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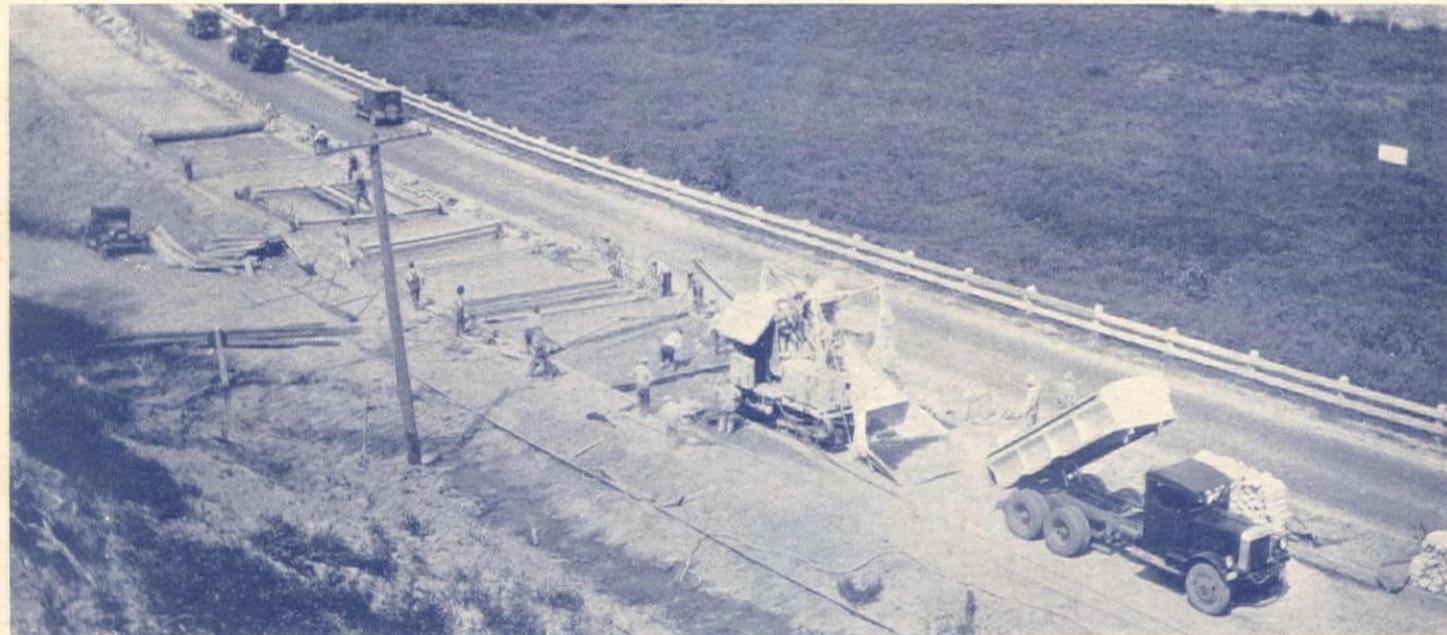
WESTERN CONSTRUCTION NEWS

CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

PUBLISHED SEMI-MONTHLY
VOLUME V NUMBER 16

SAN FRANCISCO, AUGUST 25, 1930

25 CENTS A COPY
\$3.00 PER YEAR



RECONSTRUCTING PACIFIC HIGHWAY THROUGH DUWANISH VALLEY, WASHINGTON, BETWEEN KENT-DES MOINES ROAD AND SEATTLE; S. A. MOCERI, CONTRACTOR

THE Trencher with 3 BUCKET LINE SPEEDS

3



The P & H
is the Only
Large Trencher
with THREE
Bucket Line
Speeds
without
Sprocket Change

IN a P & H Trencher the operator has available *three* speeds on the bucket line...he can make maximum footage in *any* soil... speeds up in soft digging and slows down in tough going. He shifts from "high" to "intermediate" to "low" at the touch of a gear transmission lever. By thus matching soil conditions he can cut the time on every job... save wages... save on fuel...

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Established 1884

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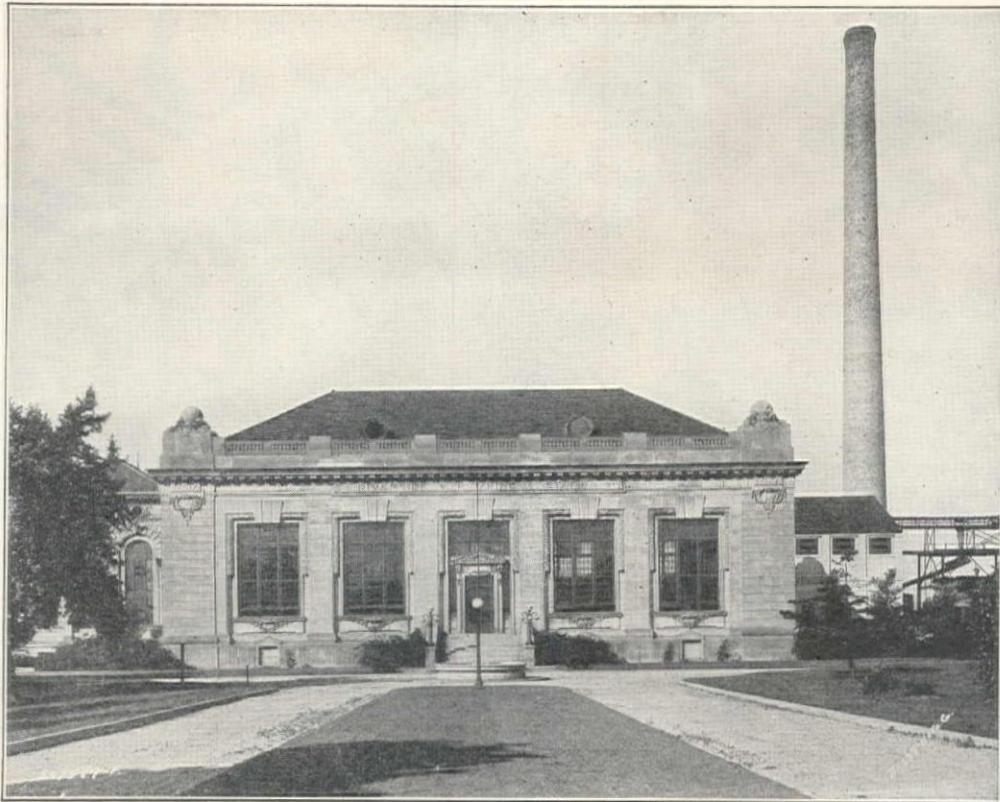
ROBERT M. TAYLOR, *Pacific Coast Manager*

*Service Stations, Complete Repair Part Stocks and Excavators
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P&H Greater Yardage at Lower Cost

LEADITE

Trade Mark Registered U.S. Pat. Office



The Riverside Pumping Station of the Indianapolis Water Co., Indianapolis, Ind.

Indianapolis Water Co. has used LEADITE on 150 Miles of Cast Iron Pipe

Mr. H. S. Morse, Manager of the Indianapolis Water Company, Indianapolis, Ind., another of the C. H. Geist Properties, and one of the largest privately owned plants in this country (supplying a population of approximately 400,000) advises us in a recent letter, as follows:

"We have laid 150 miles of cast iron pipe during the past 5½ years in which Leadite has been used as a jointing material. The sizes of pipe ranged from 6" to 36". These pipes have been used under pressures of from 60 to 100 pounds and we have found the tightness of the joints to be satisfactory."

The pioneer self-caulking material for c. i. pipe.

Tested and used for over 30 years.

Saves at least 75%

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2326 E. 8th St., Los Angeles

Water Works & Power Equipment Co., White Building, Seattle

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



No Caulking'





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IT takes a sharp pencil to land contracts and make a job show profit nowadays. Sharpen your pencils with RIX. Fifty years prove this sturdy pioneer rig does cut cost. Now as never before, you need RIX half-century dependability . . . RIX 26% extra efficiency . . . RIX "Express" service. A size for every purpose, and a hundred jobs on which it will save you time and money. Write for Bulletin 3-K.

SINCE 1877

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684 Santa Fe Avenue
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LOS ANGELES
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Rix Co. are also agents for COCHISE Drills,
and exclusive distributors for THOR Pneumatic Tools in Los Angeles and Seattle territories.



RIX
PORTABLE AIR COMPRESSORS
6'

The Compressor with
the Super-Charger

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

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DEVOTED TO CIVIL ENGINEERING AND CONSTRUCTION IN THE FAR WEST

VOLUME V

AUGUST 25, 1930

NUMBER 16

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 Entered as second-class matter at the postoffice at San Francisco, California, under the Act of March 3, 1879
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HYDRO-TITE *joints are* TIGHT

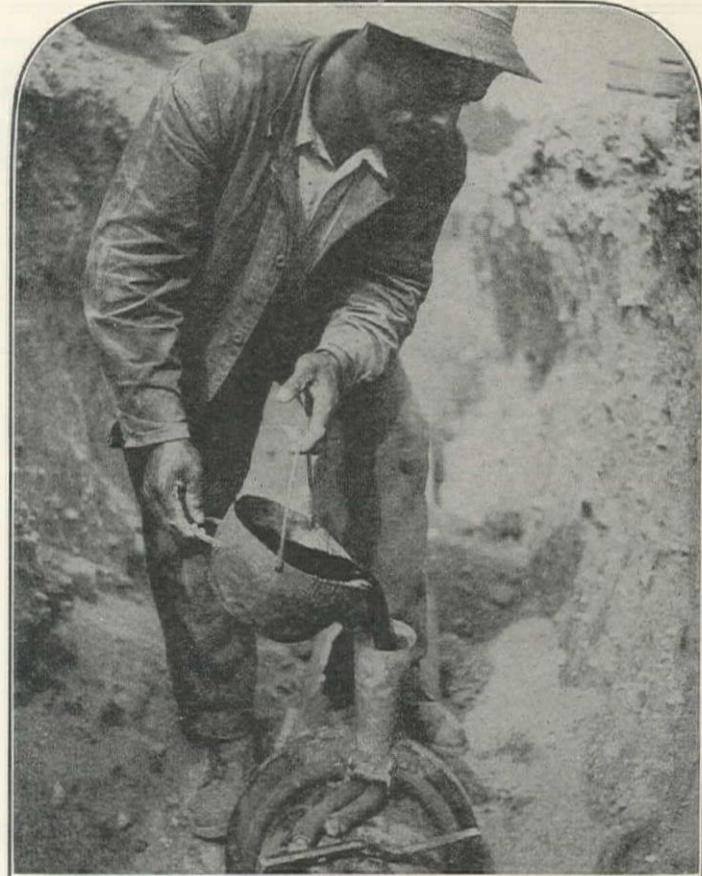
WOULDN'T it be ideal if you were positive that all of the bell and spigot joints in your pipe lines were perfectly tight? Also that these joints would never open up nor blow out thus causing worry, loss of time and loss of water?

You can have this protection if you resolve now to make the first joints on your next line with Hydro-Tite. We know if you will but use Hydro-Tite on these first few joints you will be sure to finish a strong Hydro-Tite booster. If you are one of those who are still using lead, a substantial saving will result; also a positive knowledge of a better joint.

Hydro-Tite is not a substitute for any



Easy to Prepare



jointing material. It was first compounded and placed on the market twenty years ago for a specific purpose. This purpose is to make joints stronger, tighter, and more

flexible without caulking.

Let us tell you more about this better material—our proposition to furnish Hydro-Tite with no risk to you. Write now for full details.



Easy to Pour

HYDRO-TITE

REG. U. S. PAT. OFF.

A DEPENDABLE SELF-CAULKING JOINT COMPOUND
FOR CAST IRON BELL AND SPIGOT PIPE

HYDRAULIC DEVELOPMENT CORPORATION

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SAN FRANCISCO: 7 Front St. LOS ANGELES: 6800 Avalon Blvd.

Northwestern Distributors:
PACIFIC WATER WORKS SUPPLY CO.
Atlantic Street Terminal, Seattle, Wn.

UNDISPUTED LEADERSHIP

SOME idea of the magnitude of the operations of Western Pipe & Steel Co. may be gained from the fact that this company is now installing one of the largest steel penstocks in the world for the City of Tacoma. There is being fabricated at the South San Francisco factory a huge penstock for Pacific Gas & Electric Co., the heaviest sections of which are of 11/2 inch boiler plate. The company is also furnishing twenty miles of 40 inch steel water pipe for the City of San Diego. For the Southern Counties Gas Co. it is erecting high pressure gas holders, which are the largest ever designed. A large contract has just been closed with the City of Los Angeles for steel water pipe, and with the United States Government for over 7000 feet of riveted steel pipe for siphons for the Vale, Oregon, reclamation project. This pipe is 101 inches in diameter, large enough to drive an automobile through. Recently Western Pipe & Steel Co. expanded its facilities to manufacture steel underframes for railroad cars.

Western Pipe & Steel Co.
of California

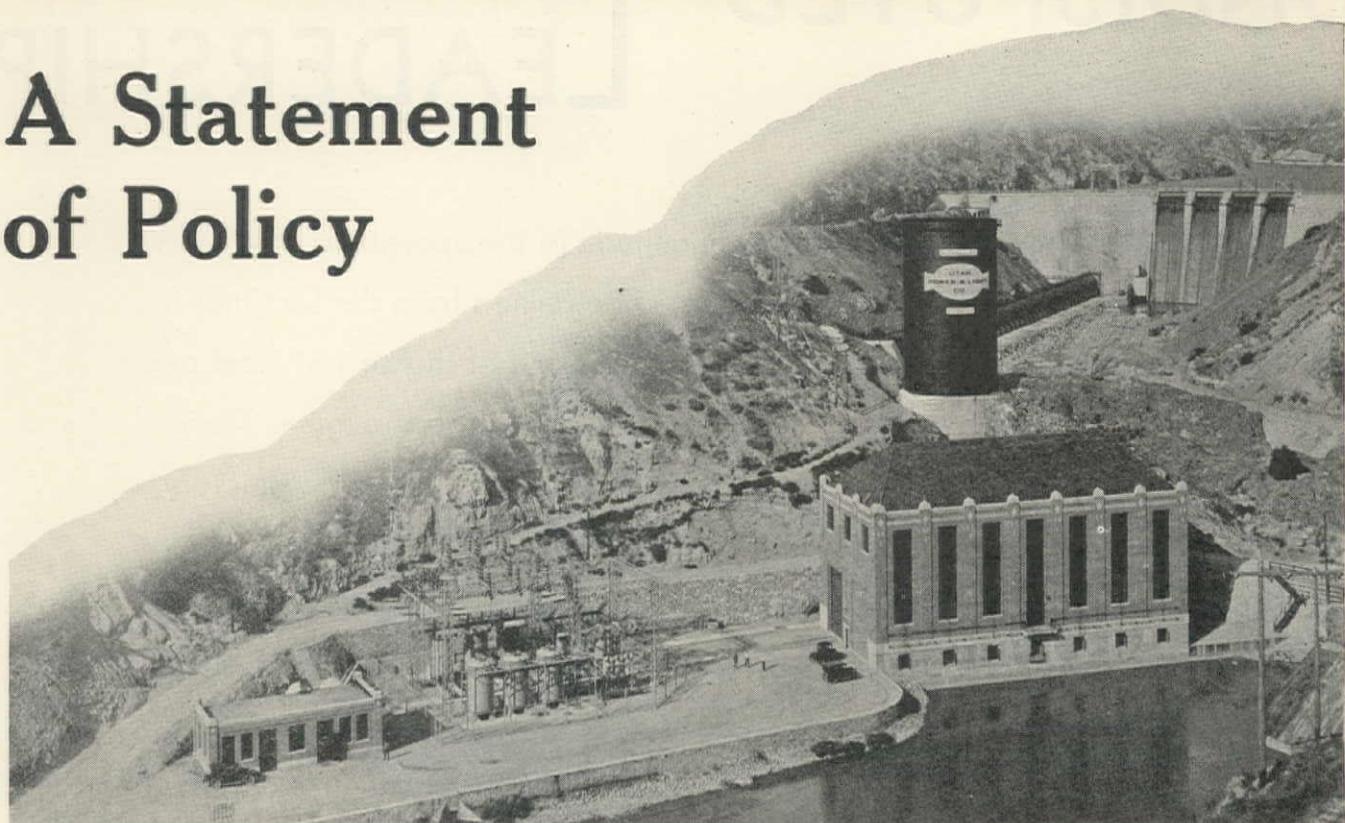
SAN FRANCISCO
FRESNO

TAFT

LOS ANGELES
PHOENIX



A Statement of Policy



Concerning Larner Engineering Co. Differential Surge Tanks

PRACTICALLY all of the Differential Surge Tanks built during the last ten years for hydro-electric developments have been designed under the supervision of the Larner Engineering Co. As a consequence their experience with problems involving control of surges in flow lines and conduits by means of the differential tank is most unique, and has resulted in a valuable accumulation of design, test and performance data.

It has now become the established policy of this company to serve as consulting engineers in the preparation of designs only, to the elimination of actual tank building. Thus, at reasonable cost, utilities may take full advantage of the experience of Larner engineers, using their designs as specifications for competitive bidding by tank manufacturers.

*Inquiries may be directed to The Pelton Water Wheel Co.,
exclusive representatives for the Larner Engineering Co. on the
Pacific Coast.*

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

2985 Nineteenth Street, SAN FRANCISCO

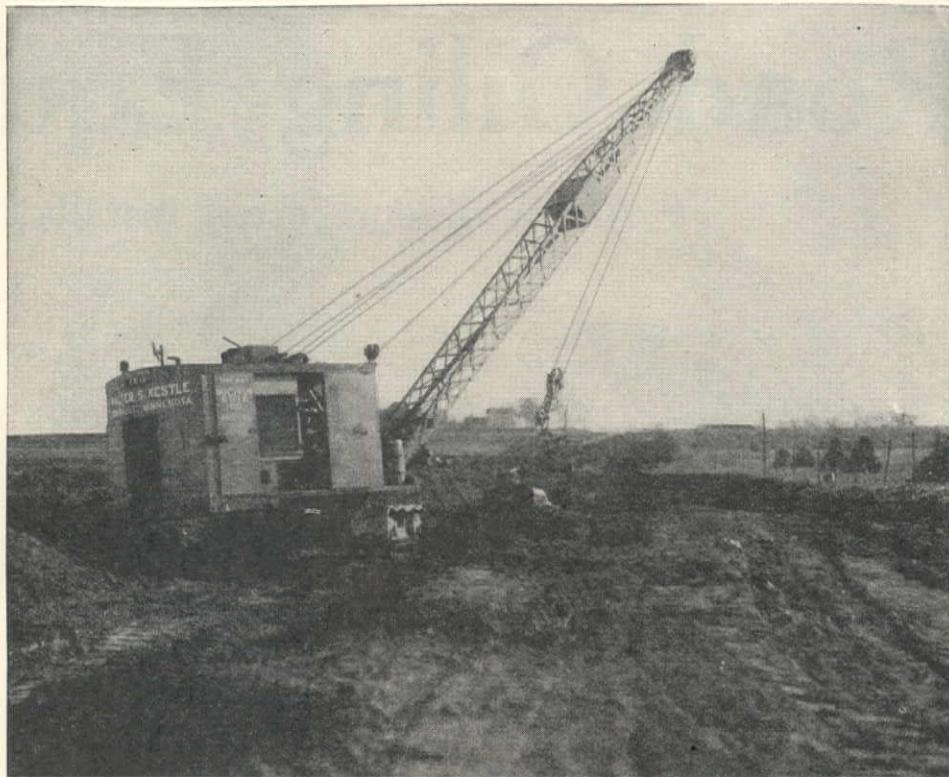
33 Rector Street, NEW YORK

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



When writing to THE PELTON WATER WHEEL COMPANY, please mention Western Construction News

100 MORE YARDS TODAY



What Would They Be Worth To You?

To make a profit in road grading you must dig fast—get big monthly estimates in spite of rains and labor tie-ups. A hundred more yards a day "while the sun shines" makes the difference between black ink and red.

That's why so many Gas + Air convertible 1-yard machines are seen along the new roads in every part of America. In these amazing machines Bucyrus-Erie harnessed two old forms of power together in a new way. Convenient gas-power to do the hoisting and store compressed air. Air power to give the crowd and swing the pep and accurate control of a steam machine. The natural result is lower digging cost and faster output than ever before.

It was five years ago that the Gas + Air was introduced. Its instant popularity was nothing compared to its wide acceptance today. It has set a faster pace for road grading and every other kind of digging. It will set a faster pace for you, too — dig that additional 100 more yards a day that mean so much.

Say the word and we'll send you a complete description. Write us today.

Representatives throughout the U. S. A. Offices or distributors in all principal countries. Branch Offices: Boston, New York, Philadelphia, Atlanta, Birmingham, Buffalo, Pittsburgh, Detroit, Chicago, St. Louis, Dallas, San Francisco.

A-136—8-25-30—WCN



BUCYRUS-ERIE COMPANY, manufacturers of the only complete line — all sizes, types and powers. Plants: S. Milwaukee, Wis., Erie, Pa., Evansville, Ind. General Offices: S. Milwaukee, Wis.

WEST COAST BRANCH OFFICE: 989 Folsom Street, San Francisco
Clyde Equipment Company, Portland, Ore., Seattle, Wash.

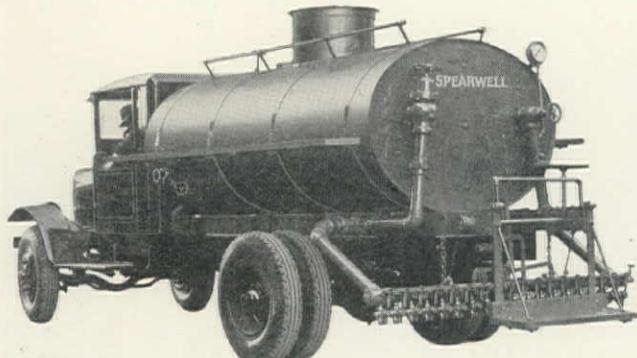
Concrete Machinery & Supply Company, Los Angeles, Calif.

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

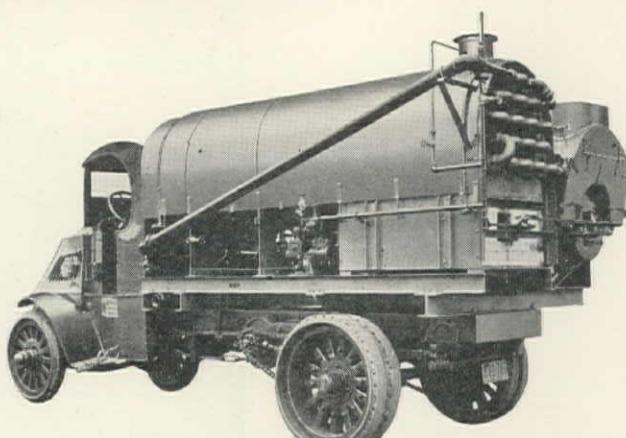
SPEARWELL

Road Oiling Equipment

A few of our recent installations



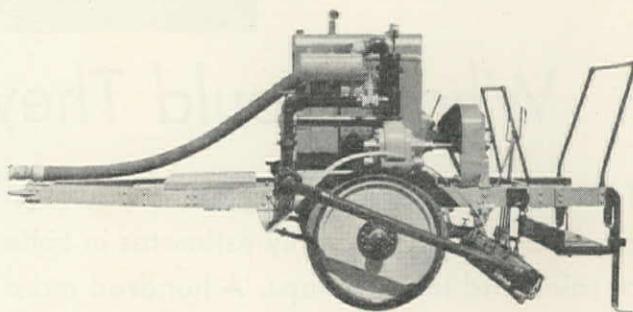
Standard California Distributor



The Best Retort Made



First Oil Distributor Built to Meet the New Oregon Specifications



First Commercial Trailer Oiler to Meet California Fuel Oil Conditions

SPECIALISTS IN ROAD OILING EQUIPMENT

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

... also ...

Retorts, Boilers, Screenings Spreaders, Drags, Etc.

Spears-Wells Machinery Company, Inc.

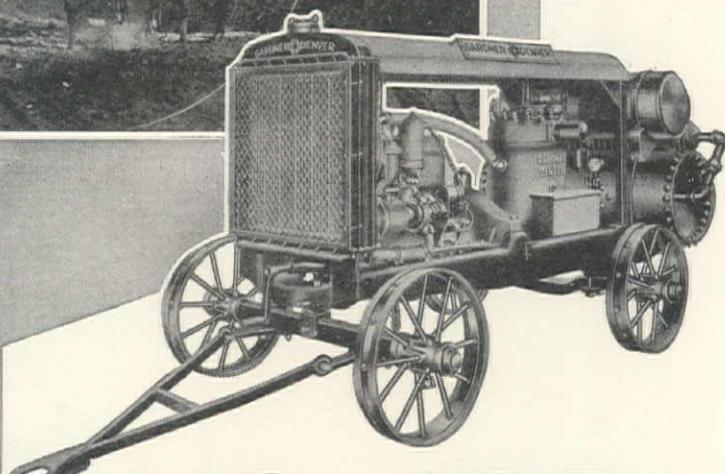
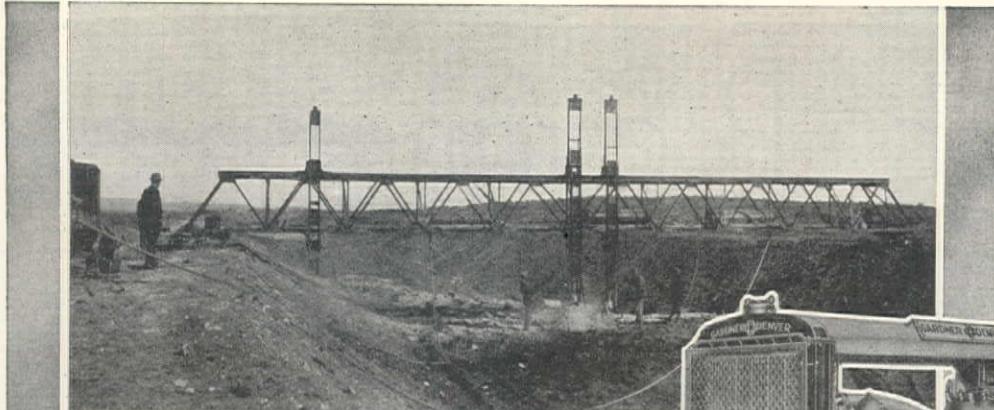
Manufacturers and Distributors of

ROAD CONSTRUCTION AND MAINTENANCE EQUIPMENT

1832 W. 9th Street

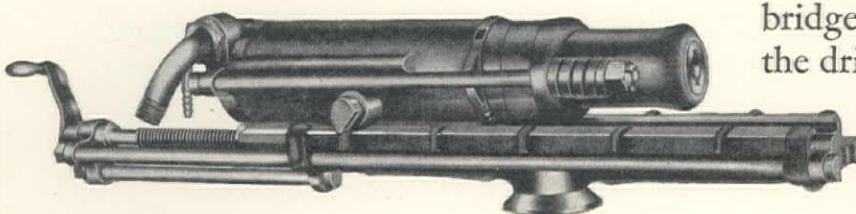
OAKLAND

Holliday 4100



-NO JOB- TOO BIG

for Gardner-Denver equipment. Digging a canal through country that necessitates 26 miles of hard rock work, requires Air Compressors, Rock Drills and other equipment that will stay on the job. In order to obtain a maximum amount of work from the drilling equipment Mittry Brothers developed a novel portable drill bridge which with G-D Portable Compressors allowed three G-D Model 17 Drills to be used at the same time. The mobility and ease of handling of this bridge together with the fast cutting of the drills, is accomplishing an amount of work that will complete this project in record time. Let us tell you more about our construction equipment.



GARDNER-DENVER COMPANY

QUINCY, ILL. DENVER, COLO.

SALES OFFICES THROUGHOUT THE WORLD

GARDNER-DENVER

When writing to GARDNER-DENVER COMPANY, please mention Western Construction News

It's Permanent



EDITH Street Sewer, Oakland. R. B. McNair, Contractor. For this installation of Vitrified Salt-Glazed Clay Pipe there was required 13,800 Ft. of 8" pipe and 406 Tees, Ys, etc. Sewers laid with such pipe will last indefinitely.

Gladding, McBean & Co.

San Francisco
Los Angeles

Oakland
Portland

Seattle
Spokane

AUGUST 25, 1930

WESTERN CONSTRUCTION NEWS

13

BUY A BUSINESS, SEE
Classification 45

Seattle Post *Intelligencer*

THE POST-INTTELLIGENCER
is the only Seattle newspaper receiving dispatches
from UNIVERSAL SERVICE and INTERNATIONAL
WIRE PRESS. It is a member of the AMERICAN
NEWSPAPER GROUP and is a member of the ASSOCIATED PRESS and
the ONLY Seattle Sunday newspaper member.

MONDAY PART TWO

SEATTLE, APRIL 7, 1930.

HH 13

PART TWO MONDAY

HEALTH CHIEF'S REPORT ATTESTS WATER SUPPLY PURITY



CHLORINATION
TREATMENT IS
IMPROVED ON

The high standard of Seattle's water from the standpoint of the public health has been maintained through chlorination, it is declared in the annual report of Dr. E. T. Hanley, city health commissioner.

"The water department recently installed measuring devices which automatically record and regulate the flow of water and the amount of chlorine added.

"This apparatus was in operation during the whole of 1929 and we are convinced that its installation was a definitely progressive step and that we are now fully justified in regarding Seattle's water as being safe.

Automatic Chlorination — Solves Seattle's Problem

"The Only Safe Water
is a
Sterilized Water"



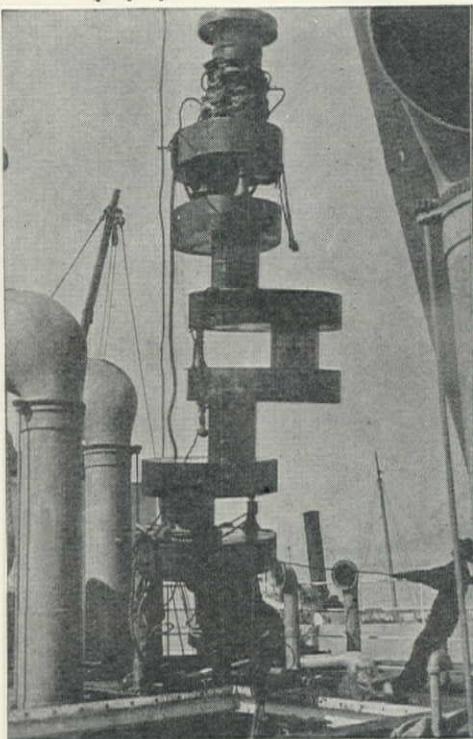
ACCURATE proportioning of chlorine dosage to a widely varying flow was Seattle's problem. Dependable automatic control apparatus a necessity. « « That the six W&T Automatic Vacuum Chlorinators installed on Young's Lake Supply adequately fill this need is evidenced by Dr. Hanley's report. « « Technical publication 106 (yours for the asking) describes this apparatus in detail.

WALLACE & TIERNAN
COMPANY, INCORPORATED
Manufacturers of Chlorine Control Apparatus
NEWARK • NEW JERSEY

Baltimore, Boston, Buffalo, Charleston, Charlotte, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Jacksonville, Kansas City, Knoxville, Lexington, Lincoln, Los Angeles, Minneapolis, New York, Ogden, Oklahoma City, Philadelphia, Pittsburgh, Roanoke, San Francisco, Seattle, Spokane, St. Louis, Syracuse, Wallace & Tiernan, Ltd., Toronto, Winnipeg, Canada. Wallace & Tiernan, Ltd., London, England

1A-23

When writing to WALLACE & TIERNAN COMPANY, INC., please mention Western Construction News



What it takes to Run a Ship

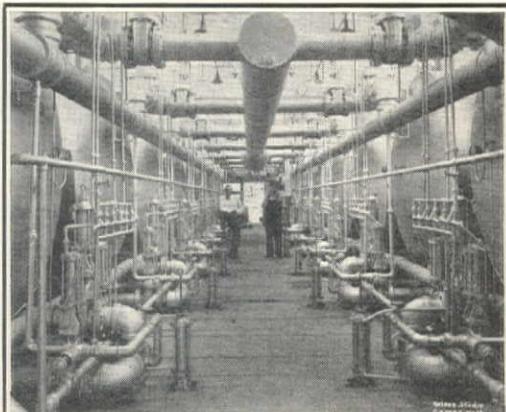
Shippers who have entrusted their machinery to the "careful handling" of American-Hawaiian service may be interested in the machinery used to transport that machinery.

The photograph shows the half section of a crankshaft being lowered into the engine room of the Motorship "Californian." There are 4 such sections in the ship, each weighing 23½ tons.

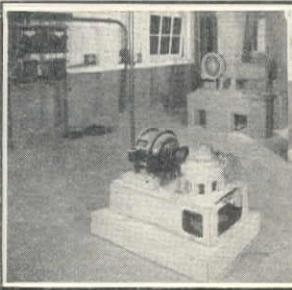
American-Hawaiian machinery or your own machinery can be handled with equal facility and security on any one of this fleet of 23 fast freighters, supplying superior coast-to-coast service.

AMERICAN-HAWAIIAN STEAMSHIP CO.

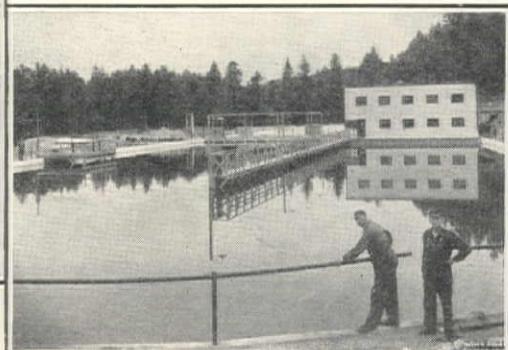
Superior Coast-to-Coast Service



BELOW: North side battery, showing ten tanks



ABOVE: Chemical room showing "Gaunt" dry feeder, and agitator for mixing tank in foreground



LEFT: Hydraulic valves and pipe gallery
B BELOW: Sedimentation basin, east

12,000,000 Gallons Per Day Supplied by California Filters

AT THE Camas mill of the Crown-Willamette Paper Company, twelve million gallons of clear water are necessary daily for the manufacture of bleached sulphite pulp and paper. To supply this demand from the highly colored, turbid flow from Lake Camas, Crown-Willamette uses twenty horizontal California Pressure Filters, each 8 feet by 25. A dry chemical feed and sedi-

mentation basin in connection prepare the water for filtration.

Installation of the entire filtration equipment, views of which are shown above, was supervised by California Filter Company.

Our booklet No. 40 provides complete information on Califilter equipment for every type of water purification problem. A copy will gladly be sent on request.

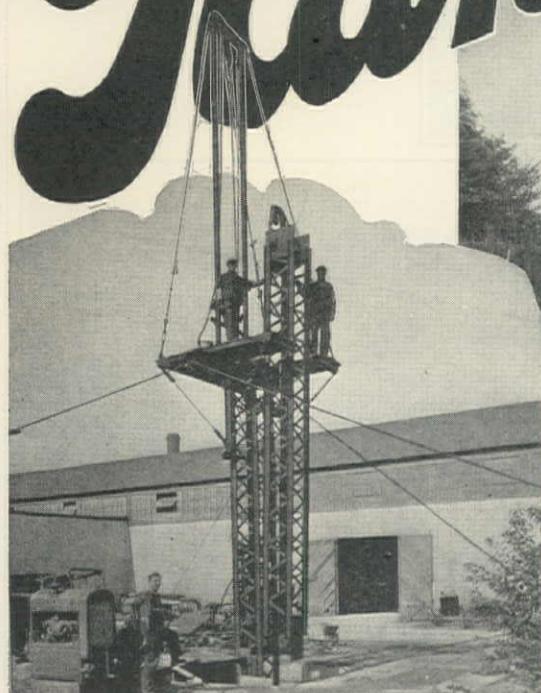
CALIFORNIA FILTER COMPANY, Inc.

981 Folsom Street, San Francisco

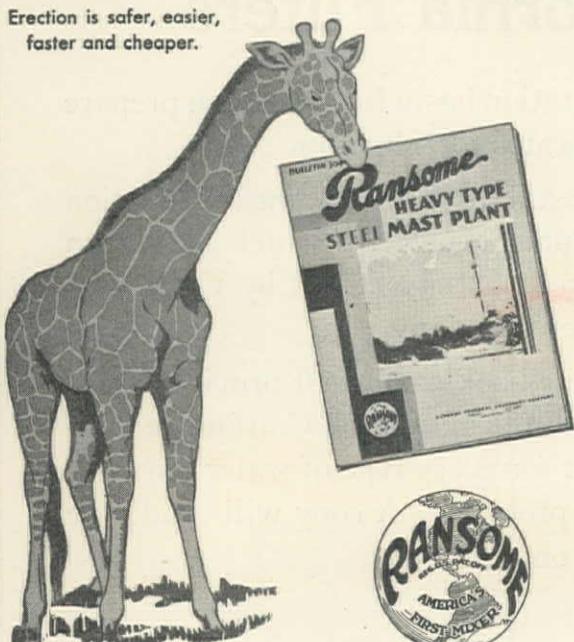
SEATTLE

LOS ANGELES

HEAVY TYPE *Ransome*



Erection is safer, easier,
faster and cheaper.



This plant is being used on a bridge job at Angola, New York

Steel Mast Plant Can be Quickly - Easily-Economically Erected - - - - -

The working platform extends around the mast on three sides, and automatic safety latches are always in position when the platform is being hoisted from section to section. > > >

The Ransome Heavy Type Steel Mast Plant can be used with any of the concrete chuting plants commonly used on construction work—counterweight boom chute plant, continuous line plant or the bin plant. > > > > > > > >

Top and bottom sheaves for raising the sliding frame are furnished as standard equipment. A tip-over bucket in two sizes is offered for use with this mast. These are made in 18 and 36 cu. ft. water level capacity for use with 14-S and 28-S Mixers.

Send for Bulletin No. 304.

Ransome Concrete Machinery Company

1850 — Service for 80 Years — 1930

Dunellen

STAR MACHINERY CO.
Seattle, Wash.

MCCRACKEN-RIPLEY CO.
Portland, Ore.

KRATZ & McCLELLAND, INC.
San Francisco, Calif.

New Jersey

THE CROOK CO.
Los Angeles, Calif.



LIMA
"101"

*West Coast
Representatives:*

Western Road Machinery
Company
Seattle :: Portland
Tyee Machinery Co., Ltd.
Vancouver, B. C.
A. L. Young Machinery
Company
San Francisco
Leigh M. Railsback
4880 Alhambra Ave.
Los Angeles, Calif.

LIMA "101" Fits All Varieties of Work

The Lima "101" successfully covers every type of excavating job suitable to a shovel of 1 or $1\frac{1}{4}$ yard capacity. When not being used as a shovel it can be easily converted in the field to crane, clamshell, dragline or drag shovel—a desirable feature if you have a large variety of work to be done.

Investigate the Lima "101" before you buy

The Ohio Power Shovel Co.

Division of Lima Locomotive Works Incorporated
Western Office 846 Straus Bldg., Chicago
Lima, Ohio

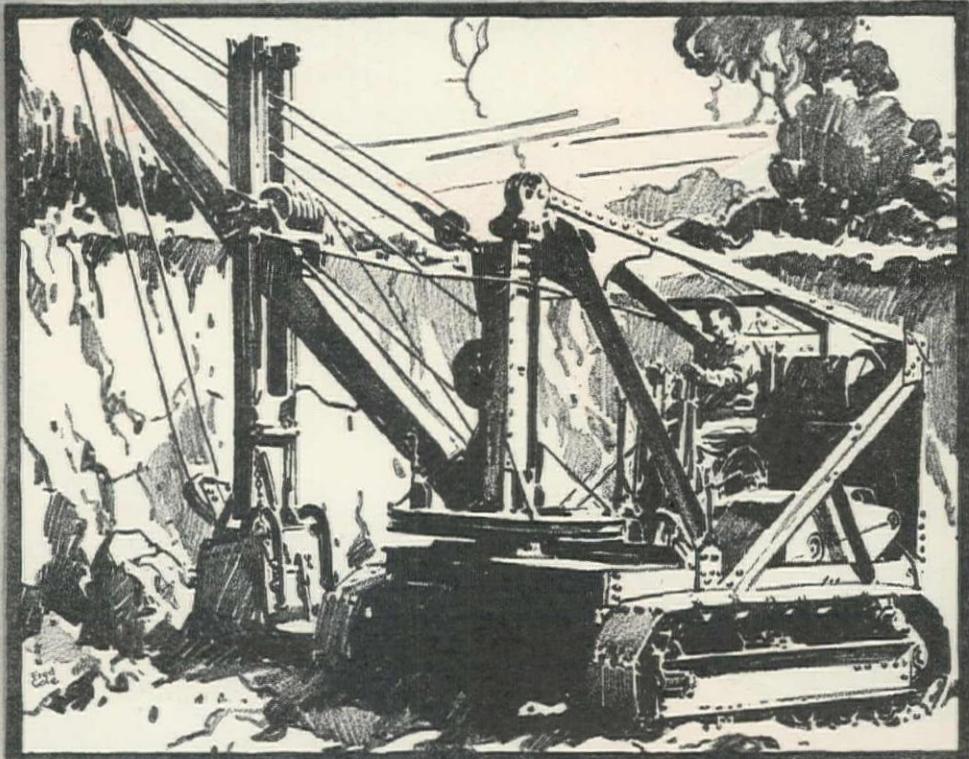
Eastern Office 2351 Geary Bldg., New York

Roller Bearing Equipped
A Timken at Every Vital Bearing Point

LIMA "101"

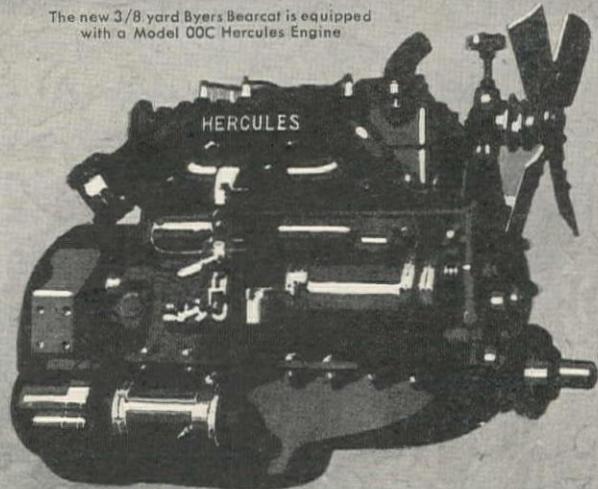
When writing to THE OHIO POWER SHOVEL CO., please mention Western Construction News

HERCULES ENGINES



Hercules Engines are built in a complete line of Four and Six cylinder models. They range in size from 9 to 175 H. P. They are advanced in design, rugged in construction, reliable and economical in performance. They are recognized, both by manufacturers and users of power equipment, as providing the utmost in engine value.

The new 3/8 yard Byers Bearcat is equipped with a Model 00C Hercules Engine



HERCULES MOTORS CORPORATION, CANTON, OHIO

West Coast Branch: San Francisco, Cal. Mid-Continent Branch: Tulsa, Okla.

Distributors: Smith-Booth-Usher Co., Los Angeles, Cal.; Edward R. Bacon, San Francisco, Cal.; F.C. Richmond Machinery Co., Salt Lake City, Utah; Worthington Machinery Corp. of Oklahoma, Tulsa, Okla.; Norvell-Wilder Supply Co., Beaumont, Tex.; Bovaird & Co., Bradford, Pa. European Distributor: Automotive Products Co., London, Berlin, Vienna.

IT'S
BACON
IN SAN FRANCISCO

BACON AND PEGS

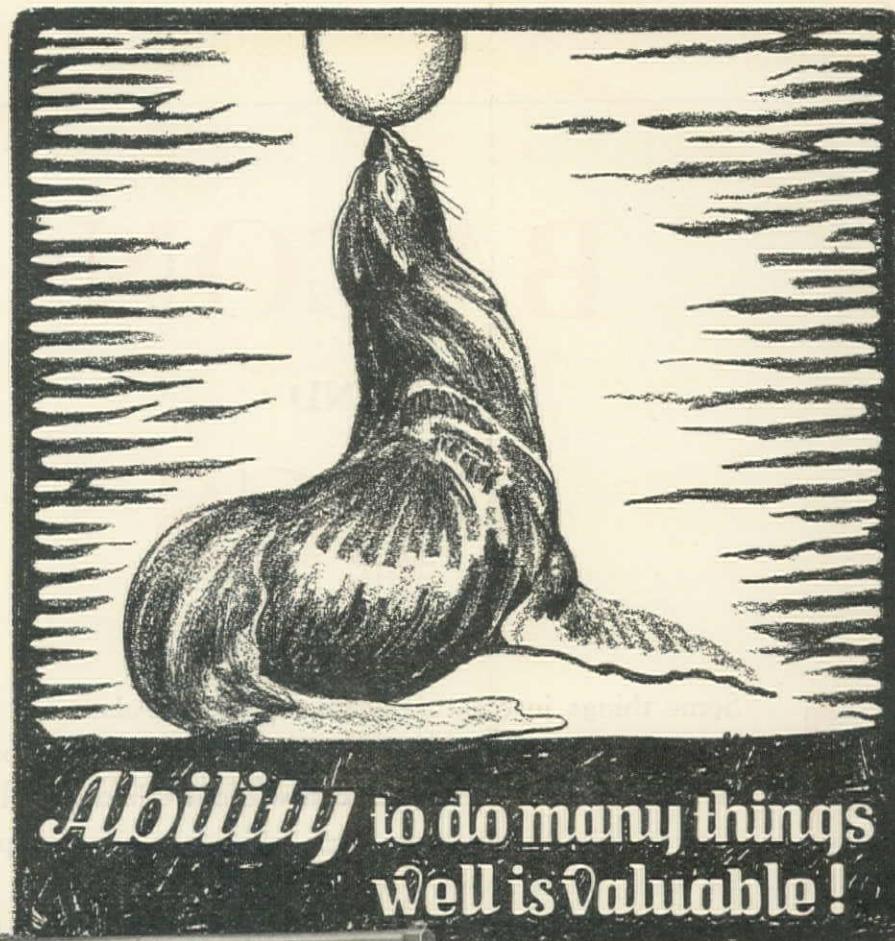
Some things just naturally go together—Adam and Eve—Black and White—Up and Down—Profit and Loss—etc. It's hard to think of Bacon without thinking of Eggs—or in this case, Pegs—which brings us up to the point we want to talk about.

