WCN-11-1935

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME X, No. 11

NOVEMBER, 1935

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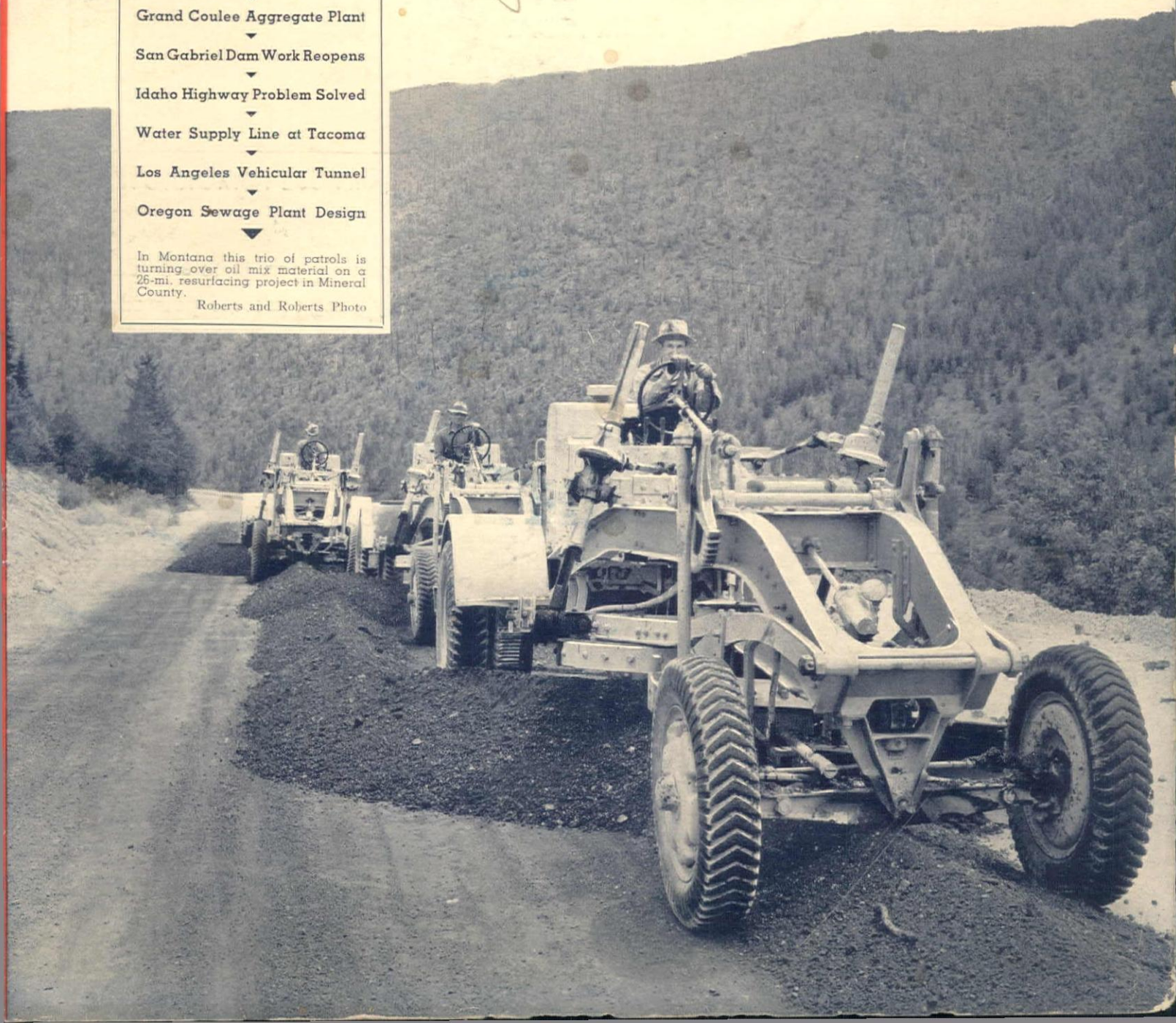
$2.00 PER YEAR

