Black Point Road, etc., involving 230,000 sq.ft. emulsified asphalt and screenings. 5-14

SANTA BARBARA, CALIF.—Bids to 10 a.m., June 2, by County for Bitumuls Armorcoat surfacing over existing oil macadam pavement on the Guadalupe-Santa Maria Road between Upper Betteravia Road and a point 5280 ft. easterly. 5-9

HELENA, MONT.—Bids to 9:30 a.m., May 28, by State Highway Comm. for (1) 15 miles Pablo-Rollins Road, LAKE COUNTY, involving 65,250 cu.yd. rock excavation, 156,000 cu.yd. special excavation, corr. pipe, etc.; (2) 8 miles Sect. A, Reed Point-Columbia Road, STILLWATER COUNTY, involving 150,720 cu.yd. special excavation, 18,000 cu.yd. rock excavation, etc.; (3) 15 miles Bearmouth-Deer Lodge Road, POWELL COUNTY, involving 195,000 cu.yd. special excavation, 77,500 cu.yd. rock excavation, etc.; and (4) Oiling 2 miles of Yellowstone Trail, PARK COUNTY; and Livingston-Bozeman Road, PARK COUNTY.

CARSON CITY, NEV.—Bids to 2 p.m., May 28, by State for 52 miles surfacing in WHITE PINE COUNTY from McGill to north county line, involving 966,645 gal. asphaltic fuel oil applied to roadway surface.

OGDEN, UTAH—Bids to 10 a.m., June 2, by Bureau of Public Roads for (1) 10 miles Ketchum-Clayton Road, Sawtooth National Forest, involving 67,000 cu.yd. excavation, concrete structures, etc.; and (2) 2.5 miles Salina-Emery Road, UTAH FISHLAKE NATIONAL FOREST, involving 51,000 cu.yd. excavation, etc.

OLYMPIA, WASH.—Bids to 10 a.m., June 10, by State Highway Comm. for 53 miles rock surfacing and oil treating Sunset Highway from North Bend to Cle Elum. 5-19

52.31 mi. mix oil with cr. rock or gravel, 52.31 mi. rebuild and finish shoulders. 5-14

OLYMPIA, WASH.—Bids to 2 p.m., June 2, by County for 3 miles St. Clair-Yelm Road, involving 35,000 cu.yd. excavation, 5040 cu.yd. rock surfacing, etc.

OLYMPIA, WASH.—Bids to 2 p.m., June 2, by Washington State Highway Comm. for: WHITMAN COUNTY—Surfacing 13.8 miles of the Inland Empire Highway from Colton to Pullman, involving 69,000 cu.yd. crushed stone surfacing. WHITMAN COUNTY—28.3 miles of bituminous treated roadway surfacing as follows: 12.6 miles from North Pine to Thornton and 15.7 miles from Pullman to Colfax. OKANOGAN COUNTY—Grading ½ mile the Methow River Bridge approaches, involving 10,250 cu.yd. excavation. OKANOGAN COUNTY—Surfacing ½ mile the Methow River Bridge approaches and surfacing of 11.6 miles of highway from Junction State Road 10 to Carlton, 7700 cu.yd. crushed stone. PACIFIC COUNTY—10 miles of bituminous treated roadway surfacing on State Road No. 12 from Astoria Ferry to Illwaco. 5-12

BIDS RECEIVED

WINSLOW, ARIZ.—Southern California Roads Co., L. A., $171,000, low for asphalt paving various streets for City. 5-12

REDDING, CALIF.—Jack Casson, Hayward, $12,594, low bid to State for 52 miles oiling LASSEN and SIERRA COUNTIES from Milford to State Line. 5-13

SACRAMENTO, CALIF.—Low bids as follows by State: (1) SAN JOAQUIN COUNTY—D. McDonald, P.O. Box 170, Sacramento, $22,147, low for 0.7 mile grading and surface from Lodi to west of Mokelumne River; (2) HUMBOLDT COUNTY—J. V. Galbraith, P.O. Box B2, Petaluma, $148,707, low for 4.3 miles grading and concrete paving at Scotia and from Fortuna to Loleta; (3) DEL NORTE COUNTY—Smith Bros. Co., Eureka, $32,650, low for 15 miles gravel or stone surfacing from Smith River to Patricks Creek; and (4) COLUSA and GLENN COUNTIES—Lilly, Willard & Biasotti, 40 W. Clay St., Stockton, $6421, low for draining ditch at Hunters Creek. 5-8

SACRAMENTO, CALIF.—C. G. Willis & Sons, 2119 E. 25th St., L. A., $15,091, low for 0.7 miles grading at Mojave River, SAN BERNARDINO COUNTY, for California Division of Highways. 5-15

DENVER, COLO.—Low bids as follows by State: (1) Bedford & Woodman, Greeley, Colo., $50,000, low for 10 miles grading and bridge from Ovid to Julesburg, SEDGWICK COUNTY; and (2) H. C. Lallier Const. Co., Denver, Colo., $114,590, low for 3 miles grading, surfacing and bridge from Twin Bridges to South Fork, MINERAL COUNTY.

OGDEN, UTAH—Ora Bundy, Ogden, Utah, $40,936, low bid to Bureau of Public Roads for 3.6 miles oil surfacing on East Rim Road, Zion National Park, WASHINGTON COUNTY. (See Unit Bid Summary.) 5-12

OLYMPIA, WASH.—Low bids as follows by State: (1) Homer G. Johnson, Easton, Wash., $86,500 low for 10.1 miles stone surfacing from Salmon Creek to Raymond, GRAYS HARBOR AND PACIFIC COUNTIES.

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Packard & Tanner, 905 W. Latham St., Phoenix, Ariz., $142,782 for 15.5 miles grading, surfacing, and constructing bridge on Florence-Tucson Highway from Rillito southeast toward Tucson for Arizona State Highway Comm. (See Unit Bid Summary). 5-5

PHOENIX, ARIZ.—Awards as follows by State: (1) To Skeels & Graham Co., 709 Cons. Bank Bdg., Tucson, Arizona, who bid $134,124 for surfacing and oil processing State Highway Contract, Douglas-Rodeo Highway, F.A.P. 38 Reo. Work begins at Bernardino and extends northeast about 26.5 miles to the Arizona-New Mexico State Line. (2) To Skeels & Graham Co., Roseville, Calif., and 709 Cons. Bank Bdg., Tucson, Arizona, who bid $55,287 for road mix surfacing and oiling of 9 miles of Douglas-Rodeo Highway from 12.5 miles northeast of Douglas toward Rodeo. (3) To N. G. Hill & Co., 1344 E. McKinley St., Phoenix, who bid $41,802 for surfacing and oil processing of State Highway Contract, F.A.P. 7, Reo., work beginning about 6½ miles southeast of Apache Junction, extending 6 miles toward Florence Junction. (See Unit Bid Summary May 10th issue.) 5-7

PHOENIX, ARIZ.—To General Const. Corp., 1026 N. McCadden Place, L. A., $85,744 for surfacing and oil processing Utah-Nevada Highway from Nevada State Line toward Utah State Line for State. (See Unit Bid Summary.) 5-19

TUCSON, ARIZ.—To White & Miller, Tucson, Ariz., $69,618 for asphalt paving E. 7th St., etc., for City.