Now a round Peg does a good job in a round hole, but it has to be hammered out of shape to plug a square one. The same thing is true of Construction Equipment. A Jaeger is the most efficient concrete mixer in the world, but it can't compete on a paving job with a MultiFoote Paver—which brings us up to the second point.

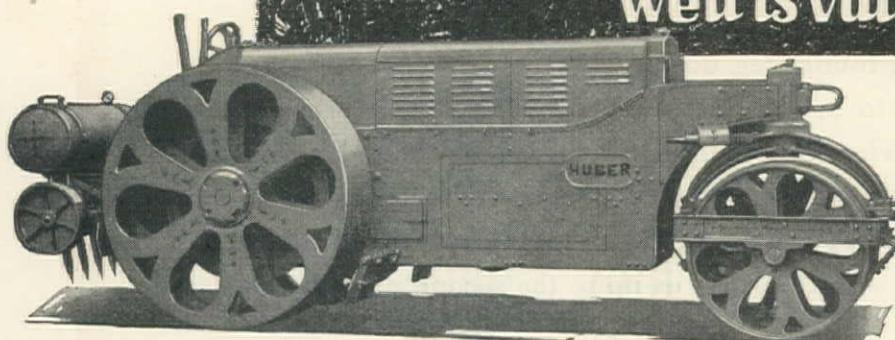
Every piece of Equipment in the Bacon line is built to fit specified needs—and the line is complete. That means round Pegs for round holes and square Pegs for square holes—the Right Equipment for the job. That gives you a chance to separate Loss from its little pal and makes it read: PROFIT.

It pays to buy it from Edward R. Bacon. We have branches in San Jose, Reno, Oakland, Sacramento, Fresno and Honolulu. Our Head Office and Display Rooms are at 17th and Folsom Streets, San Francisco, and the Phone Number is HEmlock 3700. Give us a ring.

IN SAN FRANCISCO
IT'S
BACON



*Ability to do many things
well is valuable!*



You'll like a *Huber* because of its all-round ability to do all types of road work. It takes the place of a number of different pieces of equipment—and does the work efficiently and economically! A *Huber* with sprinkling attachment is ideal for rolling hot asphalt—with scarifier it tears up old roads and streets to any accurate depth—with grader blade it levels off old roads in a hurry—many operations with one machine. Made in sizes from 5 to 15 tons.

Write for the *New HUBER* Roller Catalog

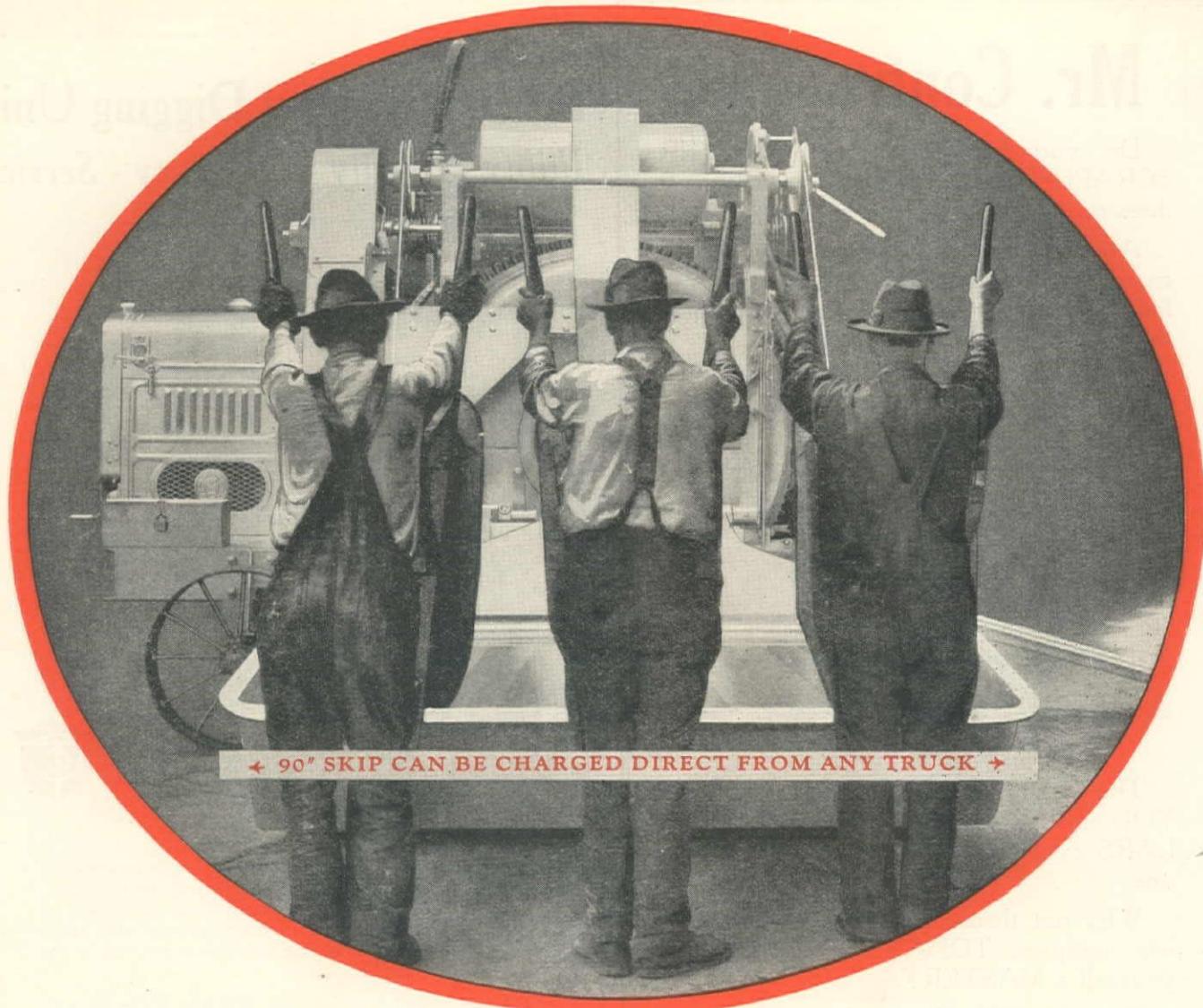
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17th and Folsom Sts., San Francisco

Phone HEmlock 3700

HUBER
MOTOR ROLLERS

When writing to THE HUBER MFG. CO., please mention Western Construction News

IT'S
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90" Skip Shaker Loader Makes Jaeger World's Fastest 14S Mixer!

This truck charging skip is optional equipment—at NO EXTRA COST!



—With Patented SKIP SHAKER!

Also available with standard loader, extension track or batch hopper, on wheels or skids, gas or electric drive.

ATCH by truck direct from proportioning plant to this loader and you get rigid control concrete cheaper than you can buy it anywhere, without stock piles, wheelers or bins, without a minute lost on material handling or charging, and with Jaeger's patented automatic Skip Shaker to slice more seconds off the loading operation for every batch. If you do use wheelers, three can load at one time, make real speed.

Faster concrete construction starts with a faster mixer. You need this 14S Jaeger and it doesn't cost a nickel more. Discharging time is cut to minimum, gives you a maximum thoro mix and all the easy handling of a short coupled, pivot axle, roller bearing truck, steel and ball bearing construction and original Jaeger one-man end control.

MAIL SLIP FOR CATALOG, SPECIFICATIONS, PRICES

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Edward R. Bacon Co., San Francisco
Smith Booth Usher Co., Los Angeles
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Clyde Equipment Co., Portland—Seattle
General Machinery Co., Spokane
Neil B. McGinnis, Phoenix, Ariz.

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BACON

Mr. Contractor!

Do you know that the MASTER SCRAPER loads on a turn as easily as it does on a straight pull?

And has it ever occurred to you how many hard-earned DOLLARS you are losing whenever you work tractor scrapers that you cannot load on the turn?



FULL Loads Are PAY Loads

The MASTER will load on a turn, and YOU are LOSING hard-earned DOLLARS every day you move dirt without one.

Why not throw away those old, obsolete scrapers, TODAY, NOW, and get yourself a MASTER?

The MASTER Rotary Scraper will cut and skip, underspill, finish grade and level. Manual load control or Automatic.

"It moves the Earth"

Simple Design Rugged Construction Easy Operation

Sold in Northern and Central California by:

EDWARD R. BACON CO.

FOLSOM AT SEVENTEENTH STREET
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Manufactured by:

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In One Compact Digging Unit Utility - Quality - Efficiency - Service



THE Cleveland Baby Digger, incorporating as it does in one compact, efficient unit, speed, mobility, strength, power and economy of operation, enables you to meet quickly and satisfactorily the ever-changing conditions present in the digging of trench.

If the trench is for a long line, the Baby Digger, with its wide range of speeds, assures fast, uninterrupted performance.

Carrying no excess tonnage, the Baby Digger, exceedingly mobile, is quickly and easily moved from location to location, on its special trailer, thus reducing the unproductive time and assuring the advantages of machine digging on the many short line jobs.

Precision built of the finest quality, best-adapted steels, its ruggedness and strength are unsurpassed; and more than amply powered, it digs through the toughest and hardest soils.

Extremely compact, only 58 inches wide, it operates easily in the most confined areas, thus enabling you to secure all the advantages of machine trenching on over 95% of your jobs.

Because of its availability and usability, the Baby Digger is a wise and profitable investment. Write today for full information.

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"Pioneers of the Small Trencher"

20100 St. Clair Avenue, Cleveland, Ohio, U. S. A.

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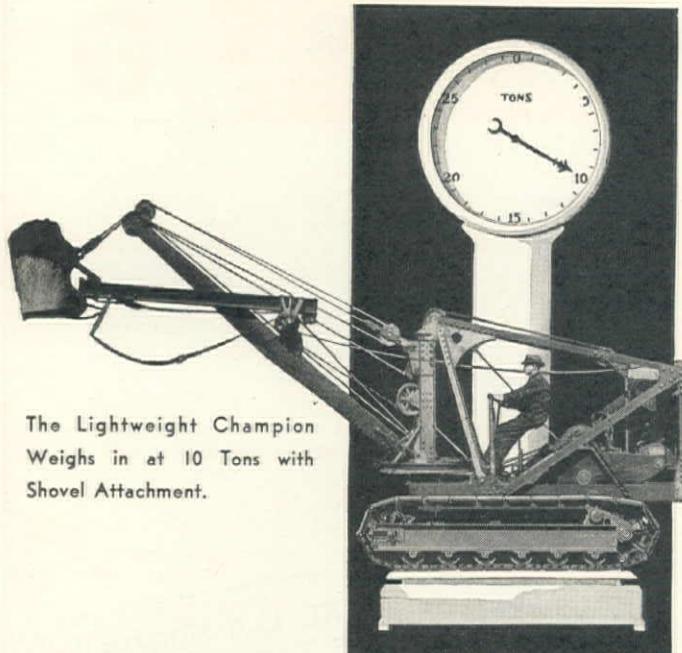
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Down



to **FIGHTING WEIGHT...**
Up to FINEST STANDARDS
of Big Rig Construction



The Lightweight Champion
 Weighs in at 10 Tons with
 Shovel Attachment.

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EVERYTHING you could ask for in light, clean-up equipment is found in Byers Model 40. Quality construction . . . weight, 10 tons with attachment . . . wide working ranges . . . speed . . . economy of operation and maintenance . . . all the desirable features needed, but never before actually combined in one small machine, are now offered to you in Byers Model 40.

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Builders of $\frac{3}{8}$ yd., $\frac{1}{2}$ yd., $\frac{3}{4}$ yd., 1 yd. and $1\frac{1}{4}$ yd. Machines.

BYERS model 40

A WORTHY ADDITION TO BYERS FULL CIRCLE LINE

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Material Handling Equipment

A model for every type of industrial and contractor use. The new gravel car unloader successfully works beneath all drop bottom cars without a pit for the unloader or conveyor. Write for literature describing the model best suited to your requirements.



UNIVERSAL BELT



IN THE GRAVEL PIT



CONVEYOR and SHAKER SCREEN



THERE IS A NORTHERN
OF THE TYPE AND
CAPACITY TO FILL
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SOLD ON CONVENIENT
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OUR FIVE YEAR
GUARANTEE

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**The Fast,
Stream-Line
Skip
on the**

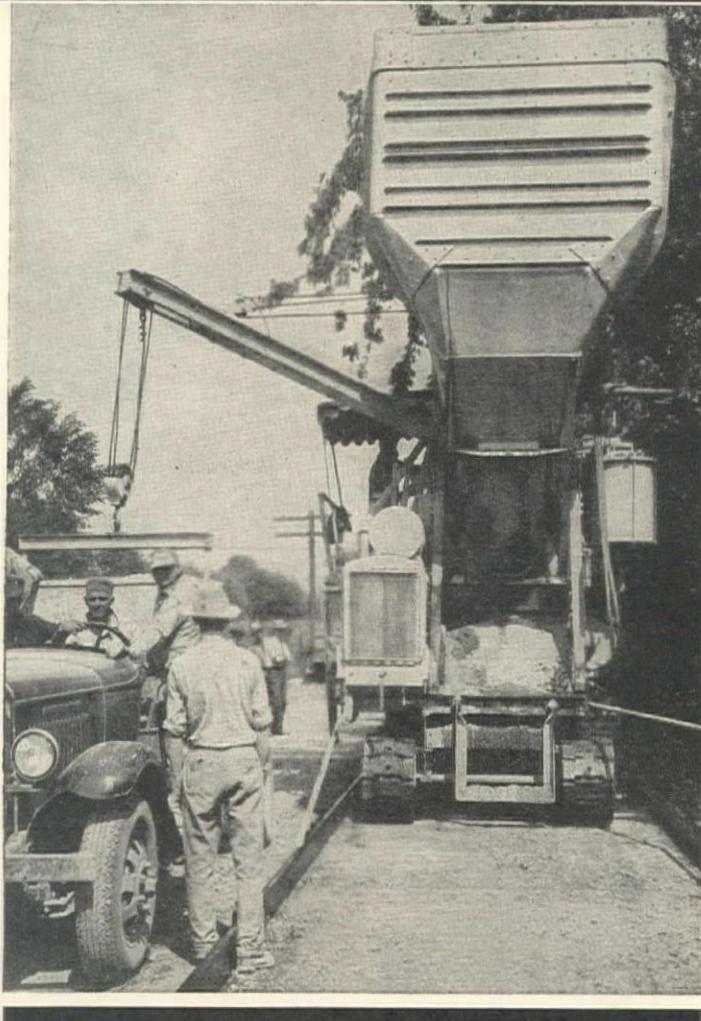
MULTI FOOTE PAVER

It handles every batch with the speed that is typical of every operation in the mixing and spreading of its concrete.

With either Truck-dump or Batch boxes, MultiFoote makes that unusual yardage, day after day, with ease.

Equipped with
Timken Bearings

Hercules Six-Cylinder
Heavy-Duty Gasoline Motor



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MultiFoote's Record for 26 years
assures Speed and Dependability.
Every proven, practical equipment
for the severest road tests.

THE FOOTE COMPANY, INC.

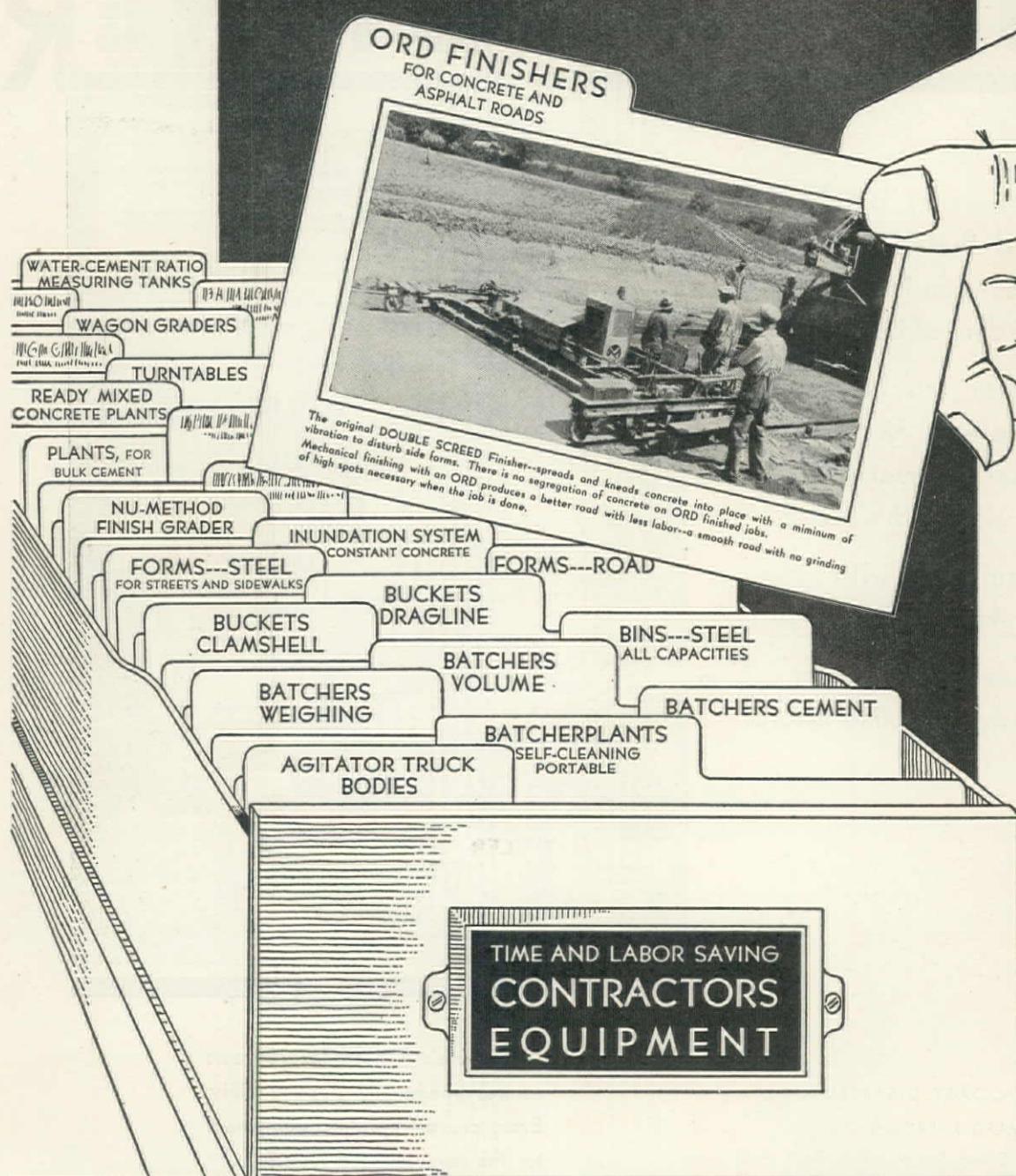
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World's Largest Exclusive Builders of Road Pavers

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

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Write to---

Descriptive literature on any or all items
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EQUIPMENT** will be sent to you.

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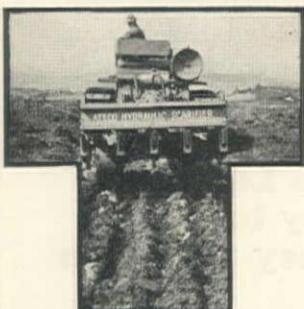
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ATECO EARTH MOVING EQUIPMENT



DIRT CHEAP!

ATECO Earth Moving Equipment has proved its low cost operation both in this country and abroad. Almost every unit has earned such profits for the contractor that more units have been purchased, often in groups of three or four.

The reasons for this unusual sales record are in the design and operation of the machines themselves. The Dirmover, Bulldozer and Scarifier are hydraulically controlled by a single lever on the operating deck of the tractor. The control mechanism is simple and absolutely accurate. With the Dirmover and Bulldozer, earth is loaded, transported and discharged in layers to meet any specifications, and the Scarifier will cut accurately to any required depth.

All of the units are electrically welded of specially hardened steel and built with a margin of strength to withstand the full power of the tractors for which they are manufactured. They are designed so that they are installed with no changes in the tractor and they can be quickly detached to free the tractor for other work. Combination outfits as well as the individual units are strictly one man control.

If a profit on a contract is an item, ATECO Equipment cannot be overlooked.

Sold Throughout the World

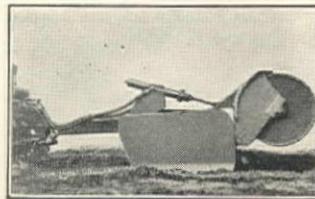
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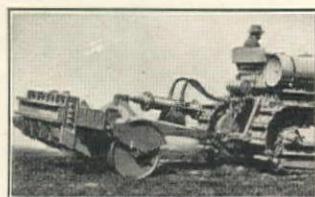
AMERICAN TRACTOR EQUIPMENT CO.,
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CUTS EARTH MOVING COSTS



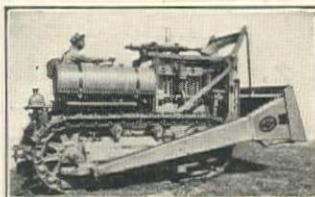
DIRT MOVER

ATECO DIRT MOVERS are manufactured in two sizes—the S10 (4 cu. yds.) for the "Caterpillar" Sixty and the S8 (2 cu. yds.) for the Thirty.



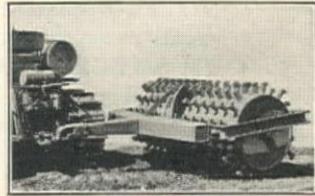
SCARIFIER

ATECO SCARIFIERS (Model R5) are built to withstand the full power of the "Caterpillar" Sixty. Accurate hydraulic control.



BULLDOZER

ATECO BULLDOZERS are manufactured in two sizes—the B8 (8 ft. blade) for the "Caterpillar" Thirty and the B10 (10 ft. blade) for the Sixty.



TAMPING ROLLER

The hollow, electrically welded ATECO TAMPING ROLLER can be filled with water to add still greater weight to its many teeth.



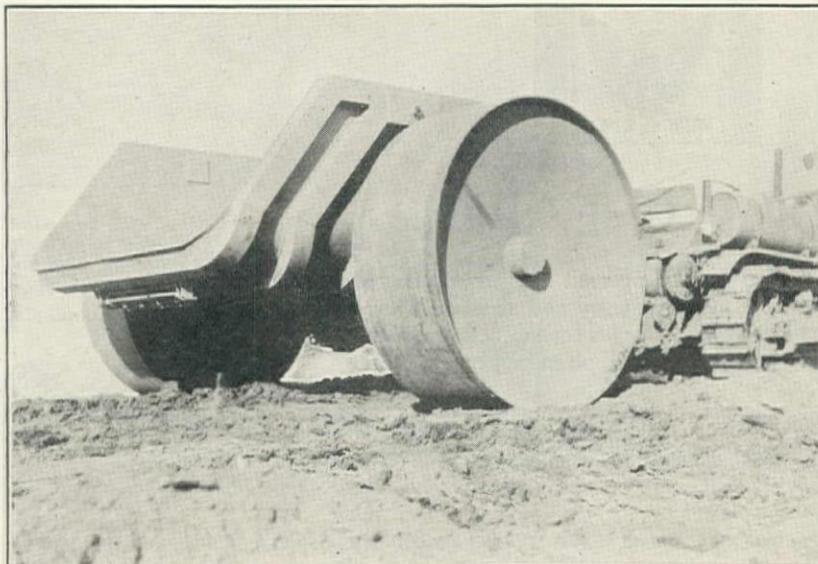
COMBINATION

ATECO COMBINATION OUTFITS offer extreme flexibility and economy for earth moving. They are operated independently through the one pump.

CUTS EARTH MOVING COSTS

Something New!

Le Tourneau Chariot Type Cart



Built at our factory at Stockton, California, and developed through practical experience on contract work. We can now offer this labor-saving, 2-wheel cart to the excavating contractors of the world. 78-inch wheels with 30-inch face mounted on heavy Timken bearings, made entirely of steel, electric welded throughout, with our power-winch control unit. 12 yards struck measure to the load.

**Easy to Load
Easy to Pull
Easy to Dump**

1. OUR BULL-DOZER—

Light, durable, high lift, easy to control, good for pioneering a road.

2. OUR 7-YARD SCRAPER—

For short hauls, loading and spreading, easily controlled by tractor driver.

3. OUR ROOTER—

For loosening soft rock or hard pan. Built to stand pull of two tractors.

4. OUR 12-YD. WAGON—

For long hauls used in connection with shovel or dragline. This 12-Yard struck-measure wagon beats everything.

5. OUR SHEEPS FOOT ROLLER—

For packing highways and dams.

6. OUR POWER-WINCH CONTROL UNIT—

Which you can't do without--handy for everything.

This type of equipment has practically nothing to wear out--a big saving in depreciation.

More dirt moved per man power means more profit to the contractor.

WE HAVE IT
Write for Free Booklet



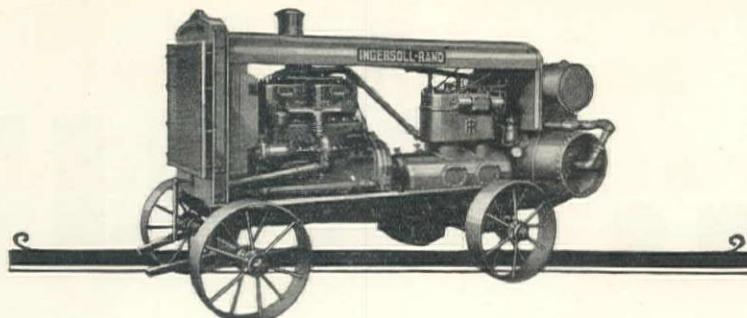
R. G. Le TOURNEAU, Inc.

Manufacturers of

"A Small Line of Big Things"

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The I-R Portable Compressor—standard mounting

The Most Complete Line of Portable Air Compressors

Ingersoll-Rand offers its standard portable compressors in six sizes, with capacities ranging from 66 to 310 cu. ft. per minute. These units are designed for maximum pressures of 100 pounds. There are, however, two recent additions to the line—a 204-ft. machine for discharge pressures of 125 to 150 pounds, and a 442-ft. unit supplying air at 50 pounds.

But the choice does not end here. The compressors can be furnished on an unusually wide variety of mountings; for example, steel wheels and



steel axles; rubber tires; four- and two-wheel trailers; Ford and Chevrolet trucks; or without running gear for mounting on skids, railway car, etc.

These compressors are backed by a service organization which has no peer the world over. There are branch offices, warehouses, and authorized dealers at convenient points throughout the United States and foreign countries. Write or phone our nearest representative; he will be glad to furnish details with no obligation on your part.

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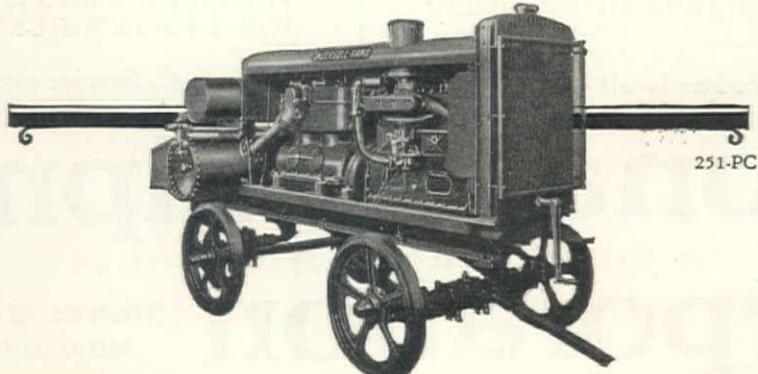
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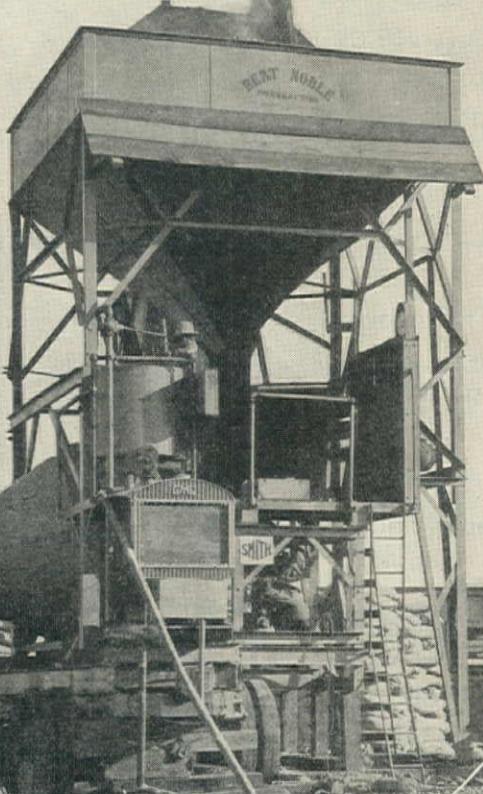
Ingersoll-Rand

The 8" x 6" Portable Compressor on I-R Trailer



251-PC

T. L. SMITH



For Central Mixing Plants

SAVES plant construction, equipment and operating cost because low bin height cuts "lift" of materials!

The Smith Weigh-Mix does not exceed height of standard mixer!

Weighs stone, sand, cement and water, making possible standardized quality concrete!

One man easily controls all operations!

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 KOEHRING — Pavers, Mixers; Power Shovels, Pull Shovels, Cranes, Draglines; Dumptors.
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 PARSONS — Trench Excavators, Backfillers.
 C. H. & E. — Portable Saw Rigs, Pumps, Hoists, Material Elevators.
 KWIK-MIX — Mixers: Concrete, Plaster and Mortar.

Vibrating hopper cleaner accelerates fast charging and cleans hopper to bring scales to balance! Smith high speed tilting drum discharge!

Frame easily taken down or assembled!

Smith Weigh-Mix for Central Mixing Plants 1, 1½, 2 and 3 yard capacities! Write for Smith Weigh-Mix Literature!

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Short Turns . . Long Hauls

UNDER

Tough Hauling Conditions

A

“CATERPILLAR”
REG. U. S. PAT. OFF.

TRACTOR

and a Large Capacity Wagon

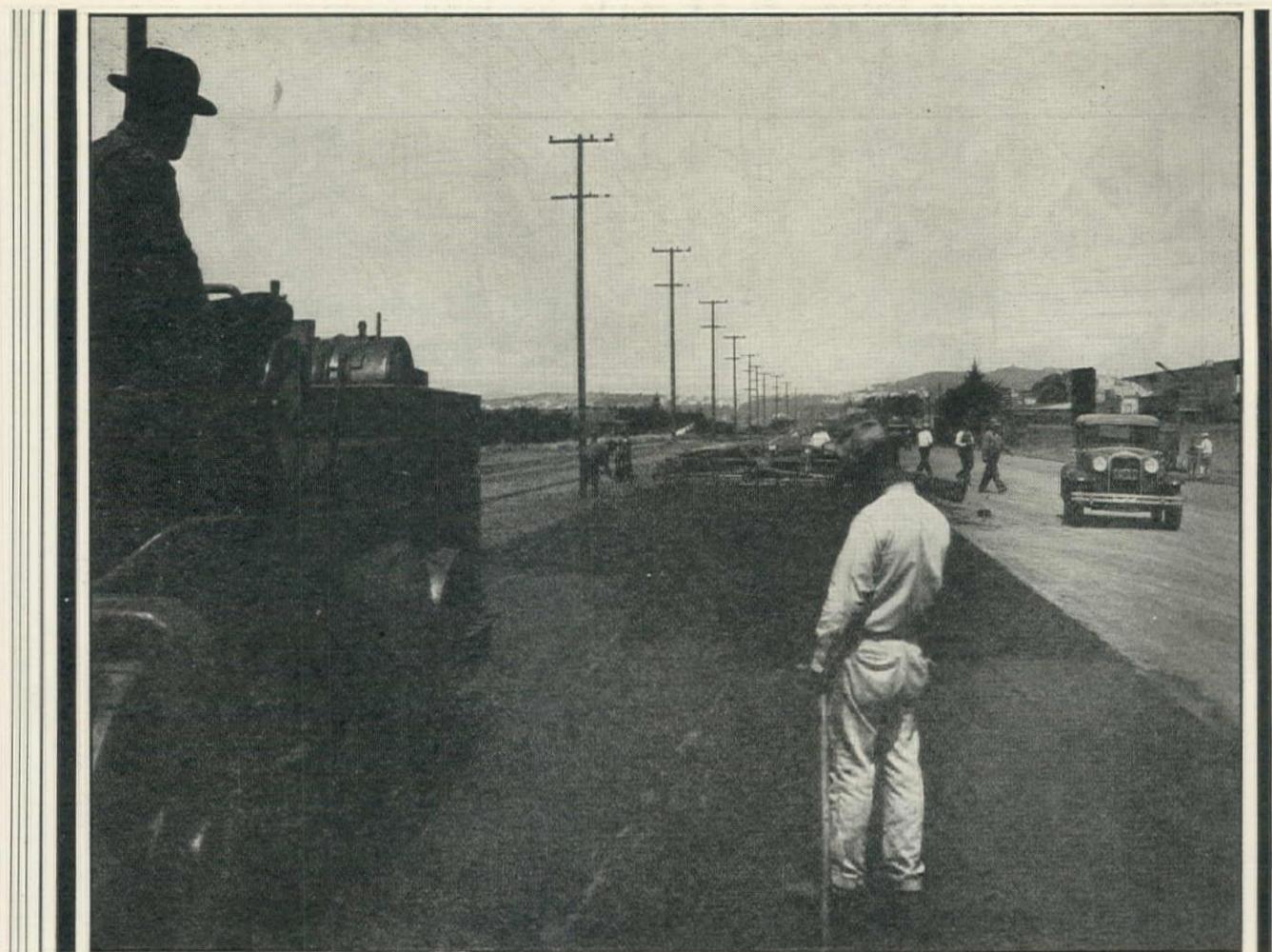
SIDE DUMP — END DUMP — BOTTOM DUMP



West Coast Tractor Company

1175 Howard Street, San Francisco

**“ATECO” DIRT MOVERS :: KILLEFER IMPLEMENTS
 MASTER BACKFILLERS**



NO DETOURS *away from business*

NO DELAYS FOR THIS PAVING!

If business falls off fifteen, twenty-five—even thirty per cent while paving goes on, that's a high price to pay for your streets and it's needless.

Traffic is not kept off your thoroughfares when Non-Skid Asphaltic Concrete is laid. Almost as soon as rolled—in twenty-four hours—sometimes in four or six—the entire streets are open to traffic—your paving job's done.

And you'll have smooth-paved business districts—Non-Skid—safe in any weather—resilient enough to absorb traffic impact for years at the **LOWEST MAINTENANCE COST**.

Maintenance has been very small—says Phoenix—yet since 1921 three miles of Asphaltic Concrete, just outside the city, have carried Arizona's heaviest traffic—5000 cars a day—more than ten per cent of them trucks! And sixty-five other Western communities report the same sort of service from Asphaltic Concrete highways—that have outlived their bond issues—that cost no more to build than other hard-surface pavements—usually a little less.

Look at the records—investigate Asphaltic Concrete before you pave.

STANDARD OIL COMPANY OF CALIFORNIA



Asphaltic CONCRETE **NON-SKID PAVEMENT**

When writing to STANDARD OIL COMPANY OF CALIFORNIA, please mention Western Construction News

Certified Performance Survey 51-AZ Made by Independent Cost Engineers

One of a fleet of six Linn tractors owned by the R. H. Cunningham & Sons Co., of Turtle Creek, Pa., and operating under the difficult conditions described in the impartial survey offered below.



**"MOVED 15%
MORE EARTH AND
SAVED ABOUT \$800 DESPITE SPRING THAW"**

"Linn tractors kept the job going without difficulty when the February thaw stopped other hauling equipment, thereby saving about \$800 through avoiding interruptions of operations. And the total movement was 15% more than had previously been hauled under the best possible conditions."

These findings are from the unbiased report of A. C. Nielsen Co., engineers on a road construction job. These engineers found Linn tractors hauling capacity loads (ten tons) through deep muck and mire where no wheel could turn, each tractor making twenty-four 1600-foot round trips daily, at a total cost of .146 per net ton.

A complete copy of this independent survey is available to anyone interested in heavy hauling. With it will be sent other interesting and convincing data.

Patent No. 1,270,531
Patent No. 1,521,454
Patent No. 1,685,641
Patent No. 1,685,676
Patent No. 1,701,979
Other Patents Pending

LINN MANUFACTURING CORPORATION

Division of LAFRANCE-REPUBLIC Corporation

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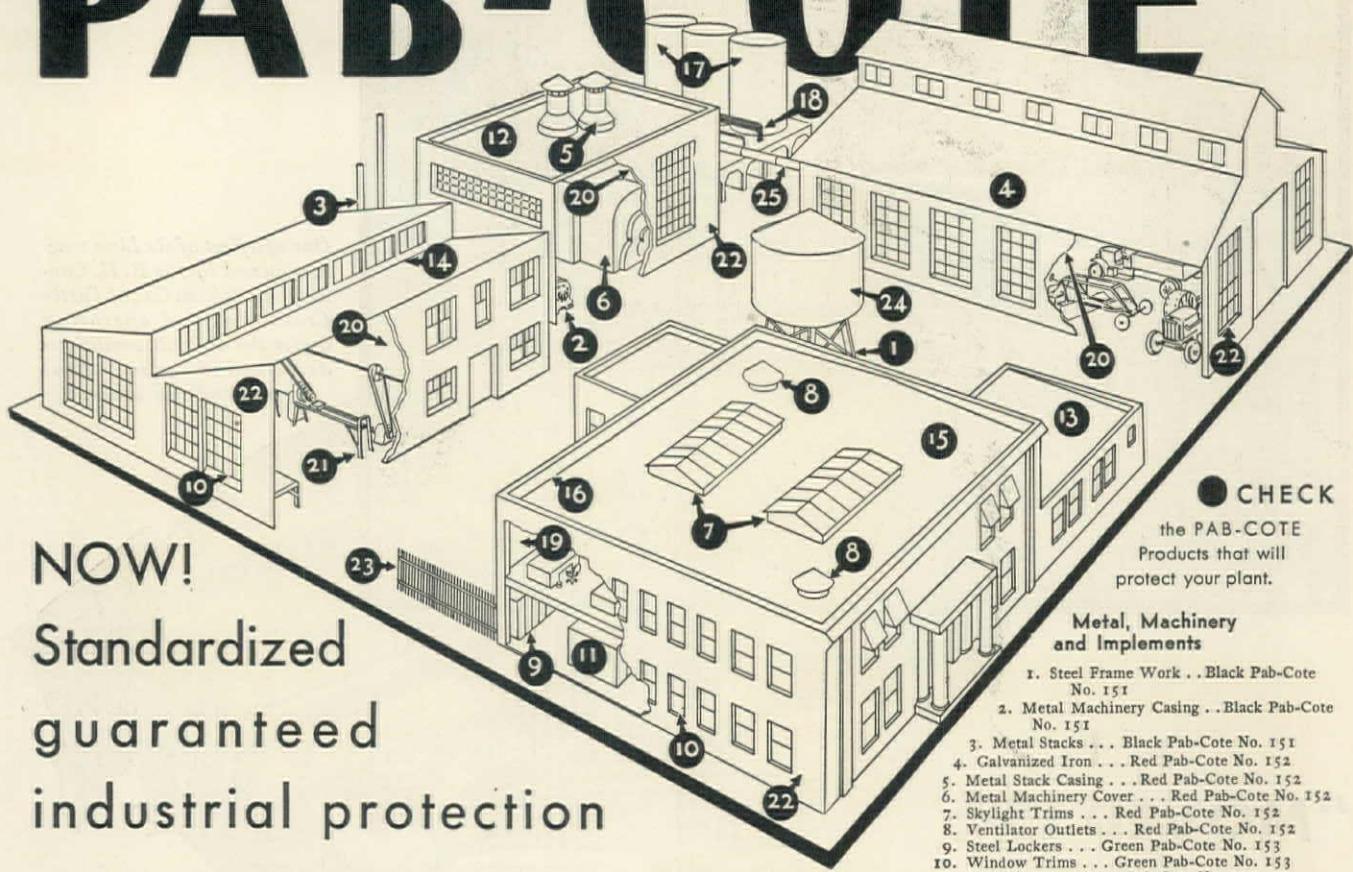
105 direct distributors located throughout the United States and 49 distributors located in 30 foreign countries

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NOW!
Standardized
guaranteed
industrial protection

At last, a definite standard of quality for protective industrial coatings...a completely developed yet simplified line of ready-to-use products that meets this exacting standard...an advisory service by a huge manufacturer with 47 years' experience in industrial protection... Summed up in four words...Pab-Cote Protective Industrial Coatings.

Now the plant executive can purchase his materials for the protection of all large-area surfaces with the assurance that under the Pab-Cote Green Rooster label he can get the one product best suited to each protective purpose. No uncertainty, no worry. Check the list at the right to select the Pab-Cote product that will do the work with greatest efficiency...

Purchase through a Pab-Cote Approved Distributing Agent, with a positive guarantee from the manufacturer of satisfaction or money back...

If desired the cooperation and advice of our Industrial Department will be placed at your disposal, without charge or obligation.

Pab-Cote...simplified, standardized, guaranteed coatings for industrial protection.

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● CHECK

the PAB-COTE
Products that will
protect your plant.

Metal, Machinery
and Implements

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2. Metal Machinery Casing . . . Black Pab-Cote No. 151
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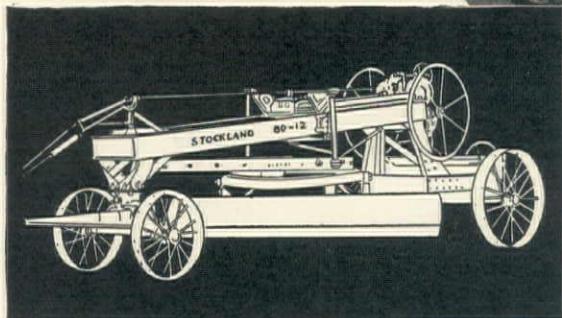
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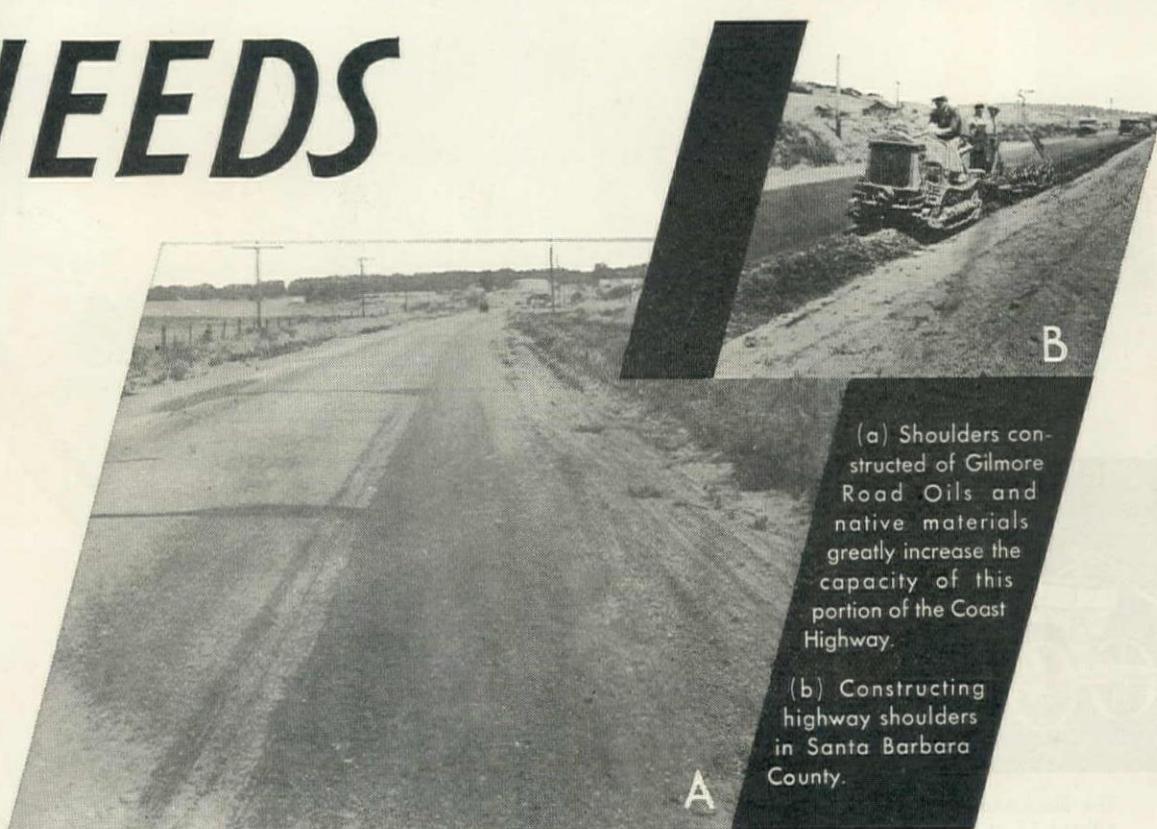
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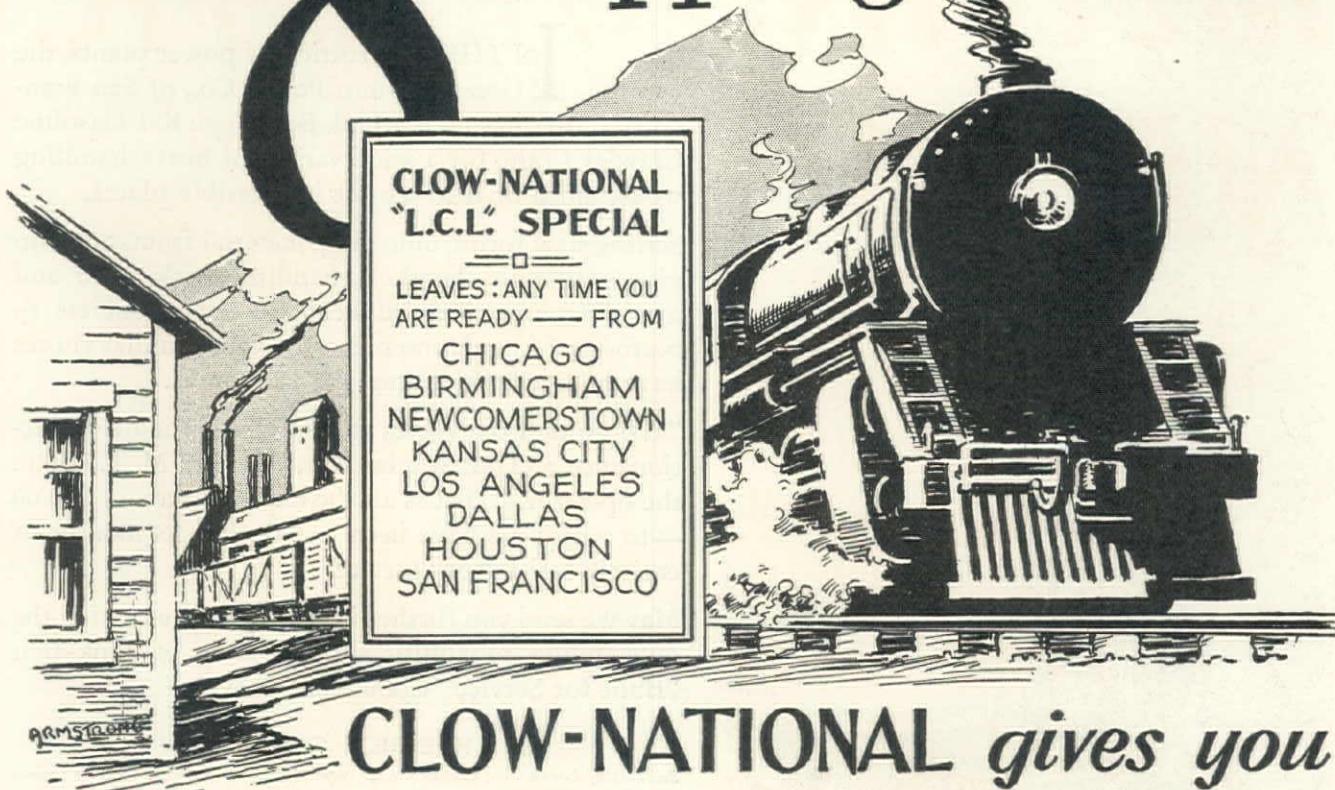


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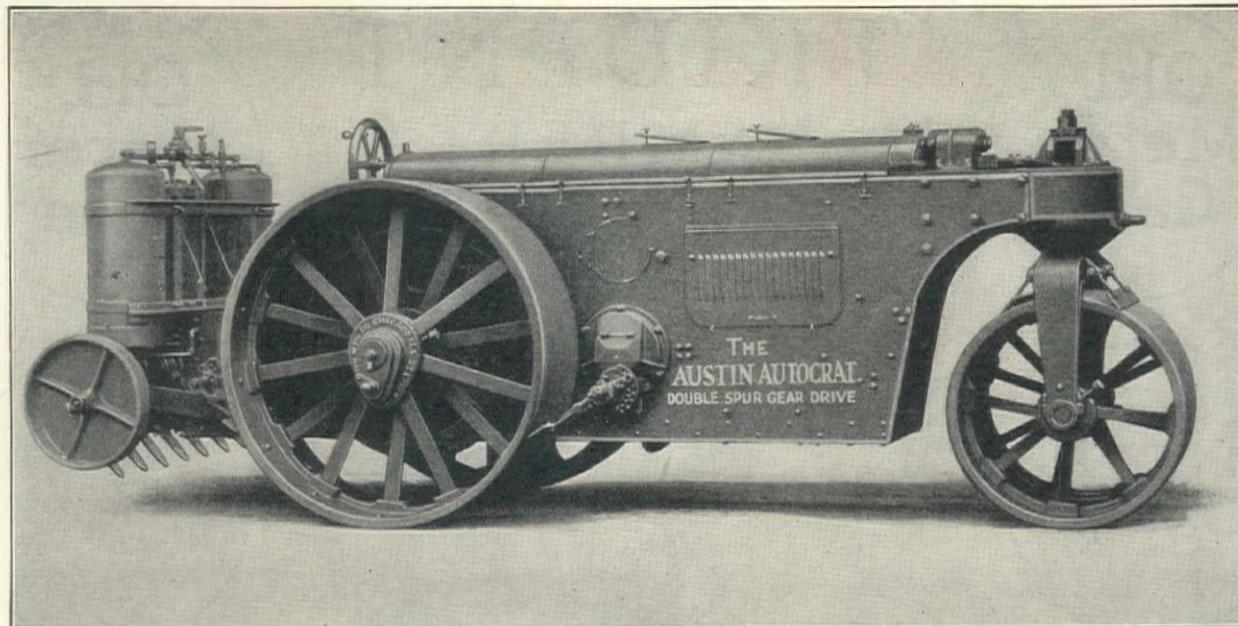


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A heavy-duty, 4-cylinder engine directly connected to a heavy-duty sliding gear transmission provides an abundance of power for every rolling and scarifying task.