IN THIS ISSUE

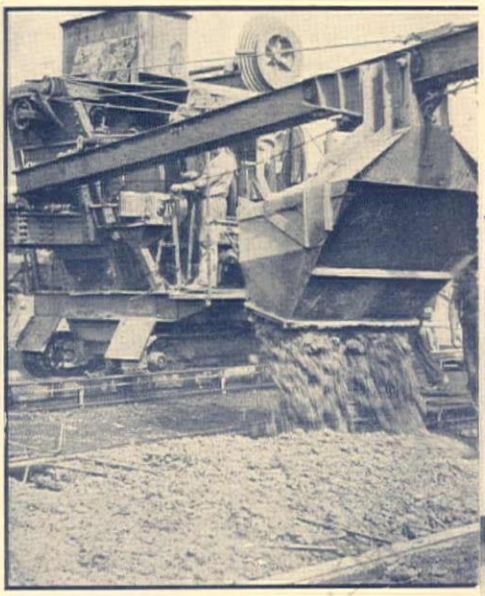
In Montana this trio of patrols is turning over oil mix material on a 26-mi. resurfacing project in Mineral County.

Roberts and Roberts Photo

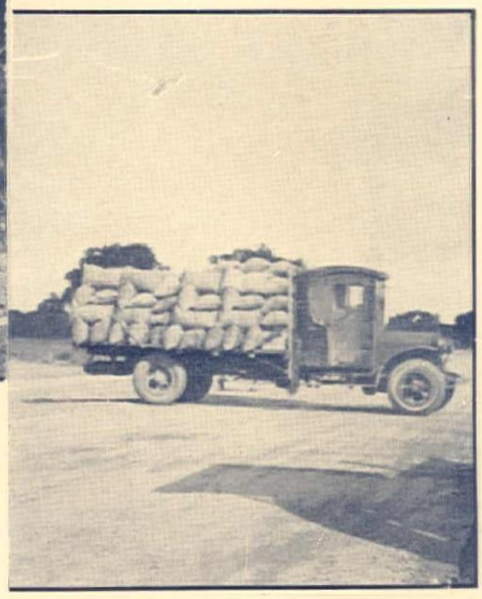


When Schedules Say

GO!



POUR TODAY



IN USE TOMORROW

Don't let Concrete waiting to harden, say STOP!

Costly delays are eliminated with Golden Gate 24 HOUR. It develops strength so rapidly that concrete poured one day can be used the next.

Chemist's sworn statement of tensile and compression tests attained by *Golden Gate 24 HOUR cement* on this job will be furnished on request.