FAIRFIELD, CALIF.—To U. B. Lee, 888 Rodney Drive, San Leandro, $6825 for the oil surfacing from near Toll Gate Entrance to the Carquinez Bridge about ¾ mile north, work for Joint Highway District No. 5. 5-12

HILLSBOROUGH, CALIF.—To Union Paving Co., Call Bdg., S. F., $7983 for improving Ranelagh Road, etc., for City, paving with asphalt, etc. 5-8

HOLLISTER, CALIF.—To Granite Const. Co., Watsonville, $67,935 for concrete paving South St., East St., etc., for City. (See Unit Bid Summary.) 5-15

LOS ANGELES, CALIF.—To Griffith Co., Los Angeles Railway Bdg., Los Angeles, $121,245 for improvement of streets in Hilldale and 218th St. Improvement District, for City, grading, paving with 6-in. concrete, sanitary sewers, water system. 5-12

MARTINEZ, CALIF.—To Peres & Gatto, 475 10th St., Richmond, for macadam paving, vitr. pipe, corr. culverts, etc., in Berkeley Park Dist. for County. 5-19

NEWPORT BEACH, CALIF.—To Newport Beach Boat Builders, Inc., Newport Beach, $37,890 for improving Channel Place, etc., involving grading, constructing of bridge, etc., for city. 5-7

REDWOOD CITY, CALIF.—To Irving L. Ryder, San Carlos and Dupont Sts., San Jose, $151,625 for improving streets in Menalto Park for County, grading, paving with 4-in. rock macadam base, 3-in. asphalt surface, vitrified and concrete sewers, etc. 5-12

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: (1) To Fredrickson & Watson, 354 Hobart St., Oakland, and Fredrickson Bros., First National Bank Bdg., Stockton, who bid $58,269 for 8.3 miles grading from Wilfiams to Maxwell, COLUSA COUNTY. (2) To Matich Bros., Elsinore, $38,118 for 0.9 mile grading and concrete paving from San Onofre to San Clemente, SAN DIEGO COUNTY. (See Unit Bid Summary May 10th issue.) 5-7

SACRAMENTO, CALIF.—To Skeels & Graham, Roseville, who bid $3264 to California Division of Highways for 8.6 miles light fuel oil to be furnished and applied as a dust layer in ALPINE COUNTY, between Hangman's Bridge, about two miles southeast of Markleeville, and Woodfords. 5-15

SALINAS, CALIF.—Awards as follows by County: (1) To Granite Construction Co., Watsonville, $54,541 for asphalt macadam surfacing of King City-Jolon, San Lucas-Lockwood, Lonoak, Bitterwater, and King City-Metz Roads; and (2) To Granite Construction Co., Watsonville, who bid $11,645 for asphalt macadam surfacing of Carmel Valley Road. (See Unit Bid Summary.) 5-15

SAN BERNARDINO, CALIF.—To Gilmore Oil Co., 2423 E. 28th St., Los Angeles, who bid $7670 to Division of Highways, District Engineer, San Bernardino, for 8.5 miles oiling between Indio and Oasis, RIVERSIDE COUNTY. 5-6

SAN DIEGO, CALIF.—To Griffith Co., 2104 Main St., San Diego, who bid $31,515 to City of San Diego for improvement of Tennyson and Sterne Sts., work consisting in the main of excavation, paving with 6-in. concrete, construction of cast-iron water main, fire hydrants, concrete sewer laterals. 5-15

SAN FRANCISCO, CALIF.—Awards of contract recommended as follows by Bureau of Public Roads: (1) To Christie & Allen, Crocker Bdg., S. F., $55,044 for 7.7 miles grading Sect. E. Route 1, Loop Route, LASSEN VOLCANIC NATIONAL PARK; and (2) To Tieslau Bros., 1315 Allston Way, Berkeley, $53,279 for surfacing on Loop Route, LASSEN VOLCANIC NATIONAL PARK. (See Unit Bid Summary.) 5-15

SAN FRANCISCO, CALIF.—Awards as follows by City: (1) To Fay Improvement Co., Phelan Bdg., San Francisco, who bid $17,993 for Utah St., from 18th to 19th Sts., and 19th St., from Utah to San Bruno, by grading, concrete work, vitrified sewers, paving with concrete, etc.; (2) To Louis Johnson, 109 Davis St., San Francisco, who bid $5140 for improvement of Phelps St., from Jerrold Ave. to Evans Ave., by filling. 5-16

SAN JOSE, CALIF.—Awards as follows by County: (1) To San Jose Paving Co., San Carlos and Dupont Sts., San Jose, $16,355 for improving Union Ave.; (2) To A. J. Raisch, Burrell Bdg., San Jose, $4850 for improving Cottle Road; and (3) To Granite Const. Co., Watsonville, $7848 for improving Silver Creek. 5-6

SAN LUIS OBISPO, CALIF.—To I. L. Ryder, San Carlos and Dupont Sts., San Jose, who bid $16,064 to City for improvement of Santa Rosa and Stenner, paving with concrete, corrugated culverts, etc. 5-5

COLORADO SPRINGS, COLO.—To New Mexico Const. Co.. Denver, Colo., $61,850 for improving streets in Paving Dist. 1 for City.

BOISE, IDAHO—Awards as follows by State: (1) To Cook & Coburn, Spokane, Wash., $11,724 for 17 miles rock surfacing in Fourth of July Canyon, KOOTENAI COUNTY; (2) To Quinn-Robbins Co., Boise, Ida., $6540 for gravel surfacing from Greenleaf to Homedale, CANYON COUNTY; (3) To F. R. Hewitt, Spokane, Wash., $14,625 for 7 miles resurfacing from St. Maries to Mission Point, BENEWAH COUNTY; (4) To Wm. Hoops, Twin Falls, Ida., $47,291 for 58 miles bituminous treatment from Blackfoot to Arco, BINGHAM AND BUTTE COUNTIES; (5) To Morrison-Knudsen Co., Boise, Ida., $31,419 for 33 miles bituminous treatment from Weiser to Cambridge, WASHINGTON COUNTY; (6) To Idaho Contracting Co., Boise, Ida., $48,330 for 20 miles stone surfacing from Thorn Creek to Viola, LATAH COUNTY; and (7) To Joslin & McAllister, Spokane, Wash., $43,250 for 18 miles rock surfacing from Kennedy Ford to Washington State Line, LATAH COUNTY.

BOISE, IDAHO—Awards as follows by State: (1) To Western Const. Co., Bozeman, Mont., $46,357 for 10 miles surfacing South Yellowstone Highway from Newdale to Teton River; and (2) To Hargraves Const. Co., Spokane, Wash., $32,359 for 35 miles bituminous treatment from Lapwai to Culdesac, etc., in NEZ PERCE and LATAH COUNTIES.