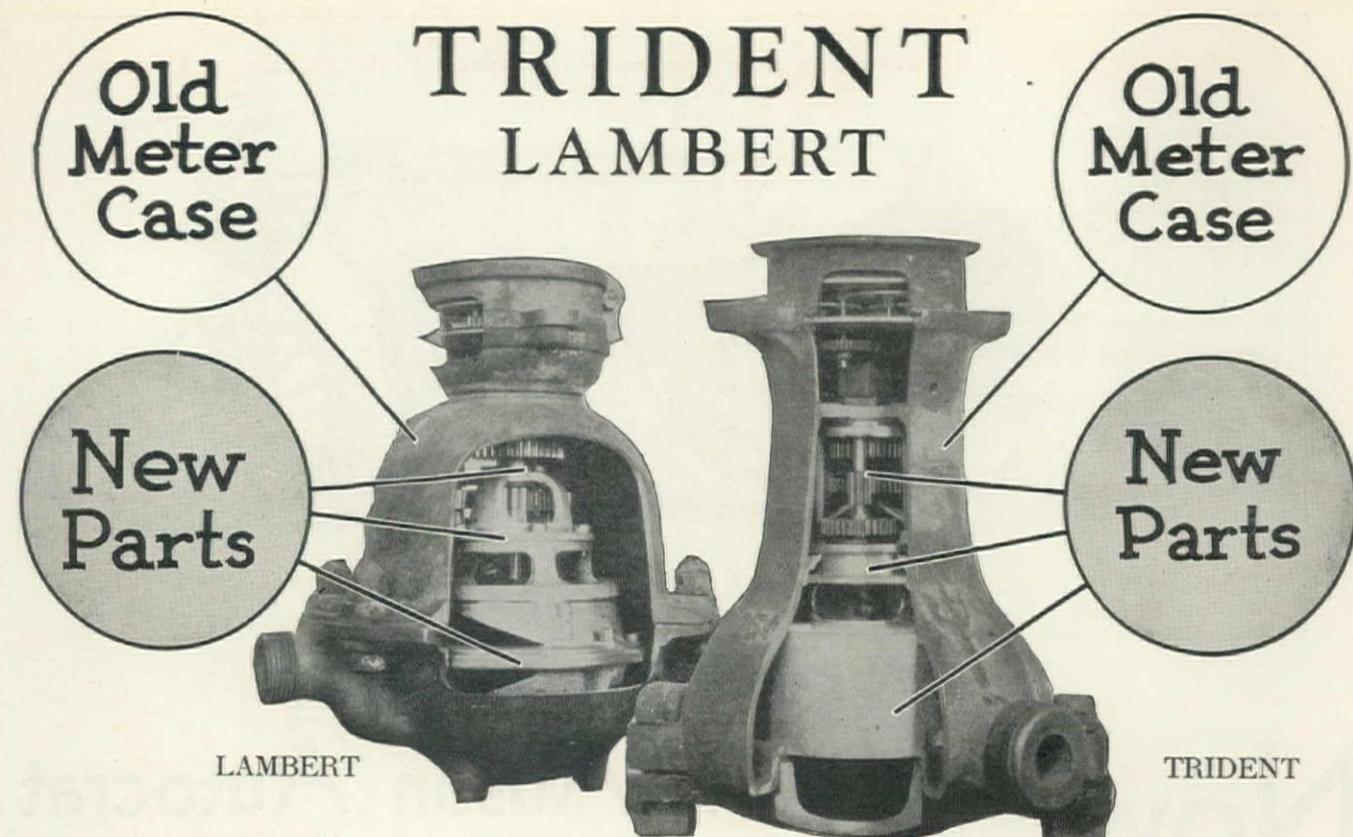
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VOLUME V

AUGUST 25, 1930

NUMBER 16

The building contractors were literally forced into economic-efficiency in construction with the advent of skyscrapers in congested districts. Without careful scheduling, speeding up of every operation, and elimination of delays, More Efficiency in Contracting a skyscraper could not be constructed in a congested district.

Most of the larger contractors of buildings, therefore, have learned the economic value of unit costs.

The engineering-contractor, partly from lack of necessity and partly because this type of construction in most instances is spread out over considerable territory, has been slow to properly schedule his operations, eliminate delays, and keep accurate and detailed unit costs.

When the U. S. Bureau of Public Roads started time studies of certain projects, the contractors were inclined to resent what they thought was an intrusion into their business. Nevertheless the engineers of the U. S. Bureau 'sold' their idea to the contractors who now realize that they are the ones being benefited the most. An interested case of improved economic efficiency as shown by the time studies made by the Bureau, is detailed in the article on H. W. Rohl's contract for the La Canada-Mt. Wilson highway, published elsewhere in this issue.

Pressure grouting of foundations has become as important a function of dam construction as the building of the dam itself. Without this means of solidifying the bedrock and preventing percolation under and around the dam, we would have to limit the height of dams.

Pressure Grouting Foundations

Probably the highest-pressure grouting so far used in dam foundations was at the Tepuxtepec rockfill dam in Mexico, described elsewhere in this issue. The geology of this damsite was complex and foundation poor, necessitating a cutoff wall 125 ft. below streambed. Although the dam is only 150 ft. high above bedrock, great care was exercised to obtain impermeability throughout the foundation, and special equipment was used for grouting at a maximum pressure of 1500 lb. per sq.in. It is interesting to note that with this high pressure and careful handling of the apparatus, grout holes which apparently were plugged to refusal, would suddenly release and take considerable more grout.

There is no doubt but that pressure grouting is a delicate and scientific job, and that we have much to learn about it. With higher dams and higher static heads on the foundations and abutments, we must grout with greater care and higher pressures.

Although emulsified asphalts have been used for road surfacing in Europe for some years (see series of articles in 1928 issues) their application in the United States is but two years old. That Emulsified Asphalt emulsified asphalt has 'come to stay' so to speak, is evident by the rapid increase in its use and by the number of producers of this product.

But, as pointed out by E. R. Hoffman in his article in this issue on 'Asphaltic Emulsions', we have much to learn about this product, its proper application and extent of its use, and the life and wearing qualities of this type of pavement. Also, there is danger in the use of emulsified asphalt manufactured by those unfamiliar with its technique. Fortunately there are several dependable manufacturers in the United States who can be relied on to safeguard this comparatively new road surfacing product.

Our contention from the beginning has been that the engineering-construction industry in the far west preferred a magazine covering all types of engineering-construction, with up-to-the-minute news, and a proper balance between technical and construction articles. The remarkable growth of this magazine on a basis of paid subscribers, and the pre-eminent position it has achieved, has fully confirmed our contentions.

We cannot hope to satisfy all our subscribers all the time, for they range all the way from the technical experts down to the construction 'stiffs', as Harvey Slocum, in the August 10th issue, refers to the fearless group who put into concrete form what the technician has planned.

We are glad to learn from the technical expert—see 'Letter to the Editor' on page 405—that the News pleases this group, just as we receive many letters from our 'construction stiff' subscribers that the News 'hits the nail on the head' for them.



You Can Always Go to This One

FROM May until October is the convention season—when professional men, tradesmen, and manufacturers meet with others of their craft, interchange ideas, and visit the exhibitors of products suited to their business use. There are two conventions of particular interest and importance to the engineering-construction industry in the Far West this fall—the 'Municipalities' and 'Sewage Works' joint convention at Long Beach, and the 'Water Works' convention at Pasadena, outlined elsewhere in this issue.

The convention habit is a good one. It combines cooperation and mind-nutrition into one pleasant vacational undertaking.

Go to conventions—attend every one you can. You'll meet a bunch

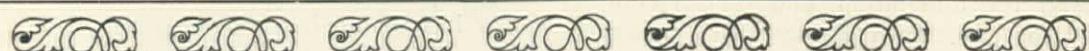
of the best fellows on earth and you'll get a wealth of good things from the sessions.

But supplement your attendance with regular visits to the all-year convention which Uncle Sam brings to your door.

The year-round convention for contractors and engineers is WESTERN CONSTRUCTION NEWS.

Its editorial pages exhibit the new and improved products for your business use.

Start now. After attending the editorial or convention part of this and the convention issues of September 25th and October 25th, you can walk down the aisles of the advertising pages, looking at the manufacturers' exhibits therein.



La Canada-Mt. Wilson State Highway, California

H. W. Rohl Company Moves Over 400,000 cu.yd. of Unclassified Excavation on 2.6-Mile Section of State Highway Through San Gabriel Mountains

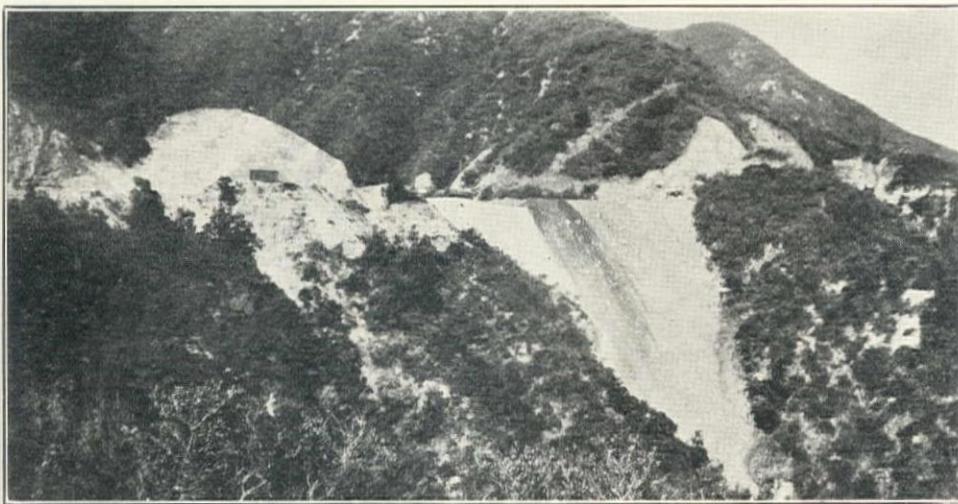
By R. W. EDWARDS

*Junior Highway Engineer, Division of Management, U. S. Bureau of Public Roads,
Washington, D. C.*

General Description of Project—More than 400,000 cu.yd. of roadway excavation moved with a loss of working time of less than 16% is a record set by the H. W. Rohl Co. of Los Angeles in grading 2.6 miles of the new La Canada-Mt. Wilson state highway. This project is the first unit of the new 26-ft. highway crossing the San Gabriel mountains from a point near La Canada. The highway is projected through a section of mountainous country which has never been made accessible and which is noted for its magnificent scenery. It follows closely the alignment of the Southern California Edison Co. maintenance road for its power line.

long. The remaining 100,000 cu.yd. was included in a number of smaller sidehill and thorough cuts. About 150,000 cu.yd. was scheduled to be moved up a 5½% grade through a distance of about 1200 feet, and the remainder down a grade of 5%. The largest fill on the job contained over 180,000 cu.yd. and was more than 100 ft. deep at the center. All of the fills were constructed by the end-dump method.

The contractor's operations were directed by Ben F. Wells, general superintendent for the H. W. Rohl Co., assisted by Oscar Swanson, grade foreman, and by Lee Tietzel and Robert Fontana, timekeepers. The major items of equipment employed were:



LA CANADA-MT. WILSON HIGHWAY, ARROYO SECO PROJECT, LOS ANGELES, COUNTY, CALIFORNIA—150,000-YD. FILL BETWEEN STA. 177+00 AND 180+00

The chief items of the contract,* together with approximate quantities and unit bid prices, are listed below:

Quantity	Item	Unit price	Total
400,000 cu.yd.	roadway excav., unclassified	\$ 0.38	\$152,000
140 sta.	clearing and grubbing	20.00	2,800
3,500,000 sta.yd.	overhaul	0.005	17,500
6,260 cu.yd.	structure excavation	1.00	6,260
355 cu.yd.	class 'A' portland cement concrete, structures	26.00	8,630
140 sta.	finishing roadway	10.00	1,400
	Reinf. concrete cribbing, aggregating	45,000	
Total bid		\$244,532	
Average of 16 bids received		\$305,500	

The excavated material was for the most part a diorite in more or less advanced stages of disintegration, and about 60% of it was blasted so as to facilitate high rates of shovel production.

Almost 75% of the total yardage was confined to a continuous sidehill and thorough cut over 4000 ft.

Two 1½-yd. Northwest gas shovels.
One 1¼-yd. Northwest gas shovel.
One 1¼-yd. Lorain 75-B gas shovel.
Nine 7-yd. Sterling trucks, special bodies, solid tires.
Six 10-yd. Sterling trucks, special bodies, solid tires.
Two '60' Caterpillar tractors with Ateco hydraulic dirt movers.
One '30' Caterpillar tractor.
One 12-ft. blade grader.
One 8-ft. blade grader.
One Ingersoll-Rand air compressor, portable, 250 c.f.m.

All of the equipment noted above was in good condition, with the exception of the 7-yd. Sterling trucks, which were rather old and in only fair condition.

Production Study—A study conducted on this project by the division of management of the Bureau of Public Roads, which study is one of many being conducted throughout the United States for the purpose of reducing unit costs of highway construction, indicates that this has been an efficiently managed grading project. The study of this project covered the period from January 13 to April 6, 1930, during which time more than 160,000 cu.yd. was moved. This period is

*For the unit bid summary see the August 10th, 1929, issue, p. 42.—EDITOR.

believed to be quite typical of the entire time during which heavy excavation was in progress.

Hourly typical stop-watch studies were made of the operation of each shovel on each day it worked. These studies involved the recording of the time to load, swing, dump, and return for each cycle during the observation, and also a careful record of all delays or time losses. Delays are classified as major and minor. Major delays are those of 15 minutes or more in length and minor delays are those of less than 15 minutes in length. Major delays are still further classified as delays under full operating expense with the entire crew on the job, and those occurring due to weather or wet grade, etc., during which most of the

shovels. Hauling studies were made to determine the standby or terminal cost per cu.yd. of loading material into trucks of different sizes and working under different conditions. These hauling studies disclosed the cost per sta.yd. of hauling over different grades and over roads of varying degrees of roughness.

A thorough study was made of the drilling and blasting operations. Records were kept of the number of holes and lin.ft. drilled per day, together with the springing and blasting charges in each. The yardage covered or affected by the blasting was determined by measurement, and a relation was found between the cubic yards loosened, the lineal feet of holes drilled, and the pounds of explosives used. Inasmuch as the



LA CANADA-MT. WILSON JOB—(UPPER LEFT) NORTHWEST 1½-YD. GAS SHOVEL CUTTING THROUGH HILL AT STA. 139+00; STERLING 7-YD. DUMP TRUCK IN FOREGROUND (UPPER RIGHT) THE W. LORAIN 1¼-YD. SHOVEL CAUGHT IN 4000-YD. SLIDE AT STA. 160+00; SHOVEL SHOVED TO EDGE OF 200-FT. CLIFF AND OPERATOR REMAINED AT THE LEVERS WITHOUT INJURY (LOWER LEFT) CATERPILLAR '60' AND McMILLAN SCRAPER (LOWER RIGHT) INGERSOLL-RAND EQUIPMENT FOR DRILLING

crew is laid off and costs are greatly reduced. Minor delays are usually the most serious and costly. These vary from a few seconds to several minutes. They occur frequently and cannot be ascertained except by systematic stop-watch studies.

The production studies conducted on this project disclosed that less than 16% of the total available time was lost through minor delays and less than 14% through both classes of major delays. This is quite unusual, as studies conducted by the Bureau during 1927 and 1928, on more than 60 grading projects, indicate that the average project losses approximate twice those on the La Canada-Mt. Wilson unit.

One of the chief uses made of the stop-watch studies of the shovel operation, was to determine just how much it was economical to spend to reduce or eliminate the various time losses. This was accomplished by computing the hourly cost of a shovel unit and multiplying this by the length of delay.

Stop-watch studies were also made of the operation of the other equipment auxiliary to the four power

material on this project is quite similar to that elsewhere in this locality, the results obtained on Rohl's job will be applicable to other sections of the La Canada-Mt. Wilson highway which are to be constructed in the future.

A complete tabulation of the time losses and daily and hourly production for each shovel is given hereafter.

Sequence of Handling Excavation—The contract for the first unit of this highway was awarded early in August, 1929, to the H. W. Rohl Co. and work preparatory to moving in the shovels was started August 19. Construction of a field office and supply base began August 21, and clearing and grubbing started on September 3.

About the middle of September, a 3/4-yd. P&H gas shovel was brought on the job and used for the next month in pioneering around and widening the existing Southern California Edison Co. road, which was to serve as the only means by which the different sections of the job could be reached. After completing

pioneering, this shovel excavated for a few weeks prior to being moved off the job. Shortly after, the four shovels shown in the equipment list were moved on the job.

Description of Operations—Clearing and grubbing was done by subcontract. This phase of the work took place as rapidly as was necessary and was completed well in advance of the shovel work.

Drilling and blasting was done by a crew of five men, consisting of powderman, an assistant powderman, two drillers, and a laborer. This crew was shifted about the job in such a manner that all tough and hard material was drilled and blasted prior to being excavated. Hence, with only this single drilling crew, it was essential to carefully schedule the drilling operations well in advance so that the desired yardage would be covered without delay to shovel operation. Studies conducted by the Bureau indicated that about 60% of the material excavated was drilled and blasted. These studies also disclosed that the average daily output for this crew was 132 lin.ft. of the hole or 1 lin.ft. per 13 cu.yd. of excavation. Giant powder (10,000 lb. of dynamite and 40,000 lb. of black blasting) was used in the contract.

Excavation and loading were accomplished by the

four gas shovels. These shovels were handled by highly skilled operators who understood the importance of reducing time losses to a minimum, and also the importance and advantage of fast but smooth shovel operation. The crowd was combined with the hoist, and the hoist combined with the swing, so that the cycle was a smooth continuous movement. Every effort was made to reduce the angle of swing and to place the trucks so that they could be loaded as quickly as possible. Idle time, due to lack of trucks, was utilized in casting material from the far portion of the cut to a point from which it could be loaded into the trucks on a reduced angle of swing. Moving forward and trimming slopes was usually done during a truck delay. Whenever practical, attempts were made to bring the shovel and trucks as high up on the cuts as the quantity of material warranted. Often, however, due to steep ground slopes and high cuts, it was necessary to drill slope holes, gopher holes, and lifter holes, and shoot the high material down to the shovel. This procedure obviated any necessity for constructing long hauling roads, hairpin turns, and switchbacks. Occasionally, the shovels climbed to the top of a steep cut and 'casted' the material below and then moved it a second time.

Comparative Summary of Shovel Operation

H. W. Rohl Co., La Canada-Mt. Wilson Highway, California

	Northwest gas 1 1/4-yd. (No. 3)	Northwest gas 1 1/2-yd. (No. 5)	Northwest gas 1 1/2-yd. (No. 6)	Thew-Lorain 75-B-1 1/4-yd. (No. 7)	Grand average
Condition of road	rough	rough	good	good	
Material	rough rock	block, rock and earth	block, rock and earth	fairly soft rock	
Number of trucks used	2.2	3.0	3.9	4.3	3.5
Length of haul, ft.	569	557	1,550	1,510	1,160
Total hours available	408	264	552	576	1,800
Total cu.yd. moved	24,562	20,902	45,683	65,420	156,567
Cu.yd. per day on days operating	533	697	725	990	761
Major delays, hours	52.82	36.50	88.75	63.70	241.77
Major delays, per cent	12.90	13.80	16.12	11.04	13.43
Hours equipment actually operated, including minor delays	355.18	227.50	463.25	512.30	1,558.23

OPERATING TIME DATA

Load, seconds	9.6	7.1	8.5	7.9	8.3
Swing, seconds	7.6	5.9	8.0	4.9	6.6
Angle, degrees	138	103	136	111	122
Dump, seconds	1.7	1.6	1.6	1.0	1.5
Return, seconds	8.2	6.1	7.9	4.7	6.7
Total cycle, seconds	27.1	20.8	26.0	18.5	23.1
Possible dippers per hour	132	173	138	194	159
Actual dippers per hour	111	131	115	172	132
Cu.yd. per dipper	0.62	0.70	0.85	0.74	0.75
Cu.yd. per hour, exclusive of major delays	69.1	92.0	98.0	129.0	99.0

MINOR TIME LOSS DATA (Per Cent)

Truck supply	2.0	1.38	2.1	2.68	2.16
Truck handling	0.3	0.30	1.9	0.54	0.68
Moving shovel	1.7	3.3	4.8	2.14	3.06
Engine trouble	0.3	0.17	0.3	0.10	0.22
Shovel repairs	1.4	0.7	0.7	1.25	0.91
Rocks or stumps	1.4	0.6	1.6	...	1.29
Rain	0.17	0.05
Wet grade	0.20	...	0.06
Shovel handling	0.5	0.7	0.9	0.17	0.56
Crowded roadway	3.8	1.2	1.4	1.07	1.83
Truck repair	2.9	6.4	1.7	1.51	2.57
Trimming	0.1	1.2	1.2	0.26	0.64
Miscellaneous	0.4	1.4	0.8	2.6	1.37
Total time lost, minor delays	14.8	17.35	17.6	13.4	15.38
Total per cent of available time spent moving dirt at 100% efficiency	72.3	68.85	66.28	75.56	70.19
Hours equipment operated at 100% efficiency	294.80	182.25	365.98	435.30	1,279.70

Hauling was done in 7 and 10-yd. Sterling trucks, solid tired, with specially constructed bodies which carried a load at least 60% larger than the ordinary 4-yd. truck. Consequently, the percentage of time spent in standing or loading was greater, while that spent in hauling and dumping was less for these large trucks than for the average 4-yd. truck. On this particular job, the large trucks proved very satisfactory.

Hauling-roads through the cuts and over the fills were maintained by two '60' Caterpillar tractors with Ateco hydraulic dirt movers. Toward the completion of the job, on hauls exceeding 1200 ft., a water tank sprinkler truck was used to sprinkle the hauling road and thus keep it firm. Truck speeds varied from



Theew 1 1/4-yd. (foreground) and Northwest 1 1/2-yd. Shovels at 4000-yd. Slide, Sta. 160+00

150 ft. per min. for hauls of less than 400 ft. over rough roads, to more than 1200 ft. per min. for hauls exceeding 1400 ft. over well maintained roads. In instances where it was impossible to blade the road, one or two laborers with shovels were employed to fill in the ruts with earth. Every effort was exerted to facilitate hauling.

Trimming slopes was done, as far as possible, by the shovels. In places where it was impossible to bring the shovels high enough, sloping was done by hand. The sloping crew consisted usually of five men.

Conclusions—The unusually high rate of time utilization attained on this job is attributed chiefly to two factors: first, the employment by the company of a high-type of personnel and the payment of wages commensurate with their ability; and second, a keen understanding on the part of this personnel, particularly the management, of the importance of the following:

1. Advance scheduling of operations
2. Conservation of shovel time
3. Thorough drilling and blasting to obtain high shovel production
4. Maintenance of smooth hauling roads

The engineering for the California Division of Highways was conducted by A. N. George, resident engineer, who was assisted by M. L. Bauders and R. J. Hatfield. S. V. Cortelyou is district engineer of district VII at Los Angeles and L. M. Ranson is constructing engineer for the southern district.

Acknowledgment—I am indebted to A. N. George, resident engineer, and to R. P. Rogers and C. F. Izzard, junior highway engineers, U. S. Bureau of Public Roads for assistance in obtaining and compiling the data submitted in this article.

GREAT NORTHERN AND WESTERN PACIFIC CONTRACT AWARDS

The Great Northern Railway has awarded the contract for the construction of its 88-mile section (Klamath Falls, Oregon, to Bieber, California) of the 200-mile connection between its system and the Western Pacific Railroad to A. Guthrie & Co., of Portland, who will in turn sublet sections of this work. The first 7 miles southerly from Klamath Falls is across the Modoc lava beds and the remainder through timber.

The Utah Construction Co. and W. A. Bechtel Co. who were awarded the general contract for the 122-mile section between Bieber and Keddie being built by the Western Pacific Railroad have sublet and allotted various sections as follows:

From Keddie northerly in order of sequence:

Morrison-Knudsen Co. 4 miles; Paul J. Tyler 4 miles; 7-mile section across valley to Greenville not awarded; Paul J. Tyler 4 miles; Utah Construction Co. Camp 4 miles; W. A. Bechtel 4 miles; Heiselt Construction Co. 15 miles.

From Bieber southerly:

W. H. Puckett & Co. 14 miles. There are several sections not yet awarded.

(See July 10th issue, page 337, for map and detailed quantities.)

SAN FRANCISCO BOND ELECTION

At the August primary, San Francisco taxpayers will vote upon four power bond issues totalling \$68,115,000, and divided as follows: \$44,600,000 to acquire the local distributing system of the Pacific Gas & Electric Co.; \$18,945,000 to purchase the Great Western Power Co. holdings; \$3,525,000 to build a transmission line between Newark and San Francisco, including stepdown transformers; and \$1,045,000 to build a power plant at Red Mountain bar.

There will also be on the ballot \$4,000,000 for enlargement and improvement of the airport at Mills Field, and \$1,000,000 for a municipal garbage incinerator.

MONTEREY COUNTY WATER WORKS SOLD

Western Continental Utilities, Inc., of which Chester H. Loveland is president and founder, has acquired the Monterey (California) County Water Works, a description of which appeared in the January 10th, 1930, issue, p. 19. Extensions and improvements will be gradually made to accommodate the resort area served by this system.

Tepuxtepec Rockfill Dam, Mexico

Highest Structure of This Type in Mexico Built by Mexican Light & Power Company in Northern Michoacan for Flood Control and Hydroelectric Power at Cost of \$8,000,000

By H. EADS MACGREGOR STEVENSON*

Formerly Construction Engineer, The Mexican Light & Power Co., Ltd., Mexico, D. F.

Editor's Note—H. Eads Macgregor Stevenson was born in San Luis Potosi, Mexico, in 1903. He was a student in the civil engineering department at the Agricultural and Mechanical College of Texas from 1921 to 1923. From 1923 to 1926 he was with W. E. Simpson Co., Inc., consulting engineers of San Antonio, as draftsman on highway work, inspector on reinforced concrete construction, transitman, and resident engineer (after September, 1924) on the Rock Springs-Del Rio highway in western Texas. Between 1926 and 1930 he served as construction engineer for the Mexican Light & Power Co., Ltd., on the following work: Tepexic hydroelectric plant on the Necaxa river, Tenango spillway, Tezcapa flumes and canal, and Tepuxtepec development on the Rio Lerma, described

Sierra Madres of western Mexico for a distance of 375 miles, emptying into the Pacific ocean. In its turbulent course it has brought disastrous floods to the Acambaro district, one of the most thickly populated and finest agricultural regions of the Republic.

After extensive studies of various damsites, work was started at a site near the small town of Tepuxtepec in northern Michoacan. At this stage, the Compania de Fuerza del Suroeste de Mexico, S.A., a subsidiary of the Mexican Light & Power Co., Ltd., applied for and obtained a concession to use for power

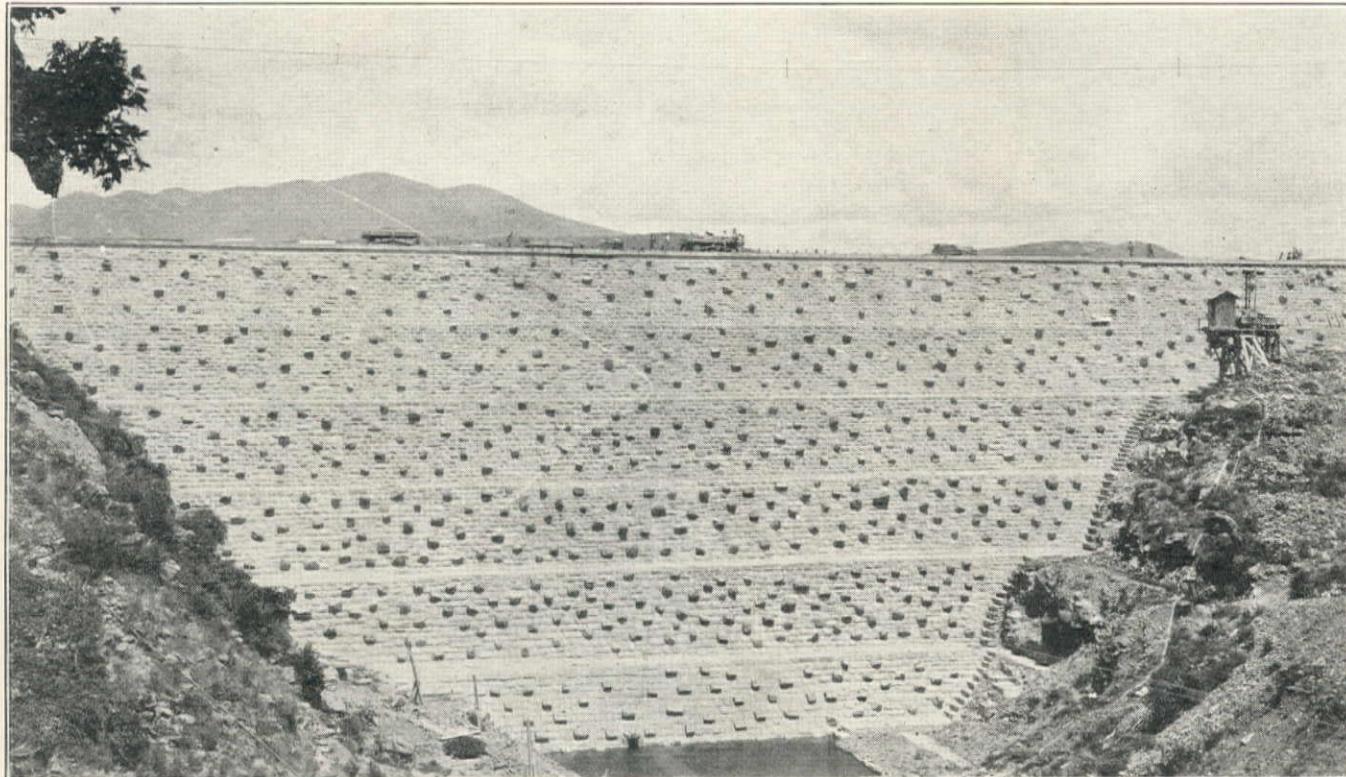


FIG. 1. TEPUXTEPEC ROCKFILL DAM LOOKING UPSTREAM UPON COMPLETION TO CREST ELEVATION 2343.5 METERS

hereafter. Stevenson returned to the United States in the fall of 1929 and, since November of that year, has been field engineer for the city of Stockton, California, on the Calaveras river flood control dam near Valley Springs.

Early in May of 1926 the Mexican government, under the Calles administration, began the greatly needed flood prevention and irrigation development in the valley of the Rio Lerma. This flashy river, receiving its supply from rainfall and from the melting snows of Mount Toluca, has its source in Lake Lerma, in the state of Mexico. It has cut its way through the rugged

development purposes the water made available by the construction of the dam. Further negotiations resulted in a formal contract between the company and the government, whereby the company took over construction of the Tepuxtepec dam. This work—done by company forces—was continued through 1927-28 and the dam was completed late in 1929. Construction of the hydroelectric plant will be completed by 1931.

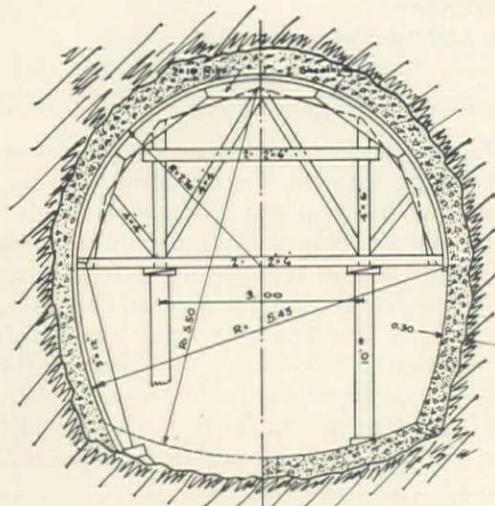
The estimated cost of the entire development, including the power plant, is \$8,000,000 gold.

Important features of the project were: a steep-

*Junior, American Society of Civil Engineers.

sloped rockfill dam of Italian design, made possible by the cheap labor of the country; a badly fractured foundation necessitating deep excavation and cement grouting at extreme pressures; a diversion dam of concrete buttresses and wooden stop-logs; and a diversion tunnel equipped with control gates for use as an irrigation outlet.

Exploration—The Tepuxtepec site was selected as



Typical Section of Diversion Tunnel
All Dimensions are in Meters

Fig. 2

the most feasible of four upon the completion of extensive diamond drilling, test pitting, and tunnel driving. This work was done under the direction of Wilbur H. Grant, consulting geologist, San Francisco.

The geology of the site was very complex. Under-

covered. This interesting formation was composed of basalt spalls, ranging in diameter up to 6 in., all firmly cemented together; its physical appearance being that it had been fired from some giant cannon.

Data obtained from the explorations indicated a major fracture in the streambed, requiring a deep cutoff, and that a rockfill dam was more adapted to the site than the originally-planned gravity section concrete structure.

Diversion Works—The site was unwatered by diverting the river through a horseshoe-shaped tunnel, 900 ft. long (Fig. 2), with a capacity of 2100 c.f.s. As this tunnel will be used as a permanent irrigation outlet, it was concrete lined and equipped with a cylindrical plug-gate operating in a concrete tower over the intake opening. This plug-gate or valve was manufactured by Verrina, of Italy.

The diversion dam consisted of concrete buttresses 6 ft. thick, spaced to a clear opening of 10 ft., which was closed by use of wooden stoplogs. The buttresses had a crest width of 10 ft. with an average width of 27 ft. across the base. The length of the dam was 330 ft., and its crest 25 ft. above the lowest bedrock.

These works functioned normally during the flood seasons and at no time was the work at the damsite in danger of high water.

Tepuxtepec Dam—This dam is of the rockfill type, with the upstream face paved with two reinforced concrete slabs tied into the fill by vertical keyways (Fig. 3). The downstream face is of dressed stone set in 1:3 mortar. The mass of the fill is clean basalt rock, hand-chinked to an average density of 25% voids.

The height of the dam above bedrock is 150 ft., and

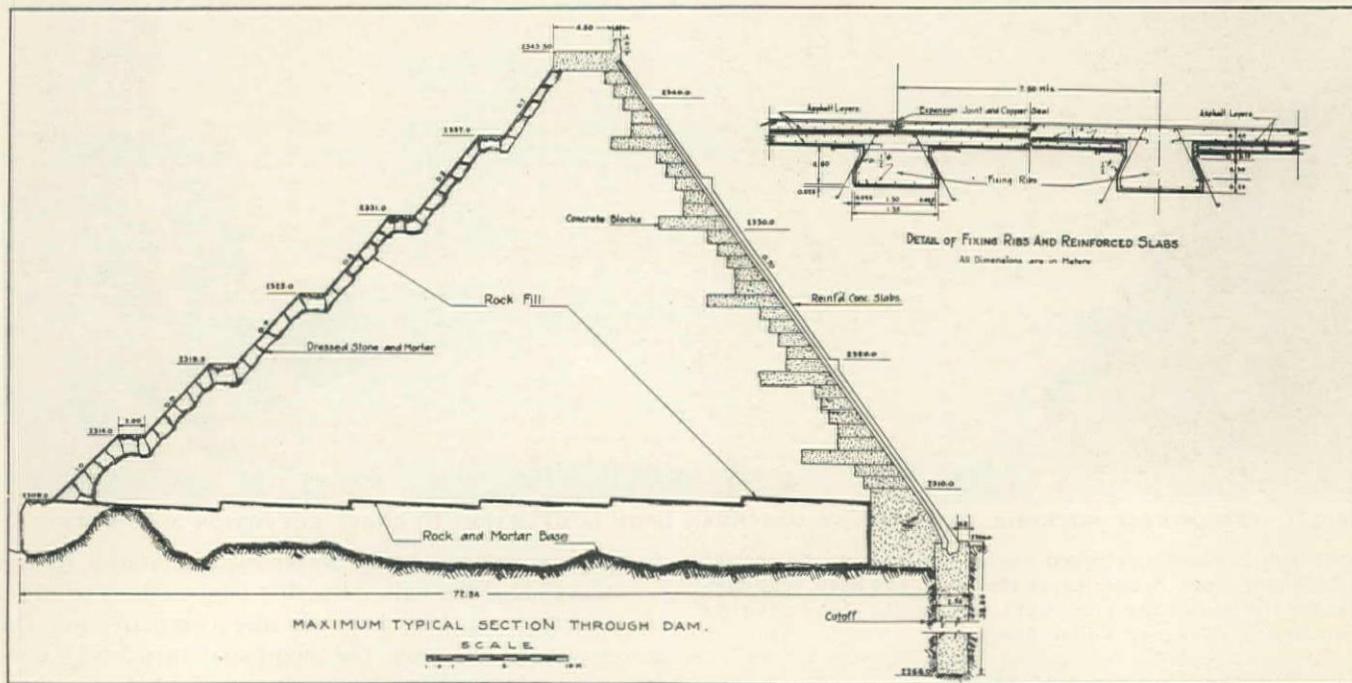


FIG. 3

lying a thick mantle of 'tepetate' or tuff, the basaltic formations ranged from a dense massive to a vesicular, from fresh to altered, with pockets of scoriated material that could be removed without the aid of explosives. In some zones, a formation known as 'A-a' lava, and common only to the Hawaiian isles, was un-

its crest length is about 900 ft. It has a crest width of 15 ft. and a maximum width across the base of 240 ft. The upstream face has a slope of 0.7:1, while that of the downstream gradually straightens from a 1:1 to a 0.7:1 (Fig. 3). A total of 91,000 cu.yd. of rock and 17,000 cu.yd. of concrete was placed in the dam.

The reinforced concrete slabs of the upstream facing bear against concrete blocks, which were poured against the rock fill. These slabs are separated by a 1-in. thickness of asphalt.

Drains, connecting to the main foundation drains, were left in the masonry to provide for any filtration.

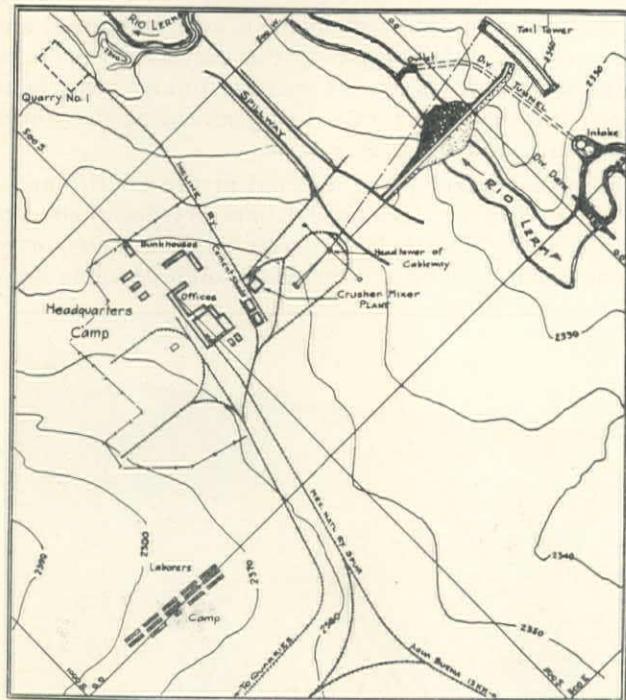


Fig. 4

Cableway skips were dumped onto the working area, and the rocks barreled into place and chinked. Native laborers, at an average wage of 60¢ (U.S.) per day, were used for this work.

The rock was spread in horizontal lifts and at no time was piling allowed. The concrete of the upstream blocks was placed by cableway directly against

discharging into tremie pipe extending down the face of the dam and into the wooden forms of the slab.

The asphalt layers were made up of precast sheets of Texaco asphalt of special specifications. These sheets were reinforced with expanded metal and joints between them were sealed with heated spatulas of special design. Fig. 7 shows work on the facing.

An important feature of the dam was its deep cutoff in the central portion of the streambed. This was made necessary by the uncovering of a major fracture filled with clay, scoriated material, breccia, and badly fractured 'platy' basalt. A depth of 125 ft. below the streambed was reached before reliable foundation was encountered. This cutoff wall has an average thickness of 8 ft. and is of dense concrete. Fig. 5 is a profile of the cutoff trench as excavated.

On account of poor foundation material, special efforts to obtain impermeability were made. Grouting at extreme pressures (maximum 1500 lb. per sq.in.) was accomplished by use of equipment imported from the Diamond Drill Borings Co. of Stockholm, Sweden. This equipment consisted of an electrically-driven hydraulic pump, double-chambered mixing drum, and special high-pressure gages and fittings.

Grout holes were drilled along the cutoff, on an average spacing of 15 ft., to depths corresponding to the reservoir head at that point. The holes were first washed with clean water, then neat cement grout introduced to refusal; the pressure being raised in direct proportion to the resistance offered by the underlying formations. When the maximum pressure was reached, this was applied to the hole for one hour to assure tightness. In some instances a temporary plug-up would occur, only to be broken down by the constant pressure, and the hole would take additional grout.

There was no uniformity to the pressures required. Some holes took only one sack of cement at 50 lb.

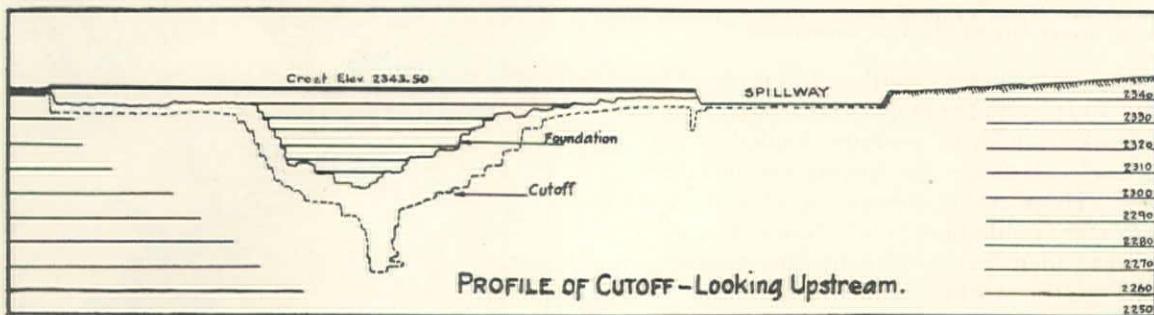


FIG. 5

The masonry fill—in the main—was hand placed. the rockfill. Wooden forms, with tie wires and pipe braces, were used in lifts of 5 ft. Rock and concrete were carried to the same elevation across the entire length of the dam before a new lift was started (Fig. 9).