GOLDEN GATE 24 HOUR

TRUE PORTLAND CEMENT

PACIFIC PORTLAND CEMENT COMPANY

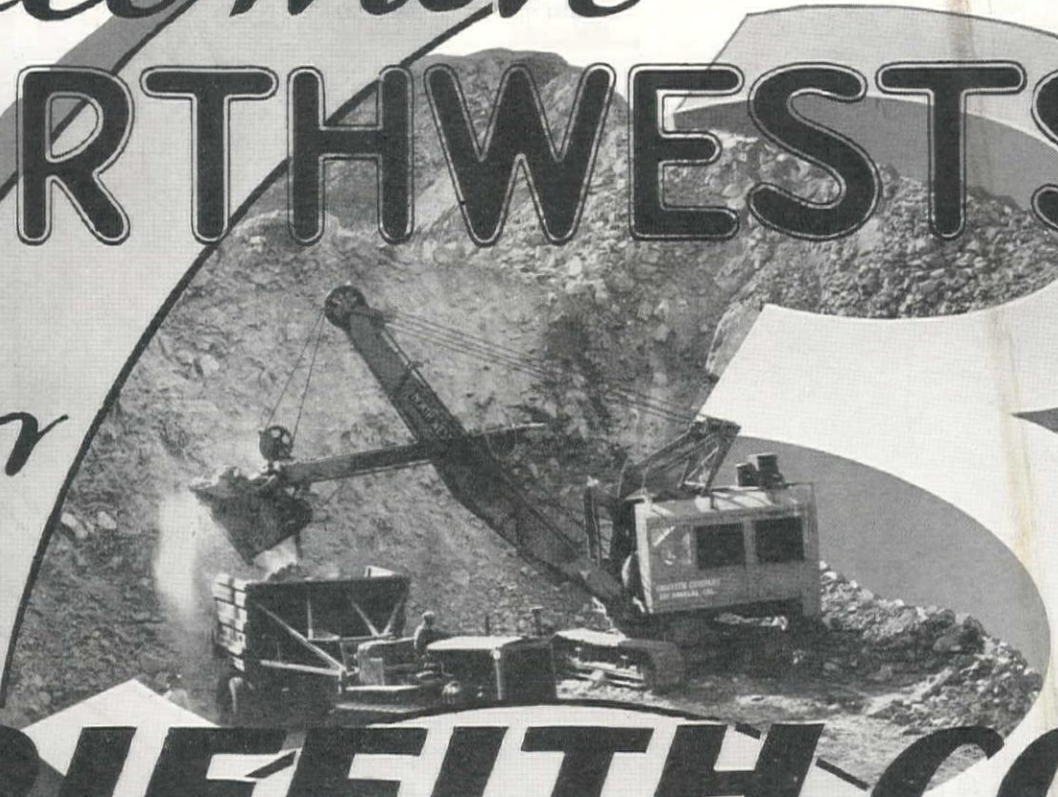
SAN FRANCISCO

Coast Wide Service

MADE BY **DOUBLE-BURNING** PROCESS

Three More NORTHWESTS for The GRIFFITH CO.

Los Angeles Calif



After using a 2½ yd. Northwest shovel on the All-American Canal, the Griffith Co., of Los Angeles, Calif., has purchased *three* more 2½ yd. Northwest shovels for the 9,000,000 cu. yd. Cajalco Dam job, making 6 Northwest machines in all.

The proof of the pudding is in the eating and if you are in the market for a shovel, repeat order purchases such as this by responsible concerns deserve your consideration. Let us send you the booklet, "Digging Power Plus."

SHOVELS, CRANES, DRAGLINES, PULLSHOVELS, SKIMMERS

NORTHWEST ENGINEERING CO.

The world's largest exclusive builders of gasoline, oil, diesel or electric powered shovels, cranes, draglines, pullshovels and skimmers