CARSON CITY, NEV.—To Wheelwright Const. Co., Ogden, Utah, $92,659 for 47 miles grading and surfacing from Robinson Summit to Keystone and from Nagnusons to county line, WHITE PINE COUNTY, for State. (See Unit Bid Summary.) 5-16

RENO, NEV.—To I. Christensen, Reno, $15,415 for curbs, gutters, and sidewalks on various streets for City. 5-15

PORTLAND, ORE.—Award recommended to F. H. Slate, Lebanon, Ore., $23,840 for grading 1 mile, Alsea River Sect., Siuslaw National Forest, OREGON, for Bureau of Public Roads; (3) To Wheeler & England, Moreland, Ida., $108,349 for fill across Couer d'Alene River Flats, near Harrison. 5-19

THE DALLES, ORE.—To Lair & Co., Kelso, Wash., $21,777 for grading East Canyon Market Road for County.

TOLEDO, ORE.—To Yuncker-Weicks Co., Toledo, Ore., $17,842 for grading Farm-Nashville Sect. of Rock Creek Road for County.

OLYMPIA, WASH.—Awards as follows by State: (1) To N. E. Nelson, Tonasket, Wash., $38,020 for surfacing with stone 8 miles from Columbia River north, FERRY COUNTY; (2) To Stone & McDonald, Tacoma, Wash., $69,425 for surfacing with stone from Kalalock Creek to Cedar Creek, JEFFERSON COUNTY; (3) To Standard Asphalt Paving Co., Spokane, $78,144 for 37 miles bituminous treated surface near Port Townsend and Agnew, CLALLAM AND JEFFERSON COUNTIES; and (4) To Grays Harbor Const. Co., Hoquiam, Wash., $61,200 for surfacing with stone from Arctic to Salmon Creek, GRAYS HARBOR COUNTY.

BRIDGES and CULVERTS

WORK CONTEMPLATED

SACRAMENTO, CALIF.—Plans by County Engineer, C. W. Deterding, Jr., and bids will be called at once for 1000 ft. bridge, including 183 ft. steel span, balance redwood or creosoted construction over Snodgrass Slough. $60,000. 5-12

SAN CARLOS, CALIF.—Bond election June 3 by City to vote $14,000 for constructing culverts. 5-17

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to June 11 by City for Sixth St. undercrossing at Santa Fe and 6th St., involving 7000 cu.yd. concrete, 700 reinf. conc. piles, etc. 5-17

LOS ANGELES, CALIF.—Bids to 10 a.m., June 4, by City for 240-ft. timber and steel Sunnybrook footbridge. 5-16

SACRAMENTO, CALIF.—Bids to 2 p.m., June 4, by California Division of Highways for timber bridge over Salt Creek, 15 miles west of Redding, Shasta County, involving 170 cu.yd. concrete, 17,750 lb. structural metal, 16,500 lb. reinf. steel, and 63 M ft. BM redwood lumber. 5-7

SACRAMENTO, CALIF.—Bids to 2 p.m., June 11, by California Division of Highways for: (1) Overhead crossing over S.P. near Yuba Pass, NEVADA COUNTY, involving 1025 cu.yd. concrete, 57,000 lb. reinf. steel, 270,000 lb. structural steel, 105 M ft. b.m. redwood timber, etc.; (2) Timber bridge over Cosumnes River, near El Dorado, AMADOR AND EL DORADO COUNTIES, involving 250 cu.yd. concrete, 14,000 lb. structural steel, 129 M ft. b.m. douglas fir timber, etc.; and (3) Concrete bridge over Yuba River near Indian Springs, NEVADA COUNTY, involving 425 cu.yd. concrete, 55,000 lb. reinf. steel, etc. 5-14

SALINAS, CALIF.—Bids to 10 a.m., June 2, by County for: (1) Construction of bridge over the Salinas River at Gonzales, involving 200 cu.yd. structure excavation, 8420 ft. reinforced concrete piles, 1270 cu.yd. 'A' concrete, 166,000 lb. reinforcing steel, 1,132,000 lb. structural steel (lump sum bid); and (2) Construction of two reinforced concrete bridges on Pacific Grove-Carmel Road, involving 547 cu.yd. 'A' concrete, 74,585 lb. reinforcing steel. 5-15

SANTA BARBARA, CALIF.—Bids to 10 a.m., June 2, by County for steel highway bridge with wooden floor and rails, concrete footings and abutments, including painting or painting and galvanizing, over San Roque Creek, on the Goleta Foothill Blvd. 5-9

PORTLAND, ORE.—Bids to May 27 by Bureau of Public Roads for 80 ft. bridge over Klickitat Creek, PIERCE COUNTY, involving 2800 cu.yd. approach and 540 cu.yd. structure excavation, 115 cu.yd. concrete and 540 cu.yd. cement rubble masonry. 5-5

PORT ARTHUR, TEX.—Bids to 12 m., May 29, by City for pleasure pier bridge, involving: SUBSTRUCTURE—5600 cu.yd. excavation, 2800 cu.yd. fill in approaches, 20,000 lin.ft. foundation piles, 4600 lin.ft. protection piles, 170 ft. pile and timber fenders, 3500 cu.yd. concrete, 40,000 lb. reinforcing bars, 80,000 lb. substructure steel to be erected; SUPERSTRUCTURE—80,000 lb. substructure steel (furnish), 800,000 lb. superstructure steel, 66,000 lb. machinery, 28,000 lb. special steel castings, 34,000 bd.ft. treated timber and lumber, 510 sq.yd. asphalt plank roadway floor, 70 cu.yd. concrete floor and sidewalks, 220 cu.yd. concrete above elevation +4.27 in. (piers and houses), 15,000 lb. reinforcing steel, 640 lin.ft. steel hand railing, 2 operators' houses, entire electrical equipment. 5-13

OLYMPIA, WASH.—Bids to 2 p.m., June 3, by State Highway Department, Olympia, Washington, for construction of bridge over the Queets River at Harlow Crossing in JEFFERSON COUNTY, consisting of two 260-ft. steel through spans on concrete piers, and 124 ft. of timber approaches; 17-ft. roadway with timber deck throughout. 5-13

OLYMPIA, WASH.—Bids to 10 a.m., June 17, by Washington State Highway Commission, Olympia, Washington, for construction of steel superstructure for Aurora Street Bridge in the City of Seattle. Work involves: 7500 tons of structural steel. 5-8

OLYMPIA, WASH.—Bids to 10 a.m., June 24, by State Highway Comm. for superstructure for Lake Union Bridge at Aurora St., Seattle, involving: 6,900,000 lb. carbon structural steel, 8,100,000 lb. silicon structural steel, 480,000 lb. castings, 3800 cu.yd. concrete, 1,000,000 lb. reinforcing steel, 422 lin.ft. metal railing. 5-16

BIDS RECEIVED

TUCSON, ARIZ.—Lee Moor Contracting Co., El Paso, Tex., $63,900, low for reinf. conc. Sixth Ave. subway for City. 5-14

LOS ANGELES, CALIF.—E. G. Perham, 1128 Stearns Drive, Los Angeles, who bid $22,560, submitted low bid to County for constructing a wooden truss bridge over San Gabriel River on Washington St. 5-14

OLYMPIA, WASH.—MacRae Bros., 614 5th Ave., Seattle, $83,075, low bid to State for reinf. conc. bridge over Yakima River at Prosser.