The downstream facing of trimmed rock was placed by a 2-ton Insley gasoline crane with a 125-ft. boom. Projecting rocks were left in this face to provide bond for the ultimate width, when the dam is raised to full height. Fig. 1 shows the downstream face.

The concrete of the impermeable facing was also placed by the cableway through hoppers on the crest

pressure, while others took 20 tons of cement with a maximum pressure of 1500 lb.; some holes requiring days to fill. A continuous shift of workmen, therefore, was necessary; these men becoming expert in handling the equipment. Satisfactory results were obtained in this important high pressure grouting.

Reservoir—North, east, and southeast of Tepuxtepec extends the Yereje valley. Five other valleys—like fingers of a giant hand—converge into the Yereje to form the Tepuxtepec reservoir, which—at ultimate crest elevation—will impound 400,000 ac-ft. of water. Extending for a distance of 10 miles above the dam, this reservoir creates a shallow but picturesque lake,

with one finger reaching into the state of Guanajuato.

Construction Methods—On account of the remote location of the project, well-equipped shops were maintained at the damsite, including machine, blacksmith, and carpenter shops, a foundry, sawmill, welding booth, and a complete rigging loft. Major repairs were handled, and many spare parts made in these shops.

Electrical energy was delivered to the site over an 80,000-volt transmission line from the company's Necaxa plant, 200 miles distant.

For handling the rock and concrete to the dam, a

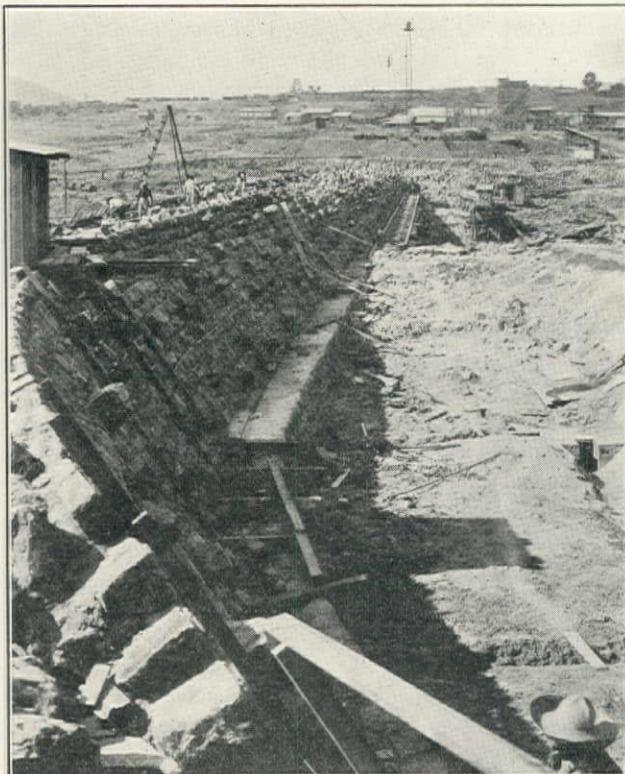


Fig. 6. Downstream Face, Looking South. Rock Crushing and Concrete Mixing Plant in Background

10-ton Henderson cableway, with a 120-ft. fixed headtower and a 70-ft. radial traveling tailtower, was used (Fig. 8). Rock from three quarries, loaded in 2½-yd. skips, was brought under the headtower in trains of 6 to 10 cars. Three trains were used, each hauled by a 20-ton Porter saddletank oil-burning locomotive. The skips were then transported by the cableway to, and dumped on, the working areas of the dam.

The deep excavation at the damsite, especially the cutoff trench, presented a problem, as the Henderson cableway did not arrive in time to be used for this work. Instead, three headframes, each handling 1-yd. buckets, were erected over the trench and the muck hoisted to the surface through shafts. Hand-trammed $\frac{1}{4}$ -yd. Koppel side-dump cars handled the muck from these frames to a spoil bank on either side of the river below the outlet of the diversion tunnel.

The spillway excavation was handled by a 1½-yd. Koppel shovel, operated by compressed air. The concrete lining was placed in wooden forms, filled from a track running from the mixer plant down each side of the spillway.

The driving of the diversion tunnel was done by

the heading and bench method, using two headings. Waugh drifters, model 17, mounted on horizontal bars were used in the headings, while Ingersoll-Rand DCR-23s were used on the benches. Muck was shoveled by hand off steel muck plates into $\frac{1}{4}$ -yd. Koppel side-dump cars which, in the intake heading, were hand trammed to a shaft and hoisted to the surface. In the outlet heading, an inclined adit was used, and the muck hauled directly to the surface by a 5-ton Lidgerwood air hoist. Concrete lining was hand placed into wooden forms, being mixed at the outlet portal in a Koehring 28-S mixer.

A crusher-mixer plant, erected at the south end of the dam (Fig. 6) furnished laboratory-designed concrete to the cableway. Aggregates were transported to the headtower by a 5-ton Whitcomb gasoline loco-

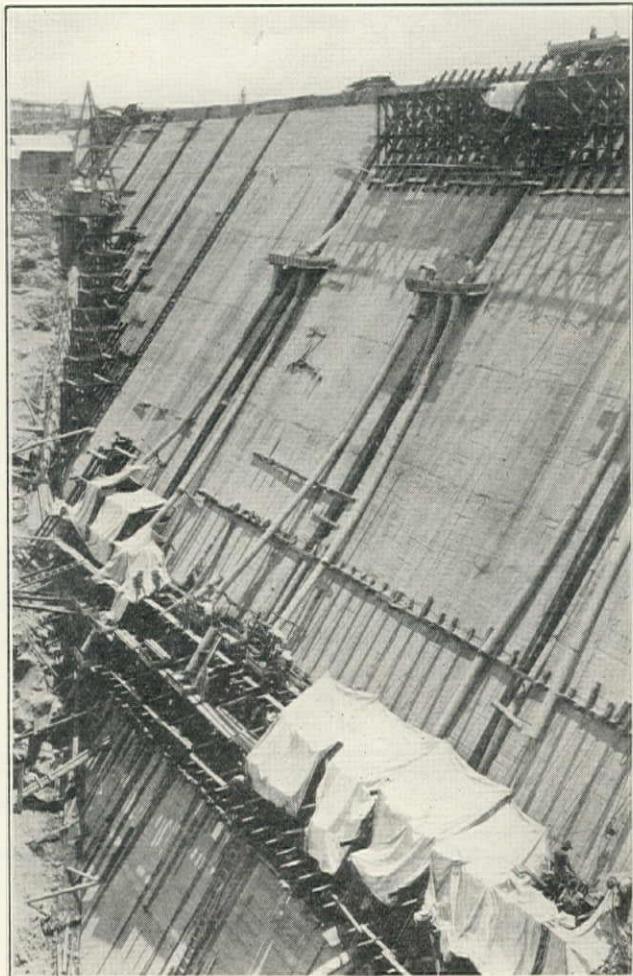


Fig. 7. Placing First Layer of Impermeable Concrete on Upstream Face

motive pulling two Steubner 2-yd. bottom-dump concrete buckets.

Quarried basalt, sent to the plant over an incline railway in Western 2-yd. side-dump cars, was dumped onto an apron feeding a No. 6 Krupp gyratory crusher. A Telsmith bucket elevator raised the product from the crusher to a revolving Telsmith screen which discharged into bins of 125 cu.yd. capacity each. Oversize rock was carried off the end of the screen into a rejection chute which fed two Jumbo Jr., Williams sand mills and two No. 6 Krupp jaw crushers. These dumped onto a 24-in. conveyor belt which fed back to

the bucket elevator. The artificial aggregates were measured by volume in Blaw-Knox batchers hung directly beneath the bins, then dropped into an Insley end-dumping car which was pushed by hand to a hopper above the Koehring mixer. Two of these mixers were installed side by side and were used alternately for continuous concreting.

Grading of the aggregates was closely watched to insure uniform concrete. Trouble was experienced at first in keeping a uniform sand, due to excessive wearing of the hammers in the sand mills. This was corrected by keeping an operator on each mill, raising the breaker-plate as the hammers wore.

Cement from La Tolteca plant (of the Company of that name) was shipped by rail to the damsite, where it was stored in warehouses. These warehouses were connected to the mixer-hopper by an incline railway operated by an Ingersoll-Rand 'Little Tugger' hoist.

A complete testing laboratory, of which I had charge, was maintained for rigid control of the cutoff and paving concrete. Equipment included a 200,000-lb. Reihle testing machine, a Tinus Olsen tension machine, and apparatus for chemical tests of cement. Impermeability tests of the concrete and all physical tests of the asphalt used in the upstream paving were also made. Twenty-eight and ninety-day tests were made on all concrete to check designed strengths.

Because of the harshness of the aggregates, some difficulty was experienced in designing workable mix-

The grout holes were put down by two Denver deep-hole drills, each using Waugh model 34 drifters, these drills having a capacity of 100 lin.ft. For the deeper work, two Sullivan diamond drills, types H and S, were used, both operated by American drillers.

In the quarries, the open-face method of excavation



Fig. 8. Looking North Across Tepuxtepec Dam, January, 1929

was used. Black powder, loaded in vertical holes drilled by the Denver deep-hole rigs, was used to bring down the rock. An air-operated Model 60 Marion railroad shovel, a 2-ton electric car-derrick, and many small 2-ton air-driven stiff-leg derricks were used to load the rock into the skips, which were set on individual flat cars.

Because of the many different formations uncovered

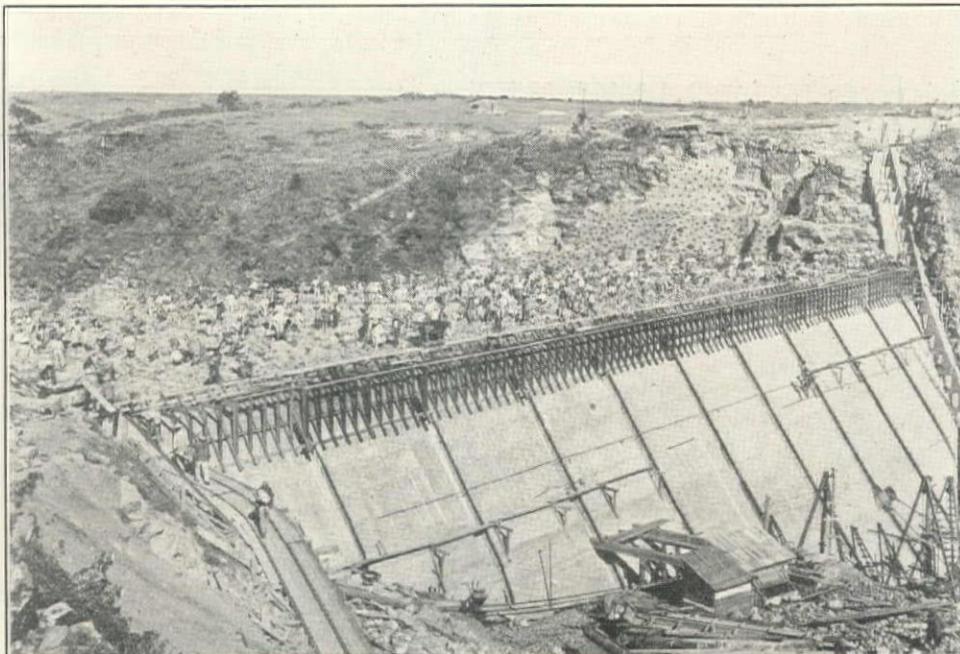


FIG. 9. TEPUXTEPEC ROCKFILL DAM LOOKING NORTH, SHOWING UPSTREAM FACE AND CUTOFF WALL

tures which would remain within the limits of the required strengths. But this was overcome by close check of the mechanical grading of the aggregate as produced at the crushers and mills.

Field mixes were as follows:

Use	Mix	Cement (Bbl. per cu.yd.)
Cutoff	1:2.75:3.5	1.2
Paving	1:2.3:3.2	1.5
Concrete blocks	1:4.7:4.7	0.9
Spillway lining	1:4.2:4.2	1.0

These mixes resulted in plastic, workable mixtures, all giving the required high strengths at 28 days.

in these quarries, great difficulty was experienced in keeping a working face. Waste ran as high as 50%, and in some instances an entire shot would be pulled in material unsuitable for the dam.

Labor—Fortunately, the project was situated in the heart of a rapidly declining mining district, and experienced native labor of all classes was abundant. A maximum of 3600 men was employed, with an average of 1500 during the life of the job.

Settlement Data—A total settlement of 0.50 meters

(1.64 feet) was allowed for in the design. This would drop the crest elevation from 2343.50 to 2343.00.

During construction the fill was sprinkled with water to further the filling of voids by carrying rock particles into them, and to decrease settlement.

A close check was kept on the settlement of the structure during construction. Brass bolts were set in the downstream berms and the two steps of the upstream paving. These bolts were set both for alignment and grade, there being a transit station on either side of the gorge—concrete monuments set in the rock walls of the abutments, corresponding to the elevation of each berm. Any movement up or down stream was observed by setting a transit over the monument, fore-sighting across the gorge, then observing the position of the bolts. Settlement was measured by direct leveling from benches set on the transit stations at each end of the berms.

Observations up to the time of my departure disclosed a maximum settlement of 0.005 meters (0.018 feet) with no deflection up or down stream. This was with an empty reservoir. Further readings were to have been made during the rainy season when the reservoir would be full.

Personnel—A. Omodeo, of Milan, Italy, was consulting engineer, and was represented at Tepuxtepec by G. Tonini and G. Gibellini, the latter being the company's hydraulic engineer with offices in Mexico City. Willis Ranney was construction superintendent with B. Giono and myself as principal assistants.

G. R. G. Conway is president of the Mexican Light & Power Co., with offices in Toronto, Canada, and Mexico City. W. H. Fraser is general manager, with offices in Mexico City.

YOSEMITE NATIONAL PARK Sewerage System

Construction is well underway on \$140,000 of improvements to the sewerage system at Yosemite National Park, California. This work is being done by day-labor forces under the general supervision of H. B. Hammon, district engineer, U. S. Public Health Service, San Francisco, and under the direct supervision of O. G. Taylor, resident engineer at Yosemite.

The improvements consist of 21,000 lin.ft. of 20-in. vitrified pipe and a sewage treatment plant.

Trenching for the 20-in. pipe (manufactured by Gladding, McBean & Co.) is being done by hand on account of trees and angles in line, and is 60% completed. Laying of pipe, average depth 6 ft., is being done with flexible asphaltic joints, using Standard Oil single 'X' compound with a primer coat of Oronite first applied to bell and spigot. Where pipe is 8 ft. or more in depth, a saddle of concrete is poured under pipe up to spring line.

The sewage treatment plant consists of: Free settling tanks, activated sludge tank, Dorr clarifiers, covered sludge digestion tanks with gas domes, gas storage tank, and glass-covered sludge beds. Provision has also been made for heating the sludge. This is the first installation in the Far West of glass-covered

sludge beds. Concrete has been poured for the major units.

The design, construction, and operation features of this project will be published after completion of installation.

YACHT HARBOR IN SANTA MONICA BAY, CALIFORNIA

Construction has started on a precast concrete seawall or breakwater in Santa Monica bay, which includes several unique features. It will extend in a northerly direction from the outer end of Santa Monica's 2000-ft. pleasure pier a distance of 2000 ft., paralleling the shore and enclosing a 10-acre yacht harbor.

The project will cost \$400,000 and is financed by C. E. Hewing, vice-president of the Deauville Beach club and other local sportsmen. Taggart Aston, civil engineer of Santa Monica, designed the seawall and will supervise its construction, buying the materials needed and hiring the necessary labor; it is to be completed in 18 months.

Twenty huge reinforced concrete boxes will constitute the seawall, which boxes are to be constructed at Los Angeles harbor (San Pedro), floated to position, then sunk by pumping them full of sand. Each box will be 100 ft. long; 35 ft. wide at the bottom, and sloping on the inside to 24 ft. wide at a height of 39 ft. where there will be a level walk 12 ft. wide on the inside. Estimated weight when filled with sand is 5800 tons per box. The outer half of the wall will rise 10 ft. higher, sloping down from the outer edge to the walk below in a series of steps, which will be used as seats for spectators. The seating capacity of the entire structure will be 20,000. Ornamental lights and other conveniences will be installed.

The walls of the boxes will be 2 ft. thick, heavily reinforced, and the interior will be thoroughly braced with reinforced concrete ribs. A coating of chemicals will protect the concrete from salt water attack.

The bottom of the sea, which at this point is 24 ft. deep, is practically level, but will be dragged until exactly so, then covered with a layer of stones and asphalt to receive the wall. The upper 10 ft., including the level walk, will not be built until the boxes have been pumped full of sand.

A 25-year lease of the harbor site for the use of pleasure craft has been granted to W. E. Craven, who represents the project backers.

The cost of the concrete box breakwater will be about the same as one built of rock in the usual manner. The main reason concrete construction was chosen instead of a rockfill is because it can be moved by pumping out the sand in case a different location is deemed more desirable at a later date. Another deciding factor in favor of concrete is its stability. Eight-ton rocks, of which breakwaters usually are built, are sometimes moved by waves, whereas a concrete breakwater has stood for six years in Lake Erie without being moved more than two or three inches, another off the Florida coast has withstood a tidal wave, and still another of similar construction, two miles long, off the coast of Spain, has resisted wave action. None of these breakwaters have any seating superstructure.

Water Works Problems

Synopsis of Papers Presented at Fourth Annual Meeting, Rocky Mountain Section, American Water Works Association, Denver, Colorado, February 13 and 14

Albuquerque, New Mexico, Iron Removal Plant, By F. M. Veatch, consulting engineer, Kansas City.

The iron removal plant at Albuquerque, (1930 census 26,526) has been operating over a year and is satisfactorily handling an unusual water problem. Based on a 25,000 population, of which 23,000 was served by the water system, consumption averaged 1.8 m.g.d. with a maximum of 2.7 m.g.d., representing daily per capita rates of 91 and 136 gal. With estimated 1935 and 1940 populations of 32,300 and 38,000, the average consumptions are estimated at 3.2 and 3.8 and the maximum at 4.8 and 5.7 m.g.d.

The Albuquerque plant includes two mixing basins of the tangential flow type, the motion of the water furnishing the agitation; two settling basins; two gravity type filter units;

with 2.7 grains of lime and 0.2 grain of alum per gallon.

Hardness, iron content, and yield of the wells varies widely (Table I) and there seems to be a trend toward increased hardness with years. Water of varying hardness can be obtained from combinations of these wells as shown in Table II. The production of softer water at Albuquerque is largely a matter of selection. Use of so many varying kinds of water complicates the treatment problem and frequent alkalinity and permanent hardness tests are necessary. The chemical feed is checked at 2-hour intervals and recorded on a daily log sheet along with flow and filter data. A monthly summary of the log sheets gives the total and average daily amounts of water treated, the chemicals used, and the effect of treatment.



ALBUQUERQUE, NEW MEXICO, IRON REMOVAL WATER FILTRATION PLANT. PUEBLO INDIAN STYLE OF ARCHITECTURE

and chemical feeding equipment for lime, alum, and chlorine. The water supply is taken from wells in the city limits intercepting the underflow of the Rio Grande and can be readily increased.

Based on a normal flow of 5 m.g.d., the various units have the following capacities: mixing basins—10 min. each; settling basins—90 min.; filter—874 sq.ft. filter surface operating at 4 gal. per sq.ft. per min. (double the conventional rate); clear water storage—200,000 gal. at plant and 13,000,000 gal. in high-level storage.

Principal chemical treatment consists of the use of lime for removal of carbon dioxide and iron and for partial softening, a small amount of alum being used to aid filtration. Chlorine is not regularly used, since numerous bacteriological tests have shown it to be unnecessary, but an emergency supply is maintained.

A departure from the usual method (aeration) for carbon dioxide removal has been adopted, as the additional lime required is less expensive than the additional pumping head required to operate the aerator. Lime is introduced into one mixing basin by a dry feed machine. After mixing, the water flows to the settling basins where much of the iron is precipitated. From this point, it flows through a second mixing basin where a small dose of alum is added and thence goes to the filters. Iron may be completely removed by using 0.7 to 1.0 grain of lime, and sufficient flow for filtration may be obtained with 0.1 to 0.2 grain of alum per gallon of water. A limited amount of softening is possible with this plant, from 10 to 15% total hardness being removed by treatment

TABLE I
Albuquerque Water Supply from Wells

Well	Date Sampled (year)	Temporary Hardness (p.p.m.)	Permanent Hardness (p.p.m.)	Total Hardness (p.p.m.)	Iron (p.p.m.)	Probable Yield (g.p.m.)
Kent Sturgis	1926	34	189	323	1.8	550
Kent Sturgis	1929	154	256	410	0.2	
Broadway	1926	127	285	412	2.9	200
Broadway	1929	126	316	442	7.0	
Mountain Road	1926	132	55	182	0.1	625
Mountain Road	1929	134	88	222	Trace	
Fifth and Mtn. Road	1926	200	84	284	0.3	925
Fifth and Mtn. Road	1929	172	74	246	Trace	
Plant	1926	145	52	197	0.6	500
Plant	1929	138	172	310	Trace	

TABLE II
Combinations of Albuquerque Water

No.	Well	Probable Yield (g.p.m.)	Temporary Hardness (p.p.m.)	Permanent Hardness (p.p.m.)	Total Hardness (p.p.m.)
1.	Broadway	200	126	316	442
2.	Kent Sturgis	550	154	256	410
3.	Mountain Road	625	134	88	222
4.	Fifth & Mtn. Road	925	172	74	246
5.	Plant	500	138	172	310
	All wells	2800	151	149	300
1, 2, 3, 5		1875	140	187	327
2, 3, 5		1675	141	171	312
2, 3, 4, 5		2600	152	137	289
3, 4, 5		2050	152	104	256
3, 4		1550	156	83	239

Corrosions and Conservation of Underground Structures, by P. J. Richards, J. W. Richards & Son, assayers and chemists, Denver.

Corrosion is the disintegration of metal due to chemical action. In the case of underground metallic structures, corrosion is caused by the action of chemicals in the soil, groundwater, etc. It does not occur in the absence of moisture or in the presence of pure water. Besides chemicals and moisture—two major factors in corrosion—the disintegration is influenced to some degree by temperature, physical characteristics of the soil, and differences in potential and stray currents.

There is more corrosion from a warm solution than from one that is cold. Physical characteristics of soil affect the rate of percolation of groundwater and determine the contact between the metal and surrounding material, heterogeneity leading to differences in potential. Stray current electrolysis probably accelerates corrosion. Iron and steel show little difference in rate of corrosion and their service life, if used under the same conditions, might be expected to be equal.

To predict service life, the chemicals present and the amount and character of groundwater in the soil should be determined through studies of soil samples taken along the proposed line and between the surface and the ditch bottom. Given a chemical and physical rating for the soil, this can be correlated with a study of topography—especially as regards drainage, exposure, and use of surface—to predict whether or not the pipe-line should have a protective coating. Frequently, the same soil characteristics obtain over considerable areas, but when decided changes appear in the nature or amount of chemicals in adjacent samples, the point of change should be located. The soil survey, beside determining relative corrosiveness of unknown soils, establishes the dividing line between decidedly corrosive and comparatively non-corrosive sections.

The soil around the bottom of a pipe may contain more moisture than is to be found in a soil sample, as the trench provides a possible drainage way for excess water from rainfall and melting snow and higher ditches.

The chemicals present in soil are important factors to corrosion. Strong alkalis are usually destructive, but chlorides and sulphates seem most harmful. Sulphides are dangerous because they may contact with the pipe and are apt to oxidize into sulphates. Limestone is non-corrosive and seems to have an inhibiting action when corrosive chemicals are present. Mountainous regions, foothills, and surrounding areas in arid sections are usually alkaline. Away from the hills and in regions of increased rainfall, a considerable amount of alkali is removed by leaching. In regions of abundant vegetation, the soils have become acid for the most part.

As no appreciable corrosion will occur to dry metal, material capable of excluding groundwater will prevent serious corrosion to underground structures. A film of any thickness and impermeable to all groundwater for an indefinite period would be ideal if it resisted the stresses and abrasions of underground service. The coat of protecting material must cover all parts of the metal. Most coating failures are due to misapplication, but many of them result from a poor choice of coatings. In choosing a coating, the chemicals present in the soil must be considered; also the melting point and danger of severe abrasion. In the last case, wrapped coatings should be used. If paints with vegetable oils are used in alkaline soils, the oils are apt to saponify. Concrete is subject to attack by certain soil chemicals. Thin coatings are dangerous in extremely corrosive soils. The addition of an inhibitor to a coating material may increase its efficiency by retarding corrosion after the soil waters have penetrated to the metal.

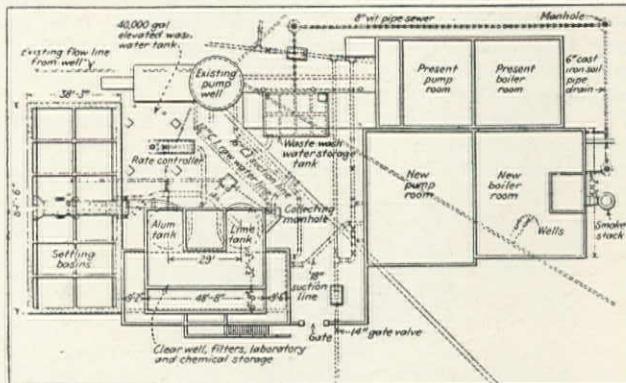
Legal Phases of Municipal Water Storage, by Malcolm Lindsey, Lindsey & Lowell, attorneys-at-law, Denver.

Rocky Mountain water law is still in the making—many problems remain unsolved. One, which has become acute, is the problem as to whether a junior direct appropriator may invade a senior storage right. When a reservoir is constructed following that of small ditches and large canals, there is no problem, but when ditches and flood canals are subsequent in construction to the reservoirs, complications arise. Colorado has a statute providing for the storage of

water 'not needed for immediate use.' The state supreme court has never passed directly on the question but has, in two cases, used language which gives comfort to junior ditch owners claiming the right to use water in preference to senior reservoirs.

Reservoirs are usually able to store water in winter when there is no irrigation; during the spring runoff when melting snows produce more water than the irrigationists desire; and during short periods in the summer when torrential rains cause floods exceeding the capacity of all the ditches. These potential storage periods are being invaded by construction of large 'flood water' canals to the embarrassment of municipalities, sugar beet owners, and others.

Invasion of senior storage rights by junior ditches overturns the economic principle of getting the maximum use from water, as the canals are continually so short of water that they take it regardless of whether or not the crops are at the



Albuquerque, New Mexico, Iron Removal Water Filtration Plant

proper stage for irrigation. Permitting a junior ditch to draw water ahead of a senior reservoir also violates the principle that an appropriator is entitled to a continuance of those river conditions existent when he made the appropriation.

If the courts can be made to see the situation, they will probably decide that all appropriations, whether for direct use or for storage, must be supplied in the order of their priority. If some court, not fully informed, should render a decision favoring a junior direct user, it would thereby create a difficult precedent. Every reservoir owner should be vigilant to see that the court is fully informed in all such cases.

Problems of a Watershed Patrolman, by S. F. Glass, sanitary inspector, Denver municipal water works.

The watershed of Denver municipal water works covers 3910 sq.mi. and includes Bear and Cherry creeks, the south fork of South Platte river, and all their tributaries. One of the big problems in this area is rural sewage disposal for country homes and mountain cabins. Many of these houses are on the brink of a stream, with no possible chance for sewage disposal.

Colorado State Board of Health regulations provide for location of septic tanks and all parts of their seepage system at least 100 ft. from any mountain stream, lake, or dry gulch; 200 ft. from a well; and 300 ft. from a spring. These regulations tend to eliminate the possibility of sewage or of septic tank effluent flowing over the ground to enter a watercourse; they also provide for location of cesspools at least 300 ft. from any mountain stream, lake, or dry gulch, and 500 ft. from a well or spring, and only in coarse sand or gravel.

One hotel in the watershed has a septic tank, raises the effluent 200 ft. by electric pumping, and carries it through 2000 lin.ft. of 3-in. pipe to a series of open wells constituting the disposal field. The estimated cost of this handling is \$200 per month. A few watertight concrete vaults have been built in the area, from which sewage is pumped to tank wagons, hauled away, and dumped into old mine holes.

Campers in the hills are especially troublesome, as they seldom provide themselves with toilets but use the hillsides instead. At the first rain, their excrement is washed into the streams. Dead and unbranded animals constitute a hard problem, especially on the open range or highway. On deeded ground, the owner of the ground must dispose of the carcass.

A dead animal having a registered brand must be disposed of by the owner of the brand.

In 8½ years of watershed patrolling for the city of Denver, I have had to make but 7 arrests. Our policy is to 'get results' and not to be 'out with the big club'.

Water Accounts and the Public, by G. C. Culberson, water works manager, Raton, New Mexico.

In my opinion, the uniform classification of accounts prescribed by the National Association of Railway and Utility Commissioners comes nearest to meeting needs of the average water works. The water works superintendent is entitled to know exactly where his plant stands financially and to have it a separate entity, with its own set of accounts.

An annual or semi-annual audit is a good tonic for water works men and will clarify the atmosphere between their department and the public. Often, it will reveal expensive errors, such as charging into operating expenses items that properly belong in capital accounts. Although an audit costs money, all things being equal it brings great returns. Periodical audits will be helpful in getting modern methods installed and in leading to a proper business system—they dignify the work of the water department.

The Raton water works is municipally owned and serves a population of 7000 through 1630 water taps, of which 99% are metered. The supply is secured by gravity from impounding reservoirs 10 miles from the city. Affairs of the water department are administered by a board of public works. The water bond issue is being retired annually from a sinking fund created by tax levy.

Every water plant should have a cash reserve, or the equivalent, to meet emergencies in flood periods, etc. These funds will only be created if the rate structure is at the proper level and the cost of operations properly supervised. The reserve might well be invested in approved securities, the interest therefrom going back into and building up the reserve. Not less than 7 to 10% of the value of fixed assets is a good reserve. With a comfortable cash reserve, there is no necessity for issuing bonds each time an improvement or replacement of assets is to be made.

The consumer ledger sheet in our department is in loose leaf form, with space for four years business, the tap number, name and address of owner, name of tenant, lot, block, and addition description. A general ledger control account must tie into the value of the consumer's ledger, the balance being made monthly.

We bill the consumer quarterly to reduce the number of meter readings and billings. Two years ago we adopted a 10% discount on water bills paid within 15 days after the end of the quarter. This progressive rule has cured many ills—it is a 'loud speaker' for good will. The good will of a consumer is an invaluable asset and should be cultivated, it cannot be gained by threatening to shut off the water when a bill is not paid. Courtesy at the counter or window goes far toward creating and cultivating good will. Sympathy and patience with a consumer whose bill is abnormally large is helpful. If investigation of such cases shows a leak from underground sources of which the consumer knew nothing, we propose a 50% reduction in the bill on the condition that he stop the leak and make immediate repairs. Where it is evident that the family knew of the leak, full payment is insisted on. When large readings are picked up, we at once notify the consumer to forestall trouble at the time of settlement.

Contests for the best kept lawns, flower gardens, and shrubbery are helpful in beautifying the city, they enhance property values and increase the water department revenue. The department can well afford to take part in these contests and to offer a substantial prize.

Editor's Note—The program of this convention was published in the February 25th, 1930, issue, p. 116, and a list of new officers elected by the Section appeared in the April 10th issue, p. 197.

*'Die wirtschaftliche und konstruktive bedeutung erhöhter zulaessiger Beanspruchungen fuer den Eisenbetonbau' by Dr. Ing. H. Olsen, Berlin, 1928, and 'Untersuchungen ueber die Zugfestigkeit von Zementmoertel und Beton' by Dr. Ing. H. Olsen in Beton u. Eisen, June 5, and 20, 1929, p. 204-209 and 218-220.

LETTERS TO THE EDITOR

THE EDITOR:

DEAR SIR—I am pleased to comply with your request to express my opinion on the various defects manifested in several high dams in the Southwest, because **Western Construction News** has always been open to articles considered by other engineering publications as too mathematical or highly technical. The avoidance of publishing such material—faithfully followed by other editors—is decidedly harmful to progress and tends to degrade the engineering profession to a mere trade.

With rapid progress in the design and construction of dams, engineers accustomed to quick work have apparently underestimated the fact that the designing methods they are using and the materials with which they have to deal possess certain disadvantages and serious drawbacks. The occurrence of cracks and other defects endangering the safety of dams are mainly due to the following cardinal causes:

- (1) Inadequacy of the elementary methods of analysis, and
- (2) Low tensile strength of the concrete.

By neglecting to take these important facts sufficiently into account, it is obvious that no faultless structures can be built.

Dams of the arch, multiple arch, and dome types are shells, while gravity dams can only be analyzed if they are considered as discs. In the theory of elasticity, under a shell is meant a structure consisting of thin slabs and with loads acting on their surfaces. On the other hand, discs are thin slabs acted upon by forces in the direction of their mid-surface. Extensive literature on the subject is available, mostly in German. Unfortunately, the theory of the arched dams considered as shells has received little attention. Gravity dams treated as discs have been more frequently investigated, although the results of these theories remain almost unknown to the majority of engineers engaged in the design of such structures. Dams analyzed according to these refined methods can be reasonably accepted as safer and better than those receiving ordinary treatment. It is true that these theories are 'thorny', tedious, and mostly beyond the understanding of the engineer with average training. However, the stresses produced in the structure remain as they are and do not alter in any way by the simplifying assumptions of the elementary analysis.

The appearance of cracks during construction can be chiefly traced to shrinkage in concrete, as is well known. As this material cannot sustain appreciable tensile stress, it is evident that cracks will invariably ensue. The necessity for combating such cracking of dams is fully realized by all engineers.

In recent years there has been manifested among engineers, especially on the Pacific coast, a tendency to split the dam into several parts by the introduction of contraction joints, thus avoiding continuous surfaces of great extent. This practice has been condemned by some, while by others it is considered as the only means of building high dams safely. However, by reducing the continuous surfaces with joints, the resisting ability of the dam to external forces will also be reduced. This fact seems to be entirely overlooked by the exponents of novel designs.

The first step in the right direction has been taken by German engineers, assuming correctly that a concrete of far higher tensile strength is required to give better and more economical structures. Based on his tests and theoretical investigations, H. Olsen came to the conclusion that concrete structures should be able to sustain greater tensile stresses than is now possible.* For reinforced concrete, he fixes the allowable comprehensible stress in bending at about 1400 lb. per sq.in. with a corresponding high value for tension, while for steel he recommends 28,000 lb. per sq.in. It is probable that the cement industry will be able to produce in the near future a cement of higher tensile strength. This, combined with a better knowledge of the properties of the concrete, especially with regard to its tensile strength, will undoubtedly make possible structures successfully resistant to cracks. Until this is attained, all efforts to prevent the ill effects of shrinkage will be probably futile.

A. FLORIS,
Civil Engineer.

Asphaltic Emulsions

By E. R. HOFFMAN

*Junior Testing Engineer, California Division of Highways,
Berkeley*

Editor's Note—E. R. Hoffman was born at Keystone, South Dakota, in 1898 and graduated from the University of California in 1923 with the B.S. (Min.E.) degree. He had construction experience with the state highway departments in South Dakota and New Mexico; did materials testing for the city of Berkeley and Colusa county, California; and served as assistant resident engineer for the California Division of Highways on projects at Lake Tahoe and Clear Lake. He is now testing and inspecting material manufactured for state highway use in the San Francisco bay region. Hoffman is a member of the American Society for Testing Materials.

The old adage that 'Oil and water will not mix' in this age of development and invention will have to be modified. Oil, in the form of asphaltic products, and water are now being emulsified and advantageously used. Asphaltic emulsions have proved their worth as a road material binder as they permit the mixture of asphalt and aggregate without heating the former. The bituminous binder can now be applied cold to wet or dry road material in the form of a liquid emulsion.

The following is a discussion of the emulsion itself rather than of the manner of application. A number of companies, usually in conjunction with the major asphalt producers, are manufacturing emulsions for highway and street use. Each manufacturing plant has its own patented process of emulsification and is secretive regarding methods employed, but the desirable product is usually conceded to possess these five properties:

1. A specified percentage of asphalt.
2. Freedom from objectionable unemulsified particles.
3. A limited quantity of emulsifying agent.
4. No appreciable tendency to segregate on standing.
5. A rate of break suitable to the purpose for which the emulsion is to be used.

These properties are explained hereafter.

Specified Percentage of Asphalt—The emulsion consists of a mixture of asphalt, water, and emulsifying agent. The consumer of an emulsion on any highway project is interested, primarily, in a maximum percentage of asphalt, from a workable emulsion, at a minimum cost. The percentage of asphalt is varied to meet different specifications, but usually constitutes between 49 and 60% of the emulsion. It has been found that for the new processes of highway building, comparable to the old hot penetration asphaltic macadam, a cold asphaltic emulsion having an asphaltic content of 55 to 60% gives best results.

Freedom from Unemulsified Particles—Unemulsified particles are conceded to be objectionable. When in excess, they have a tendency to clog distributors as well as to interfere with uniform distribution on the road. An indication of the amount of unemulsified asphalt can be determined by pouring the emulsion through a screen. A 40-mesh screen is most commonly used, and on it, even in the best emulsions, a few particles are almost always retained.

Limited Quantity of Emulsifying Agent—A limited quantity of emulsifying agent is desirable, in that it permits an emulsion to 'break' (the water separating from the asphalt) rapidly after application to the road. It is believed by some that an excess of emulsifying agent might cause an asphaltic binder obtained from an emulsion to re-emulsify in wet weather. In the manufacturing process, the emulsification takes place at a high temperature. The asphalt's temperature before mixing is between 200 and 300° F., whereas the resulting emulsion has a temperature of 125 to 200° F. These temperatures are not likely to be duplicated on the road, so it is doubtful if an asphaltic binder obtained from an emulsion will re-emulsify under conditions found in the field.

No Appreciable Tendency to Segregate on Standing—A desirable emulsion should be so manufactured that the asphaltic particles are in complete suspension. Any tendency to settle or segregate might cause difficulties in removing the emulsion from its containers, or lead to uneven distribution on the road. A good emulsion will show but little difference in the percentage of asphalt on samples of the liquid taken from the top and bottom portions of the container.

Rate of Break Suitable to Purpose for Which Emulsion to be Used—The rate of break should vary with the use for which the product is intended. Emulsions applied to roads by the penetration process should break down quickly. Emulsions which are mixed with aggregate, either in a mixer or by blading on the road, should remain in suspension so as to permit time in which to properly work and apply the paving mixture. These asphaltic emulsions have found extensive use in repair work, and are gaining favor over hot asphaltic processes on major projects.

Handling—Emulsions require care and skill in handling. Some emulsions, which are satisfactory and give good results in the penetration types of road making, are so delicate that they can be broken down by introducing ordinary tap water into a beaker containing the emulsion. Acid or alkaline solutions will quickly separate the asphalt from the water. Even kerosene, ordinarily a solvent for bitumens, will precipitate the asphalt. The necessity for shipping emulsion in clean containers and the care required to prevent contamination is apparent.

Conclusion—The field of developing and standardizing tests for asphaltic emulsions is an exceedingly interesting one. Considerable pioneering in this line is under way, which should lead, eventually, to greater cooperation between manufacturer and user and a better understanding of the possibilities of this valuable product.

Construction Review

PAVING

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

Progress is being made on important paving projects as follows:

WASHINGTON STATE HIGHWAYS

Pierce County—Joseph L. Warter, Sr., of Tacoma, was awarded a contract on April 15 for grading and paving 4.1 miles of the Pacific Highway with cement concrete from Fort Lewis to Nisqually; contract price \$123,104. Grading started May 20, and paving June 16.

It was necessary to break up and remove the existing concrete pavement, sta. 121+00 to 224+68, which was done with a 1200-lb. ball hammer operated by a 6-hp. gasoline donkey hoist mounted on an old truck; removal of the broken slabs being made with a Koehring $\frac{3}{4}$ -yd. shovel equipped with a special bucket, and loading into Kenworthy trucks.

Sand and gravel aggregates were secured from a pit at Nisqually; weighed at the bunkers with Johnson weighing equipment; and batch-hauled to the mixer in 7-sack batches. Mixing and placing was done with a MultiFoote 27-E paver and a Lakewood finisher, with



Pacific Highway Between Fort Lewis and Nisqually, Washington; Joseph L. Warter, Sr., Contractor. Laying Cement Concrete Pavement with MultiFoote Paver and Lakewood Finisher

the usual state-standard hand finishing tools; and curing by covering with earth and sprinkling.

A feature of this project was the use of high early-strength concrete (4-day cure) between sta. 123+00 and 224+68 to permit early resumption of traffic.

On August 9, the status of the work was: one 18-ft. strip paved from Fort Lewis to sta. 210+95, the end of double-track paving; existing concrete pavement removed; paving of half-width with 4-day concrete was under way. Contract will be completed October 1.

King County—S. A. Moceri, of Seattle, was awarded the contract in March for grading and paving with cement concrete 8.1 miles of the Pacific Highway from Kent-Des Moines road to Seattle; contract price \$169,300. Grading was started on March 31, paving began on May 8 and completed on July 22, and contract will be finished on August 31.

Rough grading was done with a Link Belt $1\frac{1}{2}$ -yd.

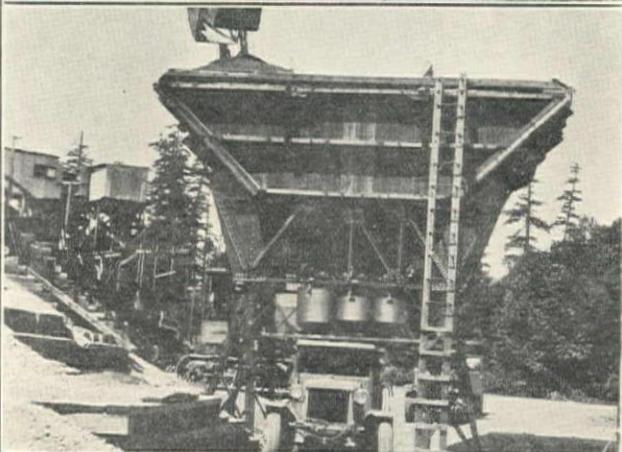
gas shovel and three Mack 4-yd. trucks equipped with Wood hydraulic hoists; and to remove the 5000-yd. slide at Riverton, a Bucyrus-Erie crane with $\frac{3}{4}$ -yd. Williams bucket, a dragline, and Bagley scraper.

Subgrading equipment included a Russell grader pulled by a Caterpillar 60, a Buffalo-Springfield 10-ton steam roller, and a Lakewood planer-type subgrader.

Concrete aggregates (sand and gravel) were secured from a pit at Steilacoom, barged to a dock at Des Moines, and proportioned by Butler weighing bins into 7-sack batches as follows:

Sand	1304 lb.
$\frac{1}{4}$ to $1\frac{1}{2}$ -in. gravel	1492 lb.
$1\frac{1}{2}$ to 3-in. gravel	739 lb.
Total	3535 lb.

The average haul for the 3-batch Fageol trucks was



Pacific Highway Between Fort Lewis and Nisqually, Pierce County, Washington; Joseph L. Warter Contract. (Upper) Koehring $\frac{3}{4}$ -yd. Shovel Lifting Broken Old Pavement into Trucks. (Lower) Concrete Aggregates Bunkers Equipped with Johnson Weighing Hoppers and Bins

5.8 miles, a minimum of 9 and maximum of 16 trucks being used.

Diamond brand cement was hauled from the Pacific Coast plant and stock piled on the grade two-days run ahead of mixer.

Concrete paving was mixed and placed with a

Koehring 27-E paver and state-standard subgrading and finishing tools; curing being done with burlap and irrigation. Water was secured by pumping from Bow lake with a Barnes quadruplex road pump through 3-in. and 2½-in. pipe.

The average paving progress was 842 lin.ft. per day or 1871 sq.yd. of 10-7-10-in. concrete pavement.

J. A. Davis was superintendent for S. A. Moceri.

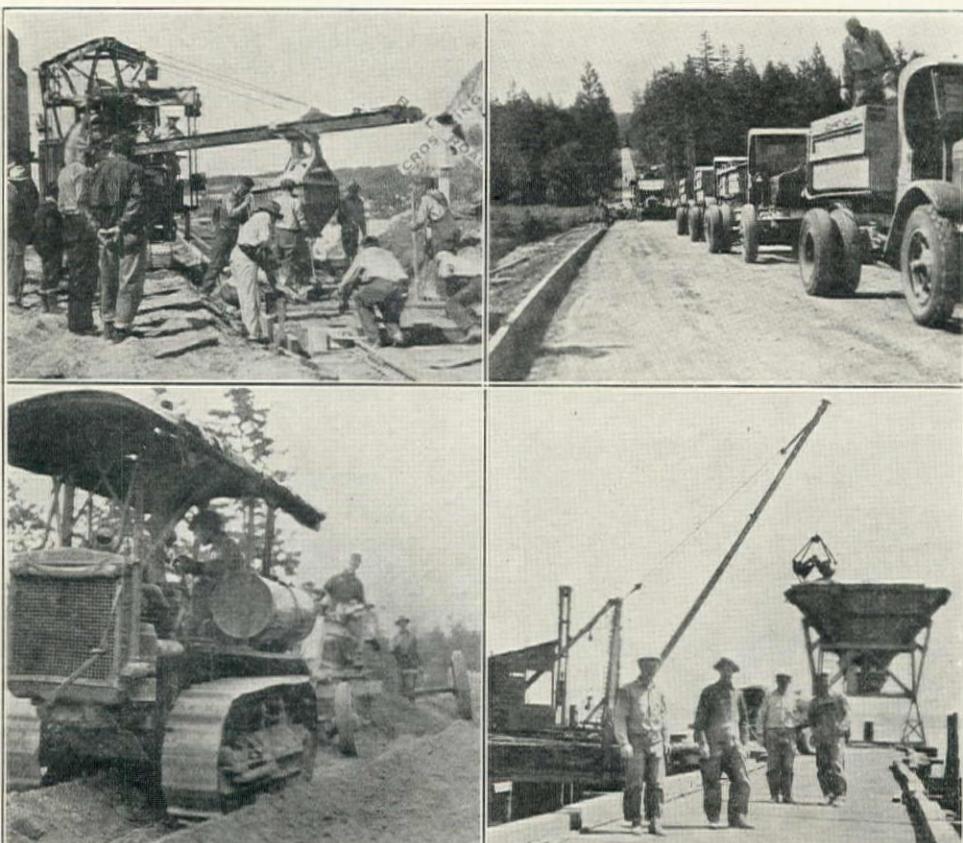
Jefferson County—J. L. Smith Construction Co. of Seattle, was awarded the contract on March 25 for grading and paving with cement concrete 6.4 miles of the Olympia highway between Ludlow and Port Townsend; contract price \$121,089.