1727 Steger Bldg., 28 E. Jackson Blvd.
Chicago, Ill., U. S. A.

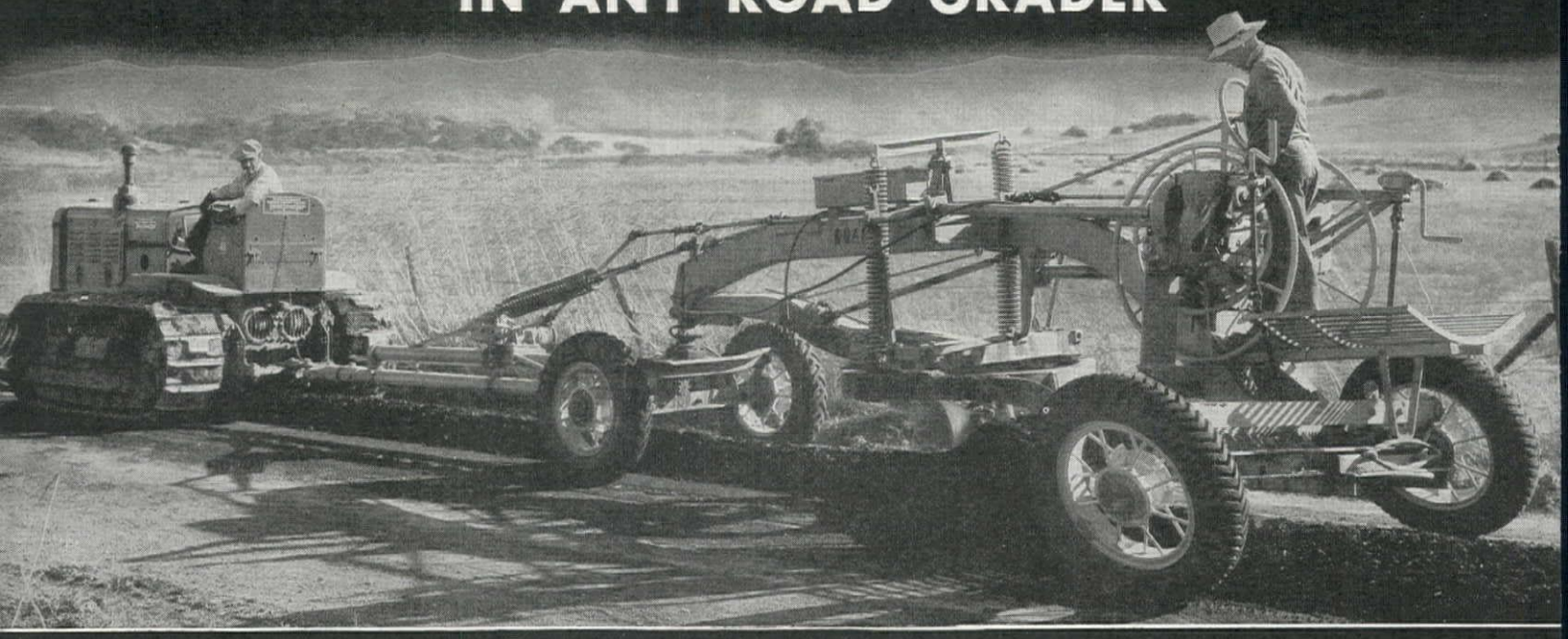
GASOLINE, OIL, DIESEL OR ELECTRIC POWERED

BUILT IN A RANGE OF 12 SIZES, 1/2 CU. YD. CAPACITY AND LARGER

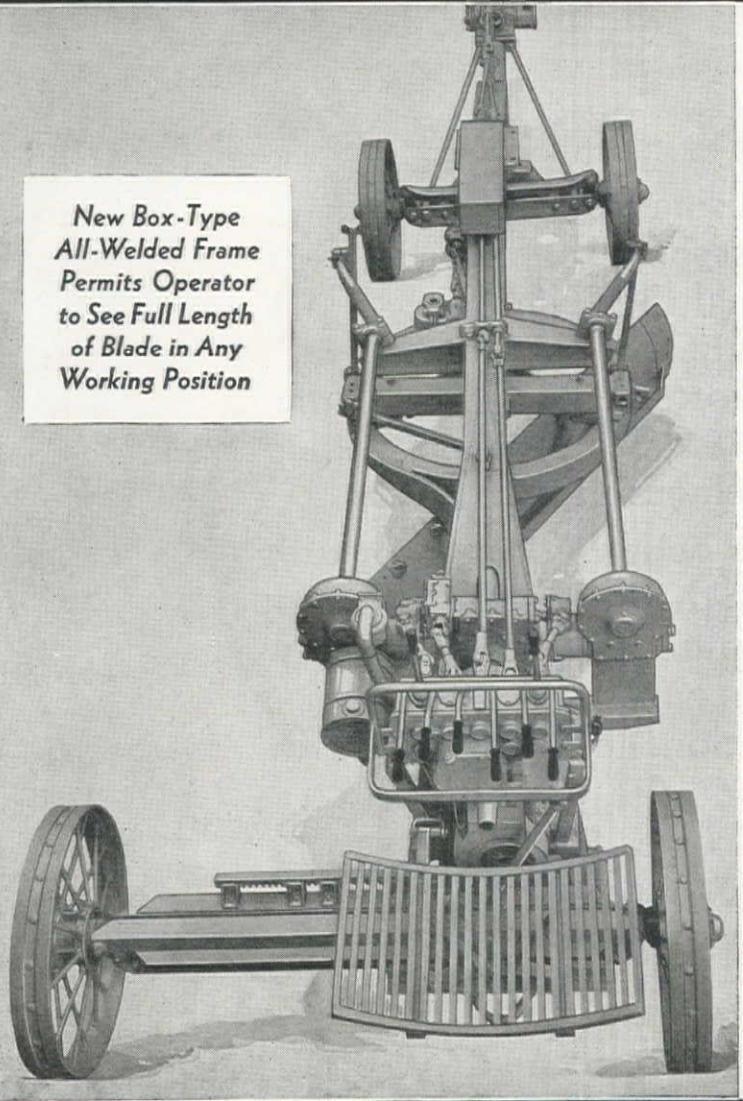
NORTHWEST ENGINEERING COMPANY
255 Tenth Street, San Francisco, Calif.
3707 Santa Fe Avenue, Los Angeles, Calif.