SEATTLE, WASH.—J. Paduano & Co., 7301 Dibble Ave., Seattle, $24,614, low for steel towers for crossing of Duwamish Waterway at W. Michigan St. for City. 5-19

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Wm. Piper, 617 Heard Bdg., Phoenix, $20,900 to Arizona State Highway Commission, for rein. concrete bridge at Continental 122 ft. long. 5-5

EUREKA, CALIF.—To Henry Padgett, Eureka, $7200 for trestle bridge over Old River near Clausens for County. 5-8

LOS ANGELES, CALIF.—To Fisher, Ross, MacDonald & Kahn, Inc., Room 1204 Spring Arcade Bdg., Los Angeles, who bid $1,246,635 to the Board of Public Works for the Fourth St. Viaduct over the Los Angeles River, to be reinf. concrete, 2400 ft. long. 5-5

OAKLAND, CALIF.—To Healy-Tibbetts Construction Co., 64 Pine St., San Francisco, who bid $38,725 to County for repairs to Bay Farm Island bridge. 5-6

SACRAMENTO, CALIF.—Awards as follows by County: (1) To Thos. B. Hunt, 1514 30th St., Sacramento, $6940 for reinf. conc. bridge at 9th St. over Arcade Creek; (2) To Thos. B. Hunt, 1514 30th St., Sacramento, $3381 for reinf. concrete culverts on Fulton Ave. 5-19

SACRAMENTO, CALIF.—To Dean Const. Co., 2091 California St., Berkeley, who bid $24,246 to California Division of Highways for a timber bridge over Alder Creek, 29 miles north of San Simeon, MONTEREY COUNTY. 5-6

SANTA ROSA, CALIF.—To W. L. Proctor, Santa Rosa, $2495 for bridge over Hobson Creek at Hacienda, timber and concrete, for County. 5-6

STOCKTON, CALIF.—To Carl Nelson, 1421 A, Marysville, $8844 to County for reinforced concrete bridge over Tule River, Bridge No. 57, for County. 5-6

VISALIA, CALIF.—To E. M. Noble, Route E. Channel St., Stockton, who bid $6340 for pile trestle bridges across Boulton Road, across drainage canal on Atherton Road, and on Newell Road. 5-6

BOISE, IDAHO—To Portland Bridge Co., Yeon Bdg., Portland, $49,927 for steel and timber bridge over Coeur d'Alene River near Harrison, KOOTENAI COUNTY, for State. 5-19

SEWER CONSTRUCTION

WORK CONTEMPLATED

GUSTINE, CALIF.—Plans by Engineer, A. E. Cowell, 21 Maryland Ave., Berkeley, bids soon by City for 6100 ft. 24-in. vitr. or concrete outfall, $20,000. 5-17

LONG BEACH, CALIF.—Plans by City Engr., protests May 27, for reinf. concrete storm drains, etc., retaining walls, pumping stations, vitrified sewers in 20th St., San Francisco Ave., Golden Ave., and other streets. 5-10

LOS ANGELES, CALIF.—Plans by City Engr., J. J. Jessup, City Hall, Los Angeles, protests May 27, for Jefferson Street Storm Drain System Section 3, by cement pipe house connections, reinforced concrete pipe storm drain, cement pipe storm drain. Work involves 5156 ft. 12-in., 3920 ft. 15-in., 3003 ft. 18-in., and 4250 ft. 21-in. cement pipe, 4139 ft. 24-in. medium, 305 ft. 24-in. heavy, 1395 ft. 27-in. medium, 1160 ft. 27-in. heavy, 1575 ft. 30-in. medium, 759 ft. 33-in. medium, 499 ft. 36-in. light, 395 ft. 36-in. medium, 536 ft. 39-in. medium, 186 ft. 42-in. medium, 326 ft. 42-in. heavy, 770 ft. 45-in. light, 775 ft. 48-in. light, 86 ft. 48-in. heavy, 1091 ft. 54-in. medium, 2327 ft. 57-in. medium, 324 ft. 57-in. heavy, 2486 ft. 60-in. medium, 46 ft. 60-in. heavy, 1515 ft.

63-in. medium, 1138 ft. 63-in. heavy, 740 ft. 66-in. heavy, and 396 ft. 69-in. medium rein. conc. pipe, 22 ft. 60-in. and 7 ft. 63-in. mon. conc. dr., 438 ft. 76 by 79-in. conc. box section, 32 ft. 8-in. and 12 ft. 10-in. cast-iron pipe. 1911 Act. $300,000. 5-10

MARTINEZ, CALIF.—Plans by Engr., R. L. Calfee, 322 Arlington Ave., Berkeley, for the construction of an outfall sewer in the Stege Sanitary District, work for the Board of Supervisors of Contra Costa County. Bids will be called for in about one month. Project involves the following approximate quantities: 3000 lin.ft. 30-in. and 4000 lin.ft. 36-in. vitrified sewer, 2000 lin.ft. 48-in. monolithic concrete sewer. 1925 Act. 5-13

REDWOOD CITY, CALIF.—Plans by Geo. A. Kneese, County Surveyor, protests June 2, for sewers in North Fairoaks Sanitary Dist., involving 140,000 ft. 6-in. to 10-in. vitr. pipe, 27,000 ft. 15-in. to 30-in. concrete pipe, etc. 1911-15 Acts. 5-10

BIDS RECEIVED

LOS ANGELES, CALIF.—Low bids as follows by City for portions of North Outfall Sewer: (1) SECTION 34A—P. J. Akmadzich, 121 N. Gower St., L. A., $233,252, low, using pre-cast reinf. conc. pipe, and Kemper & Cox, 1100 Westminster St., Alhambra, $188,386, low, using semi-elliptical conc. pipe; and (2) SECTION 34B—Vuksich & Vukoja, $197,201, low, using pre-cast reinf. conc. pipe; and Kemper & Cox, Alhambra, $172,031, low, using semi-elliptical concrete pipe. 5-16

LOS ANGELES, CALIF.—R. A. Wattson, 1026 N. McCadden Place, L. A., low for Main St. trunk sewer for Co. Sanitation Dist. 8; $97,209 using vitr. and heavy reinf. conc. pipe and $95,354 using concrete and heavy reinf. concrete pipe. 5-16

CONTRACTS AWARDED

FAIRFIELD, CALIF.—To M. J. Bevanda, Savings & Loan Bank Bdg., Stockton, $141,460 for sewer system north and south of Vallejo for County, vitr. sewers, cast-iron pressure mains, pipe trestle, pumping plant, etc. (See Unit Bid Summary.) 5-7

LIVERMORE, CALIF.—To J. Pestana, 1232 35th Ave., Oakland, $1022 for sewer extension on North I St. for City. 5-14

LOS ANGELES, CALIF.—To Gadza & Gogo, 3236 Garden Ave., L. A., $97,138 for McKinley Ave. and 87th St. sewer for City. 5-19

LOS ANGELES, CALIF.—To Gogo & Rados, 914 Sunset Blvd., L. A., $36,447 for 216th St. sewer for Co. Sanitary Dist. 8, using 12-in. cast iron and 36-in. reinf. conc. pipe. 5-16