Grading was started May 6; ribbons started May 24 and completed August 2; paving of railroad crossings started June 14; roadway paving begun June 16

SEATTLE PROJECTS

Pike Street Repaving—The Queen City Construction Co., Seattle, completed its contract July 3, or 25 days in advance of the specified completion date, for paving Pike st. between 1st and Summit ave. with high early strength portland cement concrete, total cost \$138,000. This was a repaving project on a 54-ft. roadway for a distance of 4040 ft., or 13 blocks. The work also included reconstruction of the municipal street railway tracks and repaving with brick between the tracks. There was also constructed 1000 lin.ft. of 21-in. relief sewer from 1st ave. to 6th ave. The total time required to complete this contract was 65 days.

Pike st. is one of the four major business arteries entering the retail district from the east. It carries double-track street railway and intersects in the heart



OLYMPIA HIGHWAY BETWEEN LUDLOW AND PORT TOWNSEND, WASHINGTON: J. L. SMITH CONSTRUCTION CO., CONTRACTORS. (UPPER RIGHT) FLEET OF BATCH TRUCKS HAULING AGGREGATES TO KOEHRING PAVER SHOWN IN UPPER LEFT. (LOWER LEFT) CATERPILLAR 60 PULLING RUSSELL GRADER. (LOWER RIGHT) CONCRETE AGGREGATES WHARF AT PORT TOWNSEND WITH BLAW-KNOX 100-YD. BUNKER EQUIPPED WITH WEIGH BINS.

and finished August 6; guard rail and gutter under construction; completion date of contract September 4.

Concrete aggregates (sand and gravel) were barged from Steilacoom (Pioneer) and from Victoria (Producers) to a dock at Port Townsend, on which was erected a Blaw-Knox 100-yd. bunker. Aggregates were weighed at the bunker and batch hauled to the Koehring paver in 6-sack batches (3 to the truck).

The average progress was 750 lin.ft. per day of 18-ft., 9-6½-9-in. pavement. All finishing was done by hand, and curing by ponding (dikes of straw covered with earth) and a continuous flow of water over the pavement.

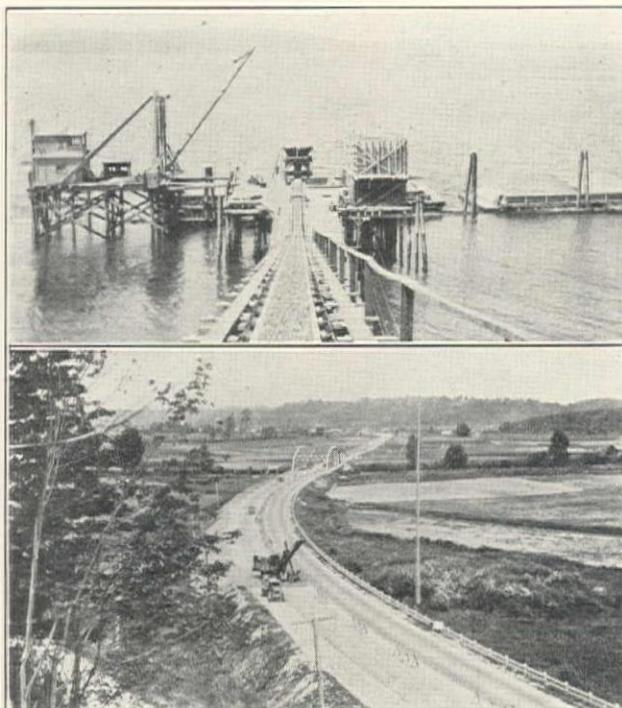
S. J. Humes is director of highways, State of Washington.

of the business district four north and south arteries, also carrying double-tracked street railways. It was necessary that all possible speed be made in the repaving, yet with a minimum of inconvenience to the business establishments on Pike st. The complete cooperation of the contractors was clearly shown by the manner in which this work was carried out.

Clearing of the existing brick pavement was started on one-half of the roadway at the east end and proceeded toward the business district. As the half of each block was cleared and prepared, it was immediately paved. Traffic continued to use the other portion of the street, and trolley service was not interrupted except at definite intervals when new rails were being laid. The relief sewer was laid at an average

depth of 22 ft., entirely in tunnel, the work being done at night. The shafts were covered during the day so as not to interfere with street traffic. Sewer construction was completed in less than 60 days working time. To further facilitate the work, the contractors used pre-mixed concrete and laid all of it at night. Street intersections were only partly blocked during the time of clearing the roadway and while the concrete was being cured. Using a 1:2:3 pre-mixed concrete, the new pavement was opened after four days of curing. It required 3530 cu.yd. of concrete with a thickness of 5 to 7 in.

The total cost of the contract was 20% under the city engineer's estimate, the saving being in engineer-



Pacific Highway Between Kent-Des Moines Road and Seattle, Washington; L. A. Moceri, Contractor. (Upper) Concrete Aggregates Wharf at Des Moines with Belt Conveyor in Foreground. (Lower) Subgrading Along Duwanish River Valley with Link Belt 1 1/4-yd. Shovel

ing expense as a result of the expeditious manner in which the work was done and in a drop in the price of cement after the estimate had been made.

The work was done under the direction of the late W. D. Barkhuff, city engineer, with O. A. Piper assistant city engineer in administrative charge and L. R. Andrews assistant engineer on paving. George P. James, president of the Queen City Construction Co., was in charge of paving and Nick Baddato, secretary of that company, was in charge of sewers.

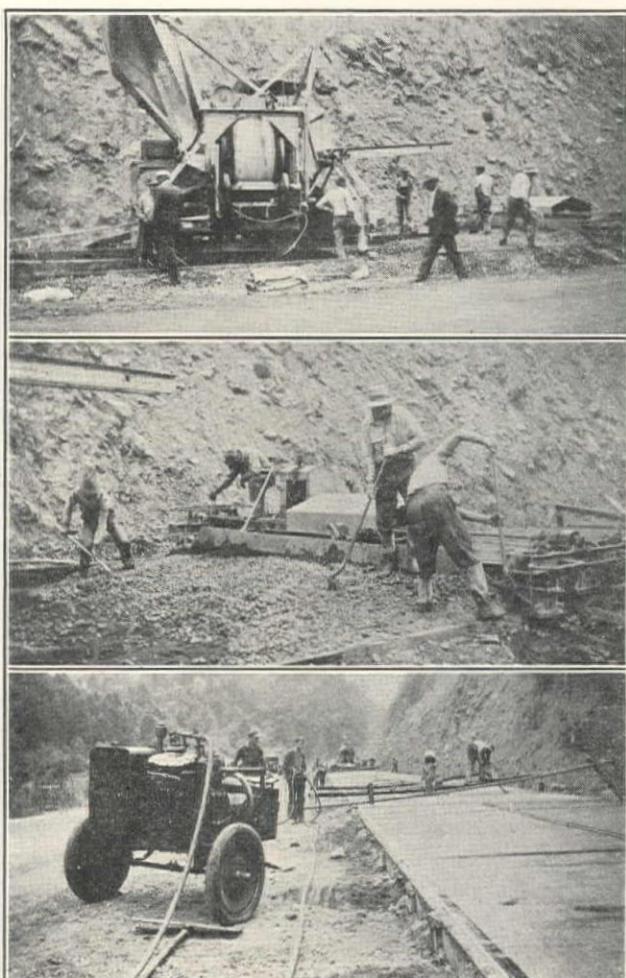
OREGON STATE HIGHWAYS

Washington County—I. L. Young, of Portland, began paving 3.9 miles of the Multnomah county line-Beaverton section of the Tualatin Valley Highway on June 25 and will complete the project about September 30. To July 18, he had laid 8500 lin.ft. of full width (20-ft.) pavement with metal center joint. The pavement will have a 6-ft. rock shoulder on each side.

Using a force of 52 men, two Byers 'Bear Cat' shovels, one Smith 'E' mixer, one Lakewood finisher, and seven trucks, Young lays and finishes about 600 lin.ft. of 9-7-9-in. portland cement concrete pavement

per day. The maximum lay to July 18 was 720 lin.ft. in one day. The batch method for handling aggregates is used, each truck delivering three 6-sack batches to the mixer. Aggregates are weighed by an Erie 2-beam scale.

The contract price, \$104,405, involves 5500 cu.yd. roadway excavation at \$0.35; 6000 cu.yd. truck-measure borrow at \$0.40; 46,000 sq.yd. subgrade at \$0.05; 46,000 sq.yd. concrete paving at \$1.67; 7000 lin.ft. expansion joints at \$0.20; 14,000 lin.ft. contrac-



I. L. Young Contract for Paving Canyon Road, Multnomah County, Oregon, Using MultiFoote Paver and Ord Finisher

tion joints at \$0.02; 44,000 lb. reinforcing steel at \$0.04; 4000 dowels at \$0.20; 5000 cu.yd. rock shoulder base course and 1000 cu.yd. rock shoulder top course at \$2.25.

W. D. Clarke is division engineer for the Oregon State Highway Commission at Salem and F. T. Young is resident engineer on this contract. Roy A. Klein is state highway engineer and S. H. Probert is office engineer for the Commission at Salem.

MULTNOMAH COUNTY HIGHWAYS, OREGON

Canyon Road—I. L. Young, Portland, will complete his contract about November 1 for paving portions of the Canyon road with two 18-ft. strips of 9-7-9-in. portland cement concrete, contract price \$181,422. Concrete gutters are being placed on the outside of tangent sections and on the low side of each lane on curves. Drainage inlets are required, using corrugated iron pipe to convey the water down the slopes. Work-

ing one 8 and one 6-hour shift, Young is getting about 2400 sq.yd. of pavement laid per day. His equipment includes one 27-E MultiFoote paver, one Ord finisher, and a Russell grader pulled by a Caterpillar '60'.

George W. Buck is roadmaster and county engineer of Multnomah county with headquarters at Portland.

CALIFORNIA STATE HIGHWAYS

Glenn County—Basich Bros. Construction Co., Los Angeles, will complete a contract about November 20 for 5.2 miles of portland cement concrete paving from Logandale to Willows. Work began May 17 and to July 17 about 25,000 cu.yd. of selected borrow had been placed in the sub-base and shoulders. This work has been closed down until after the pavement has been laid, when an additional 18,000 cu.yd. of selected borrow will be placed in shoulders. Header and sub-grade construction began July 8, and paving from the Willows end of the project late in July.

The contract price, \$146,319, includes 2000 cu.yd. roadway excavation at \$0.30; 58,800 sta.yd. subgrade for pavement at \$0.09; 43,000 cu.yd. pit-run gravel for sub-base and shoulders at \$0.57; 11,240 cu.yd. 'A' concrete pavement at \$9.00; 277,000 lb. reinforcing steel at \$0.05; 100 lin.ft. laminated timber guard rail at \$10.00; and 269 sta. finish roadway at \$3.00. Aggregates for concrete are being secured from a commercial plant near Orland and shipped by rail to Willows. A new 27-E Ransome paver and two Ord finishing machines are to be used on the contract.

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

Humboldt County—J. V. Galbraith, Petaluma, will complete his contract about October 15 for grading and portland cement concrete paving at Scotia and from Fortuna to Loleta, total 4.3 miles. On July 18, grading at Scotia had been completed and the screened gravel sub-base was under construction. Paving was scheduled to begin July 23. Grading and salvage of the existing rock surface was under way between Fortuna and Loleta. Paving from Fortuna to Loleta from the Fortuna end started about August 1.

The contract price, \$148,707, includes the following major items: 56,900 cu.yd. roadway excavation at \$0.38; 450,800 sta.yd. overhaul at \$0.0085; 1850 cu.yd. structure excavation at \$0.80; 4190 cu.yd. salvaged surface at \$0.40; 4760 cu.yd. screened gravel sub-base at \$1.17; 5820 cu.yd. river-run gravel at \$0.50; 50,830 sq.yd. subgrade for paving at \$0.08; 9875 cu.yd. 'A' concrete pavement at \$9.00; 240,000 lb. reinforcing steel at \$0.05; 229 sta. finish roadway at \$4.00.

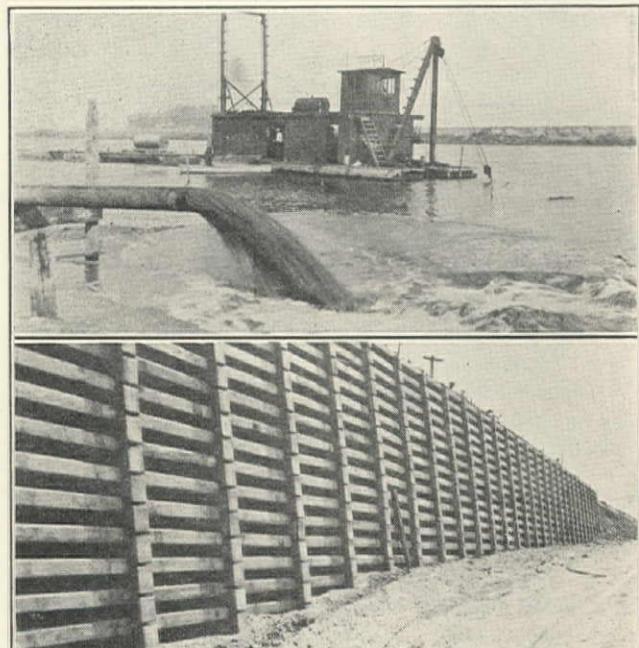
Principal equipment in use includes one 1 1/4-yd. Northwest shovel working two shifts; one 3/4-yd. P&H shovel; one 1-yd. Thew-Lorain shovel; Two '60' and two '30' Caterpillars with attachments; one 10-ton Austin 3-wheel roller; one 12-ton Acme 3-wheel roller; two Ord finishers; one Carr subgrader; one 27-E MultiFoote paver; three Gould pumps; three Johnson weigh boxes; one Freeman turntable; sixteen trucks (Whites, Morelands, Internationals, Garfords, and Fageols); and 5 miles of 2 1/2-in. pipe-line.

F. W. Haselwood is district engineer for district I, California Division of Highways, at Eureka, and Charles P. Sweet is resident engineer on this contract.

Imperial County—A. M. Peck Co., Los Angeles, will complete a contract about September 1 for grading and portland cement concrete paving on 9 miles between El Centro and Holtville, contract price \$264,955. The pavement was completed July 11 and opened to traffic on July 25. All other items had been completed by July 18 except for 18,000 cu.yd. of imported borrow, finishing roadway, and setting about 1000 lin.ft. of side drains.

Major items in the contract are: 30,000 cu.yd. roadway excavation at \$0.25; 44,000 cu.yd. imported borrow at \$0.35; 181,500 sta.yd. overhaul at \$0.01; 2690 cu.yd. structure excavation at \$1.00; 12,650 sq.yd. subgrade at \$0.09; 14,800 cu.yd. sand cushion at \$1.10; 20,200 cu.yd. 'A' concrete paving at \$9.00; 508,200 lb. reinforcing steel at \$0.045; 150 tons gravel blanket at \$3.00; 52,400 sq.yd. asphalt membrane at \$0.08; 471 sta. finish roadway at \$5.00.

Principal equipment includes one 27-E Rex paver; two Lakewood finishing machines; one 3/4-yd. Northwest clamshell crane; two 1/4-yd. Bay City power



Constructing State Highway Between Sunset Beach and Newport Beach, Orange County, California; Macco Construction Co., Contractors. (Upper) Suction Dredge Used in Making Fill. (Lower) Precast Concrete Crib Retaining Wall

shovels; four Caterpillar '30' and one Caterpillar '60' tractors; ten Sterling 5-batch, 6-wheel dump trucks.

E. Q. Sullivan is district engineer for district VIII, California Division of Highways, at San Bernardino.

Los Angeles County—Jahn & Bressi, Los Angeles, completed their contract about August 1 for 8.51 miles of portland cement concrete paving between Tunnel Station and the Santa Clara river, contract price \$253,126. The contract time limit would have expired November 14.

Equipment included one Blaw-Knox bunker with weighbox and scales; one 1 1/4-yd. Koehring clamshell crane; one 27-E Koehring paver; nine batch trucks; one Ord finisher; one Carr subgrader; one 12-ton Buffalo-Springfield roller; two Caterpillar '30' tractors; two scarifiers; two Adams no. 8 leaning wheel

graders; one Ford truck; two revolving fresnoes; one Knickerbocker no. 5 table saw.

S. V. Cortelyou is district engineer for district VII, California Division of Highways, at Los Angeles, and L. M. Ranson is district construction engineer.

Marin County—Granfield, Farrar & Carlin, San Francisco, have completed over 95% of their contract for 1.8 miles of grading and concrete and bituminous macadam paving from Bolinas creek to San Rafael. The contract has been slightly delayed because of slide protection and care of traffic, but all the crusher-run base and bituminous macadam surface on the main road is completed as is also the portland cement concrete pavement.

The contract price, \$133,231, includes 181,000 cu.yd. roadway excavation at \$0.32; 2,241,000 sta.yd. overhaul at \$0.005; 8120 tons crusher-run base at \$1.90; 9910 sq.yd. subgrade at \$0.08; 2350 cu.yd. 'A' concrete paving at \$9.50; 66,500 lb. reinforcing steel at \$0.0475; 1880 tons broken stone at \$2.00; 102 tons asphaltic oil at \$21; 6559 lin.ft. timber guard rail at \$0.80.

Equipment includes two trucks; one Caterpillar '60'; one bulldozer; one blade and scarifier; and one 10-ton roller.

J. H. Skeggs is district engineer for district IV, California Division of Highways, at San Francisco.

Marin and Sonoma Counties—The Hanrahan Co., San Francisco, has completed over 99% of the grading, all paving and structures, and 30% of the oil macadam on a contract for 11.9 miles of paving between Petaluma and Ignacio (see April 25th issue, p. 213).

Equipment includes one 1 1/4-yd. Northwest gas shovel; five 5-yd. and one 3/4-yd. International trucks; two Caterpillar '60' tractors with bowls; one Caterpillar '30'; two 12-ft. and one 8-ft. blade; one hydraulic scarifier; one 20-ft. Carr subgrader; two 1-ton Ford trucks; one portable rock crusher; three 12-ton, 3-wheel rollers; one tandem roller; one P&H no. 600 clamshell crane; one 3-bin Johnson hopper.

E. E. Sorenson is resident engineer and Fred Carlstad paving inspector for this project which is in district IV of the California Division of Highways.

Orange County—Macco Construction Co., Clearwater, completed a contract late in July for grading and portland cement concrete paving of 6.4 miles between Sunset Beach and Newport Beach, contract price \$201,545. The time limit on this contract would have expired December 20.

Major equipment included one 27-E MultiFoote paver; one 10-ft. Lakewood finisher; one Adams leaning wheel grader; one 6-ft. all-metal sheepfoot tamper; one 3/4-yd. Bucyrus-Erie gas shovel; one 'Air King' portable compressor; one Barber-Greene loader; one Thew-Lorain 1 1/4-yd. gas shovel; one Caterpillar '60' tractor; two Caterpillar '30' tractors; one Caterpillar '10' tractor; ten 5-ton trucks; one dredge equipped with a 120-hp. 6-cylinder Holt motor direct-connected to a Krogh no. 8 dredge pump. The dredge has a 10-in. suction and an 8-in. discharge.

S. V. Cortelyou is district engineer for district VII, California Division of Highways, at Los Angeles, and L. M. Ranson is district construction engineer.

San Joaquin County—The T. M. Morgan Paving Co., Los Angeles, will complete a contract about September 1 for grading and portland cement concrete paving on 6.9 miles between Cherokee station and Harney lane. Rough grading is nearly completed, one 10-ft. strip 6.7 miles long has been completed, and the other 10-ft. strip is over half completed. For the first 1200 ft. of the Cherokee station end, a 20-ft. base of 4-in. salvaged macadam and a 3-in. surface course of untreated crushed gravel or stone is being placed. For the remainder of the work, a 36-ft. graded roadbed with flat slopes to the ditch makes a section about 96 ft. wide. Portland cement concrete paving is 20 ft. wide in two 10-ft. strips, each strip being 6 in. thick at the center and increasing to 9 in. at 3 ft. from the edges. Metal pipe and concrete box culverts are being extended, fences moved and reset, and new fence built. With concreting finished about



Reconstructing State Highway with Cement Concrete Pavement Between Cherokee Station and Harney Lane, San Joaquin County, California; T. M. Morgan Paving Co., Contractors. (Upper) Carr Subgrader with Clausen Tailing Elevating Wheels. (Lower) Koehring Paver Followed by Two Ord Finishers

August 1, completion of the shoulders is the only remaining work.

The contract price is \$251,562 and includes the following major items: 47,800 cu.yd. roadway excavation at \$0.32; 33,400 cu.yd. imported borrow at \$0.55; 34,500 cu.yd. imported selected material at \$0.57; 44,200 sta.yd. overhaul at \$0.02; 3060 cu.yd. structure excavation at \$0.70; 9200 cu.yd. salvage macadam subbase and border at \$1.10; 2000 tons untreated cracked gravel or stone surfacing at \$2.25; 100 M gal. water applied to surface at \$2.00; 19,840 sq.yd. subgrade for pavement at \$0.08; 1610 cu.yd. cushion course at \$1.00; 15,000 cu.yd. 'A' concrete pavement at \$9.40; 383,000 lb. reinforcing steel at \$0.0484; 2180 bbl. fuel oil for shoulders at \$2.00.

Major equipment includes one 1 1/4-yd. Koehring gas shovel; one P&H model 206 convertible gas dragline and clamshell; one 27-E Koehring paver; seven 7-yd. International trucks; one 1 1/2-ton Ford truck; two 3 1/2-yd. Kleiber trucks; two 3 1/2-yd. Fageol trucks; two 5-yd. Autocar trucks; one Mack truck with 1000-gal. water tank; one Chevrolet truck; three Fordson tractors; one Barber-Greene loader; one

12-ton Galion gas roller; two Ord finishing machines; one 42-ft. Russell 'Super-Mogul' grader; one 8-ft. Russell highway patrol; five Caterpillar '60' and one Caterpillar '20' tractors; one LeTourneau scarifier; three Johnson proportioning units with scales; one Carr subgrader; one set of Clausen tailing elevating wheels; four Ateco scrapers; two model 35-B Barnes pumps.

Four concrete bridges are also being built on this stretch of road by Jacobs & Pattiani.

T. M. Morgan is handling this contract from Stockton. R. E. Pierce is district engineer for district X, California Division of Highways, Sacramento.

San Luis Obispo County—J. F. Knapp, Oakland, will complete his contract late in August for 7.2 miles



Coast Highway Between Santa Maria River and Los Barros Creek, San Luis Obispo County, California, Reconstructed with Cement Concrete Pavement by J. F. Knapp, Contractor

of reconstruction on the Coast Highway between the Santa Maria river and Los Berros creek. Grading of the 36-ft. roadbed and a 20-ft. portland cement concrete pavement have been completed. Excellent progress has been made on this job.

Major equipment includes two no. 600 P&H shovels; one Ingersoll-Rand compressor; one 150-ton batching plant; one 10-ton Huber roller; one 27-E MultiFoote paver; two Ord finishers; one '30' and one '60' Caterpillar tractors.

L. H. Gibson is district engineer for district V, California Division of Highways, at San Luis Obispo.

Santa Barbara County—Cornwall Construction Co., Santa Barbara, will complete a contract late in August for 4 miles of grading and portland cement concrete pavement between Zaca and Wigmore. This stretch of highway is being reconstructed with a 36-ft. roadbed and a 20-ft. pavement.

The contract price, \$153,239, includes: 100,000 cu.yd. roadway excavation at \$0.28; 44,500 sq.yd. subgrade at \$0.08; 1100 cu.yd. cushion course at \$1.25; 9650 cu.yd. 'A' concrete pavement at \$9.00; 237,500 lb. reinforcing steel at \$0.0375. Major equipment includes one 1 1/4-yd. and one 1-yd. Northwest shovel; one 1-yd. Link-Belt shovel; one compressor; one 10-ton Austin roller; one 27-E Koehring paver; one Ord finisher; two Caterpillar and one Allis-Chalmers 'Monarch' tractors; one Carr subgrader.

L. H. Gibson is district engineer for district V, California Division of Highways, at San Luis Obispo.

Santa Clara County—The Hanrahan Co., San Francisco, has completed rough grading, placed 14,000 cu.yd. of imported borrow and 3500 tons of crusher-run base and 4600 cu.yd. of portland cement concrete

pavement on a contract for 4.4 miles of grading and paving between San Francisquito creek and San Antonio ave., contract price \$264,926. Major items in the work are 10,000 cu.yd. roadway excavation at \$0.23; 15,500 cu.yd. imported borrow at \$0.70; 96,000 sta.yd. overhaul at \$0.009; 18,650 tons crusher-run base at \$4.08; 18,450 tons asphaltic concrete paving at \$4.08; 30,830 sq.yd. asphalt paint binder at \$0.015; 8430 cu.yd. 'A' concrete pavement at \$9.00; 243,000 lb. reinforcing steel at \$0.05.

Equipment includes one Caterpillar '60' and bulldozer; one Caterpillar '30'; five 1 1/2-ton and eight 5-ton trucks; three shovels; one 27-E MultiFoote paver; two road graders; one 12-ton road roller; one Dinuba scarifier; one Johnson scarifier; two Ord finishers; one Ateco hydraulic scraper; one material batching plant; one Triplex pump and engine.

Santa Clara County—The Hanrahan Co., San Francisco, has started work on a contract for 4.9 miles of grading and paving with portland cement and asphaltic cement concrete from San Antonio ave. to Sunnyvale. A small amount of borrow has been handled, 112 trees removed, and 207 cu.yd. of concrete placed in bridges. The contract price, \$204,904, in-



Cornwall Construction Co. Grading State Highway Between Zaca and Wigmore, Santa Barbara County, California

cludes the following major items: 3550 cu.yd. roadway excavation at \$0.25; 22,500 cu.yd. imported borrow at \$0.70; 2780 cu.yd. structure excavation at \$1.25; 33,300 sq.yd. subgrade for paving at \$0.09; 5300 tons crusher-run base at \$1.00; 13,700 tons asphaltic concrete at \$3.47; 7800 cu.yd. 'A' concrete in paving at \$9.90; 1370 cu.yd. 'A' concrete in structures at \$20; 255,000 lb. reinforcing steel at \$0.05; 53,000 sq.yd. asphalt paint binder at \$0.02; 250 tons screenings for bituminous surface at \$2.00.

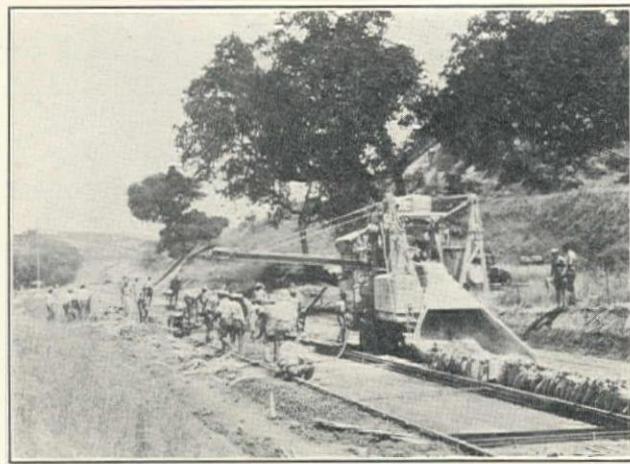
Major equipment includes one Caterpillar '60'; one 10-S Jaeger mixer; four 1 1/2-ton and three 5-ton trucks.

W. F. Hanrahan is president, T. A. Hanrahan vice-president and general superintendent, M. S. Hanrahan secretary, H. A. Daae engineer, and S. P. Doyle office manager for the Hanrahan Co. J. H. Skeggs is district engineer and A. W. McCurdy and E. G. Poss are assistant district engineers for district IV of the California Division of Highways at San Francisco.

Tulare County—The Valley Paving & Construction Co., Visalia, completed its contract June 20 for

12.2 miles of paving from the south boundary of Tulare county to Pixley. The work in general consisted of regrading and widening and resurfacing the existing 15-ft. portland cement concrete pavement with asphaltic concrete to a width of 20 ft., using a 30-ft. roadbed. Grading and paving accounted for about 80% of the value of the work. The contract price was \$287,674.

Major equipment included one 1-yd. Northwest clamshell crane; one 1 1/4-yd. Northwest gas shovel; three Caterpillar '60' and one Caterpillar '30' tractors; one Fordson power grader; one 10-ft. Galion blade; one 10-ft. Adams blade; three Ateco hydraulic scrapers; one Rix compressor mounted on a 1-ton pneumatic-tired G.M.C. truck; two 10-ton Buffalo-



Cornwall Construction Co. Paving State Highway with Cement Concrete (Koehring Paver and Ord Finisher) Between Zaca and Wigmore, Santa Barbara County, California

Springfield 4-cylinder tandem rollers; one 12-ton Buffalo-Springfield 3-wheel, 4-cylinder roller; one 12-ton, 3-wheel, 2-cylinder Austin roller; one Ord finishing machine; one complete Geiger asphalt mixing plant; one 1-sack concrete mixer.

E. E. Wallace is district engineer for district VI, California Division of Highways, at Fresno.

LOS ANGELES COUNTY HIGHWAYS, CALIF.

Main Street Near Wilmington—Kovacevich & Price, Long Beach, will complete their contract about January 9, 1931 for improving Main st. north of Wilmington from S st. to Olive st. (6.12 miles), contract price \$293,104. The work includes excavation, portland cement concrete pavement, asphaltic concrete surface, asphaltic concrete base, corrugated metal pipe, etc. Work started June 4. To July 18, the most extensive work consisted of lowering, moving, and treating pipelines and was 90% complete on that date. Drainage structures, excepting one bridge, were 70% completed on July 18; a reinforced concrete bridge had been started and the structure excavation completed; roadway excavation was being started; and removal of existing macadam was about 30% complete. The macadam had to be raised for the subgrade.

Geo. W. Jones is road commissioner, O. F. Cooley assistant road commissioner, E. A. Burt construction engineer, and G. W. Sprotte assistant construction engineer for Los Angeles county; J. F. Rockhold being county surveyor.

SAN DIEGO COUNTY HIGHWAYS, CALIF.

Marron Canyon Road—Bert Noble, San Diego, has been getting equipment on the job, placing small culverts, and driving 1900 lin.ft. of bulkhead on his contract for placing cement concrete pavement on this road. Equipment now on the job consists of two Caterpillar '60' tractors, one 3/4-yd. steam shovel, scarifiers, and blades. Paving will not be commenced for some time. The contract price is \$135,961.

Ernest R. Childs is the county surveyor for San Diego county with Bertram B. Moore as chief office deputy, Chester O. Richards as chief field deputy, and J. W. Cole as deputy county surveyor.

SAN MATEO COUNTY HIGHWAYS, CALIF.

Menalto Park Improvements—Irving L. Ryder, San Jose, will complete his contract about November 15 for improving streets in Menalto park by grading, paving with 4-in. rock macadam base and 3-in. asphaltic surface, laying vitrified and concrete pipe sewers, etc., contract price \$151,625. To July 16, the rough grading was 75% complete; lateral sewers and the 24-in. storm sewer were complete; sidewalks, curbs, and gutters were 20% complete. The water system and sewer system had been laid prior to this construction.

George A. Kneese is county surveyor for San Mateo county with headquarters at Redwood City. R. A. Klassen is engineer of work, Albert Simpson resident engineer, and E. A. Feddersen office engineer in charge on the Ryder contract.



Reconstructed State Highway in Tulare County, California, Looking North Toward Tipton, The Valley Paving & Construction Co., Contractors

LOS ANGELES CITY PROJECTS

Laurel Canyon Road—J. L. McClain, Los Angeles, will complete his contract about September 4 for improving Laurel canyon road from Pacoima ave. to Lookout mountain road, contract price \$241,737. To July 22, the rough grading was 80% complete; the storm drain (0.32 mile total length) 60% complete; the sanitary sewer (2.89 miles total length) 70% complete; and utilities were being placed. The contract includes 64,865 cu.yd. excavation, 20,990 cu.yd. embankment, and 35,000 yd. special flooding at \$50,000 lump sum; 425,168 sq.ft. of 8-in. compressed concrete pavement at \$0.23; 23,075 lin.ft. of reinforced integral curb at \$0.57; sanitary sewer—main line and house

connections—at \$36,441 lump sum; storm drain complete at \$30,000; concrete headwalls at \$3000 lump sum; water system, including 311 water service connections, total \$9391; removal of 44 trees and 3 wooden bridges.

Equipment in use includes one P&H trencher, one P&H power shovel, one MultiFoote 27-E paver, and one Jaeger 1-sack mixer.

Main and 90th St. Improvement District—Geo. H. Oswald, Los Angeles, will complete his contract about January 27, 1931, for improvements in the above district. The contract was signed July 11 and work is now underway, total contract price \$436,129. The work includes \$25,000 lump sum for grading; 1,343,829 sq.yd. 6-in. and 8-in. cement concrete pavement totaling \$179,669; sanitary sewer—main line and house connections—total length 30.45 miles at \$141,634; 1.83 miles of storm drain at \$44,000 lump sum;



Improvement of Sunset Boulevard, Los Angeles,
W. F. Crawford, Contractor

1,389,130 sq.yd. class A-A resurfacing at \$0.0125; 89,613 sq.ft. cement concrete sidewalk at \$0.10; 21,460 lin.ft. light and heavy concrete curb totaling \$7748; and \$2450 for ornamental lights.

Major equipment includes one P&H no. 600 shovel; one P&H trencher; one Parsons trencher; two Barber-Greene trenchers on house connections; six 6-wheel trucks; and six 6-ton, 3-batch pneumatic-tired trucks.

Sunset Boulevard—W. F. Crawford, Culver City, will complete his contract about May 17, 1931, for the improvement of Sunset blvd. from Normandie ave. to Hayvenhurst drive, contract price \$563,648. The work includes 51,760 cu.yd. excavation at \$39,200 lump sum; 1,246,793 sq.ft. Warrenite 8-in. granular type pavement totaling \$246,901; 202,685 sq.ft. 8-in. combination gutter at \$0.18; 49,144 sq.ft. sidewalk at \$0.099; 35,871 lin.ft. of heavy unplastered curb at \$0.44; 7.47 miles of sanitary sewer and house connections totaling \$100,871; 1.58 miles storm drain and culverts totaling \$66,000; water system complete at \$7255; ornamental lights totaling \$23,400; and minor items. Removals include 37,600 lin.ft. of curb; 77,707 sq.ft. of sidewalk; 8397 sq.ft. of gutter; 1,280,217 sq.ft. of pavement; 32,738 sq.ft. of driveways; and 58 trees, of which 22 are to be transplanted; and resetting of 97 manholes.

Major equipment includes two 1 1/4-yd. Bucyrus-Erie gas-air shovels, one 1 1/4-yd. P&H shovel, and 30 trucks.

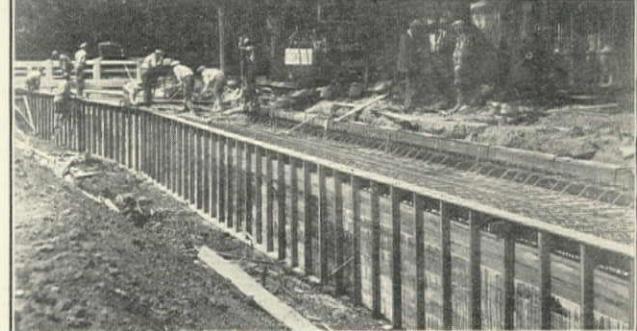
J. J. Jessup is city engineer, R. W. Stewart chief deputy, D. M. True office engineer, and H. P. Cortel-

you engineer of general construction for the city of Los Angeles.

SAN MATEO CITY PROJECTS

City of San Mateo—The Union Paving Co., of San Francisco, is making good progress on its contracts for street improvements in the San Mateo Homestead tract and in the eastern section of the city of San Mateo. These two contracts were awarded on June 3 and will be completed between October 15 and 30.

The San Mateo Homestead contract includes: Grading, 12,700 cu.yd at 20¢; cement concrete pavement, 114,000 sq.ft. of 5-7-in. at 17¢, and 172,000 sq.ft. of 6-8-in. at 19.4¢; concrete curb, 14,920 lin.ft. at 25¢; cement sidewalk, 77,100 sq.ft. at 14¢; concrete sewer, 383 lin.ft. of 12-in. at \$1.10; catchbasins, 16 at \$35; vitrified sewer, 5900 lin.ft. of 4-in. at 50¢; reinf. concrete box culvert, 920 lin.ft. at \$12; cast-iron pipe,



Union Paving Co. Contracts in San Mateo. (Upper) Grading on Palm Ave. (Lower) Constructing Reinforced Concrete Box Culvert on 19th Ave.

6-in., at \$1.00 per lin.ft.; total, \$84,821. The sewers, laid by Oakland Sewer Construction Co. under subcontract, have been completed, as is also the rough grading. The storm drain is being built and the concrete pavement is 25% finished. All concrete work, including storm drain, is being done by Batchelder & Freeman, subcontractors.

The contract for street work in eastern section of San Mateo amounted to \$90,582, and includes grading, curb and gutter, 253,700 sq.ft. of 5- and 6-in. asphaltic concrete paving on 3-in. rock cushion, concrete pipe storm sewers, vitrified pipe sanitary sewers, and sewage pumping plant. Rough grading has been completed; sanitary and storm sewers are under construction by Oakland Sewer Construction Co., subcontractor; and concrete work is being done by Batchelder & Freeman under subcontract.

E. P. Wilsey is City Engineer.

PALO ALTO AND STANFORD UNIVERSITY SEWER IMPROVEMENTS

Consulting Engineers Recommend New Outfall Sewers and Sewage Treatment Plant to Cost \$295,000

The Burns-McDonnell-Smith Engineering Co., of Los Angeles and Kansas City, recently submitted its report to the city council of Palo Alto, a digest of which follows:

The original sanitary sewer system for Palo Alto was designed on a basis of an ultimate population of 5000 to 6000. The outfall sewer consisted of a 12-in. line on Embarcadero road constructed in part of vitrified pipe and wooden pipe, from the city to the point of discharge into Mayfield slough. In 1919, the original line became inadequate and the 12-in. line was paralleled with a 14-in. line. The outfall sewer from Stanford University is also a 12-in. line on Embarcadero road, with the lower 6300 ft. of wooden pipe. All outlets are submerged during high tide periods and are surcharged during maximum peak flows. Considerable trouble is experienced on the University outfall sewer from breaks in the wooden portion of the line during high tide and peak flow periods.

The raw sewage from the city and University discharged into the slough has caused the formation of sludge banks and very nauseous conditions in the slough. The city owns a large acreage along the bay front and has developed a pleasure boat harbor near the sewer outlets and will eventually develop this acreage into a recreational park. The present and proposed development necessitates the abatement of unsightly and odorous conditions in the slough.

The U. S. Census count of 1930 gave Palo Alto a population of 13,635, and the population contributing to the sewer system of Stanford University is estimated at 4000. The present per capita flows are 75.5 gal. per day from Palo Alto and 110 gal. from Stanford University, or an average daily flow of 1,030,000 gal. and 440,000 gal. or a total of 1,500,000 gal. per day.

The problem of sewer outfall and sewage disposal for Palo Alto and Stanford University can be most economically and satisfactorily solved by a joint outfall and sewage treatment and disposal project.

The proposed new outfall and collecting mains are estimated and planned on a basis of serving three times the area as exists in the present city limits and a future population of 70,000 for Palo Alto and contiguous areas, and 10,000 for Stanford University. The sewage treatment plant is estimated on a future average daily flow of 2,750,000 gal., or about a ten-year future increase.

The proposed sewer improvements include the replacement of the original Embarcadero outfall with a line of sufficient capacity to serve a portion of Stanford University and the contributing area of Palo Alto and a new outfall main to serve Stanford University, the eastern portion of Palo Alto, and Mayfield areas with provision for future development in the natural drainage areas lying east and south of the present city limits of Palo Alto.

All sewage will be concentrated to one point and

will be pumped to the treatment plant site.

Two plans of disposal are feasible for satisfactorily disposing of the sewage. First, by preliminary treatment by sedimentation and the discharge of settled sewage into the bay, 3000 ft. off shore, and second, complete treatment by the activated sludge process and the discharge of the effluent into Mayfield slough. The complete treatment process offers a value of reclaimed water for use in irrigation of proposed park area or for sale for irrigation of orchards and small farm areas adjacent to the bay shore.

The sewer improvements and sewage disposal improvements necessary to relieve the present overloaded lines, to provide for future growth, and to abate the present disposal conditions involve the construction of 4.3 miles of 10 to 27-in. pipe (listed below), 2 miles of 24-in. force mains and bay outfall sewer, sewage pumping station, and separate sludge digestion treatment plant. The total cost of the three improvements is estimated at \$295,000, of which the proportional cost is: City of Palo Alto, \$220,500, and Stanford University, \$74,500.

Quantities of Pipe Sewers

1720 lin.ft. of 10-in. pipe
1580 lin.ft. of 12-in. pipe
1420 lin.ft. of 15-in. pipe
5360 lin.ft. of 18-in. pipe
4025 lin.ft. of 21-in. pipe
2350 lin.ft. of 24-in. pipe
4500 lin.ft. of 27-in. pipe
7700 lin.ft. of 24-in. Bay outfall
2400 lin.ft. of 24-in. c.i. force main

PALO ALTO, CALIFORNIA, PLANS TO CONSTRUCT 60-TON GARBAGE INCINERATOR

The ordinances and regulations of the city of Palo Alto require that all garbage and refuse must be collected by an authorized and bonded collector and disposed of by incineration. No burning of trash, leaves, rubbish by private parties is permitted within the city limits. The amount of refuse and wastes now being collected and incinerated amounts to an average of 17 tons per day for a six-day week, or 1 ton per 1000 population, exclusive of 5 tons per day of hotel and restaurant garbage and swill sold for hog feeding. On peak days the refuse amounts to 25 tons.

The present incinerator, constructed in 1912, has a rated capacity of 15 tons per 24 hours; hence is operating at an overload almost continuously. The city also has a contract with Stanford University to incinerate the refuse from that institution, which amounts to 1 ton per day.

It is estimated that with a reasonable growth of the city in the next fifteen years, the capacity of a new incinerator should be sufficient to dispose of 35 to 40 tons per day with peak days of 50 to 60 tons.

It has been recommended by the Burns-McDonnell-Smith Engineering Co., of Los Angeles and Kansas City, who recently submitted its report, that the city construct a 60-ton incinerator at an estimated cost of \$55,000.

PERSONAL MENTION

John Zoss, formerly assistant resident engineer for the Strauss Engineering Corp. on the Columbia River-Longview bridge (see August 10th, 1929, and March 10th, 1930, issues) is now engineer for J. H. Pomeroy & Co., Inc., subcontractors for division B, bridge steel, on the St. Johns suspension bridge at Portland. Zoss has particularly supervised construction of the wooden towers from which the superstructures of the main piers are being erected.

Clyde C. Kennedy, consulting engineer of San Francisco, with offices also in Los Angeles and Seattle, has been retained as consulting engineer by the city of Phoenix, Arizona, on water works extensions and improvements, also on sewer extensions, and retained as engineer on design of sewage treatment plant in conjunction with Holmquist & Maddock, engineers of Phoenix. Bond issues totalling \$3,250,000 have been voted for these improvements.

Al C. Joy, for several years publicity and advertising director for the Great Western Power Co. and San Joaquin Light & Power Co., has been appointed publicity director of the Pacific Gas & Electric Co., which company recently absorbed the former companies, with J. Charles Jordan, manager of publicity department of the P. G. & E., as his assistant.

The engineering personnel of the G. W. P. Co. and S. J. L. & P. Co. have been absorbed and distributed into various departments of the P. G. & E. Co., and will be detailed in a later issue.

OBITUARY



William Delbert Barkhuff, city engineer of Seattle since June, 1928, was killed on July 26 in an automobile accident. He is survived by a brother, George P. of Colton, Washington, and a son, Delbert Kirby.

Barkhuff was born in Iowa, June 10, 1873, and came to Washington in 1875. He entered Washington State College on the day this institution was opened, January 13, 1892, graduating in 1898 with the degree of civil engineer. In 1903 he was appointed city engineer of Everett, Washington, serving two terms. From 1908 to 1912 he was district engineer in the engineering department of the city of Seattle. From 1912 to 1922 he was in consulting practice, contracting, and ranching. In 1922 he was appointed a member of the board of public works of Seattle, as commissioner of streets and sewers. Barkhuff directed many important engineering projects during the period of rapid growth and expansion of the city of Seattle. In 1901 he married Miss Orabelle Kirby, who died in 1926. He was a Mason, Shriner, and an Eagle, and active in a number of civic organizations.

O. A. Piper has been acting as city engineer since Barkhuff's death.

John D. Twohy, a member of the firm of Twohy Brothers, well-known contractors of Portland and San Francisco, died August 10 in St. Mary's hospital, San Francisco, from an attack of pneumonia. He was born in St. Paul, Minnesota, October 7, 1885, and was a graduate of Gonzaga university, Spokane, Washington. Twohy is survived by his widow and four children; by two brothers, James F. Twohy of Portland and Philip Twohy of Spokane, and by two sisters. The firm of Twohy Brothers, railroad contractors, was started by his father, the late (Judge) John Twohy.

ASSOCIATIONS

CALIFORNIA WATER WORKS CONVENTION

Pasadena, October 28-November 1

The California Section of the American Water Works Association will hold its 11th annual convention October 28 to November 1, at Pasadena, with headquarters, sessions, and exhibits in the Huntington Hotel. A number of water works officials from Oregon, Nevada, and Arizona will attend. As these conventions have been growing rapidly in attendance, it is hard to predict what the registration will reach at Pasadena.