REPRESENTATIVES—Pacific Hoist & Derrick Co., 3200 Block, 4th Ave. S., Seattle; Arnold Machinery Co., Inc., 149 W. 2nd St. S., Salt Lake City; The Mine & Smelter Supply Co., 1422 17th St., Denver Colo.; Neil B. McGinnis Co., 1401 S. Central Ave., Phoenix, Ariz.

NEVER BEFORE SUCH
COMPLETE VISIBILITY
IN ANY ROAD GRADER



—the New-Type ADAMS GRADERS



New Box-Type All-Welded Frame Permits Operator to See Full Length of Blade in Any Working Position

THE blade is the "business" end of any road grader and it is important that the operator be able to see as much of his blade as possible so that he can see what he is doing. This is particularly true on work where fine adjustments are necessary.

On other graders the operator's vision of the blade is seriously impaired by a maze of frame beams, cross-bracing, lateral shift adjustments, lift springs and other obstructions. The simplicity of Adams design, as illustrated at the left, gives the operator a full view of the blade in any position—an important advantage as any operator will tell you.

Complete visibility is but one of the outstanding features of the new-type Adams Graders—the new, box-type all-welded frame is unequaled for strength and rigidity and it permits an extremely wide range of blade positions without making time-consuming adjustments of lift links, lateral shift mechanisms and moldboard. Adams power-operated controls raise the blade from ditching position to high bank-cutting position in 40 seconds—other adjustments are correspondingly fast.

These new machines are now available in 12-ft. and 10-ft. blade lengths, with power-operated or hand-operated controls. Before buying any grader let our local representative demonstrate one of these remarkable machines.

ROAD ADAMS MACHINERY

J. D. ADAMS COMPANY

SAN FRANCISCO—LOS ANGELES—SPOKANE

Western Distributors: LUND MACHINERY CO., Salt Lake City; NIEL B. McGINNIS CO., Phoenix, Ariz.; ELTON T. FAIR CO., Denver; McCHESNEY-RAND EQUIPMENT CO., Santa Fe, N. M.; A. C. HAAG & CO., Portland, Ore.

"Partial Estimates"

The season for national conventions is about to open in the East. The months of December and January include the annual meetings of several important organizations in the construction industry, with which western engineers and contractors are affiliated. The list of major conventions this season include: American Road Builders Association and Annual Road Show, Cleveland, Ohio, week of January 20; American Association of State Highway Officials, Miami, Fla., December 9-12; American Society of Civil Engineers, New York City, January 15-18; Associated General Contractors Convention in Miami, Fla.; Associated Equipment Dealers, Cleveland, January 18-19.

These meetings bring together national leaders of the construction industry to review the past year, appraise developments, discuss common problems and plan for the coming season. In the exchange of ideas with others from different sections of the country, attendance at these meetings is of value to individuals from the West and, indirectly, to the construction industry of the West, as a whole.

In addition, these conventions provide an opportunity for relaxation. To those contractors, engineers and machinery dealers attending the Road Show and other meetings in the East a boat trip through the Panama Canal offers a real opportunity for getting away from business for several days and enjoying a complete change.

•

Correction: On page 287 of the October issue, the caption to Fig. 7 was incorrect in its reference to the companies responsible for the production and finishing of the castings for the cable saddles for the Golden Gate Bridge. The castings were made and rough machined at the Bethlehem, Pa., plant of the Bethlehem Steel Co., and the finished machining and the grooving was done by The Midvale Company at its plant at Nicetown, Pa.

SUBSCRIPTION RATES

The annual subscription rate is $2 in the United States and foreign countries where extra postage is not required. To Canada and to foreign countries where extra postage is necessary the annual rate is $3. Single copies 25 cents.