LOS ANGELES, CALIF.—To Herbert M. Baruch, 742 S. Hill St., Los Angeles, who bid $242,058 to Board of County Supervisors, Los Angeles, for reinforced concrete Drainage District 29, near Sherman. 5-14

SAN FRANCISCO, CALIF.—To MacDonald & Kahn, Financial Center Bdg., San Francisco, who bid $75,976 to the Board of Public Works, City Hall, San Francisco, for the construction of Section C of the Fillmore Street Sewer from Fell St. to Van Ness Ave., and from Laguna St. to Grove St., work consisting of reinforced concrete construction. (See Unit Bid Summary.) 5-14

SAN MARINO, CALIF.—To Kristovich & Wold, 1919 Wedgewood St., Temple City, $33,990 for vitr. sewer in La Mirada Ave., etc., for City. 5-16

SAN MATEO, CALIF.—To Oakland Sewer Const. Co., 1003 85th Ave., Oakland, $54,715 for vitrified sewers and pumping plant in southeastern portions of City. (See Unit Bid Summary.) 5-6

IRRIGATION and RECLAMATION

BIDS BEING RECEIVED

TERRA BELLA, CALIF.—Bids to 10:30 a.m., May 31, by Secy. of Terra Bella Irrigation District for: Section 1—Furnish, deliver, and lay in trench riveted or welded steel pipe: 5280 ft. 8-in., 14-gauge, 2640 ft. 7-in., 14-gauge, and 2640 ft. 6-in., 14-gauge, pipe; Section 2—Trenching and backfilling for above pipe; Section 3—Complete work, involving furnishing, installing, and trenching. 5-13

VALE, ORE.—Bids to 10 a.m., June 9, by Bureau of Reclamation, Vale, Ore., for reinf. concrete or steel Bully Creek and Fairman Coulee siphons: (1) PLATE STEEL SIPHONS, involving 41,900 cu.yd. excavation, 24,000 cu.yd. embankment, 2215 cu.yd. concrete, 170,000 lb. reinf. steel and 7139 ft. 101-in. diameter riveted plate steel pipe to weigh 4,053,000 lbs.; and (2) PRECAST CONCRETE SIPHONS (Alternative), involving 62,660 cu.yd. excavation, 24,000 cu.yd. embankment, 31,000 cu.yd. backfill, 818 cu.yd. concrete and 7246 ft. 96-in. precast conc. pressure pipe with steel cylinder. 5-19

BRIGHAM CITY, UTAH—Bids to 2 p.m., June 20, by U. S. Department of Agriculture, Washington, D. C., for constructing certain overflow control works, dikes, canals, roadways, and structures appurtenant to Bear River Migratory Bird Refuge, in Box Elder County, Utah. Work involves 400 cu.yd. excavation for overflow control structures, 550 cu.yd. excavation for spillways through dikes, 500 ft. timber bearing piles (round timbers), 50 cu.yd. gravel for mat under concrete, 240 cu.yd. reinforced concrete, 22,000 lb. reinforcing steel, 6 steel radial gates 3.5 ft. high by 16 ft. long, 6 radial gate hoists, 50 cu.yd. extra backfill around conc. struc., 100 ft. painting bridge rails and posts, 6 paint radial gates and hoists, 13,500 ft. b.m. Type A, 18,000 ft. b.m. Type B, and 34,500 ft. b.m. Type C sheet piling, 88,000 ft. b.m. lumber No. 1 common (dimension), 67,000 ft. b.m. lumber No. 1 common (timbers), 8000 ft. b.m. lumber No. 1 common, 451,000 cu.yd. embankment (about 14 miles), 1000 cu.yd. muck ditch, 68,500 cu.yd. canal and later. excav. (6 miles), 14,000 cu.yd. roadway embankment, 1800 cu.yd. cinders (surf. mat. for roadway), 400 cu.yd. cinders (surfacing material), 1400 cu.yd. gravel (surfacing material). 5-14

CONTRACTS AWARDED

DENVER, COLO.—To Joshua Hendy Iron Works, 200 Pine St., San Francisco, who bid $98,423 to Bureau of Reclamation, Denver, Colorado, for furnishing high-pressure gates with hydraulic hoists, conduit lining, conduit lining-transitions, circular conduit linings, elbows, and bolts, for the sluice, irrigation, and power outlets at Owyhee dam, Owyhee project, Oregon. 5-13

RIVER and HARBOR WORK

WORK CONTEMPLATED

SAN FRANCISCO, CALIF.—Plans by Engr., M. H. Levy, Islais Creek Reclamation District, Room 375, City Hall, San Francisco, and bids will be called for soon, for the first unit of the Reclamation Project: (1) First Unit—Heavy rock wall, to be 2090 ft. in length and involving 480,000 tons of rock, 380,000 cu.yd. dredging, $493,867; (2) Second Unit—Redwood box sewer, to be 3500 ft. in length and 8 by 14-ft. diameter, $160,000; and (3) Third Unit—Fill, to cost $860,000. 5-6

BIDS BEING RECEIVED

HUNTINGTON BEACH, CALIF.—Bids to 7:30 p.m., June 23, by City for (1) Gunite repairs for 1400 ft. present pier, to be 25 ft. wide, $60,000; (2) 500-ft. extension to present concrete pier, to be 25 ft. wide, using centrifugally spun concrete piling, and concrete girders and beam for deck. Replacing of ornamental lighting system on old pier, $62,000. 5-19

SACRAMENTO, CALIF.—Bids to 3 p.m., May 28, by U. S. Engineer Office, California Fruit Bdg., Sacramento, for furnishing, delivering, and placing 3000 tons of riprap stone along the Sacramento River, in the vicinity of the Rio Vista bridge. 5-19

BIDS RECEIVED

SAN FRANCISCO, CALIF.—American Dredging Co., 255 California St., S. F., who bid .1819 per cu.yd., low bid to U. S. Engineer's Office, S. F., for 871,780 cu.yd. dredging in Oakland Harbor. Other bids:

United Dredging Co.	.2367 yd.
Hydraulic Dredging Co.	.25 yd.
San Francisco Bridge Co.	.26 yd.
Ben J. Walters, S. F.	.265 yd.
Engineer's estimate	.2398 yd.

5-8

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To Healy-Tibbetts Const. Co., 64 Pine St., San Francisco, who bid $323,240 to Board of State Harbor Commissioners, Ferry Bdg., San Francisco, for construction of Pier No. 15. 5-14

LIGHTING SYSTEMS

WORK CONTEMPLATED

GUSTINE, CALIF.—Plans by A. E. Cowell, Engr., 21 Maryland Ave., Berkeley, bids soon by City for street lighting system to cost $5000.