In addition to several intensely interesting inspection trips, there will be the usual 'big golf meet', with Ed Prentice and his 'flexible' golf clubs to put spice into the match, and 'Bob' Martindale as master of ceremonies. The exhibits under the able direction of 'Jim' Barker and 'Alec' Bell will be better than ever. The manufacturers' dinner-dance—the big event always—will be in charge of 'Bob' Martindale and several able assistants. Many worthwhile papers will be presented and discussed (details in a later issue).

Charles S. Olmsted (Del Monte) is president; W. W. Hurlbut (Los Angeles) vice-president; and Louis L. Farrell (supt., East Bay Municipal Utility District, Oakland) secretary-treasurer.

Be sure to attend this convention.

CALIFORNIA MUNICIPALITIES AND C. S. W. A. CONVENTION

Long Beach, October 6 to 11

The League of California Municipalities will hold its 32nd annual convention at Long Beach, October 6 to 11, the Hotel Virginia—an unusually fine convention hotel—being headquarters. A number of Oregon cities will participate. There will be the usual number of exhibitors, and the discussion-sessions divided into different sections.

The California Sewage Works Association will hold its third annual convention in conjunction with the League of California Municipalities, but with separate technical sessions.

The main features of the program as tentatively arranged are:

Thursday, October 9—Inspection trip starting at Hyperion sewage screening plant, city of Los Angeles; next, Harbor City plant, near Wilmington, of Los Angeles County Sanitation District, with demonstration of sewer cleaning; luncheon at Long Beach; meeting and discussion of sludge handling (digestion and fertilizer), and grease removal (Imhoff method and Los Angeles method), and garbage disposal.

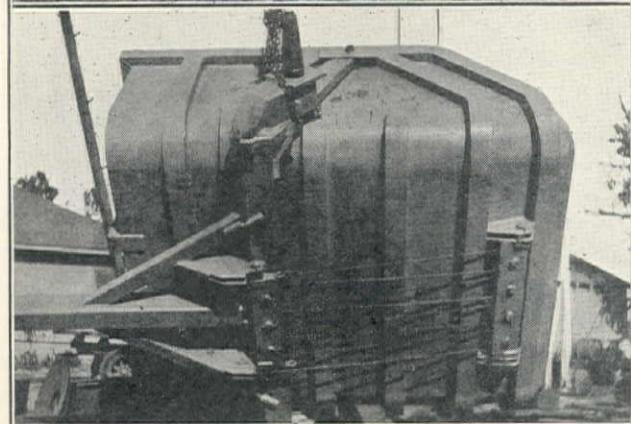
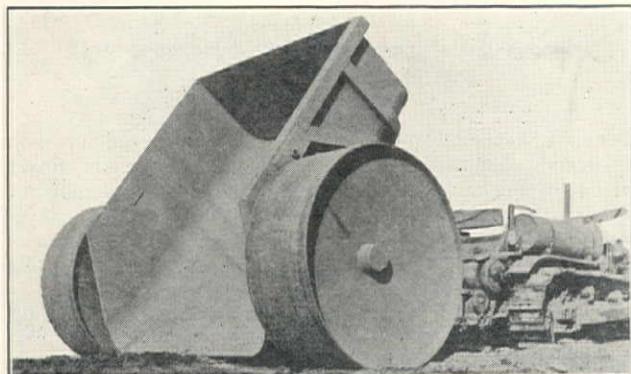
Friday, October 10—Breakfast meeting of the board of directors at Virginia hotel; business meeting and election of officers; discussion of odor control (chlorination and design); lunch at Los Nietos factory (as guests) of Pacific Clay Products; inspection trip to Griffith Park experimental plant for 'sewage purification for water recovery' of Los Angeles city water department, and to Pasadena sewage treatment plant to witness grease removal and sludge handling.

E. A. Reinke, 3093 Life Sciences bldg., Berkeley, Calif., is secretary of the C. S. W. A., which now has a membership of nearly 250.

New Equipment and Trade Notes

LE TOURNEAU CHARIOT TYPE DUMP CART

The Le Tourneau Manufacturing Co., Stockton, California, announces a 2-wheel chariot type dump cart with a capacity of 12 cu.yd. (water level) or 16 cu.yd. maximum. The body is 9 by 11 by 4 ft., built of structural shapes and heavy plate steel, and is of electric welded construction; it weighs 7 tons empty. The 6-in. axle is of heat-treated alloy steel and is equipped with Timken bearings. Furnished with solid wheels 78 in. diam. and 30 in. face width, this cart can be hauled by a Caterpillar '60' over nearly any material where a track machine will go. The body is hinged high on the sides so that the tail end will swing forward in dumping, thus eliminating any overhang while in this position. There is no tail gate to give trouble, nor is there any hydraulic mechanism. Dumping is done with a cable and sheaves from the tractor,



using the single-drum Le Tourneau standard power control unit, and can be continually observed by the tractor operator.

Power shovels can increase their output with this cart because the large body opening makes loading practically the same as side-casting and the dipper need not be spotted. As the top of the body is only 7 ft. above the ground, the dipper has a low lift. The low center of gravity of this cart makes it easy for the Caterpillar to handle it either while moving forward or in backing.

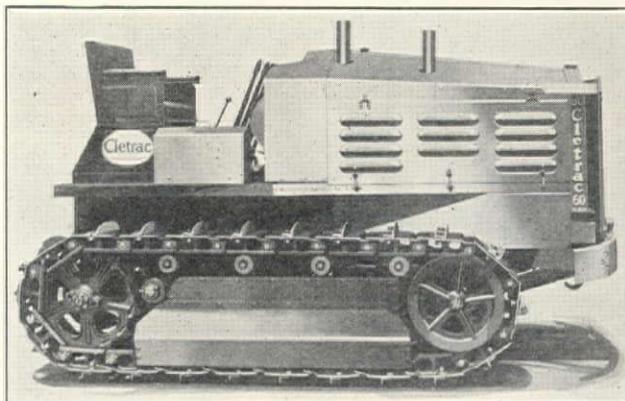
CENTRAL FOUNDRY CO. UNIVERSAL PIPE

E. A. Keithley, for many years Pacific coast representative for the Central Foundry Co. of New York, manufacturer of Universal cast-iron pipe and fittings, has moved his San Francisco office to 100 Potrero ave., where a full warehouse stock of pipe and fittings will be maintained. Stocks will also be carried in Seattle and Los Angeles.

Keithley will be an exhibitor as usual at the annual convention of the California Section of the American Water Works Association at Pasadena, October 28 to November 1.

CLETRAC 80-60 LOGGING SPECIAL

Getting logs out of the woods with any kind of equipment means working under extraordinary conditions. Tractors used for this work need protection to ward off inevitable blows that would inflict damage to vulnerable parts of their mechanism. The radiator core must be armored against the possible thrust of a snag or limb; the tractor may have to climb over rocks, straddle stumps, and crawl through thick underbrush, so an extra guard is needed for the oil pan, crank case, and underneath structure; as it is frequently of advantage to push and



pull from the front end of the tractor, a front bumper and pull hook is installed; a spark arrester furnishes a safeguard against fire. All of these accessories are found in the 80-60 Cletrac logging special, recently announced by the Cleveland Tractor Co.

The company has issued an attractive broadside in colors (form 584) showing the five models of Cletracs in action.

SPEEDER MACHINERY CO.

Speeder Machinery Co. of Cedar Rapids, Iowa, manufacturers of Speeder gasoline, electric, and diesel powered shovels, cranes, and draglines, announces that E. H. Kliebenstein will be direct factory representative in the Los Angeles territory. Stocks and repair parts will be carried at 455 East Third st. at the office and warehouse of the Construction Machinery Co.

T. M. Deal, sales manager of the Speeder Machinery Corp., is making a tour of the Pacific Coast States, visiting the many dealers who handle Speeder power shovels.

JENISON MACHINERY COMPANY

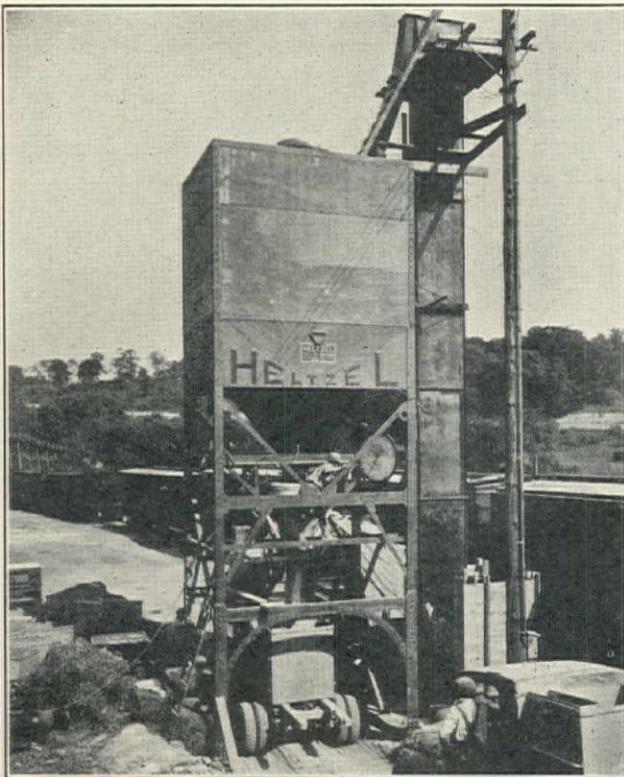
The contractors' department of Jenison Machinery Company, San Francisco, have taken over the sale and service of the Wolf Portable Timber Sawing Machine manufactured by the Reed-Prentice Corp., Worcester, Mass. This equipment is available in A. C. and D. C. electric and air operated types. Standard machines have a capacity of 24"; however, special capacities of 16", 36", 42" and 48" are available to order. Over 450 of these machines are now serving the railroad, mining, marine, general construction and other fields, including many installations in the west coast territory.

INTERNATIONAL FILTER CO. EXPANDS

The International Filter Co. and associated companies (International Water Softener Co. and General Zeolite Co.) announce the removal of their general offices and engineering departments from plant no. 1 at 333 w. 25th place, Chicago, to larger quarters at 59 e. Van Buren st., Chicago. This move is due to the expansion of manufacturing facilities.

HELTZEL BULK CEMENT HANDLING EQUIPMENT

The Heltzel Steel Form & Iron Co., Warren, Ohio, has developed complete equipment for storing and batching bulk cement. The basic bin is portable, of all-riveted construction, and has a capacity of 125 bbl.; an inexpensive extension can be added to increase the capacity to 320 bbl. The bin is loaded by a vertical elevator. If desired, a power shovel for unloading the bulk cement from box cars can also be furnished. Flow of cement between the bin and batcher is accurately controlled by a rotary valve arrangement. The cement batcher is entirely dustproof and makes a dust jacket unnecessary,



besides eliminating waste. An automatic, springless, dial-type scale allows the operator to back check each batch without moving any counterpoises. The weighing device is said to be extremely accurate and rapid in action.

RIC-WIL SEWER-PIPE JOINT COMPOUND

The tendency during the past few years, in California and the far west especially, has been to use flexible jointing mediums in sewer-pipe construction. Some engineers have made the mistake of using ordinary asphalt because it is cheaper, resulting in root intrusion or destruction of joints by hot water. The cost of a good jointing medium is negligible, especially as a permanently tight sewer is extremely important. The necessary characteristics for a dependable compound are: That the compound should possess a high fusing point as not to soften in warm weather or on coming in contact with hot water flowing through the pipe; it should be sufficiently ductile to permit the pipe settling in sections without the joints breaking open; and, it should have great adherence and tensile strength to enable the line to expand or contract without tearing the compound away from the sidewalls of the pipe bell.

The following points of superiority are claimed for Ric-Wil compound:

1. The compound is of purest asphalt base.
2. The filler used is a fine mineral flour, not clay.
3. The flour will pass 350-mesh bolting cloth and combines perfectly with the asphalt. (Water will not pass 200-mesh.)
4. Because it is mineral, it is stronger.
5. Its fineness gives a more perfect adhesion, insuring a tight joint and preventing root penetration and infiltration.
6. It remains in suspension longer, even under hottest tem-

perature, and does not settle to the bottom of the heating kettle like heavier fillers. This insures greater uniformity.

7. It is ductile and will stand extreme movement of the line without breaking the joint.
8. There is less waste, because the tendency to cake is less.
9. It does not deteriorate with age.

The H. G. Sperry Co. is the western representative for The Ric-Wil Co., of Cleveland, Ohio, with offices in the Call bdg., San Francisco, and the Calo bdg., Los Angeles.

OHIO POWER SHOVEL CO.

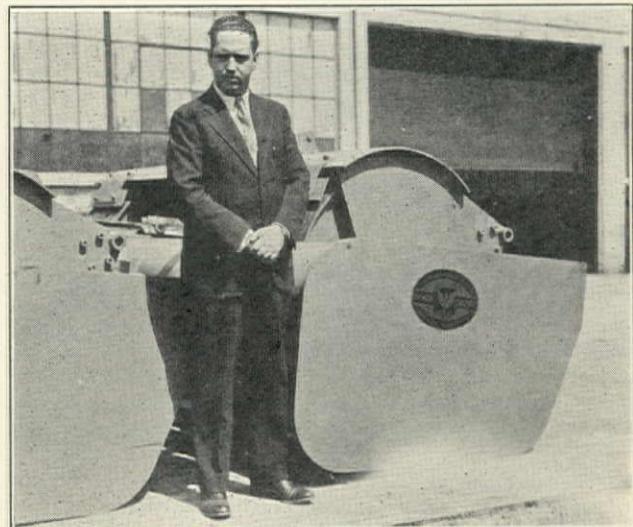
The Ohio Power Shovel Co. has recently opened its own district office at 1712 First Ave., south, Seattle, with W. C. Champion as district manager of the northwest territory. Champion for the past four years has been district manager for the Northwest Engineering Co. in the same territory and resigned July 15 to accept the above position. Agents for the Lima '101' in the northwest territory at the present are the Western Road Machine Co. at Portland; General Machinery Co. at Spokane; S. P. Wright Co. of Butte; and the Tyee Machinery Co. at Vancouver.

Shovels are carried in stock at Portland and Seattle with repair service from Seattle, Portland, and Spokane.

ATECO REPRESENTATIVE CHOSEN FOR PACIFIC NORTHWEST

Homer L. Guiler, for the past four years Caterpillar tractor and special equipment salesman with Hofius-Ferris Equipment Co. of Spokane, has been appointed Northwest representative for the American Tractor Equipment Co. of Oakland. This firm, of which Edward R. Bacon is president, manufactures Ateco earthmoving equipment for use with Caterpillar tractors.

Guiler had previous earthmoving experience with the Con-



Homer L. Guiler, District Representative in Pacific Northwest for American Tractor Equipment Co.

nelly Machinery Co., Caterpillar dealer at Billings, Montana, and the Northwest Equipment Co., Butte, Montana. With a total of 16 years experience in the machinery business, he is well qualified to represent Ateco in the states of Oregon, Washington, Utah, Idaho, Wyoming, Montana, South Dakota, North Dakota, and Minnesota.

AMERICAN STEEL & WIRE CO. 'TALKIE'

The American Steel & Wire Co., a subsidiary of the U. S. Steel Corp., has produced one of the first successful industrial motion pictures showing a trip through the mills in which its wire rope is made. Each stage of manufacture is orally explained at the time it is viewed.

Calco Gates Bring Economy and Efficiency to Water Control

CALCO GATES, with or without attached lengths of rust-resisting Armco Corrugated Pipe, are easily transported and installed. Time and labor, which are ordinarily spent in repairing wooden structures, are saved; for Calco Gates, when once installed, need very little further attention.

Much water, which is usually wasted by leaky gates, is saved when Calco Gates are on the job. Water is also controlled much more easily for they are constructed for simple operation.

Calco Gates give dependable and durable service. There is a Calco Gate for every water control problem. Let us send you information and prices.

California Corrugated Culvert Company

LOS ANGELES
424 Le Roy Street

BERKELEY
417 Parker Street

calco  **products**

34



For Heads up to 50 ft.

UNIT BID SUMMARY

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

STREET AND ROAD WORK

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

Award of contract recommended to Charles Harlowe, Jr., 378 Belmont St., Oakland, who bid \$118,295 for 8.335 miles grading, Section E, Route 23, Quincy-Beckwith National Forest Highway, Plumas National Forest, PLUMAS COUNTY, Calif., work for the U. S. Bureau of Public Roads, Sheldon Bdg., San Francisco. Bids received from:

(1) Charles Harlowe, Jr., Oakland	\$118,295	(6) Isbell Const. Co., Carson City	\$131,859	(11) C. R. Johnson, Portland	\$137,554
(2) Granfield, Farrar & Carlin, San Francisco	120,474	(7) A. J. & J. L. Fairbanks, So. San Francisco	133,425	(12) T. E. Connelly, S. F.	140,771
(3) Kennedy Bayles Const. Co., Oakland	123,539	(8) H. H. Boomer, S. F.	134,099	(13) Nate Lovelace, Sacramento	145,824
(4) Gist & Bell, Arcadia	127,124	(9) Hemstreet & Bell, Marysville	134,226	(14) A. C. Greenwood, Port-land	148,286
(5) Healy Tibbets Const. Co., San Francisco	129,497	(10) Morrison-Knudson Co., Boise	135,875	(15) S. H. Palmer Co., S. F.	152,790

Bids received on the following items:

(A) 26.55 acres clearing	(F) 17.7 M. ft. B.M. untreated timber	(M) 612 ft. 36-in. corr. metal pipe
(B) 212,083 cu.yd. roadway excavation	(G) 80 cu.yd. 'B' concrete	(N) 400 lin.ft. untreated timber piling
(C) 887 cu.yd. structure excavation	(H) 94 cu.yd. 'C' concrete	(O) 140 sq.yd. bituminous wear surface
(D) 42,398 sta.yd. overhaul	(I) 6,350 lb. reinforcing steel	(P) Hauling and piling logs, lump sum
(E) 8.335 miles finishing	(J) 1,756 ft. 18-in. corr. metal pipe	(Q) 150 Monuments
	(K) 1,728 ft. 24-in. corr. metal pipe	(L) (M) (N) (O) (P) (Q)
	(L) 70 ft. 30-in. corr. metal pipe	4.00 5.00 2.10 2.00 \$1500 3.00
(1) \$275 .39 2.00 .05 \$150 \$125. 32.50 27.50 .07 2.10 3.00		2.50 2.90 2.50 2.00 1000 5.00
(2) 100 .45 1.50 .03 300 90 26.00 24.00 .07 1.40 2.00		3.50 5.50 2.00 1.50 2000 3.00
(3) 250 .43 1.50 .03 200 105 25.00 25.00 .05 1.85 2.65		4.50 7.00 4.00 3.00 4000 3.00
(4) 200 .42 1.50 .02 300 110 30.00 25.00 .07 2.50 3.50		3.25 5.00 2.50 1.00 2000 3.00
(5) 125 .46 1.00 .02 250 120 30.00 35.00 .055 2.40 3.20		3.75 4.75 2.00 3.00 3000 3.50
(6) 300 .45 1.50 .03 300 100 27.00 27.00 .065 2.00 3.00		3.25 4.65 2.00 3.00 1750 4.00
(7) 250 .47 1.30 .04 250 110 36.00 35.00 .07 1.50 2.50		3.50 5.00 .75 2.00 500 3.00
(8) 100 .505 1.50 .02 300 50 30.00 30.00 .07 2.00 2.75		3.00 4.50 2.00 1.80 750 4.00
(9) 150 .50 1.50 .04 250 90 27.50 27.50 .06 1.50 2.50		3.75 5.50 2.25 2.25 2500 5.00
(10) 200 .48 1.50 .03 250 100 27.50 27.50 .08 2.00 2.50		4.00 5.50 .80 2.00 2000 4.00
(11) 225 .48 1.90 .04 225 70 36.00 58.00 .08 1.90 2.45		3.50 4.25 2.50 2.00 1500 3.00
(12) 185 .52 1.50 .01 200 80 34.00 32.00 .07 2.00 2.50		3.75 5.50 3.00 .25 2000 3.00
(13) 200 .535 1.25 .03 200 80 30.00 40.00 .06 2.00 2.25		3.50 5.75 1.30 2.00 500 3.00
(14) 200 .55 1.25 .05 300 85 30.00 30.00 .07 1.80 2.75		6.00 6.50 1.55 .40 2000 3.75
(15) 250 .53 1.75 .03 325 120 40.00 45.00 .09 2.25 3.75		4.00 5.00 1.50 3.00 1000 4.00
(16) 150 .70 1.50 .04 200 125 26.00 25.00 .06 2.20 3.00		3.50 5.75 2.90 3.00 1300 3.50
(17) 200 .50 2.00 .05 300 100 35.00 35.00 .08 1.85 2.80		

SACRAMENTO, CALIF.—STATE—SAN DIEGO COUNTY—CONCRETE PAVING

Jahn & Bressi, Corporation Bdg., Los Angeles, who bid \$171,425, low bid to California Division of Highways, Sacramento, for 5.4 miles concrete paving in SAN DIEGO COUNTY from Ba'bova Ave. to Torrey Pines Road. Bids received on:

(1) 5,000 cu.yd. roadway excav. (slide removal)	(5) 455,000 lb. reinf. steel
(2) 50,000 sta.yd. overhaul (slide removal)	(6) 60 cu.yd. remove concrete paving
(3) 96,000 sq.yd. subgrade for paving	(7) 287 sta. finish roadway
(4) 19,900 cu.yd. 'A' concrete (paving)	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	TOTALS
Jahn & Bressi, Los Angeles	.20	.005	.08	7.40	.03	2.50	5.00	\$171,425
Basich Bros., Los Angeles	.05	.005	.09	7.62	.034	3.00	5.00	177,863
Matich Bros., Elsinore	.20	.01	.10	7.35	.039	3.00	9.00	177,873
McCray Co., Los Angeles	.10	.01	.09	7.50	.045	2.50	10.00	182,385
E. Paul Ford, San Diego	.30	.005	.08	7.80	.0395	2.00	5.00	184,177
Butterfield Const. Co.	.25	.01	.07	8.00	.035	2.50	5.00	185,180
J. F. Knapp, Oakland	.40	.01	.09	7.85	.042	5.00	5.00	188,200
T. M. Morgan Paving Co.	.25	.01	.08	7.90	.045	2.00	8.00	189,531
Daley Corp., San Diego	.25	.01	.09	8.00	.043	1.00	4.00	190,363
Bert Noble, San Diego	.30	.01	.09	8.10	.04	5.00	3.00	191,191
V. R. Dennis Const. Co.	.10	.001	.10	8.45	.034	3.00	6.00	195,677
R. E. Hazard, San Diego	.25	.01	.085	8.75	.04	3.50	5.00	203,880

CARSON CITY, NEV.—STATE—GRADING AND SURFACING—ELKO COUNTY

Contract awarded to Utah Construction Co., Ogden, Utah, and Phelan Bdg., San Francisco, who bid \$117,683 for grading and surfacing with crushed rock or gravel on 23.22 miles in ELKO COUNTY from 3 miles north of Wells to Thousand Springs Creek, work for the Nevada State Highway Commission. Bids from:

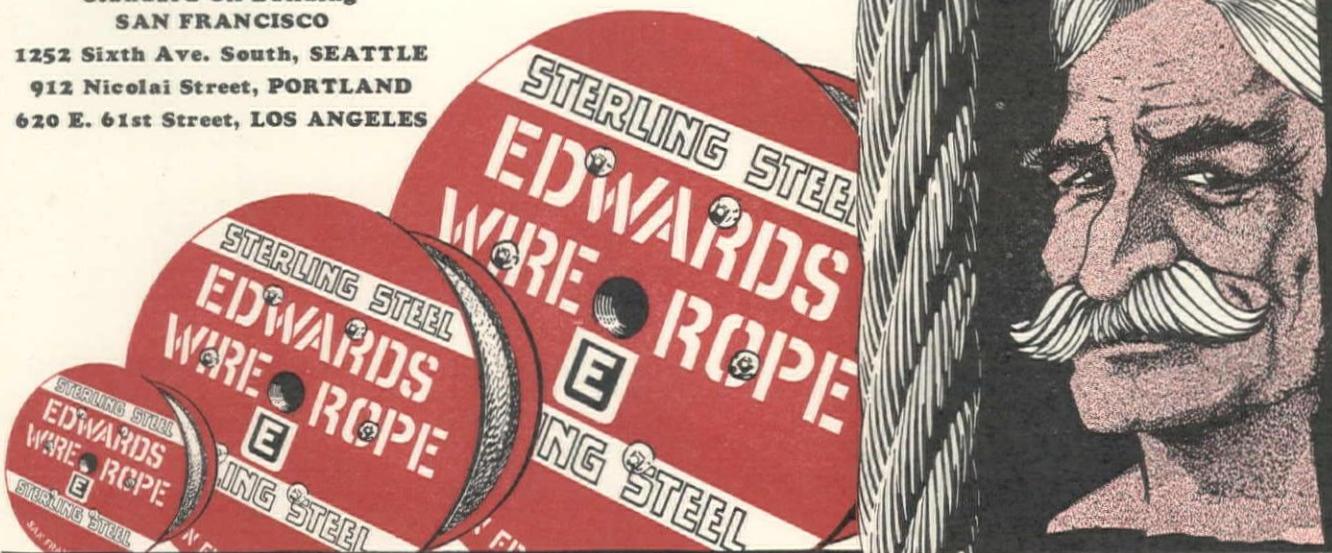
(1) Utah Construction Co., Ogden, Utah, and San Francisco	\$117,683	(2) Dodge Bros., Inc., Fallon, Nev.	\$121,308
		(3) Engineer's estimate	135,852
154,500 cu.yd. excavation, unclassified	.27 .32 .35	2,694 lin.ft. 18-in. corr. metal pipe	.65 .50 .75
163,441 sta.yd. overhaul	.04 .04 .04	772 lin.ft. 24-in. corr. metal pipe	.85 .50 .75
23.21 miles prepare subgr. and shoulders	\$200 75.00 \$100	762 lin.ft. 30-in. corr. metal pipe	1.20 .75 .75
50,600 cu.yd. creek rock or creek gravel	.86 .85 1.00	324 lin.ft. 36-in. corr. metal pipe	1.80 .75 .75
500 cu.yd. creek rock or gravel in stockpile	.80 .85 1.00	240 cu.yd. riprap	4.00 6.00 3.50
		80 monuments	4.00 4.00 4.00
235 cu.yd. "A" concrete	38.00 37.50 40.00	2 furnish and install posts for F.A. mark	6.00 10.00 5.00
194 cu.yd. "B" concrete	34.00 35.00 40.00	750 lb. bearing plates and rollers	.20 .30 .10

There are two kinds of wire rope users—those who think it costs money and those who know it saves money. Those who know—use Edwards.

E. H. EDWARDS CO.

Standard Oil Building
SAN FRANCISCO

1252 Sixth Ave. South, SEATTLE
912 Nicolai Street, PORTLAND
620 E. 61st Street, LOS ANGELES



**Framework of
BETHLEHEM SECTIONS**

THE Shell Building, like many others in San Francisco, has Bethlehem Wide-Flange Structural Shapes—commonly known as Bethlehem Sections—in its framework.

Bethlehem Sections are by no means new to architects, engineers and contractors. When they were introduced, years ago, their economy in weight and cost of fabrication received immediate recognition. The framework of thousands of buildings in every part of the country is constructed of Bethlehem Sections.

**PACIFIC COAST
STEEL
CORPORATION**

Subsidiary of Bethlehem Steel Corporation

General Offices: Matson Bldg., San Francisco

Seattle: Alaska Bldg. Portland: American Bank Bldg.
Honolulu: Castle & Cooke Bldg. Los Angeles: Pacific Finance Bldg.

Plants at Seattle, San Francisco, Los Angeles

Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York City

SACRAMENTO, CALIF.—STATE—SANTA BARBARA AND SAN LUIS OBISPO COUNTIES—GRADING AND SURFACING

Lang Transportation Co., 5501 Santa Fe, Los Angeles, \$261,612 low bid to California Div. of Highways, for 37.9 miles grading and oil tr. surfacing, SANTA BARBARA AND SAN LUIS OBISPO COUNTIES, from Cuyama Rv. to east boundary. Bids from:

(1) Lang Transportation Co.	\$261,612	(7) C. U. Heauser, Glendale.	\$359,891
(2) M. J. Bevanda, Stockton	283,740	(8) A. Teichert & Sons, Sacramento	367,818
(3) G. W. Ellis, Glendale	312,880	(9) J. P. Holland, S. F.	374,996
(4) Irving L. Kyder, San Jose	315,557	(10) Allied Contractors	458,969
(5) H. W. Rohl, Los Angeles	354,342	(11) Peninsula Paving Co., S. F.	491,338
(6) V. R. Dennis Const. Co.	358,693		
		(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)	
148,850 cu.yd. roadw. exc.	.26 .30 .40 .30 .40 .35 .365 .40 .31 .63 .60		
332,100 sta.yd. overhaul	.01 .01 .02 .015 .01 .02 .01 .01 .02		
5,975 cu.yd. struct. excav.	.75 .60 1.00 1.00 1.00 1.15 1.23 .85 1.07 1.00 1.50		
68,800 tons cr. run base	1.00 1.30 1.34 1.55 1.60 1.70 1.70 1.68 1.79 2.00 2.30		
57,700 tons oil tr. grav. or stone surf. (pl.)	1.65 1.60 1.65 1.75 1.90 2.05 2.10 2.19 2.26 2.60 2.85		
2,650 tons gravel or stone screenings	1.75 2.00 1.50 2.25 3.00 2.30 2.25 2.00 2.67 2.80 2.70		
1,300 tons gr. or st. sur.	1.00 2.00 1.50 1.45 2.50 1.50 1.70 1.75 2.14 2.50 2.00		
2,600 bbl. fuel oil	1.85 2.25 1.85 2.10 2.50 1.90 1.15 1.90 1.97 2.80 2.30		
125 sta. scar. and mixing	8.75 10.00 10.00 10.00 25.00 7.00 10.00 10.00 7.49 15.00 11.00		
3,780 ft. 18-in. corr. pipe	.50 .50 .70 .60 .60 .50 .60 .60 .53 .85 .60		
954 ft. 24-in. corr. pipe	.50 .60 .80 .70 .80 .60 .90 .75 .53 1.00 .60		
120 ft. 30-in. corr. pipe	.70 .70 .90 .80 1.00 .70 1.20 1.25 .74 1.00 .75		
196 ft. 36-in. corr. pipe	.90 1.00 1.00 1.00 1.50 1.25 1.40 1.50 1.07 1.40 .75		
876 ft. clean and relay	1.00 .75 1.00 1.60 1.00 .35 .75 .85 1.07 1.00 .75		
1,300 ft. 8-in. pipe underdr.	2.00 1.50 3.00 1.53 1.00 2.10 1.50 .35 1.44 2.00 1.35		
2,850 ft. timb. gd. rail	1.50 .85 1.00 1.00 1.30 1.25 1.00 1.00 1.01 .80 .35		
16 M redwood (dense sel.)	80.00 \$100 \$100 96.00 \$100 \$120 95.00 \$100 117.70 \$110 \$120		
74 M redwood (select)	80.00 90.00 \$100 96.00 \$100 \$115 85.00 95.00 \$107 \$100 \$115		
5,520 M gallons water	2.25 2.50 2.50 2.00 2.50 2.40 2.50 2.75 3.21 2.50 2.50		
3.8 mi. move and reset fence	\$400 \$250 \$200 \$250 \$300 \$172 \$200 \$300 267.50 \$300 \$275		
0.7 mi. new fence	\$500 \$650 \$400 \$500 \$345 \$400 \$550 695.50 \$500 \$600		
1,980 sta. fin. roadway	3.00 1.50 2.50 3.00 5.00 6.00 4.00 5.00 5.35 4.50 5.00		
485 monuments	3.00 2.50 2.50 3.00 3.00 3.00 3.00 3.00 3.21 3.00 3.50		

SACRAMENTO, CALIF.—STATE—LOS ANGELES AND ORANGE COUNTIES—GRADING AND CONCRETE AND MACADAM PAVING

T. M. Morgan Pav. Co., Edwards & Wildey Bdg., Los Angeles, \$191,604 low bid to California Div. of Highways for 3.1 miles grading, conc. and macadam paving, LOS ANGELES and ORANGE COUNTIES, from Anaheim to Seal Beach. Bids from:

(1) T. M. Morgan Paving Co., Stockton	\$191,604	(7) Kovacevich & Price, Long Beach	\$216,312
(2) J. F. Knapp, Oakland	198,564	(8) Wells & Bressler, Santa Ana	230,153
(3) Jahn & Bressi, Los Angeles	203,053	(9) Ed. Johnson & Sons, Los Angeles	243,981
(4) Macco Const. Co., Clearwater	208,031	(10) McCray Co., Los Angeles	251,346
(5) Lewis Const. Co., L. A.	208,224	(11) Griffith Co., Los Angeles	302,114
(6) Dimmitt & Taylor, Los Angeles	212,579		

	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)		
162 sta. clearing and grubbing	5.00 2.50 2.00 5.00 5.00 3.00 5.00 5.00 15.00 4.00 10.00		
55,000 cu.yd. roadway excav	.30 .30 .325 .30 .54 .35 .45 .36 .40 .45 .40		
110,000 cu.yd. imp. borrow	.47 .45 .58 .57 .45 .53 .60 .62 .60 .75 1.10		
50,000 mi.yd. haul	.10 .15 .14 .10 .15 .15 .12 .16 .30 .25 .15		
350 cu.yd. struct. excav	1.00 1.00 .75 1.00 3.00 1.00 1.00 1.00 2.00 1.00 1.00		
600 cu.yd. remove concr.	2.00 2.00 2.00 4.00 1.00 1.00 1.00 1.00 3.00 1.00 2.00		
40,250 sq.yd. subgrade	.08 .08 .08 .095 .08 .09 .14 .10 .09 .09 .10		
14,650 tons decom. gran.	1.40 1.60 1.25 1.50 1.30 1.50 1.40 1.70 1.71 1.90 2.70		
8,375 yd. 'A' Concrete (paving)	8.00 8.50 8.50 8.10 8.50 8.83 7.85 9.20 9.25 8.50 9.51		
1,700 tons broken stone	2.00 2.00 2.00 2.25 2.00 3.30 1.80 2.30 2.40 3.00 2.70		
70 tons 'E' asphalt	20.00 20.00 17.00 25.00 23.00 22.50 25.00 20.00 21.00 20.00 20.00		
250 bbl. light fuel oil	2.00 2.00 1.75 3.25 2.00 2.50 2.75 2.00 2.50 1.60 1.50		
120 cu.yd. 'A' concrete (str.)	25.00 18.00 20.00 20.00 30.00 20.00 25.00 22.00 25.00 20.00 20.00		
5,000 ft. 'A' concrete (curb)	.50 .60 .40 .50 .50 .50 .50 .55 .50 .50 .50		
25,000 sq.yd. concrete sidewalk	.12 .18 .09 .16 .14 .15 .18 .17 .13 .15 .15		
200,000 lb. reinf. steel	.045 .04 .03 .038 .04 .038 .04 .04 .06 .043 .035		
4,000 lb. misc. iron	.10 .12 .07 .14 .06 .07 .05 .10 .06 .15 .12		
6,500 lb. railroad rail	.05 .05 .04 .07 .05 .05 .04 .07 .06 .04 .05		
74 ft. 18-in. corr. pipe	.50 .50 .50 .75 .50 .60 .75 1.00 2.00 .75 1.00		
68 ft. 24-in. corr. pipe	.60 .60 .75 1.00 1.00 .75 1.00 1.50 3.00 .90 1.00		
66 ft. 36-in. corr. pipe	.75 .70 1.00 1.50 2.00 .75 1.25 2.00 4.00 1.00 2.00		
1 mi. move and reset fence	\$250 \$250 \$200 \$300 \$300 \$350 \$350 \$400 \$400 \$300 \$400		
1 mi. new property fence	\$350 \$400 \$400 \$500 \$500 \$500 \$500 \$500 \$600 \$600 \$475 \$500		
162 sta. finish roadway	6.00 4.00 5.00 10.00 5.00 5.00 5.00 5.00 4.00 8.00 7.00		
30 monuments	3.00 2.50 3.00 3.00 3.00 2.50 3.00 3.00 3.00 3.00 3.00		

RICHMOND, CALIF.—CITY—PULLMAN AVE.—ASPHALT

Union Paving Co., Call Bdg., San Francisco, who bid \$132,125 as follows, only bid submitted to City for improving Pullman Ave. from Cutting Blvd. to Panhandle Blvd. and portions of Panhandle Blvd.:

12,693 cu.yd. excavation	1.25	900 sq.ft. open drain	.30
7,376 cu.yd. filling	.40	100 ft. 5 bv 30 bv 5-in. corr. culvert	6.00
7,000 sq.ft. 2-in. wearing surface	.12	1 twin 3 bv 6-ft. reinf. conc. culv.	\$6000
550 sq.ft. cement sidewalk	.15	126 lin.ft. 8-in. corr. pine culv.	1.50
21,000 sq.ft. 8-in. gutter	.30	75 lin.ft. 12-in. corr. pine culv.	2.25
2,600 sq.ft. 10-in. gutter	.32	50 lin.ft. 15-in. corr. pine culv.	2.50
10,400 lin.ft. concrete curb	.75	55 lin.ft. 30 in. corr. pine culv.	6.00
1,300 lin.ft. concrete curb on 4-in. broken rock cushion	.80	55 lin.ft. 42-in. corr. pine culv.	10.00
380 lin.ft. curb bar	.30	1 42-in. centr. cast reinf. conc. culvert	84.00
7,000 sq.ft. 8-in. Richmond standard macadam paving	.15	2 8-in. corr. pine inlets No. 1	5.00
180,500 sq.ft. 2-in. asph. surf. on 6-in. asph. conc. base	.377	1 8-in. corr. pine inlet No. 2	10.00
with 4-in. rock cushion		2 curb inlets No. 1	20.00
25,000 sq.ft. 2-in. asph. surf. on 6-in. reinf. conc. base	.388	4 curb inlets No. 2	40.00
with 4-in. rock cushion		1 manhole	\$100
110 cu.yd. riprap	5.00		

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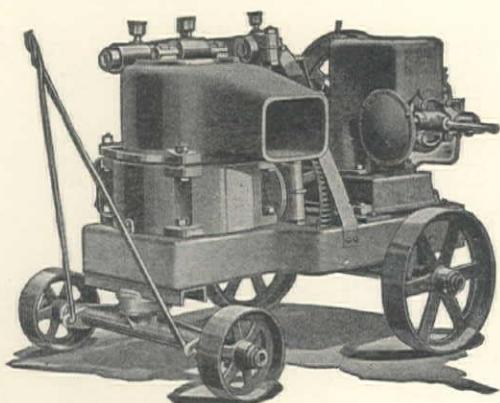
Plant at
Pittsburg, Calif.

COMPANY

9 Main Street
San Francisco

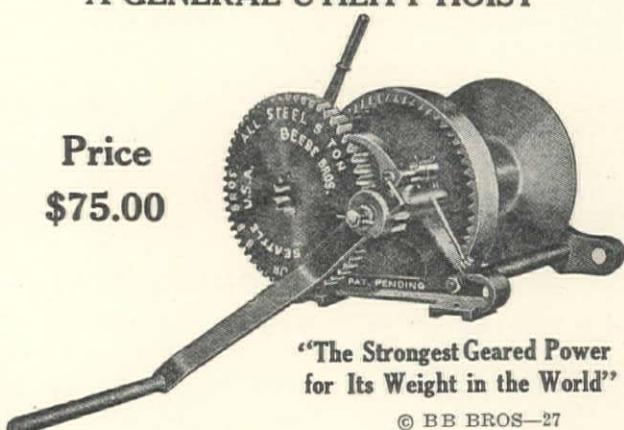
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SACRAMENTO, CALIF.—STATE—ORANGE COUNTY—GRADING AND CONCRETE PAVING

T. M. Morgan Paving Co., Edwards & Wildey Bdg., Los Angeles, \$98,432, low bid to California Division of Highways for 3.3 miles grading and concrete paving from Seal Beach to Sunset Beach, ORANGE COUNTY. Bids received from:

(1) T. M. Morgan Paving Co.	\$ 98,432	(5) Griffith Co., L. A.	\$118,850					
(2) Matich Bros., Elsinore	106,113	(6) Ed. Johnson & Sons, L. A.	122,038					
(3) Jahn & Bressi, Los Angeles	111,866	(7) J. F. Knapp, Oakland	122,387					
(4) Kovacevich & Price, Long Beach	112,215	(8) Macco Const. Co., Clearwater	129,083					
		(1) (2) (3) (4) (5) (6) (7) (8)						
51,000 cu.yd. roadw. emb.	.45	.54	.54	.60	.60	.50	.75	.55
650 cu.yd. struct. exc.	1.00	.90	.50	.75	.75	2.00	1.00	2.50
19,150 sq.yd. subgrade	.08	.08	.08	.08	.10	.09	.10	.095
4,000 yd. 'A' conc. (pave.)	8.25	8.20	10.50	8.45	9.30	9.25	9.00	8.00
30 yd. 'A' conc. (struct.)	30.00	20.00	20.00	30.00	25.00	25.00	20.00	20.00
95,000 lb. reinf. steel	.045	.036	.03	.045	.03	.06	.042	.038
1,320 ft. 12-in. rein. conc. pipe	.50	.20	.50	.75	.50	2.00	1.00	.50
60 ft. 30-in. rein. conc. pipe	.75	.50	1.50	1.50	1.00	4.00	1.50	2.00
20 yd. move concrete	2.50	2.50	2.00	1.00	2.00	4.00	3.00	4.00
270 M cr. douglas fir	90.00	\$118	\$105	\$120	\$130	\$140	\$120	\$175
5,900 ft. cr. douglas piles	.75	.69	.70	.70	.90	1.00	.70	1.00
276 drive above piles	15.00	8.75	10.00	8.50	10.00	10.00	8.00	20.00
172 sta. finish roadway	8.00	5.00	5.00	3.00	6.00	3.00	4.00	10.00
43 monuments	3.00	2.00	3.00	3.00	2.00	3.00	2.00	3.00

SACRAMENTO, CALIF.—STATE—MONO COUNTY—GRADING

Kennedy-Bayles Construction Co., 1140 Chatham Road, Oakland, who bid \$161,510, submitted the low bid to California Division of Highways, Sacramento, for 12.9 miles grading in MONO COUNTY from Sonora Junction to 4 miles south of Coleville, work for California Division of Highways, Sacramento. Bids received from:

(1) Kennedy-Bayles Const. Co.	\$161,510	(5) Gist & Bell, Arcadia	\$244,895					
(2) A. Teichert & Sons, Sacramento	191,324	(6) McCray Co., Los Angeles	267,088					
(3) O. A. Lindberg, Stockton	216,729	(7) J. P. Holland, Inc., S. F.	275,100					
(4) Isbell Const. Co., Fresno	224,874	(8) Finnell Co., Sacramento	280,833					
		(1) (2) (3) (4) (5) (6) (7) (8)						
265 sta. clearing and grubbing	20.00	27.00	75.00	25.00	30.00	40.00	20.00	30.00
259,000 cu.yd. roadw. exc.	.47	.56	.60	.67	.72	.75	.91	.80
630,200 sta.yd. overhaul	.01	.01	.01	.01	.01	.02	.01	.015
8,000 cu.yd. imp. borrow	.60	.60	.75	.80	1.00	.70	.36	1.00
1,200 cu.yd. struct. exc.	2.00	1.50	1.25	2.00	2.00	2.00	1.25	1.50
265 cu.yd. 'A' conc. (str.)	25.00	29.50	25.00	30.00	30.00	35.00	25.00	30.00
19,000 lb. reinf. steel	.07	.055	.08	.06	.07	.08	.06	.06
3,294 ft. 18-in. corr. pipe	.60	1.00	.60	.80	1.00	1.00	.75	1.00
440 ft. 24-in. corr. pipe	.75	1.25	.60	1.00	1.00	1.25	.85	1.25
38 ft. 30-in. corr. pipe	1.00	1.50	.75	1.50	1.50	2.00	1.00	2.00
1 mi. move and reset fence	300.00	200.00	450.00	300.00	300.00	300.00	350.00	300.00
6,410 sq.yd. rock slope	1.00	1.45	2.00	1.50	2.00	3.00	1.00	4.00
684 sta. finish roadway	5.00	5.00	5.00	10.00	10.00	10.00	8.00	10.00
183 monuments	3.00	3.00	3.00	3.50	4.00	3.00	3.00	3.50

SANTA FE, NEW MEXICO—STATE—CONCRETE PAVING AND BRIDGES

Bids received as follows by New Mexico State Highway Commission:

(A) EDDY COUNTY—Contract awarded to Lee Moor Contracting Co., El Paso, Tex., \$128,380 for constructing two steel bridges and 2 miles of concrete paving from Carlsbad to Carlsbad Caverns. Bids on:

(1) 9,683 cu.yd. roadway excavation	(5) 39 cu.yd. 'A' conc. (box culv.)	(8) 576 cu.yd. 'A' conc. (superst.)									
(2) 20,457 sq.yd. concrete paving	(6) 2,975 cu.yd. structure excavation	(9) 225,085 lb. reinf. steel									
(3) 50,164 sq.yd. fabric reinf. for pav.	(7) 1,104 cu.yd. 'A' conc. (sub-struct.)	(10) 551,892 lb. structural steel									
(4) 9,390 lin.ft. long. center joint											
	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) TOTALS										
Lee Moor Contr. Co.	.48	2.25	.035	.14	21.00	1.35	18.25	20.50	.047	.045	\$128,380
Veater & Davis, El Paso	.40	2.10	.05	.15	25.00	1.00	20.00	20.00	.0525	.0475	128,813
H. C. Lallier, Denver, Colo.	.50	2.17	.04	.15	22.00	2.00	22.00	22.00	.045	.04	131,124
Ed. Lembke, Albuquerque, New Mexico	.53	2.35	.036	.15	25.00	1.80	13.95	22.73	.045	.046	131,282
New Mexico Const. Co., Albuquerque, N. M.	.30	2.50	.045	.16	28.40	1.00	18.00	20.80	.047	.046	131,865
Armstrong & Armstrong, Roswell, N. M.	.50	2.37	.04	.15	24.00	2.00	20.00	23.00	.045	.0425	134,735
Engineer's estimate	.25	3.00	.05	.18	23.50	2.00	23.00	23.00	.0525	.0525	156,423

CHEYENNE, WYOMING—STATE—CONCRETE PAVING AND GRADING

Bids received as follows by Wyoming State Highway Commission:

(A) PARK COUNTY—Woodward Construction Co., Rock Springs, Wyoming, \$90,894 low for 1.2 miles concrete paving in City of Cody. Bids received on:

(1) 5,550 cu.yd. excavation, earth	(3) 960 lin.ft. corr. pipe	(5) 24,492 sq.yd. concrete paving								
(2) 60 cu.yd. 'A' concrete (struct.)	(4) 1,649 lin.ft. 12-in. vitrified pipe	(6) 4,677 lin.ft. concrete curb and gutter								
		(1) (2) (3) (4) (5) (6) TOTALS								
Woodward Construction Co.	1.00	20.00	1.20	1.50	2.46	2.50	\$ 90,894			
A. H. Read, Cheyenne, Wyo.	.85	18.00	1.00	1.50	2.60	2.40	93,608			
Ora Bundy	1.25	25.00	.90	1.50	2.60	2.50	96,447			
McLaughlin Const. Co.	1.25	25.00	1.20	1.75	2.70	2.70	100,930			
Engineer's estimate	.60	26.00	.60	1.80	3.25	3.00	85,317			
(B) CROOK COUNTY—Sharrock & Purcel, Casper, Wyoming, \$73,455 low for 5.7 miles grading Sundance-Carlile Road. Bids received on:										
(1) 58,800 cu.yd. earth excav.	(4) 130 cu.yd. 'A' concrete	(7) 2,198 lin.ft. corr. pipe								
(2) 13,500 cu.yd. loose rock excav.	(5) 13 cu.yd. 'B' concrete	(8) 38,484 ft. right-of-way fence								
(3) 32,150 cu.yd. solid rock excav.	(6) 8,360 lb. reinf. steel	(9) 22,920 ft. move and reset fence								
	(1) (2) (3) (4) (5) (6) (7) (8) (9) TOTALS									
Sharrock & Purcel	.27	.60	1.25	31.00	30.00	.075	.65	.05	.025	\$73,455
Chadwick & Birdsall	.30	.55	1.225	25.00	30.00	.07	1.00	.06	.05	75,029
Engineer's estimate	.25	.60	1.20	27.00	27.00	.07	.60	.05	.02	69,845

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"We were influenced mainly in adopting Mono-Cast pipe for our last summer's work by three considerations: *First*, the saving in cost over ordinary cast iron pipe. *Second*, availability of 16' lengths as against 12' lengths in other makes. *Third*, presence of a bead on the spigot end of Mono-Cast pipe.