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J. I. BALLARD, Editor

Contents for November, 1935

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Please address correspondence to the executive offices, 114 Sansome Street, San Francisco

Entered as Second Class Matter at the Post Office at San Francisco, California, under the Act of March 3, 1879.

70 year *old Redwood substructure near Maine Prairie, Solano County. Erected 1865, still sound and in use.*

HIGHWAYS . . . one of REDWOOD'S Testing Laboratories

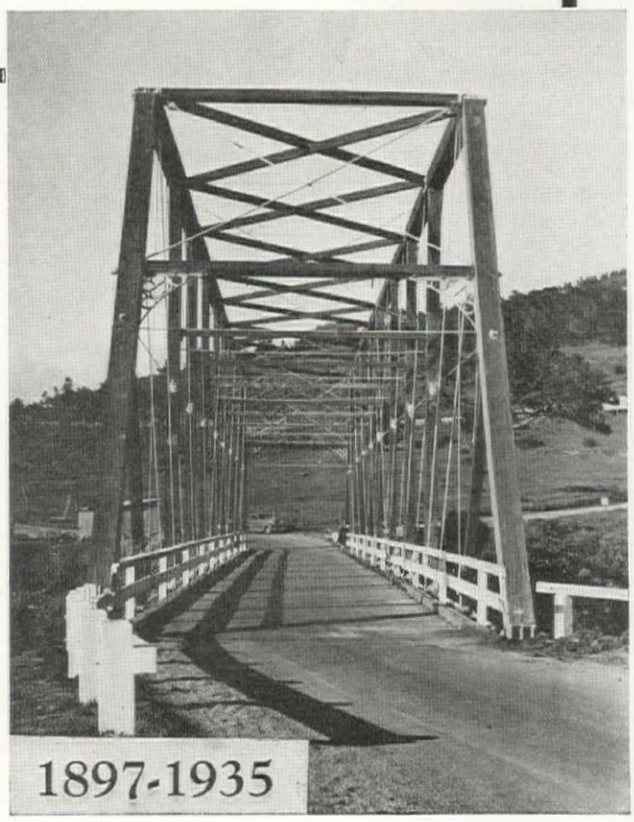
again Economy *says:* USE REDWOOD

The long life and sustained strength of properly selected Redwood timbers are proven by scores of old bridges and other structures.

The dependable structural grades provide timber which will give the same splendid service as these old examples.

Rigid inspection of each structural timber by competent, experienced and impartial Association inspectors insures proper selection. Each piece is marked with positive grade identification.

The use of Redwood gives maximum value for each dollar expended, regardless of whether traffic requirements render the highway and the structure obsolete within a few years, or whether the location, alignment, roadway width and loading remain adequate for a century.