OAKLAND, CALIF.—Plans by City Engr., protests May 29, for ornamental electric street lighting system, consisting of 50 ornamental single-light lighting standards, in Foothill Blvd., between 55th Ave. and 62nd Ave. 5-10

BIDS RECEIVED

OAKLAND, CALIF.—Butte Electric & Mfg. Co., 956 Folsom St., S. F., $6233 low for 15 lighting standards in 17th St., San Pablo Ave., etc., for City. 5-15

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

BIGGS, CALIF.—The City of Biggs, Butte County, is considering installation of a 40,000-gal. steel tank and tower to replace present structure. 5-8

CLOVERDALE, CALIF.—Plans by Engr., A. M. Jensen, 68 Post St., S. F., for water improvements for City of Cloverdale, Mendocino County. 5-10

GRANTS PASS, ORE.—Plans by Baar & Cunningham, Engrs., Spalding Bdg., Portland, for filter plant, pumping plant, reservoir and mains for City to cost $400,000. 5-14

ANACORTES, WASH.—Bonds voted by City, $500,000, for: 12 miles of 20-in. main from the Skagit River to an equalizing reservoir; construction of equalizing reservoir; 11,000 lin.ft. 16-in. industrial main from filtration plant to the industrial section of the City; auxiliary pump station to be installed at Whitsle Lake. Plans being prepared by Consulting Engineers, W. C. Morse Co., L. C. Smith Bdg., Seattle. Bids will be called for in about one month. 5-12

KENNYVALE, WASH.—Plans by Miller Engr. Co., Burke Bdg., Seattle, for well, pipe-line, pumping plant and 50,000-gallon steel or wood tank for City, $40,000.

CONTRACTS AWARDED

PUEBLO, COLO.—To Driscoll Const. Co., Denver, Colo., $16,000 for constructing sedimentation basin for City.

KENT, WASH.—To American Concrete Pipe Co., Tacoma, $13,355 to City for improvements to the headworks near Lake Sawyer, and installation of ten miles of concrete pipe-line from the headworks to the reservoirs within the town of Kent. Work involves 24,000 ft. 18-in., 16,000 ft. 16-in., and 12,000 ft. 14-in. concrete pipe. 5-9

FLOOD CONTROL WORK

BIDS BEING RECEIVED

RIVERSIDE, CALIF.—Bids to 10 a.m., May 28, by Directors of Water Conservation Association, 3596 Main St., Riverside, for the construction of the following work at the mouth of the canyon of the Santa Ana River in San Bernardino County, California: (1) Diversion weir of rubble masonry to be constructed across the canyon of the Santa Ana River from wall to wall, a distance of about 475 feet; (2) Headworks for the diversion of water to be constructed at the westerly end of said diversion weir; and (3) Conduit from said headworks to the spreading grounds of the Water Conservation Association, a distance of about 1200 feet. Work involves 7000 cu.yd. rubble masonry (weir), 1000 cu.yd. rein. conc. (headwks. and conduit), 10,000 cu.yd. excavation. 5-8

SACRAMENTO, CALIF.—Bids to 2 p.m., June 5, by State Division of Water Resources, State Office Bdg., Sacramento, for: (1) Rock jetty, 170 ft. long, at mouth of Navarro River, near Fort Bragg, Mendocino County, involving 2000 cu.yd. quarry rock, 2500 cu.yd. excavation sand; and (2) Levee repair on Sacramento River near Isleton, Sacramento County, involving 21,000 sq.ft. concrete paving, 7000 cu.yd. sand fill. 5-8

BIDS RECEIVED

LOS ANGELES, CALIF.—Low bids as follows by Los Angeles County Flood Control District: (1) Standard Dredging Co., Central Bdg., L. A., $115,195 low for railroad tracks and riprap on levees of Los Angeles River near Long Beach; and (2) D. A. Foley & Co., Grant Bdg., L. A., $10,237 low for 105,000 cu.yd. fill for earth levee along banks of San Gabriel River from Center St. to Norwalk-Clearwater Road. 5-7

MACHINERY and SUPPLIES

BIDS BEING RECEIVED

SEATTLE, WASH.—Bids to 10 a.m., May 31, by W. D. Freeman, Purchasing Agent, City of Seattle, Room 231, County-City Bdg., Seattle, for: 4 37-M volt oil circuit breakers, 13 2-M kva. transformers, 3 4-M kva. auto transformers. 5-19

TACOMA, WASH.—Bids to 2 p.m., May 26, by City Board of Contracts and Awards for: (1) 10,897 ft. 58-in. smooth-bore or 61-in. riveted steel pipe; and (2) two 48-in. control valves. 5-13

CONTRACTS AWARDED

SAN BERNARDINO, CALIF.—Awards as follows by City: (1) To American Cast Iron Pipe Co. who bid $2.539 per foot for 156 ft. of 16-in. cast-iron pipe; (2) To United States Cast Iron Pipe Co., who bid as follows: 1450 ft. 12-in. cast-iron pipe, $1.77; 20,000 ft. 6-in. cast-iron pipe, $0.645; 20,000 ft. 4-in. cast-iron pipe, $0.435; (3) To Western Pipe & Steel Co., who bid $0.53 per foot for 7000 ft. of 8-in. steel pipe. 5-16

BUILDING CONSTRUCTION

WORK CONTEMPLATED

MODESTO, CALIF.—Plans by R. G. De Lappe, Architect, 1710 Franklin St., Oakland, for a two-story power house, to be unit No. 3, at Stanislaus County Hospital, Modesto, Stanislaus County. $30,000. 5-13

RICHMOND, CALIF.—Plans by Architect, Albert Kahn, Inc., Marquette Bdg., Detroit, Michigan, and call for bids will be issued about June 1, for the Ford Motor Car Co. assembly plant at Richmond. Buildings will be brick, reinforced concrete and steel frame. Bids will be taken on: Dock; Plumbing; Heating; Electric Wiring; Concrete Pipe; Steel Work; and General Contract. Cost $2,500,000. Wm. Bremer, c/o Carquinez Hotel, Richmond, is the Architect's Local Representative; and R. E. Winkler, c/o Carquinez Hotel, Richmond, is the Ford Motor Co. local representative. 5-12

BIDS BEING RECEIVED

EUREKA, CALIF.—Bids to June 2 by Architects, O'Brien & Peugh, 315 Montgomery St., S. F., for 10-story reinf. conc. hotel at Eureka for Pickwick Stage System. $500,000. 5-13

PALO ALTO, CALIF.—Bids to 4 p.m., June 2, by City Clerk, City Hall, Palo Alto, for four-story 'A' terra cotta and reinforced concrete hospital building on Arboretum, near Old Quarry Road, for City. Reed & Corlett, Oakland Bank Bdg., Oakland, are Architects. $465,555. 5-5

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., June 18, by Board of Public Works for reinf. concrete and stone Aptos Junior High School. $600,000. 5-15

SAN JOSE, CALIF.—Bids to 4 p.m., June 3, by Board of Education, W. L. Bachrodt, Secy., San Jose, for general contract, heating, ventilating, plumbing, electric wiring, lathing, plastering, iron work, tile, shades, and hardware, for two-story stucco and reinf. concrete Junior High School, 15 rooms. $350,000. J. J. Donovan is Architect. 5-7

SANTA CRUZ, CALIF.—Bids to 8 p.m., June 10, by Santa Cruz School District for reinf. concrete and stucco Laurel Grammar School. $80,000. 5-15

UKIAH, CALIF.—Bids to 11 a.m., June 10, by County for frame and stucco American Legion Memorial Building. $20,000.