"The cost of this make of centrifugally cast pipe is less than ordinary cast iron pipe on account of the lighter weight per foot. Sixteen-foot lengths enabled us to lay water mains at a saving of about 25% in the number of joints, and as the number of joints materially affects the leakage, this was considered to be a great advantage. Presence of a bead on the spigot end minimizes the danger of ends blowing off, and as we have had at least one serious break of this kind,* this feature had something to do with our decision. We feel that Mono-Cast is stronger than ordinary cast iron pipe in beam action, and approaches the strength of ordinary cast iron pipe in resistance to shock."

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CLYDE EQUIPMENT CO.....Portland, Ore.
H. J. ARMSTRONG CO.....Seattle, Wash.



DENVER, COLORADO—GOVT.—GRADING—PARK COUNTY, WYOMING

Taggart Construction Co., Cody, Wyoming, who bid \$88,654 as follows, only bid submitted to Bureau of Public Roads, Denver, Colorado, for grading 4.2 miles Cody-Yellowstone National Highway, Shoshone National Forest, PARK COUNTY, Wyoming:

645 cu.yd. cement rubl. masonry	\$17.00	5 acres clearing	\$175
560 lin.ft. 24-in. corr. pipe	3.00	1 acre grubbing	175
442 lin.ft. 30-in. corr. pipe	3.50	47,600 cu.yd. roadway excavation	.72
110 cu.yd. hand laid riprap	3.50	950 cu.yd. struc. excavation	2.50
2,700 cu.yd. hand laid rock embk.	3.00	5,000 cu.yd. borrow	.40
100 lin.ft. wooden guard rail	1.00	28,000 sta.yd. overhaul	.03
Maintenance of detours, lump sum	2,500	7,000 cu.yd. crush. rock or gravel surfacing	2.50
Remove old structures, lump sum	400	225 cu.yd. "A" concrete	27.00
		27,800 lb. reinforcing steel	.075

TUNNEL CONSTRUCTION

SACRAMENTO, CALIF.—STATE—PLACER COUNTY—TUNNEL AND ROADWAY

T. M. Morgan Paving Co., Edwards & Wildey Bdg., Los Angeles, \$209,755 low bid to the California Division of Highways for 531-ft. tunnel, 36 ft. diameter, and 1 mile of roadway through Newcastle, PLACER COUNTY. Bids received from:

(1) T. M. Morgan Paving Co., Stockton	\$209,755	(5) Ward Engineering Company, San Francisco	\$272,996
(2) W. S. Mead, Oakland	241,627	(6) T. E. Connelly, San Francisco	298,132
(3) Geo. Pollock Co., Sacramento	249,999	(7) J. G. Donovan & Son, Los Angeles	308,121
(4) Fisher & Bonney	260,352		

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
531 lin.ft. drive tunnel, 36 ft. diameter	\$120	\$176	\$160	\$200	\$197	\$280	\$167
240 lin.ft. 'A' concrete (tunnel lin.), Sec. A	\$110	\$121	\$215	\$120	\$112	\$125	\$180
75 lin.ft. redwood timb. (tunnel lin.), Sect. B	95.00	55.00	80.00	92.00	83.00	\$120	\$138
216 lin.ft. redwood timb. (tunnel lin.), Sect. C	60.00	46.00	65.00	67.00	67.00	\$110	\$118
51 sta. clear. and grubbing	50.00	15.00	10.00	50.00	7.00	70.00	50.00
71,000 cu.yd. road. exca.	.70	.85	.65	.80	1.00	.54	.96
648,000 sta.yd. overhaul	.01	.01	.01	.0075	.008	.01	.02
3,900 cu.yd. str. excav.	1.50	1.00	1.50	1.50	1.65	1.35	2.00
96 cu.yd. 'A' concr. (ditch lining)	20.00	12.00	18.00	20.00	13.00	22.00	20.00
430 cu.yd. 'A' concr. (portals and structures)	25.00	18.00	20.00	18.00	20.00	24.00	30.00
39,500 lb. reinf. steel	.05	.05	.06	.05	.046	.05	.06
2,600 tons crusher run base	2.00	2.47	2.25	2.50	2.80	2.25	3.00
2,200 tons oil treated gravel or stone sur.	2.50	4.00	2.90	3.25	4.15	3.45	5.00
450 tons untreated gravel or stone sur.	2.00	2.47	2.25	2.50	2.80	2.50	3.00
276 ft. 12-in. corr. pipe	.50	.50	.50	.40	.50	.50	.50
500 ft. 18-in. corr. pipe	.60	.60	.70	.50	.70	.50	.60
56 ft. 24-in. corr. pipe	1.25	.70	1.00	.75	1.00	1.00	.70
70 ft. 30-in. corr. pipe	1.50	.80	1.50	1.00	1.30	1.00	.80
252 ft. 42-in. corr. pipe	2.50	1.00	2.50	1.50	1.75	2.00	1.00
53 ft. corr. pipe, clean and relay	1.00	1.25	1.50	2.00	1.00	2.00	1.00
4 move and reset headw.	15.00	10.00	40.00	20.00	24.00	10.00	50.00
1,500 ft. 10-in. vitr. pipe	1.00	.60	.90	.50	.90	.80	1.55
1,520 ft. 8-in. vitr. pipe	.90	.40	.80	.40	.70	.65	1.20
870 ft. 6-in. vitr. pipe	.50	.30	.70	.30	.60	.50	.85
15 sew. house connect.	25.00	2.50	20.00	10.00	12.00	1.00	25.00
3 brick manholes	60.00	85.00	70.00	\$150	\$180	\$100	\$100
3 vitr. lampholes	10.00	10.00	5.00	5.00	24.00	10.00	25.00
1.1 mi. new fence	\$400	\$450	\$500	\$500	\$720	\$540	\$500
25 cu.yd. move and dispose of concrete	3.00	2.50	3.00	15.00	2.40	4.00	25.00
Lighting equipment	\$1500	\$1800	\$1400	\$2000	\$980	\$1250	\$2500
325 ft. timber guard rail	1.25	1.00	1.00	1.00	1.20	.85	1.00
140 ft. pipe handrail	2.50	1.60	1.00	2.00	1.20	2.85	1.50
56 sta. finish roadw.	10.00	6.00	10.00	10.00	18.00	4.00	10.00
50 monuments	3.00	3.00	4.00	3.00	3.00	3.00	3.00

BRIDGES AND CULVERTS

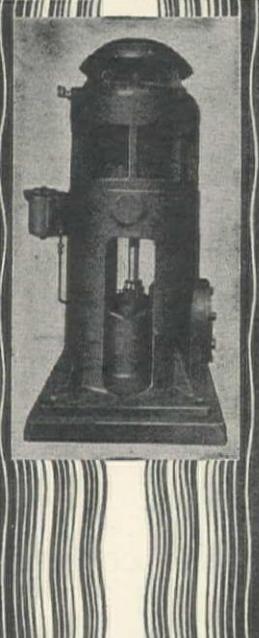
SACRAMENTO, CALIF.—STATE—HUMBOLDT COUNTY—STEEL, CONCRETE AND TIMBER

Fred J. Maurer, Eureka, who bid \$50,320, low bid to the California Division of Highways, Public Works Bdg., Sacramento, for construction of overhead crossing over the tracks of the Northwestern Pacific Railroad, 2½ miles north of Beatrice, HUMBOLDT COUNTY. Bids received from the following concerns:

(1) Fred J. Maurer, Eureka	\$50,320	(4) Henry Padgett, Fields Landing	\$55,985
(2) Mercer-Fraser Co., Eureka	51,693	(5) C. Emil Force, Piedmont	66,961
(3) Smith Bros. Company, Eureka	55,813		

	(1)	(2)	(3)	(4)	(5)
570 cu.yd. struct. excav.	2.50	2.50	3.88	2.77	4.50
2,300 ft. douglas fir pil.	.28	.20	.36	.315	.28
79 drive above piles	12.00	18.00	14.00	14.00	26.50
7,700 ft. creo. douglas fir piles	.863	.70	.94	.91	1.00
106 drive above piles	12.00	18.00	14.00	18.72	28.50
92 M redwood (dense sel.)	85.00	92.00	85.50	110.40	105.00
51 M redwood (select)	77.00	88.00	81.50	101.10	104.00
60 cu.yd. 'A' concr. (trem.)	18.00	12.00	15.30	16.40	23.00
480 cu.yd. 'A' concr. (brid.)	18.00	22.00	20.00	15.25	25.00
205 cu.yd. 'A' concr. (pav.)	14.00	15.00	14.00	16.63	17.50
53,000 lb. reinf. steel	.049	.05	.05	.0475	.05
187,000 lb. struct. steel	.063	.055	.075	.065	.08
2,480 lb. cast steel	.14	.16	.18	.1825	.16
Miscellaneous work	324.00	450.00	414.00	\$1200	\$1000

DEEPWELL TURBINES

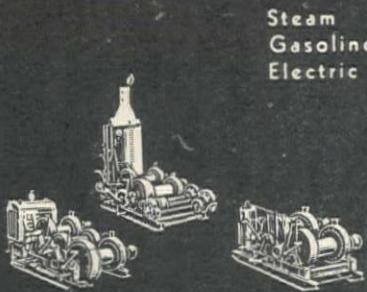


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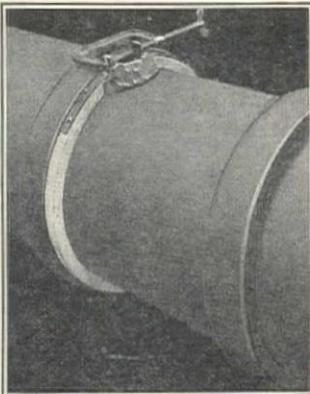
And in addition it has unusual adhesion and is flexible enough to allow normal or even extreme movement of lines in settling without damage to joints. Ric-wil Compound is economical and easy to pour.

Write for test sample and illustrated Service Detail for pouring Ric-wil Joints.

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RIC-WIL
SEWER AND DRAIN PRODUCTS



Illustrating the Ric-wil joint runner in position for pouring a Ric-wil Compound joint.

SACRAMENTO, CALIF.—STATE—LOS ANGELES COUNTY—REINF. CONCRETE

J. F. Knapp, Financial Center Bdg., Oakland, \$113,977 low bid to California Division of Highways for reinf. conc. bridge over San Gabriel River, at Seal Beach. Bids on:

(1) 9,250 cu.yd. channel exc.	(5) 300 cu.yd. 'A' conc. (tremie)	(9) 554,000 lb. reinf. steel
(2) 2,600 cu.yd. struct. exc.	(6) 2,500 cu.yd. 'A' conc. (struct.)	(10) 30,600 lb. cast steel
(3) 23,000 ft. doug. fir piles	(7) 1,710 cu.yd. 'C' conc. (struct.)	(11) Miscellaneous work
(4) 448 drive above piles	(8) 31 cu.yd. 'E' conc. (struct.)	
J. F. Knapp, Oakland.....	(1) 3.75 (2) .25 (3) 10.00 (4) 12.50 (5) 15.00 (6) 12.50 (7) 50.00 (8) .0375 (9) .12 (10) \$750 (11) \$113,977	TOTALS
Oberg Bros., L. A.....	.58 5.35 .28 15.00 14.00 14.00 50.00 .041 .12 1640	125,151
Carpenter Bros.....	.65 6.10 .29 12.30 13.44 14.73 11.83 38.00 .049 .0925 886	127,179
T. M. Morgan Pav. Co.....	.35 3.00 .35 14.00 15.00 17.00 14.50 65.00 .04 .20 500	127,949
Bodenhamer Const. Co.....	.58 4.50 .21 20.00 17.50 16.00 15.00 60.00 .044 .12 1000	132,663
Merritt, Chapman & Scott.....	.70 1.61 .26 17.40 15.00 23.50 15.00 \$100 .0385 .097 3085	143,818
Gist & Bell, Arcadia.....	.50 5.00 .30 20.00 14.00 20.00 16.00 70.00 .04 .20 2000	147,495
R. H. Travers, L. A.....	.50 6.50 .36 16.00 20.00 18.00 17.00 70.00 .0428 .11 1700	147,990
M. H. Slocum.....	.45 8.80 .25 26.65 17.60 19.25 14.90 40.00 .044 .115 545	152,464
Torson Const. Co.....	.80 4.00 .30 28.00 17.50 18.50 17.50 50.00 .05 .15 2000	154,509

RIVER AND HARBOR WORK

SAN FRANCISCO, CALIF.—DREDGING AND ROCK WALL—ISLAIS CREEK PROJECT

Contract awarded to Healy-Tibbitts Construction Co., 64 Pine St., San Francisco, who bid \$257,615 to Islais Creek Reclamation District, Room 375, City Hall, San Francisco, for dredging channel and constructing rock wall. Bids received on:

(1) 325,000 cu.yd. dredging	(2) 475,000 tons of rock in place
Healy-Tibbitts Con. Co.....	(1) .18 (2) 41875 TOTALS \$257,615
Geo. Pollock Co., Sacramento.....	(1) .20 (2) 467 287,058
Industrial Land Development Co.....	(1) .20 (2) .6275 363,376

WATER SUPPLY SYSTEMS

FRESNO, CALIF.—CAST IRON PIPE SYSTEM, VALVES, HYDRANTS, ETC.—COUNTY

Edgley Company, 800 E. 61st St., Los Angeles, who bid \$42,758, submitted the low bid to Board of Supervisors of Fresno County for water distributing system in Fresno County Water Works District No. 1. Bids received from:

(1) Edgley Co., Los Angeles.....	\$42,758	(6) W. J. Tobin, Oakland.....	\$51,791
(2) V. A. Thompson, Los Angeles.....	45,004	(7) Cali. Road & Street Pav. Co.....	52,116
(3) O. E. Thompson, Fresno.....	45,461	(8) M. Murphy, Berkeley.....	52,391
(4) Nick Bebek & Co., Los Angeles.....	47,639	(9) Stroud Bros. & Seabrook.....	60,837
(5) O. U. Miracle, San Diego.....	50,552		

6,880 ft. 4-in. cast iron pipe.....	.65 .73 .82 .80 .84 .92 .95 .96 .10
25,580 ft. 6-in. cast iron pipe.....	.95 1.03 1.04 1.10 1.14 1.16 1.15 1.17 1.40
6,750 ft. 8-in. cast iron pipe.....	1.38 1.31 1.32 1.47 1.45 1.52 1.70 1.60 1.90
10,100 lb. cast iron fittings.....	.07 .10 .064 .085 .09 .10 .07 .10 .10
10 4-in. gate valves.....	12.00 16.10 15.20 15.75 23.00 20.00 19.75 20.00 18.35
32 6-in. gate valves.....	20.00 27.07 23.00 23.78 36.00 30.00 27.80 24.00 24.90
7 8-in. gate valves.....	32.00 36.58 35.00 33.26 48.00 45.00 48.95 35.00 39.63
73 irrigation hydrants.....	20.00 16.86 15.25 16.33 20.00 20.00 17.10 20.00 17.00
33 1-in. service connections.....	12.00 7.59 8.10 4.75 12.00 8.00 10.45 9.00 6.40
14 1 1/4-in. service connections.....	14.00 12.38 11.55 8.30 15.00 15.00 16.40 11.00 9.25
20 1 1/2-in. service connections.....	16.00 15.67 16.70 12.90 20.00 30.00 22.75 18.00 9.75
34 large meter boxes.....	3.00 3.00 5.30 2.70 6.00 5.00 2.00 3.00 5.75
33 small meter boxes.....	2.00 2.00 4.75 2.58 5.50 4.00 1.00 2.00 4.50
162 4-in. x 4-in. redwood posts.....	2.00 1.00 1.10 .50 1.00 1.00 .50 1.00 .75
23 conc. box collars.....	5.00 7.00 6.25 4.00 8.00 2.00 4.00 6.00 1.00

Work under bond issue. A. Segel, Griffith-McKenzie Bdg., Fresno, is Consulting Engineer.

DENVER, COLORADO—CONCRETE DAM—CITY

Contract awarded to Gordon Construction Co., 31st and Platte River, Denver, Colorado, who bid \$469,505 for construction of concrete reservoir in Eleven Mile Canon, work for the Board of Water Commissioners, City and County of Denver, Colorado. Bids from:

(1) Gordon Construction Co., Denver.....	\$469,505	(7) Munroe & Westcott, Inc.....	\$612,957
(2) J. H. Miller & Co., Denver.....	470,745	(8) Utah Const. Co. and Morrison-Knudsen Co., Utah and Idaho.....	644,223
(3) Stearns-Rogers Mfg. Co., Denver.....	534,740	(9) Frazier Davis Const. Co.....	663,484
(4) Peter Seerie, Denver.....	544,005	(10) Northern States Contr. Co.....	746,210
(5) Platt Rogers, Inc., Pueblo.....	549,012	(11) Guy F. Atkinson Co., S. F.....	842,140
(6) J. A. Kries & Sons, Inc., Knoxville.....	599,630		

(1) Diversion of river and care of water.....	\$12,000	(2) \$8,000	(3) \$24,000	(4) \$40,000	(5) \$15,000	(6) \$15,000	(7) \$25,000	(8) \$18,000	(9) \$80,000	(10) \$33,179	(11) \$72,000
4,406 cu.yd. excavation, earth and loose rock.....	2.35	2.00	1.50	3.50	.65	8.00	5.00	2.00	1.70	1.18	7.00
3,950 cu.yd. excav. solid rock below elevation.....	5.50	8.00	6.00	6.00	3.00	10.00	5.00	6.50	3.50	5.70	12.00
6,980 cu.yd. excav. solid rock above elevation 8480.....	4.25	2.50	4.60	3.50	2.00	4.50	5.00	4.00	2.70	5.80	7.00
5,600 cu.yd. excav. solid rock stripping.....	4.25	1.00	4.60	3.25	2.50	4.00	5.00	3.00	2.70	4.00	5.00
1,600 cu.yd. backfill upperside of dam.....	1.50	.50	1.00	1.00	.75	4.00	1.00	2.00	1.00	1.58	2.00
4,100 cu.yd. backfill lower side of dam.....	1.00	.50	.75	1.00	.50	2.50	.50	1.00	1.50	1.58	1.00
200 cu.yd. surfacing of road.....	3.00	2.50	3.00	2.50	2.50	5.00	2.00	3.00	2.50	5.13	4.00
800 ft. drill grout and drain holes.....	1.50	2.00	1.50	.50	1.00	2.00	1.00	2.00	1.50	3.61	4.00
20 cu.yd. pressure grouting.....	60.00	100.00	60.00	25.00	50.00	50.00	50.00	75.00	78.84	100.00	
25,750 lb. place grout and drain pipe.....	.10	.03	.09	.03	.05	.04	.02	.10	.20	.079	.15
711 boxes place metal grouting boxes.....	1.50	1.00	.30	.50	.30	1.50	1.00	1.00	1.50	3.95	1.00
1,700 ft. place metal cutoff strips.....	1.00	.20	1.00	.50	.25	.20	.10	1.00	.70	.236	.75
850 cu.yd. concrete (ret. walls).....	12.00	13.00	20.00	11.00	13.00	15.00	15.00	16.00	12.00	17.47	25.00
620 cu.yd. concrete, reinf. (out str.).....	24.00	10.00	20.00	12.00	16.50	18.00	20.00	24.00	16.00	26.93	25.00
49,000 cu.yd. concrete in dam.....	6.40	7.20	7.33	7.75	9.10	8.00	9.00	9.75	9.70	10.85	11.00
88,629 lb. placing reinforcing.....	.03	.03	.03	.02	.015	.03	.01	.03	.02	.032	.03
215,904 lb. place lining (outlet conduit).....	.03	.03	.03	.02	.025	.025	.01	.02	.02	.0592	.03
182,000 lb. install gate valves.....	.03	.04	.04	.025	.03	.025	.02	.04	.02	.067	.03
34,800 lb. installing screens.....	.03	.03	.04	.02	.02	.025	.02	.03	.02	.039	.03
Lump sum, constr. valve and power house.....	\$2,800	\$3,000	\$4,279	\$5,300	\$3,800	\$4,000	\$2,500	\$10,000	\$4,000	\$10,328	\$4,500



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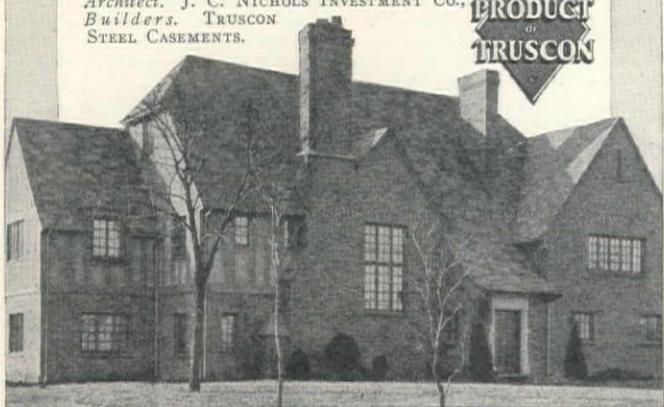
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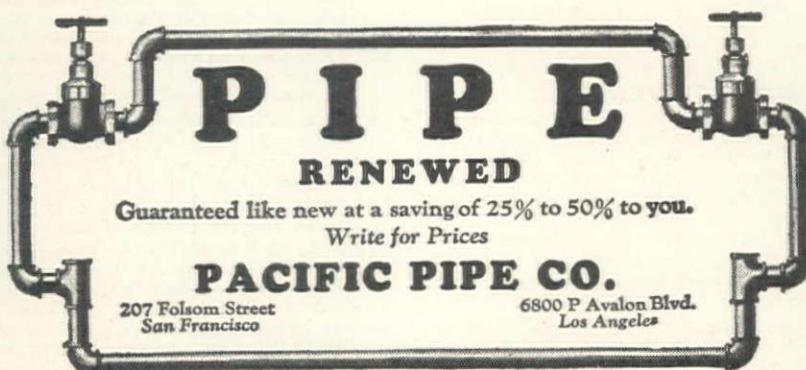
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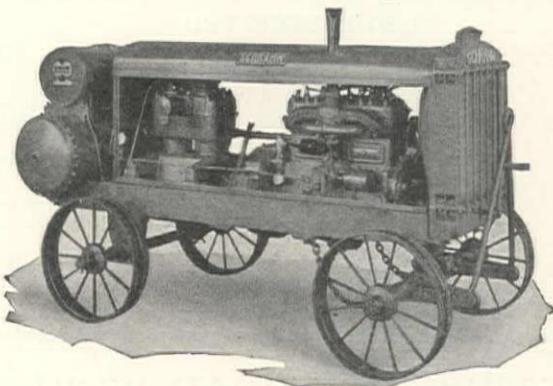


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CONSTRUCTION NEWS SUMMARY

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.)

BIDS BEING RECEIVED

Railroad, 27 miles from main line to Summit, Nev., (Boulder Canyon Dam Branch Railroad), for Union Pacific Railroad, Los Angeles, bids to Sept. 5.
Storm Drain, Sect. C&D on Alemany Blvd., for City of San Francisco, \$208,000, bids to Sept. 3.
Pipe lines, reservoir, pumping house, etc., for City of Anacortes, Wash., bids to Sept. 5, \$420,000.

BIDS RECEIVED

Office building for State at Los Angeles, Weymouth-Crowell Co., Los Angeles, \$639,000 low.

CONTRACTS AWARDED

Asphalt paving Olive St. for City of Los Angeles to Griffith Co., Los Angeles, \$373,925.
Concrete paving Olive Ave. for City of Burbank, Calif., to J. L. McClain, Los Angeles, \$237,189.
Dam, concrete construction in Eleven Mile Canon, for the City and County of Denver, Colorado, to Gordon Construction Co., Denver, Colo., \$469,505.
Railroad, 88 miles from near Klamath Falls, Ore., to Bieber, Lassen County, for Great Northern Railroad Co. to cost \$3,924,620, awarded to A. Guthrie & Co., Portland, Ore.

STREET and ROAD WORK

WORK CONTEMPLATED

CRESCENT CITY, CALIF.—City is considering paving K St., Third St., F St., etc., to cost \$30,000. H. M. Malpas is City Engr. 8-6
GILROY, CALIF.—Plans by Engr., R. W. Fisher, 74 North First St., San Jose, for improving Hanna, Rossana, and other streets, involving 500,000 sq.ft. 5-in. asphalt paving, 3052 ft. 6-in. concrete sewer, etc. Bids after Aug. 8. 8-8

LOS ANGELES, CALIF.—Plans by J. E. Rockhold, protests Sept. 8, for improving Arden Drive, Broadway, etc., involving 11,500 cu.yd. excavation, 130,000 sq.ft. 6-8-in. concrete paving, 58,000 sq.ft. 1½-in. oil macadam paving, corr. pipe, \$36,000. Bids after Sept. 8. 8-16

LOS ANGELES, CALIF.—Plans by J. E. Rockhold, County Surveyor, for improving Florence Ave. from Jefferson Blvd. to Centinella Ave., involving 20,317 cu.yd. excavation, 237,067 sq.ft. 6-in. Bitumuls paving, 13,380 sq.ft. 6-in. concrete paving, 24,822 sq.ft. 8-in. concrete paving, 353,179 sq.ft. 6-in. disintegrated rock base, etc. \$106,250. Bids after Aug. 25. 8-9

OAKLAND, CALIF.—Plans by City Engr., Walter N. Frickstad, for concrete paving Hopkins St. from Coolidge Avenue to High Street and from High Street to Seminary Avenue. \$300,000. 8-8

SAN RAFAEL, CALIF.—Plans by H. K. Brainerd, City Engr., protests Aug. 30, for: (1) Improving Second St., involving 59,746 sq.ft. 5-in. concrete paving with 4-in. stone subbase, vitr. sewers, corr. pipe; and (2) Improving Mission and Belle Aves., involving 23,258 sq.ft. 5-in. concrete paving with 4-in. stone sub-base, vitr. sewers and corr. pipe. 8-16

VISALIA, CALIF.—Plans by City Engr., L. H. Gadsby, protests Aug. 25 for sidewalks and curbs on W. Race St., W. Grove St., etc. 8-11

BIDS BEING RECEIVED

PHOENIX, ARIZ.—Bids to 2 p.m., Aug. 27, by Arizona State Highway Comm., for surfacing 15 miles of the Springerville-New Mexico Highway from Springerville east to the New Mexico State Line, Phoenix, Ariz., F.A. Proj. 73. Work involves the following approximate quantities: 26,000 cu.yd. subgr. stabilizer (surfacing), 29,000 cu.yd.mi. sub-grade stabilizer haul (surfacing). 8-9

PHOENIX, ARIZ.—Bids to 2 p.m., Sept. 3, by Arizona Highway Comm. for 5.6 miles Yuma-Wellton Highway near Ligurta, involving 3800 cu.yd. roadway excavation, 63,900 cu.yd. borrow excavation, 13,900 cu.yd. subgrade stabilizer, concrete structures, corr. pipe. 8-15

PHOENIX, ARIZ.—Bids to 2 p.m., Sept. 3, by Arizona State Highway Comm., for 8.7 miles of Tucson-Nogales Road, involving 23,460 cu.yd. roadw. excavation, 63,280 cu.yd. borrow, 1460 cu.yd. concrete, 77,000 lb. reinf. steel, corr. pipe, etc. 8-16

HOLLISTER, CALIF.—Bids to 2 p.m., Sept. 2, by County for improving Bolsa Road, Lucy Brown Lane, Hamilton Road, etc., involving 769,527 sq.ft. bituminous macad. surfacing; 1112 tons 1½-in. crush. rock in fin. rdway; 1112 tons ¾-in. crush. rock in fin. rdway. County furnishes base rock, \$20,000. 8-18

LOS ANGELES, CALIF.—Bids to 10 a.m., August 27, by Board of Public Works, City Hall, for improving Yorkshire Drive and Parrish Ave., involving: 30,000 yd. cut, 214,000 sq.ft. 6-in. concrete paving, 8646 ft. integral curb, 10,971 ft. special curb, storm drain, sanitary sewer, fire hydrant, reinforced concrete stairway. 8-14

MARTINEZ, CALIF.—Bids to 11 a.m., Sept. 2, by County for paving West St. and Winslow St. at Crockett, involving 537 cu.yd. concrete paving. \$6500. 8-5

REDDING, CALIF.—Bids to 10 a.m., Aug. 27, by Joint Highway Dist. 11 for 3 miles of Weed-Klamath Falls Road, involving 51,444 cu.yd. excavation, etc. 8-15

SACRAMENTO, CALIF.—Bids to 2 p.m., Sept. 3, by California Division of Highways, Sacramento, for 4.1 miles grading Bayshore Highway in SAN MATEO COUNTY from Redwood City to Willow Road, work involving 86,520 cu.yd. roadway excavation, 77,060 cu.yd. imported borrow, 2,050,000 sta.yd. overhaul, 2890 cu.yd. structure excavation, 223 cu.yd. Class 'A' concrete, 20,670 lb. reinforcing steel. 8-6

SACRAMENTO, CALIF.—Bids to 2 p.m., Sept. 10, by California Div. of Highways, Sacramento, for 15.4 miles SAN LUIS OBISPO COUNTY, from 1.7 miles west of Shandon to east boundary, work involving: 2030 tons screenings, 170 tons asphalt road oil. 8-13

SACRAMENTO, CALIF.—Bids to 2:30 p.m., Sept. 3, Board of Public Works, City Hall, S. F., for: (1) Improvement of portions of Twelfth Ave., 29th Ave., 41st Ave., 42nd Ave., 46th Ave., and Moraga St., by the construction of 6-in. vitrified side sewers; concrete pavement; and a 6-in. concrete foundations and a 1½-in. asphaltic concrete wearing surface. Cost—\$11,200. (2) Improvement of 26th Ave., portions of 41st Ave., 44th Ave., and Ortega St., by the construction of armored concrete curbs; side sewers; 6-in. concrete foundation, and a 1½-in. asphaltic wearing surface. Cost—\$6000. (3) Improvement of 31st Ave., between Lawton and Moraga Sts.; 32nd Ave. between Kirkham and Lawton Sts., by construction of concrete curbs; side sewers; 6-in. concrete foundation and a 1½-in. asphaltic concrete wearing surface. Cost—\$6400. (4) Improvement of 42nd Ave., between Judah and Kirkham Sts., by construction of armored concrete curbs; 2-ft. concrete gutters; side sewers; 6-in. Class 'F' concrete base, and 1½-in. asphaltic concrete wearing surface. Cost—\$400. (5) Improvement of 22nd Ave. between Moraga and Noriega Sts., by the construction of armored concrete curbs, and asphaltic concrete pavement with 6-in. concrete foundation and 1½-in. asphaltic concrete wearing surface. Cost—\$400. 8-12

SALINAS, CALIF.—Bids to 10 a.m., Sept. 2, by County Clerk for crushing and stockpiling broken stone at Greenfield. 8-7

SAN BERNARDINO, CALIF.—To Gilmore Oil Co., Ltd., Los Angeles, who bid \$4050 to District Engineer, California Division of Highways, for 23.8 miles of heavy fuel oil to be applied as a dust layer in SAN BERNARDINO COUNTY from Sawmill to Bear Lake. 8-12

SAN DIEGO, CALIF.—Bids to Sept. 2, by City for improving 54th and other streets, involving 362,000 sq.ft. 6-in. concrete paving, 43,800 cu.yd. excavation, 2157 ft. 8-in. and 12,682 ft. 6-in. vitr. sewers, 1198 ft. 8-in., 7754 ft. 6-in., 321 ft. 4-in. and 489 ft. 2-in. cast iron mains, 13 hydrants, etc. 8-14

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., Sept. 3, by Board of Public Works for Sect. B, Sunset Blvd. from Santiago to Yorba Sts., involving 83,800 cu.yd. excavation, 192,000 sq.ft. 2½-in. asphalt surface on 10-in. waterbound macadam base, 29,400 sq.ft. 2½-in. asphalt surface on 'F' 6-in. concrete base, 88,500 sq.ft. 4-in. and 48,900 sq.ft. 6-in. waterbound macadam paving, curbs, vitr. sewers, etc., \$88,000. 8-15

SAN FRANCISCO, CALIF.—Bids to 3 p.m., Aug. 28, by Public Works Engr. Corp., Federal Reserve Bank Bdg., S. F., for 4100 ft. crushed stone road from Co. Highway near West Pittsburg, to Mallard Pump Station, Contra Costa Co., also railroad crossings, fencing and gates. 8-18

SOUTH SAN FRANCISCO, CALIF.—Bids to 7:30 p.m., Sept. 2, by City for improving Linden Ave., involving 210,000 sq.ft. asphalt paving, vitr. and concrete sewers, two bridges, 44 electroliers, etc. 8-16

DENVER, COLO.—Bids to 10 a.m., Aug. 29, by State Highway Comm. for 5.5 miles north of La Jara, CONEJOS COUNTY, involving 23,600 cu.yd. borrow, 10,260 tons gravel or rock surfacing, and 53,900 tons base course gravel surfacing, etc.

HELENA, MONT.—Bids to Aug. 27, by State Highway Comm. for: (1) 7 miles Fort Benton-Havre Road, HILL COUNTY, involving 94,200 cu.yd. roadway excavation, reinf. conc. pipe, etc.; (2) ½ mile of Great Falls-Fort Benson Road in Great Falls, involving 6842 sq.yd. concrete or bituminous paving; (3) 9 miles Broadus-Wyoming Line Road, POWDER RIVER COUNTY, involving 189,000 cu.yd. roadway excavation, corr. pipe, etc.; (4) 13 miles of Dodson-Malta Road, PHILLIPS COUNTY, involving 17,272 cu.yd. gravel surface, 17,095 cu.yd. gravel base, etc.; (5) 11 miles of Helena-Townsend Road, etc., involving 190,000 cu.yd. roadway excavation, 11,777 cu.yd. gravel sub-

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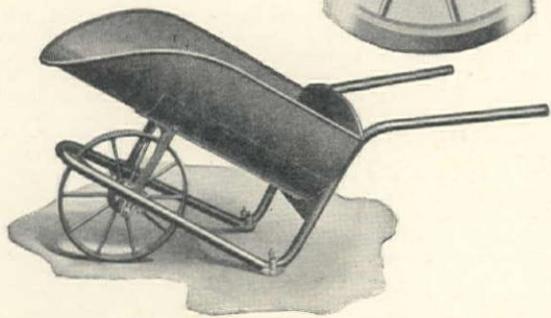
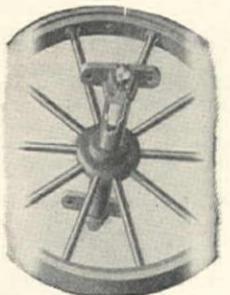
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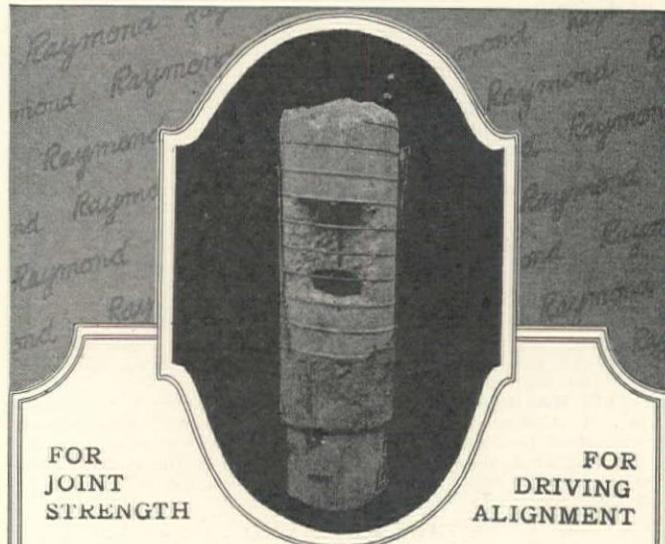


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base, etc.; (6) 12 miles of Glendive-Sidney Road, DAWSON COUNTY, involving 220,000 cu.yd. roadway excavation, etc.; (7) 12 miles of Great Falls-Fort Benton Road, CASCADE COUNTY, involving 130,000 cu.yd. roadway excavation, etc.; and (8) 6 miles of Carpenter-Manhattan Road, GALLATIN COUNTY, involving 80,000 cu.yd. roadway excavation and 13,000 cu.yd. gravel surface, etc.

PORTLAND, ORE.—Bids to 10 a.m., Aug. 27, by Bureau of Public Roads for 90 acres clearing East Side-Logan Pass-St. Mary's Junction Highway, Glacier National Park, MONTANA.

PORTLAND, ORE.—Bids to 10 a.m., Aug. 28, by U. S. Bureau of Public Roads for 1.8 miles Y. G. B. Line Road, Jefferson National Forest, MEAGHER COUNTY, MONTANA, involving 92,000 cu.yd. excavation, etc.

PORTLAND, ORE.—Bids to 10 a.m., August 28, by Oregon State Highway Comm., for: BAKER COUNTY—Regrading and resurfacing 5.7 miles of the Haines-Baker Section of the Old Oregon Trail, involving 18,000 cu.yd. excavation, 46,000 cu.yd. pit-run screen, gravel, 6500 cu.yd. crushed gravel, 26,000 lin.ft. 6-in. perforated concrete drain pipe. CLATSOP COUNTY—Grading approaches to bridges over Necanicum River and Wahanna Creek on Roosevelt Coast Highway near Seaside, involving: 23,500 cu.yd. excavation. TILLAMOOK COUNTY—Constructing 3.0 miles of gravel resurfacing and furnishing crushed gravel in stock piles on the Pleasant Valley-Hemlock Section of the Roosevelt Coast Highway, involving: 13,000 cu.yd. screened gravel, 6250 cu.yd. crushed gravel. 8-15

OGDEN, UTAH.—Bids to 10 a.m., Sept. 3, by Bureau of Public Roads for 7 miles Elk City Highway, Nezperce National Forest, IDAHO COUNTY, Idaho, involving 80,000 cu.yd. excavation, etc.

SALT LAKE CITY, UTAH.—Bids to 2 p.m., Aug. 25, by State Road Commission, Salt Lake City, Utah, for 16 miles grading from Monticello to Utah-Colorado State Line, involving 115,000 cu.yd. excavation.

COLFAX, WASH.—Bids to Sept. 15, by County for surfacing Highway No. 30 for County, involving 50,000 cu.yd. excavation and 10,000 cu.yd. rock surfacing.

OLYMPIA, WASH.—Bids to 10 a.m., Sept. 2, by Director of Highways, Olympia, for: (1) Surfacing about 4.1 miles of State Road No. 8, Nelson Creek to Wind River, in SKAMANIA COUNTY, work involving 10,210 cu.yd. surfacing; and (2) Shouldering, ditching, draining, furnishing crushed stone surfacing, and constructing a bituminous treated road surface on about 5.0 miles of State Road No. 11 between Cheney and Junction with State Road No. 2, in SPOKANE COUNTY. 8-8

OLYMPIA, WASH.—Bids to 10 a.m., Sept. 9, by Washington State Highway Comm., for 3 miles Stevens Pass Highway, Summit East, CHELAN COUNTY, involving 55,000 cu.yd. excavation, 3950 cu.yd. rock surfacing, etc. 8-15

SEATTLE, WASH.—Bids to 10 a.m., Sept. 8, by County Commissioners for: (1) Concrete paving 1.6 miles of State Road 2, Meadowbrook-Snoqualmie Hospital Sect., \$35,000; (2) Grading 4 miles of Issaquah-Redmond Road, \$30,000; (3) Grading 1.1 miles of Dumas Bay-Lakota Road, involving 50,000 cu.yd. excavation, \$60,000, and (4) Grading 1.6 miles of Soos Creek-Berrydale Road, \$17,000.

BIDS RECEIVED

GRAND CANYON, ARIZ.—J. C. Morse, 1209 Hoffman Ave., Long Beach, Calif., \$32,216, low bid to Park Superintendent, Grand Canyon, Arizona, for 17.57 miles subgrade reinforcing with selected gravel material Section D of Route 2, Grand Canyon-Old Trails National Forest Highway in Tusayan National Forest, COCONINO COUNTY. 8-14

LAGUNA BEACH, CALIF.—Gribble & Burke Co., 1242 So. Maryland, Glendale, \$125,400, low bid to the City for improving streets in Laguna Cliff, grading, rock and oil paving, cast iron water mains, vitrified sewers, storm drains, etc. 8-16

OAKLAND, CALIF.—Heafey-Moore Co., 344 High St., Oakland, about \$10,000 only bid to City for oil surfacing Russet St. from 54th Ave. to 85th Ave. 8-14

RICHMOND, CALIF.—Union Paving Co., Call Bdg., S. F., \$132,125 low bid to City for improving Pullman Ave., consisting of grading, 6-in. asphalt base, 2-in. asphalt surface, 4-in. rock cushion, reinf. conc. and corr. culverts. (See Unit Bid Summary.) 8-12

SACRAMENTO, CALIF.—Southwest Paving Co., Washington Bdg., Los Angeles, who bid \$16,425, low bid to California Division of Highways, Public Works Bdg., Sacramento, for 4.3 miles bit. rock borders from Santa Clara River to Castaic School, LOS ANGELES COUNTY. 8-7

SACRAMENTO, CALIF.—Low bids as follows by California Division of Highways: (1) SAN DIEGO COUNTY—L. C. Pulley, 1960 Alamitos, Long Beach, \$13,366 low for 8.4 miles fuel oiling from La Posta to Tecata Divide; (2) LOS ANGELES AND ORANGE COUNTIES—T. M. Morgan Pav. Co., Box 433B, Route 1, Stockton, \$191,604 low for 3.1 miles grading, conc. and macadam paving from Anaheim to Seal Beach; (3) ORANGE COUNTY—T. M. Morgan Paving Co., Box 433B, Route 1, Stockton, \$98,432 low for 3.3 miles grading and concrete paving from Seal Beach to Sunset Beach; (4) PLACER COUNTY—Tunnel and roadway through Newcastle (See item under "Tunnel Construction" this issue); (5) SANTA BARBARA AND SAN LUIS OBISPO COUNTIES—Lang Transportation Co., 5501 Santa Fe, L. A., \$261,612 low for 37.9 miles grading and oil treated surfacing from Cuyama River to easterly boundary. (See Unit Bid Summary.) 8-13

SACRAMENTO, CALIF.—F. C. Adams, Angels Camp, California, who bid \$5994 low bid, to Division of Highways, District Engineer, Dist. 3, Sacramento, for bituminous surfacing 6.2 miles between Fresh Pond and $\frac{3}{4}$ of a mile east of Riverton in EL DORADO COUNTY. 8-16

SAN DIEGO, CALIF.—R. E. Hazard Construction Co., 2548 Kettner Blvd., San Diego, who bid \$197,279, low bid to City for the improvement of La Jolla, Mesa Drive, and other streets: grading, concrete and asphalt paving, concrete sewers, cast iron mains, reinf. concrete pipe, etc. 8-14

SAN LUIS OBISPO, CALIF.—Low bids as follows by Dist. Engr., California Division of Highways: (1) Santa Maria Const. Co., Santa Maria, \$11,344 low for 4 miles oiling SANTA BARBARA COUNTY from El Capitan Creek to Tajiguas Creek; and (2) Hartman Const. Co., Bakersfield, \$6277 low for 9.4 miles shoulder oiling from Paso Robles to Atascadero, SAN LUIS OBISPO COUNTY. 8-18

SANTA BARBARA, CALIF.—Hunter & Richardson, 525 E. Haley St., Santa Barbara, \$16,500 low bid to City for improving Cota St., paving with concrete, vitr. sewers.

DENVER, COLO.—Taggart Construction Co., Cody, Wyoming, who bid \$88,654, low bid to the Bureau of Public Roads, Denver, Colorado, as follows for grading 4.2 miles Cody-Yellowstone National Highway, Shoshone National Forest, PARK COUNTY, Wyoming: (See Unit Bid Summary.) 8-11

DENVER, COLO.—Western Paving & Const. Co., Denver, \$86,770 low for widening streets in Dist. 8 for City.