CONTRACTS AWARDED

MENDOCINO, CALIF.—To Carl Nelson, 1421 E. Channel St., Stockton, $20,000 for Mendocino Grammar School. 5-12

OAKLAND, CALIF.—To Geo. J. Maurer Co., 50 York Drive, Piedmont, $150,389 for reinf. concrete and stucco addition to Fairmont Hospital on Foothill Blvd., San Leandro, for County. 5-13

OAKLAND, CALIF.—To Spivock & Spivock, Hobart Bdg., San Francisco, who bid $69,750 to Oakland Port Commission, Oakland Bank Bdg., Oakland, for reinforced concrete superstructure, 180 by 504 ft. (except steel frame), for transit shed at Ninth Avenue Pier, Oakland. 5-13

PITTSBURG, CALIF.—To Geo. J. Maurer Co., 50 York Drive, Piedmont, who bid $146,109 (based on alternatives) for the construction of a two-story brick, terra cotta and wood Junior High School building for the Pittsburg School District. 5-16

SANTA ROSA, CALIF.—To Jack Lindsay, Santa Rosa, who bid $14,819 for the construction of the South Park School, to be frame and stucco construction, work for the Santa Rosa School District. 5-12

SAN FRANCISCO, CALIF.—Awards as follows by Board of Public Works for 3rd Unit of Balboa South Side High School to be constructed on Onondaga, Tioga, Oneida Sts., etc.: GENERAL CONTRACT—To MacDonald & Kahn, Financial Center Bdg., San Francisco, $459,000; MECHANICAL WORK—To Scott Co., 243 Minna St., San Francisco, $35,977; PLUMBING—To Herman Lawson, 465 Tehama St., San Francisco, $32,000; and ELECTRICAL WORK—To R. Flatland, 1899 Mission St., San Francisco, $41,000. 5-12

VALLEJO, CALIF.—Awards as follows by Standard Oil Co. for improvements at Vallejo waterfront: (1) To J. E. Johnston, Weber Ave. and E St., Stockton, for corr. iron warehouse, office building and garage, foundations for six steel storage tanks, concrete retaining wall, etc.; and (2) To Ben C. Gerwick, Inc., 110 Market St., S. F., for 150-ft. wharf. 5-10

WILLIAMS, CALIF.—To Azevedo & Sarmento, 920 O St., Sacramento, $75,481 for reinf. conc. Williams Grammar School. Starks & Flanders, Forum Bdg., Sacramento, are the Architects. 5-15

SWIMMING POOLS

CONTRACTS AWARDED

SAN LEANDRO, CALIF.—Awards as follows by San Leandro School Dist. for concrete swimming pool: GENERAL CONTRACT—To Chester A. Gossett, 327 Davis Court, San Leandro, $14,950. HEATING & FILTRATION—To Carl T. Doell, 467 21st St., Oakland. $5142. 5-19

POWER DEVELOPMENT

BIDS BEING RECEIVED

PORTLAND, ORE.—Bids to 10 a.m., May 31, by Forester, U. S. Govt., Portland, Ore., for 60 hp. diesel power plant, generating machinery, transmission lines at Oregon Caves, JOSEPHINE COUNTY, Ore. 5-16

RAILROAD CONSTRUCTION

CONTRACTS AWARDED

MARE ISLAND, CALIF.—To MacDonald & Kahn, Financial Center Bdg., San Francisco, $162,500 for railroad and shell houses at the Naval Yard Ammunition Depot at Mare Island. Work involves 165,000 cu.yd. of excavation for railroad and railroad tracks, and four reinf. concrete shell houses. 5-12

LEBANON, ORE.—To Hauser Const. Co., Multnomah Hotel, Portland, Ore., for 27 miles grading and bridging first unit of Linn County extension from Lebanon, Linn County, to Sweet Home, for the Oregon Electric Railway Co. 5-19

SURETY BOND AND CASUALTY INSURANCE DIRECTORY

OPPORTUNITY PAGE

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Commerce Casualty Co.
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Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
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Kartschoke Clay Products Co.

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Haiss Mfgr. Co., Geo.
Harnischfeger Sales Corp.
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Jenison Machinery Co.
Marion Steam Shovel Co.
Orton Crane & Shovel Co.
Owen Bucket Co.
Slick, R. R.
Williams Co., G. H.

Buckets, Rehandling
Bacon Co., Edward R.
Garfield & Co.
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American Steel & Wire Co.
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Bacon Co., Edward R.
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Bacon Co., Edward R.
Harron, Rickard & McCone Co.
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Greenberg's Sons, M.

Castings, Iron and Steel
American Cast Iron Pipe Co.
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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
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.

Dams
Ambursen Dam Co., Inc.
Victor Welding Equipment Co.

Derricks
Bacon Co., Edward R.
Garfield & Co.
Harron, Rickard & McCone Co.
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.
General Excavator 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.
Osgood Co., The
Thew Shovel Co., The

Draglines
Austin Machy. Corp.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Garfield & Co.
General Excavator 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.
Osgood Co., The
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.
Kartschoke Clay Products Co.
Pacific Clay Products

Drills, Rock
Bacon Co., Edward R.
GardnerDenver 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.

Engineering Instruments
American Paulin System, Inc., The

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

Excavating Machinery
Bacon Co., Edward R.
Bodinson Mfg. Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Cleveland Tractor Co., The
Excavating Equipment Dealers, Inc.
Garfield & Co.
General Excavator 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.

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OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS

Surfacing

San Francisco, California, May 19, 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 12th day of June, 1930, and then publicly opened, for furnishing all labor and materials and performing all work for surfacing Sta. 184+34 to Sta. 437+00 of Section A, Route 71, in Lassen National Forest, and Sta. 437+00 to Sta. 6+00 of Section D, Route 1, in Lassen Volcanic National Park, all located in Tehama County, California. The length of the project to be surfaced is 6.00 miles and the principal items of work are approximately as follows:

Unclassified excavation, 1000 cu.yd.
Unclassified excavation for structures, 140 cu.yd.
Fine grading subgrade and shoulders, 6.00 miles.
Crushed rock surfacing, 11,620 cu.yd.
Suppl. crushed rock, 1160 cu.yd.
Additional binder, 1700 cu.yd.
Hauling binder, 6130 cu.yd.mi.
Watering, 700 M gal.
Right of way monuments in place, 108 each.
6-in. vitrified tile underdrain in place, 1000 lin.ft.

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 (100) 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 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 12, 1930.
California Forest Project 71-A1, Lassen Park Project 1-D Surfacing, 807 Sheldon Bldg., 461 Market St., San Francisco, California.

C. H. SWEETSER, District Engineer.

THE BUYERS' GUIDE—*Continued from Page 74*

Excavating Mchy. (Continued)
Orton Crane & Shovel Co.
Osgood Co., The
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.
Madsen Iron Works

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

Hydro-Tite
Industrial & Municipal Supply Co.

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.

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

Oxy-Acetylene Apparatus
Oxweld Acetylene Co.