PORTLAND, ORE.—J. C. Compton, McMinnville, Ore., low bid as follows to Bureau of Public Roads: (1) \$8691 for 4.2 miles oiling San Creek-Park Boundary, KLAMATH COUNTY, and (2) \$3866 for 1.8 miles East Entrance Road, KLAMATH COUNTY, Ore. 8-18

CONTRACTS AWARDED

PHOENIX, ARIZ.—To J. C. Steele Const. Co., Phoenix, Ariz., who bid \$75,700 for improving Jefferson St., 15th St., etc., paving with 6-in. concrete, grading, curbs, sidewalks, concrete irrigation pipe and irrigation ditches, survey monuments, manholes, etc. 8-11

BURBANK, CALIF.—To J. L. McClain, 3452 W. Slauson Ave., Los Angeles, \$237,189 to the City for improvement of Olive Ave., between Front St. and the south city limits. Grading, conc. paving, curb, culverts, and water system. 8-15

FRESNO, CALIF.—To Thompson Bros., P. O. Box 1288, Fresno, who bid \$2212 for the improvement of Glenn Ave. from Home Ave. to McKinley Ave., work for the City. 8-15

LARKSPUR, CALIF.—To Pacific States Construction Co., Call Building, San Francisco, who bid \$2500 for the construction of two tennis courts at the Larkspur Corte Madera School Grounds. 8-9

LONG BEACH, CALIF.—To P. P. Janich, Pacific Southwest Bdg., Long Beach, \$14,831 for paving with 4-in. disint. granite, water mains, etc., on California Ave., Lewis Ave., etc.

LOS ANGELES, CALIF.—To Griffith Co., Los Angeles Railway Bdg., Los Angeles, who bid \$373,925 for improving Olive Street, between Pico Street and 23rd St., work for the City of Los Angeles. Work consists of asphalt concrete paving, storm drain, water system, and lighting system. 8-8

MANHATTAN BEACH, CALIF.—To Heinecke Const. Co., 714 W. 10th St., L. A., \$293,867 for improving Sepulveda Blvd. for City, grading, asphalt paving, concrete pipe, etc. 8-11

NAPA, CALIF.—To San Jose Excavating Company, 123 So. Third St., San Jose, who bid \$19,960 to Napa County for grading and rock surfacing of 9 miles of the Berryessa Valley Road. 8-12

REDWOOD CITY—To McClure & Chamberlin, 608 Octavia St., San Francisco, \$19,635, for stripping base of Emerald Lake Dam and new fill, and paving Oak Knoll Drive across the Dam. Bids from: (1) McClure & Chamberlin, S. F., \$19,635; (2) W. A. Dontanville, Salinas, \$21,904. 8-12

1,100 cu.yd. clear and strip.....	.70	.92
2,600 cu.yd. exc. (slippage).....	.60	.70
15,000 cu.yd. embankment.....	.72	.90
100 cu.yd. grading (paving).....	.60	1.00
4,800 sq.ft. 5-in. rock macadam.....	.25	.30
600 ft. guard rail.....	1.25	1.50
240 ft. 6-in. sewer.....	2.50	1.60
One 30-in. conc. spillway.....	\$3,320	\$2,200
2 manholes.....	150	100
Remove flume.....	150	150

Work is to be done under the 1921 Act. 8-18

REDWOOD CITY, CALIF.—Awards as follows by City: (1) To W. O. Tyson, 42 Jefferson St., Redwood City, \$3446 for concrete paving Chestnut St.; and (2) To W. A. Dontanville, Salinas, \$4862 for concrete paving Maple St. 8-12

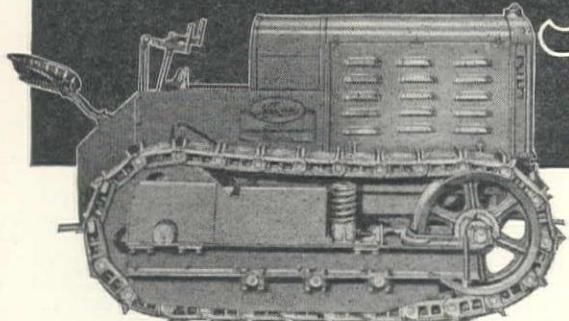
SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: PLACER COUNTY—To N. M. Ball, 1889 Yosemite Road, Berkeley, and Porterville, who bid \$62,253 for 1.7 miles grading and concrete paving through Lincoln; MENDOCINO COUNTY—To E. C. Coats, Miranda, Humboldt County, who bid \$85,289 for 2 miles grading and surfacing with untreated crushed gravel or stone and timber bridges from McDonald to Wendling; RIVERSIDE COUNTY—To Bert Noble, 841 W. Beech St., San Diego, who bid \$256,609 for 16.2 miles grading and oil treated surf. from Desert Center to 9 $\frac{1}{2}$ miles west of Hopkins Wells; and SAN BERNARDINO COUNTY—To H. W. Rohl, 4351 Alhambra Ave., Los Angeles, who bid \$187,325 for 9.5 miles grading and surfacing with oil treated crushed gravel or stone from 1 $\frac{1}{2}$ miles southwest of Dunn to Cronise Valley. 8-7

SACRAMENTO, CALIF.—Awards as follows by California Division of Highways: SAN DIEGO COUNTY—To Jahn & Bressi, Corporation Bdg., Los Angeles, who bid \$171,425 for 5.4 miles concrete paving from Balboa Ave. to Torrey Pines Road. MONO COUNTY—To Kennedy-Bayles Construction Co., 1140 Chatham Road, Oakland, who bid \$161,510 for grading 12.9 miles from Sonora Junction to 4 miles south of Coleville. (See Unit Bid Summary.) 8-12

SALINAS, CALIF.—Awards as follows by City: (1) To Granite Const. Co., Watsonville, \$27,907 for concrete paving Archer St., Homestead St., etc.; and (2) To W. A. Dontanville, Salinas, \$4990 for concrete paving Spring St. 8-6

SAN BERNARDINO, CALIF.—To Gilmore Oil Co., Los Angeles, who bid \$1622 to District Engineer, California Division of Highways, San Bernardino, for 34.3 miles fuel oil to be applied to shoulders in SAN BERNARDINO COUNTY from San Bernardino to Victorville. 8-7

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SAN CARLOS, CALIF.—To W. O. Tyson, Redwood City, \$1832 for paving at School Yard on Chestnut St. for San Carlos School Dist. 8-7

SAN CARLOS, CALIF.—To C. L. Jordan, Belmont, \$6735 for improving Holly St. for City, grading, waterbound macadam, and 12-in. concrete culverts. 8-11

SAN FRANCISCO, CALIF.—Awards as follows by City: (1) To C. B. Eaton, 715 Ocean Ave., San Francisco, who bid \$46,338 for improvement of streets in Castro Street and Glen Park Terrace, work consisting of grading, paving with 6-in. concrete base with 1½-in. asphalt surface, vitrified culverts and sewers, concrete curbs and sidewalks, etc. (2) To C. B. Eaton, 715 Ocean Ave., San Francisco, who bid \$20,663 for the improvement of Ulloa St. from 35th to 38th Ave., and portions of 36th and 37th Aves., from Taraval to Vicente St., work consisting of grading, constructing vitrified sewers and culvert, paving with 2-in. asphalt surface on 6-in. concrete base. 8-8

SAN FRANCISCO, CALIF.—Award recommended to Finnell Co., 1630 39th St., Sacramento, \$18,365 to Bureau of Public Roads, for 12 miles oil processing Route 23, Quincy-Beckwith Nat. Highway, Plumas National Forest, PLUMAS COUNTY. 8-14

SAN FRANCISCO, CALIF.—To Ariss-Knapp Co., 961 41st St., Oakland, who bid \$6303 to the District Engineer, California Division of Highways, for furnishing and installing 3135 lin.ft. 8-in. perforated metal pipe underdrain in ALAMEDA COUNTY from Dublin to Hayward. 8-12

SAN FRANCISCO, CALIF.—To E. B. Bishop, Hotel Regis, Sacramento and Chester, Calif., who bid \$27,094 for 8.8 miles crushed rock surfacing, Section C and D of Yuba Pass National Forest Highway, Tahoe National Forest, SIERRA COUNTY, work for Bureau of Public Roads. 8-11

SAN FRANCISCO, CALIF.—Award recommended to Chas. Harlowe, Jr., 378 Belmont St., Oakland, \$118,295 for 8.3 miles grading Sect. E, Route 23, Quincy-Beckwith National Forest Highway, Plumas National Forest, PLUMAS COUNTY, work for U. S. Bureau of Public Roads. (See Unit Bid Summary.) 8-5

SAN RAFAEL, CALIF.—Awards as follows by County for Emulsified asphalt paving to Highway Builders, Inc., 640 Redhill Ave., San Anselmo: (1) \$3519 for 1.9 miles Redwood Highway on Upper Novato-Black Point Road; (2) \$5586 for 2.8 miles south of Olema to Five Brooks; and (3) \$9660 for 5.8 miles Point San Pedro School to Santa Venetia. 8-18

SAN RAFAEL, CALIF.—To Highway Builders, Inc., 640 Redhill Ave., San Anselmo, who bid \$9412 to County for grading 3.6 miles of the Lucas Valley Road from the County Farm to the Big Rock. 8-12

WILLOWS, CALIF.—To G. O. Schwensen, 2701 E St., Sacramento, Calif., who bid \$12,692 for constructing gravel and oil surfacing on 6 miles of Fruto-Willows Road, beginning at Fruto and running easterly, work for County. 8-7

BOISE, IDAHO—Awards as follows by State: (1) To Wm. Hoops, Twin Falls, Ida., \$117,202 for grading 24 miles of Old Oregon Trail from Bonanza Ranch to Snake River in POWER and CASSIA COUNTIES; (2) To Wm. Hoops, Twin Falls, Ida., \$115,270 for grading and surfacing 11 miles of Raft River Highway from Burley to Delco; (3) To Allsop & Pond, Grace, Ida., \$21,750 for 7 miles gravel or rock surfacing Oneida Highway from Holbrook to Pleasant View, ONEIDA COUNTY; (4) To Olof Nelson, Logan, Utah, \$91,700 for grading and surfacing 8 miles of Yellowstone Park Highway from Preston to Utah State Line; and (5) To D. A. Sullivan, Dillon, Mont., \$33,750 for 2.6 miles grading and surfacing Palouse Highway from Coeur d'Alene to Ford, KOOTENAI COUNTY.

GREAT FALLS, MONT.—To S. Birch & Sons Const. Co., Great Falls, Mont., \$17,579 for Warrenite Bit. paving Sixth St. for City.

MILES CITY, MONT.—Awards as follows by City: (1) To Larson-Earling Co., Sioux Falls, S. D., \$43,285 for 7-in. reinf. conc. paving Dist. 90; and (2) to Larson-Earling Co., Sioux Falls, S. D., \$121,300 for 7-in. reinf. conc. paving Dist. 91.

CARSON CITY, NEV.—To Utah Construction Co., Ogden, Utah, \$116,683 for 23 miles grading and rock or gravel surfacing in ELKO COUNTY from north of Wells to Thousand Springs Creek, for Nevada State Highway Comm. (See Unit Bid Summary.) 8-11

COLFAX, WASH.—Awards as follows by County to Matefne Bros., Spokane, Wash.: \$9830 for 5 miles gravel surfacing Colfax-Manning Road; and \$6750 for gravel surfacing Clear Creek Road.

SEATTLE, WASH.—Awards as follows by County: (1) To Fiorito Bros., Seattle, \$103,550 for concrete paving 5 miles of 15th Ave. N.W.; (2) To O. E. Inglis, Enumclaw, Wash., \$17,980 for 4.6 miles regrading and surfacing Enumclaw-Sellick Road; and (3) To C. J. Erickson, Seattle, \$15,500 for constructing roadway and Mt. Sinai Bridge.

SEATTLE, WASH.—Awards as follows by City: (1) To C. L. Creelman, \$5965 for W. 44th St. paving; and (2) to R. G. Stevenson, Seattle, \$29,098 for concrete paving Warsaw St.

SPOKANE, WASH.—To Geo. Weller, Spokane, \$40,600 for concrete paving streets in Sherwood District for City.

CHEYENNE, WYO.—Awards as follows by State Highway Comm.: (1) To Woodward Const. Co., Rock Springs, Wyo., \$23,577 for 0.8 miles bit. macadam surfacing city of Gillette; (2) To Woodward Const. Co., Rock Springs, Wyo., \$90,894 for 1.2 miles concrete paving city of Cody, PARK COUNTY; (3) To N. D. Guildord, Wheatland, Wyo., \$21,992 for grading 7 miles Orio-Lusk Road, CONVERSE COUNTY; (4) To Sharrock & Purcel, Casper, Wyo., \$73,455 for 5.7 miles grading Sundance-Carlide Road, CROOK COUNTY; (5) To J. J. Dooling, \$20,987 for grading Federal Aid Project No. 120-C; (6) To Tyler & Baker, Cheyenne, Wyo., \$10,860 for 8 miles base course surfacing Casper-Sheridan Road; and (7) To Midland Const. Co., \$31,893 for grading 7 miles and three timber bridges on Rock Springs-Pinedale Road, SUBLETTE COUNTY.

BRIDGES and CULVERTS

BIDS BEING RECEIVED

PHOENIX, ARIZ.—Bids to Aug. 27, by Arizona State Highway Comm. for bridge over Queen Creek near Superior, involving 16,200 lb. reinf. steel and 330 cu.yd. concrete. 8-9

PHOENIX, ARIZ.—Bids to 2 p.m., Aug. 27, by Arizona State Highway Comm. for bridges over Mining and Post Office Canyons, near McNary, Rice-Springerville Highway, involving 111,000 lb. structural steel and 48 M ft. BM bridge timber. 8-8

AUBURN, CALIF.—Bids to 10 a.m., Sept. 2, by County for furnishing steel and cables for suspension bridge over American River on Colfax-Forest Hill Road. 8-11

SACRAMENTO, CALIF.—Bids to 2 p.m., Sept. 3, by California Division of Highways for reinf. conc. bridge over Castaic Creek, north of Castaic Junction, LOS ANGELES COUNTY, involving 2530 ft. reinf. conc. piles, 890 cu.yd. concrete and 151,500 lb. reinf. steel. 8-6

SACRAMENTO, CALIF.—Bids to 2 p.m., August 27, by the Division of Highways, Office of the District Engineer, District 3, 502 State Office Bdg., Sacramento, Calif., for the construction of a reinforced concrete bridge over the State Highway about 1 mile east of Oroville, BUTTE COUNTY, involving one earth filled arch span 46 ft. long. 8-12

SAN JOSE, CALIF.—Bids to 11 a.m., September 2, by County for widening bridge on Quito Road at Austin Corners and conc. wall at Raisch's Place on Quito Road. 8-7

HELENA, MONT.—Bids to Aug. 27, by Montana State Highway Comm. for: (1) Reinf. conc. bridge on Sect. B, Carpenter-Manhattan Road, GALLATIN COUNTY, involving 160 cu.yd. concrete, 13,200 lb. reinf. steel; (2) Timber bridges on Sect. D, Great Falls-Fort Benton Road, CASCADE COUNTY, work involving 94 M treated and 8 M untreated lumber, 94 20-ft., 16 25-ft., 8 35-ft. and 8 40-ft. treated timber piles, etc.; (3) Timber bridges on Sect. C, Glendive-Sidney Road, DAWSON COUNTY, involving 203 M treated and 16 M untreated lumber, 56 20-ft., 138 25-ft. and 4 30-ft. treated timber piles, etc.; (4) Reinf. conc. bridges on Sect. F, Helena-Townsend Road and Sect. C, Townsend-Three Forks Road, BROADWATER COUNTY, involving 308 cu.yd. 'A' and 214 cu.yd. 'D' concrete, 54,700 lb. reinf. steel, etc.; (5) Reinf. conc. bridges on Sect. A, Deer Lodge-Butte Road, POWELL COUNTY, involving 96,340 lb. structural steel, 77,000 lb. reinf. steel, 640 cu.yd. concrete, etc.; and (6) Timber bridges on Sect. B, Fort Benton-Havre Road, HILL COUNTY, work involving 83 M treated and 6 M untreated lumber, 10 20-ft., 34 25-ft., 24 30-ft. and 12 35-ft. piles, etc.

PORTLAND, ORE.—Bids to 10 a.m., August 28, by State Highway Comm., for: COLUMBIA COUNTY—Widen bridge over Milton Creek on the Columbia River Highway in St. Helens, work involving: 265 cu.yd. concrete, 45,000 lb. metal reinforcement. LINN COUNTY—Constructing bridges over Dobbin, Wolf and Canyon Creeks on the Santiam Highway about 29 miles east of Lebanon, work involving: 650 cu.yd. concrete, 116,000 lb. metal reinforcement. TILLAMOOK COUNTY—Construct bridges over Hoquartan, Dougherty and Hall Sloughs on the Roosevelt Coast Highway, about ½ mile north of Tillamook, work involving: 1000 cu.yd. concrete, 185,000 lb. metal reinforcement. TILLAMOOK COUNTY—Construct overcrossing of the Southern Pacific Railway on the Roosevelt Coast Highway about 3 miles north of Tillamook, work involving: 560 cu.yd. concrete, 95,000 lb. metal reinforcement. TILLAMOOK COUNTY—Construct bridges over Wilson River and Wilson River Slough on the Roosevelt Coast Highway about 2 miles north of Tillamook, work involving: 1000 cu.yd. concrete, 240,000 lb. metal reinforcement.

PORTLAND, ORE.—Bids to 10 a.m., Aug. 28, by U. S. Bureau of Public Roads for bridges on Bull River & Blue Creek, Clark Fork National Highway, SANDERS COUNTY, Montana, involving 900 cu.yd. concrete, 129,000 lb. reinforcing steel.

MONTESANO, WASH.—Bids to 2 p.m., Sept. 2, by County for Bridge over Stephens Creek to cost \$3000.

OLYMPIA, WASH.—Bids to 10 a.m., September 2, by State Highway Dept., Olympia, Washington, for constructing bridge 494 ft. 6 in. long, over Hoh River, JEFFERSON COUNTY, consisting of steel cantilever with a main span of 249 ft. 8 in. and two 71 ft. 4 in. anchor arms and two 50-ft. rein. concrete approach spans. 8-8

WENATCHEE, WASH.—Bids to 10 a.m., August 29, by County for bridge over Wenatchee River at Monitor, involving 1910 cu.yd. concrete, 170,500 lb. rein. steel and 7900 ft. fir piling.

BIDS RECEIVED

EUREKA, CALIF.—Smith Bros. Co., Eureka, who bid as follows, low bid to County for wooden Bridge: \$8446 for bridge over Moseley Slough; and \$9646 for bridge over north fork of Mad River at River-side. 8-13

SACRAMENTO, CALIF.—Low bids as follows by California Division of Highways: (1) HUMBOLDT COUNTY—Fred J. Maurer, Eureka, \$50,330 low for overhead crossing over Northwestern Pacific RR, 2½ miles north of Beatrice; steel, concrete and timber construction; and (2) LOS ANGELES COUNTY—J. F. Knapp, Financial Center Bdg., Oakland, \$113,977 low for reinf. conc. bridge over San Gabriel River at Seal Beach. (See Unit Bid Summary.) 8-13

SAN LUIS OBISPO, CALIF.—Irving L. Ryder, San Carlos and Dupont Sts., San Jose, \$18,709 low bid to City for French St., Santa Rosa St. and Chorro St., reinf. concrete bridges. 8-12



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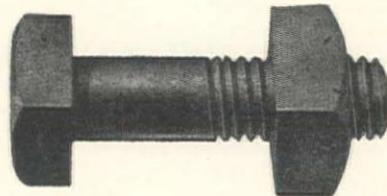


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CONTRACTS AWARDED

GLOBE, ARIZONA—To J. N. Clifford, Claypool, Ariz., \$8690 for reinf. concrete and wooden bridge over Miami Wash at Claypool for County. 8-14
TUCSON, ARIZ.—To R. H. Martin, Tucson, Arizona, \$149,096, to City, for reinf. concrete Broadway subway. 8-14
NAPA, CALIF.—To Harry Thorsen, St. Helena, who bid \$3170 to Napa County for arch culvert extension on road near Myrtledale Springs. 8-12
PLACERVILLE, CALIF.—Awards as follows by County: (1) To Hector Williamson, Placerville, \$2750 for reinf. conc. bridge over Perry Creek; (2) To Hector Williamson, Placerville, \$635 for reinf. concrete bridge over Youngson Creek. 8-7
REDWOOD CITY, CALIF.—To Frank M. Brown, P. O. Box 125, Station A, Palo Alto, Calif., who bid \$13,157 for the construction of six reinforced concrete bridges for the City. 8-11
RIVERSIDE, CALIF.—To M. H. Slocum, 2064 Dudley, Pasadena, who bid \$20,540 for constructing steel bridge over San Jacinto River for Riverside County. 8-7
SACRAMENTO, CALIF.—To Oberg Bros., 3470 Hollenbeck Ave., Los Angeles, who bid \$17,596 to the California Division of Highways, Sacramento, for widening 3 bridges east of Ontario, SAN BERNARDINO COUNTY. 8-14
SACRAMENTO, CALIF.—To Silveria & Robbins, Ventura, who bid \$20,132 for concrete bridge over Nojoqui Creek, $7\frac{1}{2}$ miles south of Zaca, SANTA BARBARA COUNTY, work for California Division of Highways. 8-7
SAN JOSE, CALIF.—Awards as follows by County: (1) To Wm. Radtke, Gilroy, \$1900 for reinf. concrete culvert on Canada Road at Dexter's Place; (2) To J. W. Williams, 931 So. 8th St., San Jose, \$3000 for reinf. concrete culvert on Blossom Hill Road at Cilkers Place and 2 corr. culverts on Short Road; (3) To Collins & Martin, 1386 for Whittin Ave., San Jose, who bid \$1725 for reinf. concrete culvert on McAbee Road. 8-5
CARSON CITY, NEV.—To O. G. Ritchie, 154 No. 11th St., San Jose, \$9237 for constructing reinf. concrete bridge over E. Walker River, south of Yerington, LYON COUNTY, for State. 8-9
SALEM, ORE.—To Frank Ferguson, Salem, Ore., \$3231 for bridge on Lee St. over Shelton Ditch for City.

SEWER CONSTRUCTION

WORK CONTEMPLATED

SANTA CRUZ, CALIF.—Plans by City Engr., R. Fowler, for 840 ft. 6-in. vitr. sewer on Plateau Ave. Bids after Aug. 18. 8-15
BENNETT, COLO.—Plans by B. Lowther, Engr., 723 Colorado Bdg., Denver, Colorado, for sewage disposal plant for City to cost \$20,000.

BIDS BEING RECEIVED

OAKLAND, CALIF.—Bids to 12 m., Sept. 4, by City Clerk for sewer extension on waterfront southwesterly of Fifth Ave., involving 49 ft. 36-in. reinf. conc. pipe, 15 ft. steel sewer, 495 ft. creosoted wood stave pipe, 700 ft. piles, etc. 8-16
SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., Sept. 3, by Board of Public Works, City Hall, S. F., for (1) Sect. C of Alemany Storm Drain, involving 915 ft. two-compartment 8 ft. 6 in.x11 ft. reinf. conc. drain, 394 ft. 2 ft. 6 in.x3 ft. 9 in. reinf. conc. sewer, 138,000 ft. timber piling, vitr. under-drain, etc., \$148,000; and (2) Sect. D of Alemany Storm Drain involving 16,200 ft. timber piling, 1195 ft. 14 ft.x8 ft. and 226 ft. 3 ft.x4 ft. 6 in. wooden box sewers, vitr. pipe, etc., \$60,000. 8-15
ELKO, NEV.—Bids to 8 p.m., Sept. 2, by City Clerk, Elko, Nevada, for sewage treatment plant. Work involves: Building, including sludge pumps, piping, valves and electric work; 520 cu.yd. excavation; 800 cu.yd. borrow; 175 cu.yd. concrete; 24,000 lb. reinforcing steel; drill 8-in. well, 50 ft. deep and equip same with pump and motor, etc. Furnishing one 22-ft. Dorr or Hardinge Clarifier. Burns-McDonnell-Smith Engr. Co., Western Pacific Bdg., Los Angeles, are Engineers. 8-18

BIDS RECEIVED

LOS ANGELES, CALIF.—Geo. W. Kemper, 1100 Westminster Ave., Alhambra, \$23,745 low bid to City for Sect. 32B, North Outfall Sewers, 10-in. centr. cast iron pipe and 10-in. to 24-in. vitrified pipe. 8-8
LOS ANGELES, CALIF.—Low bids as follows by City for sections of North Outfall: SECTION 34-C, USING PRE-CAST REINF. CONC. PIPE—Kemper & Co., 1100 Westminster Ave., Alhambra (low), \$155,900. SECTION 34-D, USING PRE-CAST REINF. CONC. PIPE—Geo. Mitchell Co., PO Box 236, Huntington Park (low), \$162,030. SECTION 34-E, USING SEMI-ELLIPTICAL SECTION—R. A. Wattson, 1026 North McCadden Place, Los Angeles (low), \$139,600. SECTION 34-F, USING SEMI-ELLIPTICAL SECTION—R. A. Wattson, L. A. (low), \$156,710. 8-15

SAN DIEGO, CALIF.—W. H. Robinson, 2893 Madison Ave., San Diego, \$25,676 low bid to State Architect, Sacramento, sewer, steam, water, gas and fire protection services at San Diego State Teachers College. 8-7
ROSWELL, NEW MEXICO—W. S. Dickey Clay Co., \$51,460 low bid to City for furnishing vitrified pipe for proposed sewer extensions. 8-8
PORTLAND, ORE.—Keating & Bade, Portland, Ore., \$18,707 low bid to City for constructing sewer system in North Front St.

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To E. J. Treacy, Call Bdg., San Francisco, who bid \$5125 for constructing vitrified pipe sewers on Pennsylvania Ave. from 23rd St. to 25th St., work for the City. 8-8
SAN MATEO, CALIF.—To Oakland Sewer Const. Co., Box 512, San Mateo, \$2177 for vitrified sewer system on Poplar Ave. for City. 8-5

COQUILLE, ORE.—To Knapp & Goss, Camas, Wn., \$21,778 for constructing Henry St. sewer for City.
ABERDEEN, WASH.—To Keasal & James, \$11,750 for constructing 21-in. sewer on Hume from H to L Sts. for City.

WATER SUPPLY SYSTEMS

BIDS BEING RECEIVED

BEVERLY HILLS, CALIF.—Bids to 8 p.m., Sept. 9, by City Clerk for 6980 ft. 16-in. cast iron pipe line. 8-15
YREKA, CALIF.—Bids up to 7:30 p.m., Sept. 4, by City for furnishing Class 150 cast iron pipe as follows: 1420 ft. 4-in., 600 ft. 6-in., 500 ft. 8-in., 400 ft. 2-in.; also tees, crosses, reducers, etc. 8-15
HAWTHORNE, NEV.—Bids to 11 a.m., Sept. 10, by the Bureau of Yards and Docks, Navy Department, Washington, D. C., for water supply system at the Naval Ammunition Depot, Hawthorne, Nevada, including water piping, sprinkler system, etc., under Spec. 6156. 8-18
ANACORTES, WASH.—Bids up to Sept. 5, by City of Anacortes, Wash., for water system improvements: PIPE LINES, work involving: 2600 ft. 24-in. steel, centr. concrete or wood stave pipe; 21,700 ft. 24-in. steel pipe; 885 ft. Class 'F' cast iron pipe; 5380 ft. 16-in. steel or centr. conc. pipe; 3043 ft. 24-in. steel centr. concrete or wood stave pipe. INDUSTRIAL PIPE LINE, work involving: 10,000 lin.ft. 16-in. steel or centr. cast iron pipe; 5900 ft. 10-in. and 8-in. cast iron pipe; constructing reinf. conc. intake pier, involving 380 cu.yd. concrete; pump house (225 cu.yd. concrete); screen chamber (175 cu.yd. concrete); coagulating basin (250 cu.yd. concrete); reservoir (1,250,000 gal., involving 810 cu.yd. concrete). Cost—\$420,000. Work under \$500,000 bond issue. W. C. Morse Co., Smith Tower, Seattle, are Engineers. 8-16

BIDS RECEIVED

PHOENIX, ARIZ.—P. G. Jewell, Phoenix, Arizona, \$13,600 low bid to City for change of channel and bank removal at city intake on Verde River.

FRESNO, CALIF.—Edgley Co., 800 E. 61st St., Los Angeles, \$42,758 low bid to County for cast iron pipe system, valves, hydrants, etc., in County Water Works Dist. 1. (See Unit Bid Summary.) 8-16

SAN FRANCISCO, CALIF.—Western Pipe & Steel Co., 444 Market St., S. F., \$7771 low bid to City for steel pipe line in South S. F. for City Water Dept. 8-15

WHITTIER, CALIF.—Bids received as follows by City for furnishing 1100 lin.ft. of 30-in. Class 'C' cast iron pipe have been rejected: C. G. Claussen & Co., L. A., \$7.74 $\frac{1}{2}$ per ft.; U. S. Pipe & Foundry Co., L. A., \$8.16 per ft.; National Cast Iron Pipe Co., \$8.29 per ft. 8-9

CONTRACTS AWARDED

CLOVERDALE, CALIF.—To J. J. Ongaro, Jr., Willow Ave., Fairfax, Calif., \$16,580 for furnishing and installing cast iron pipe, hydrants and gate valves, for City. (See Unit Bid Summary.) 8-6

CROCKETT, CALIF.—To E. P. Easley, Antioch, for the construction of a 60-ft. high earth fill dam on Solano County shore line, adjoining the Carquinez Bridge, for the California & Hawaiian Sugar Co., Matson Bdg., San Francisco. Work involves: 75,000 cu.yd. earthwork. 8-11

LOS ANGELES, CALIF.—To Western Pipe & Steel Co., 5717 Santa Fe Ave., Los Angeles, who bid \$150,470 as follows to City Purchasing Agent for furnishing electric-welded steel pipe: 12,144 ft. 36-in. steel pipe, $\frac{3}{8}$ -in. plate, f.o.b. trenchside, \$5.45 per ft.; 9,576 ft. 36-in. steel pipe, $\frac{1}{2}$ -in. plate, f.o.b. trenchside, \$6.30 per ft.; 3864 ft. 40-in. steel pipe, $\frac{3}{8}$ -in. plate, f.o.b. trenchside, \$6.30 per ft. 8-6

SAN FRANCISCO, CALIF.—To Industrial & Municipal Supply Co., 7 Front St., San Francisco, who bid \$4390 to the Park Commissioners, for the installation of a centrifugal pump and motor at Sharp Park, Salada Beach, San Mateo County, Calif. 8-13

WHITTIER, CALIF.—Awards as follows by City: (1) To Western Pipe & Steel Co., Los Angeles, \$4.50 per ft. for 1700 ft. 30-in. welded steel pipe; and (2) To Pernel Barnett, Orange, who bid 43 $\frac{1}{2}$ ft. for trenching and backfilling 3000 ft. of trench for 30-in. pipe. 8-9

DENVER, COLO.—To Gordon Const. Co., 31st and Platte River, Denver, Colo., \$469,505 for constructing concrete reservoir in Eleven Mile Canyon for Board of Water Commissioners, City and County of Denver. (See Unit Bid Summary.) 8-18

LAS CRUCES, NEW MEXICO—To Hayner & Burn, Las Cruces, New Mexico, \$80,000 for cast iron water mains, fire hydrants and reinf. concrete reservoir for City.

AMERICAN FORK, UTAH—To Wheelwright Const. Co., Ogden, Utah, \$16,970 for pipe laying for City.

HEBER CITY, UTAH—To Federal Tank & Pipe Co., Seattle, \$60,000 for furnishing two miles of 54-in. creosoted douglas fir wood stave pipe to City.

MONTESANO, WASH.—To Schofield & Wilder, Montesano, Wash., \$9000 for relaying 2 miles of pipe line for City.

LIGHTING SYSTEMS

WORK CONTEMPLATED

REDWOOD CITY, CALIF.—Plans by C. L. Dismitt, City Engr., for 41 two-light electroliers on Main St. from Maple St. to El Camino Real. Bids after Aug. 18. 8-8

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BIDS BEING RECEIVED

GUSTINE, CALIF.—Bids to 8:00 p.m., Sept. 8, by City Clerk W. Chappell, County, for installation of street lighting system. Bonds voted, \$5000. 8-15

RAILROAD CONSTRUCTION

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to Sept. 5, by Engineering Department, Union Pacific Railroad, 610 S. Main St., Los Angeles, for the construction of 22.71 miles of main trackage and 5.16 miles secondary trackage, Boulder Canyon Dam Branch Railroad Project to run from main line of the Union Pacific RR Co. in Nevada to Summit, Nevada. Work involves in the main: 218,000 cu.yd. common excavation, 23,400 cu.yd. loose rock excavation, 64,600 cu.yd. solid rock excavation. This project is exclusive of Government's portion consisting of 7.17 miles of railroad from Summit to damsite. 8-9

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Hauser Const. Co., Security Bdg., Long Beach, who bid \$16,000 to County for laying railway track and furnishing and placing riprap along west levee of Los Angeles River from Louise St. to 52nd St., near North Long Beach. 8-13

SAN FRANCISCO, CALIF.—Sub-contracts have been awarded as follows by Utah Construction Co. and W. A. Bechtel Co., San Francisco, in connection with the construction of 111 miles of railroad from Keddie, Plumas County, to Bieber, Lassen County, for Western Pacific Railroad Co. (A) From Keddie northerly in order of sequence: (1) To Morrison-Knudsen Co., Boise, Idaho, 4 miles; (2) to Paul J. Tyler, 4 miles; (3) 7-mile section across valley to Greenville not yet awarded; (4) to Paul J. Tyler, Oroville, 4 miles; (5) Utah Construction Co. will do 4 miles; (6) W. A. Bechtel Co. will do 4 miles; (7) to Heiselt Construction Co., 1611 Hot Springs Ave., Salt Lake City, Utah, 15 miles; and (B) from Bieber southerly as follows: (1) To W. H. Puckett Co., Boise, Idaho, 14 miles. There are several sections not yet awarded. 8-19

SEATTLE, WASH.—To L. Coluccio, Seattle, \$17,582 for W. Spokane St. Railroad connection for City.

SEATTLE, WASH.—To A. Guthrie & Company, Sherlock Bdg., Portland, Ore., for 88 miles of railroad from near Klamath Falls, Oregon, to joint yard at Bieber, Lassen County, Calif. (the Great Northern portion of joint line from Keddie to Klamath Falls). Work involves: CLEARING—114 acres heavy, 426 acres light. GRADING—186,312 cu.yd. solid rock excavation (lava), 47,038 cu.yd. loose rock excavation, 47,010 cu.yd. common excavation, 7000 cu.yd. lava rock borrow, 106,249 cu.yd. loose rock borrow, 870,346 cu.yd. common borrow, 157,690 cu.yd. hard-pan borrow, 729,000 sta.yd. overhauled. STEEL VERTICAL DUCTS AND BRIDGES—One 60-ft. deck plate girder, one 38-ft. girder beam, and three 40-ft. girder bridges. TIMBER PILE TRESTLES—3200 lin.ft. involving; 540,000 ft. BM lumber, 45,000 lin.ft. piling. FENCING—100 miles of right of way fencing. TIES—286,000 cross ties. RAIL (90-lb.)—14,000 tons. BALLAST—266,000 cu.yd. cinder ballast. YARDS—Round house, machine shop, boiler, oil station, at Bieber. Estimated cost—\$3,924,620. J. R. W. Davis is Chief Engineer of the Great Northern Railway Company; and Col. F. Mears, Seattle, is Assistant Chief Engineer of the Great Northern Railway Co. 8-18

MISCELLANEOUS

BIDS BEING RECEIVED

FARRALON ISLANDS, CALIF.—Bids to 11:00 a.m., September 3, by Public Works Officer, Navy Yard, Mare Island, Calif., for improvements at the U. S. Naval Radio Compass Station, Farallon Islands, California. Work consists of concrete sidewalks, sewers, fire protection system, tank hoops and necessary weather stripping. 8-14

RIVER and HARBOR WORK

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Awards as follows by Los Angeles City Harbor Comm.: (1) To Merritt-Chapman-Scott Corp., P. O. Box 698, San Pedro, who bid \$81,060 for furnishing 163 concrete anchors and driving: 28,900 ft. sheet piling, 82 wales, 5700 ft. creosoted timber footing piles, 33,700 ft. concrete bearing piles; (2) To Pan-Pacific Piling & Construction Co., Los Angeles, who bid \$18,300 for furnishing: 33,700 ft. concrete bearing piles, 28,900 ft. concrete sheet piles, etc. 8-8

SAN FRANCISCO, CALIF.—To Healy-Tibbitts Construction Co., 64 Pine St., San Francisco, who bid \$257,615 to Islais Creek Reclamation District, Room 375, City Hall, San Francisco, for dredging channel and constructing rock wall. (See Unit Bid Summary.) 8-11

POWER DEVELOPMENT

BIDS BEING RECEIVED

TACOMA, WASH.—Bids to 2 p.m., Sept. 2, by the Board of Contracts and Awards, Room 307, City Hall, Tacoma, Wash., for furnishing and installing the following equipment in Municipal Steam Power Plant No. 2: High pressure fabricated pipe; high pressure fittings; high pressure valves; installation, erection and testing of high pressure piping and equipment; distilled water and boiler blowdown tanks. 8-18

CONTRACTS AWARDED

EUGENE, ORE.—Awards as follows by Eugene Water Board: (1) To C. H. Wheeler, Portland, Ore., \$23,000 for one condenser; and (2) To Young & Hartman, \$12,366 for boiler settings. 8-11

TUNNEL CONSTRUCTION

BIDS RECEIVED

SACRAMENTO, CALIF.—T. M. Morgan Paving Co., Edwards & Wildey Bdg., Los Angeles, \$209,755 low bid to California Division of Highways for 531 ft. 36-ft. diameter tunnel and 1 mile of roadway, through Newcastle, PLACER COUNTY. (See Unit Bid Summary.) 8-13

IRRIGATION and RECLAMATION

BIDS RECEIVED

SACRAMENTO, CALIF.—Bids received as follows by U. S. Engineers Office, California Fruit Building, Sacramento: (1) Clearing brush and trees along the San Joaquin River between Burns Cutoff and Turners Cut, near the City of Stockton (Spec. 2280): A. Mitchell, 128 J St., Sacramento (low bidder), \$30,500; P. P. Maritas, Sacramento, \$34,590. (2) Clearing brush and trees along San Joaquin River from Mormon Channel, Stockton to Burns Cutoff (Spec. 2241): A. Mitchell, 128 J St., Sacramento (low bidder), \$43,560; P. P. Maritas, Sacramento, \$46,700. 8-15

MACHINERY and SUPPLIES

BIDS BEING RECEIVED

LOS ANGELES, CALIF.—Bids to 11 a.m., August 27, by Thos. Oughton, City Purchasing Agent, for 145,000 ft. 2-in. cast iron pipe. 8-15

PASADENA, CALIF.—Bids to 11 a.m., August 28, by City Clerk, for furnishing one electrically operated crane, with one 100-ton hoist, one 15-ton hoist, and one 2-ton hoist. 8-15

PASADENA, CALIF.—Bids to 10 a.m., Sept. 4, by the City Clerk, for furnishing and installing boilers for the Municipal Power plant. 8-14

TACOMA, WASH.—Bids to 2 p.m., August 25, by Board of Contracts and Awards, City Hall, Tacoma, Washington, for furnishing steel track hopper, coal conveying system, coal storage equipment, locomotive crane and ash handling equipment for Municipal Steam Power Plant No. 2. 8-17

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Awards as follows by City Purchasing Agent: (1) To Crane Company, 321 E. 3rd St., Los Angeles, who bid \$21 each for 200 8-in. valves. (2) Contract awarded to Rensselaer Valve Co., 417 South Hill St., Los Angeles, who bid as follows: 50 12-in. valves, \$84.50 each; 10 16-in. valves, \$189.75 each; 2 18-in. valves, \$241.25 each; 3 30-in. valves, \$887.50 each; 7 30-in. valves, \$1105 each. 8-11

OAKLAND, CALIF.—Awards as follows by Oakland Port Comm.: (1) To Pacific Coast Engineering Co., Oakland, \$6700 for furnishing 20-in. pontoon pipe; (2) To Pacific Coast Engineering Co., Oakland, who bid \$8800 for furnishing 20-in. steel ball joints. 8-12

ONTARIO, CALIF.—To Los Angeles Mfg. Co., Los Angeles, who bid \$2329 for furnishing 2589 ft. 10-in. welded steel pipe, 12 ga. and fittings to City. 8-7

SANTA MONICA, CALIF.—To C. G. Claussen & Co., Los Angeles, who bid \$7,7325 per ft. for furnishing 7200 ft. of 30-in. cast iron pipe to City. 8-15

OPPORTUNITY PAGE

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THE BUYERS' GUIDE

Refer to advertisements for addresses of companies listed. Advertisers index on page 68

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Acetylene Generating Apparatus

Oxweld Acetylene Co.

Air Compressors

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Seaside Oil Co.
Shell Oil Co.
Standard Oil Co.
Union Oil Co.

Asphalt, Emulsified

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Shell Oil Co.

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Speeder Machinery Corp.
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West Coast Tractor Co.
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Fidelity & Casualty Co. of N. Y., The
Fidelity & Deposit Co. of Maryland
Glens Falls Indemnity Co.
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Indemnity Insurance Co. of North America
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New Amsterdam Casualty Co.
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Link-Belt Co.
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Castings, Street and Sewer

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Chutes, Concrete

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Pacific Clay Products Co.

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(Continued on page 64)

OPPORTUNITY PAGE

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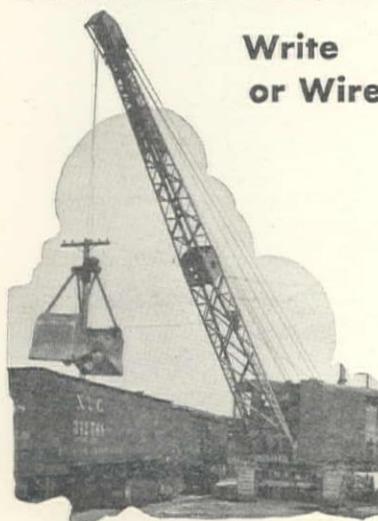
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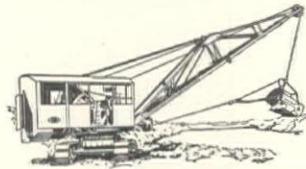
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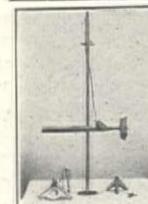
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Mixers, Plaster

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Young Machy. Co., A. L.

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MacArthur Concrete Pile Corp.

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Pipe, Cast-Iron

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Pipe, Culvert

California Corrugated Culvert Co.

Gladding, McBean & Co.

Pacific Clay Products

Western Pipe & Steel Company

Pipe Fittings

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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.

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.

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Pipe, Riveted Steel

Lacy Mfg. Co.

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Pipe, Sewer

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Pacific Clay Products

Pipe, Standard

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Pipe, Vitrified

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Pipe, Welded Steel

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Union Tank & Pipe Co.

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Plows, Road

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Spears-Wells Machy. Co.

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Ingersoll-Rand Co.

Leitch & Co.

Schramm, Inc.

Powder

OPPORTUNITY PAGE

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OFFICIAL BIDS

Sealed proposals will be received until 11:00 a.m., September 3, 1930, and then publicly opened, for the construction of six (6) Company Officers' Quarters at Fort Douglas, Utah. Plans and specifications may be obtained upon deposit of \$15.00 for their safe return. Checks must be made payable to The Treasurer of The United States.

NOTICE TO CONTRACTORS

Surfacing

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, California, until 2:00 p.m. on September 10, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made, of portions of State Highway, as follows:

San Luis Obispo County, between 1.7 miles west of Shandon and the easterly boundary (V-SLO-33-B & C), about fifteen and four-tenths (15.4) miles in length, seal coat to be applied to the existing bituminous macadam surfacing.

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

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

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

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

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

DEPARTMENT OF PUBLIC WORKS, DIVISION OF HIGHWAYS

C. H. PURCELL, State Highway Engineer
Dated August 13, 1930.

NOTICE TO CONTRACTORS

Grading and Paving

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, California, until 2:00 p.m. on September 3, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made, or portions of State Highway, as follows:

San Mateo County, between Redwood City and Willow Road (IV-S.M.-68-D), about four and one-tenth (4.1) miles in length, to be graded.

Los Angeles County, a reinforced concrete girder bridge across Castaic Creek about $\frac{1}{2}$ mile north of Castaic Junction (VII-L.A.-4-A), composed of seven 35-foot spans on concrete pile bents and concrete abutments with pile foundations.

Proposal forms will be issued only to those

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

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

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

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

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

DEPARTMENT OF PUBLIC WORKS,
DIVISION OF HIGHWAYS

C. H. PURCELL, State Highway Engineer
Dated August 6, 1930.

NOTICE TO CONTRACTORS

Grading

Sealed proposals will be received at the office of the State Highway Engineer, Public Works Building, Sacramento, California, until 2 o'clock p.m., on September 17, 1930, at which time they will be publicly opened and read, for construction in accordance with the specifications therefor, to which special reference is made, of portions of State Highway, as follows:

Amador County, between Amador City and Martell (X-Ama-65-B), about four and three-tenths (4.3) miles in length, to be graded and surfaced with untreated crushed gravel or stone.

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

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

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

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

and Conditions" annexed to the blank form of proposal, for full directions as to bidding, etc.

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

DEPARTMENT OF PUBLIC WORKS,
DIVISION OF HIGHWAYS
C. H. PURCELL, State Highway Engineer
Dated August 20, 1930.

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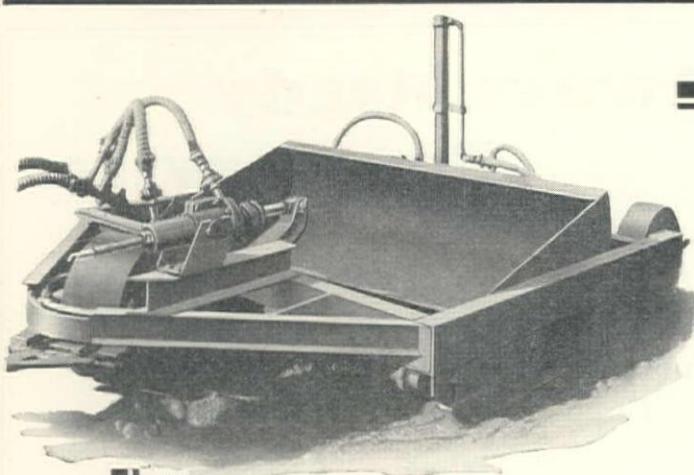


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