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

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

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

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

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

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

Paving, Contractor
Warren Bros. Roads Co.

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

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

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

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

Piles, Concrete
Raymond Concrete Pile Co.
MacArthur Concrete Pile Corp.

Pipe—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.
Kartschoke Clay Products Co.
Pacific Clay Products

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

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

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

Portable Lights
Oxweld Acetylene Co.

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

Power Units
Continental Motors Corp.
Harron, Rickard & McCone Co.
Hercules Motors Corp.
International Harvester Co.
Jenison Machinery Co.
Novo Engine Co.

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

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

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OPPORTUNITY PAGE

CONTINUED

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF RECLAMATION

Steel or Concrete Siphons

Washington, D.C., May 7, 1930.

Sealed bids (Specifications No. 481-D) will be received at the office of the Bureau of Reclamation, Vale, Oregon, until 10 o'clock a.m., June 9, 1930, and will at that hour be opened, fur furnishing labor and materials and performing work for the construction of the Bully Creek and Fairman Coulee siphons with a connecting section of concrete lined canal, on the Vale Main Canal, Vale Project, Oregon. The construction of these siphons and the concrete canal lining involves two alternative plans: one for constructing the major portion of the siphons of 101-inch diameter riveted plate steel pipe, and the other for construction of 96-inch diameter precast concrete pipes, both with appurtenant works. The principal items and the estimated quantities involved are as follows: Plate steel siphons. (Schedule 1) 41,900 cubic yards of all classes of excavation; 1000 station cubic yards of overhaul; 24,000 cubic yards of compacting embankment; 8600 cubic yards of backfill; 400 cubic yards of puddling or tamping backfill; 2214 cubic yards of concrete; placing 170,000 pounds of reinforcement bars; erecting 8.1 M. ft. b.m. of timber in bridges; and (schedule 2) furnishing and erecting 7139 linear feet of 101-inch diameter riveted plate steel pipe, plate thicknesses $\frac{1}{4}$-inch, $\frac{3}{8}$-inch. and $\frac{7}{16}$-inch, weight 4,053,000 pounds, with accessories and appurtenances. Precast concrete siphons. (Schedules 3, 4 and 5) 62,660 cubic yards of all classes of excavation; 1000 station cubic yards of overhaul; 24,000 cubic yards of compacting embankments; 31,100 cubic yards of backfill; 400 cubic yards of puddling or tamping backfill; 2200 cubic yards of gravel foundation and backfill; 818 cubic yards of concrete; placing 74,800 pounds of reinforcement bars; furnishing and laying 7246 linear feet of 96-inch diameter precast concrete pressure pipe with steel cylinder reinforcement and installing 2400 pounds of blowoff valves and piping. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be a part of the contract. For particulars, address the Bureau of Reclamation, Vale, Oregon; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD, Commissioner.

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PUBLIC ROADS

Grading and Surfacing

San Francisco, California, May 17, 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 10th day of June, 1930, and then publicly opened, for furnishing all labor and materials and performing all work for grading and surfacing on Sections C and D of Route No. 23, Quincy-Beckwith National Forest Highway, located in the Plumas National Forest. Plumas County, California. The length of the project to be graded is 3.35 miles and to be surfaced is 9.90 miles. The principal items of work are approximately as follows:

Unclassified excavation, 41,203 cu.yd.

Unclassified excavation for structures, 605 cu.yd.

Overhaul, 61,883 sta.yd.

Fine grading subgrade and shoulders, 6.55 miles.

Crushed rock or crushed gravel surfacing, 21,255 cu.yd.

Supplemental crushed rock or crushed gravel, 1000 cu.yd.

Watering, 1064 M gal.

Providing and maintaining water plants, lump sum.

Class B concrete, 232.51 cu.yd.
Class C concrete, 26.79 cu.yd.
Reinforcing steel, 22,507 lb.
Corrugated metal pipe in place, 1254 lin.ft.
Porous tile underdrain in place, 1000 lin.ft.
Maintenance of existing road, extra work—est. $600.00.
Right of way monuments in place, 128 each.
Hauling and piling logs, lump sum.

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 fifty (150) 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 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 10, 1930.

Project 23-C1. D, Quincy-Spring Garden Section, Quincy-Beckwith National Forest Highway, 807 Sheldon Bldg., 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF PUBLIC ROADS

Grading

Phoenix, Arizona, May 14, 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 5th day of June, 1930. and then publicly opened, for furnishing all labor and materials and performing all work for grading section H of route 19, Clifton-Springerville National Forest Highway, in Apache National Forest, Apache County, Arizona.

The length of the project to be graded is 6.181 miles and the principal items of work are approximately as follows:

Unclassified excavation, 37,200 cu.yd.
Structural excavation, 275 cu.yd.
Borrow, 7027 cu.yd.
Overhaul, 700 sta.yd.
Finishing, 6.181 miles.
Untreated timber in place, 14 M b.m.
Untreated timber piling in place, 520 lin.ft.
Cement rubble masonry, 32 cu.yd.
Cor. metal pipe in place, 2046 lin.ft.
Hand laid riprap in place, 75 cu.yd.
Protection ditch, 29,370 lin.ft.
Cattle guards in place, 5 each.
Right of way monuments in place, 108 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 (120) 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 until and unless 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 5, 1930.

Picnic Mesa Section, Clifton-Springerville National Forest Highway Route No. 19, 508 Ellis Bldg., Phoenix, Arizona.

C. H. SWEETSER, District Engineer.

THE BUYERS' GUIDE—*Continued from Page 76*

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
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Pumps, Hydraulic
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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
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Harron, Rickard & McCone Co.
Heltzel Steel Form and Iron Co.
Jenison Machinery Co.
Lakewood Engr. Co.

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Austin-Western Road Machy. Co.
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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
Bacon Co., Edward R.
Hackley Equipment Co., P. B.
Huber Manufacturing Co.
Jenison Machinery Co.
Spears-Wells Machinery Co.

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Paraffine Companies, Inc., The

Rules, Steel, Wood and Aluminum
Lufkin Rule Co., The

Saws, Portable
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Young Machinery Co., A. L.

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Le Tourneau Mfg. Co.
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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.
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Link-Belt Co.
Wallace & Tiernan
Water Works Supply Co.

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Ric-Wil Co., The

Sharpeners, Rock Drill Steel
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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.

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Peerless Mchy. & Mfg. Co.
Rix Company, Inc., The
Western Pipe & Steel Co.

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California Corrugated Culvert Co.
Western Pipe & Steel Co.

Tanks, Elevated Steel
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Lacy Manufacturing Co.
Montague Pipe & Steel Co.
Pittsburgh-Des Moines Steel Co.
Western Pipe & Steel Co.

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Chicago Bridge & Iron Works
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Link-Belt Co.
Thew Shovel Co., The

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Universal Crane Co., The

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Sterling Motor Truck Co.

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Claussen & Co., C. G.
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Pacific Pipe Co.
Water Works Supply Co.

Valves, Gate
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Valves, Hose Gate
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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.
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American-Hawaiian Steamship Co.

Water Wheels
Pelton Water Wheel Co. The
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Oxweld Acetylene Co.
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