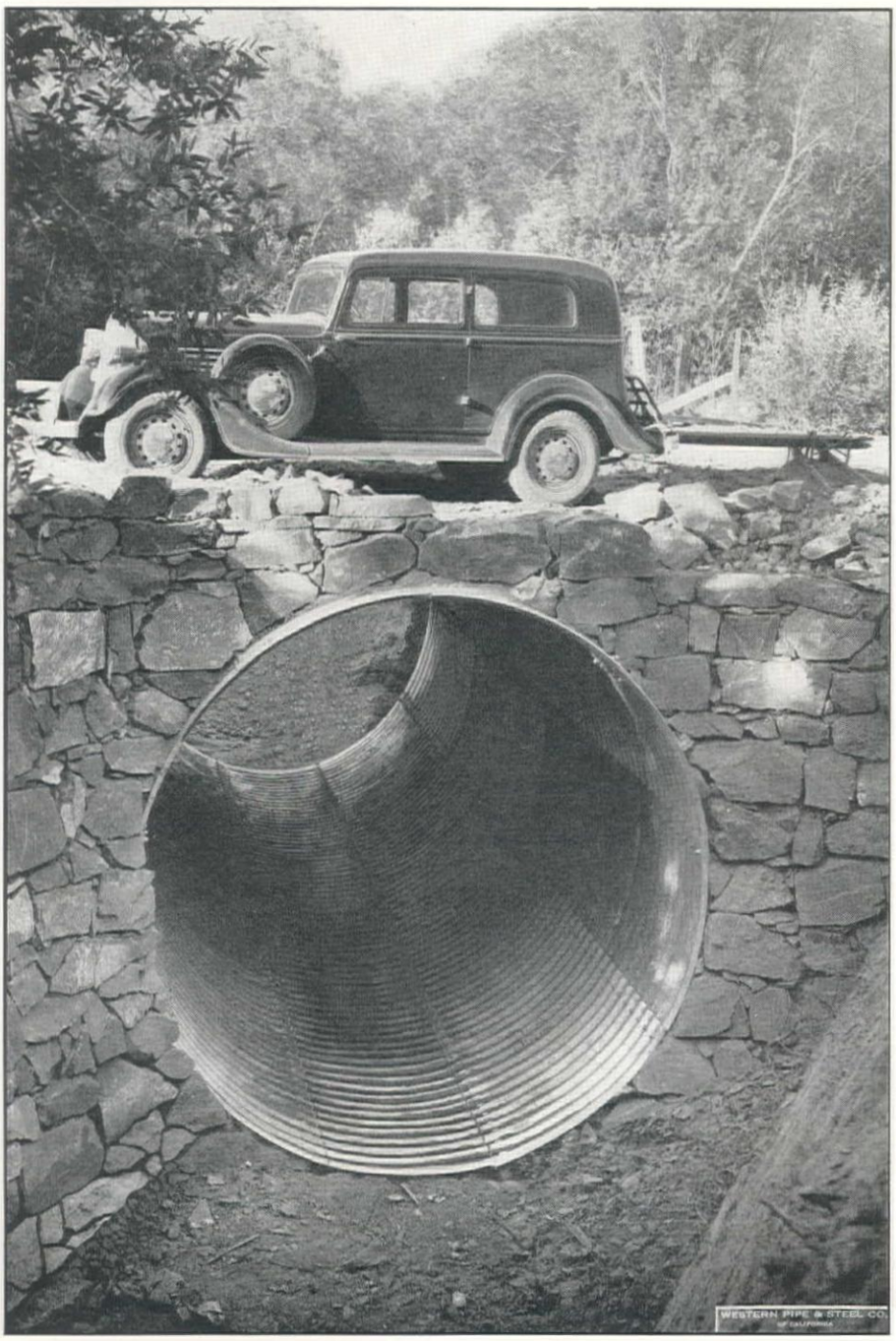
38 years *in three locations: Built 1897, 20 years over Pajaro Creek; moved 1917, 18 years over Malpaso Creek; moved 1935, for detour service. All truss timbers were Redwood.*

CALIFORNIA REDWOOD ASSOCIATION
405 Montgomery Street San Francisco

NATURALLY DURABLE CALIFORNIA REDWOOD

When writing to CALIFORNIA REDWOOD ASSOCIATION, *please mention Western Construction News*

A "TONCAN" CULVERT



135" DIAMETER

This Toncan multiplate culvert was fabricated by "Western" for Marin County, California, Road District No. 5. Delivered to S.E.R.A. at Bull Tail Creek, Nicasio-Lucas Valley Road. The culvert was made up of eight plates of No. 3 gauge plus one plate of No. 1 gauge, making up the circumference per course. Each course 5 feet long. Total shipping weight approximately 19,000 pounds.

▼

For Permanence Specify

TONCAN
IRON COPPER
MOLYBDENUM
CORRUGATED
PIPE

WESTERN PIPE & STEEL COMPANY

OF CALIFORNIA

LOS ANGELES SAN FRANCISCO FRESNO BAKERSFIELD PHOENIX

Affiliated: HARDINGE-WESTERN COMPANY

A section of open cut work on the Los Angeles aqueduct. "This 2½-yd. standard ESCO bucket has now finished 22 miles of this work and is still hungry for another job four times as big."

"If EVERY contractor knew what every ESCO owner knows."

ESCO

Write for
"BUCKET BOOK 77"

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24th and York Streets — Phone Beacon 6344
PORTLAND, OREGON

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NORMAN W. MILLS, *District Manager*
2205 Santa Fe Avenue Phone JEfferson 4191
LOS ANGELES, CALIFORNIA

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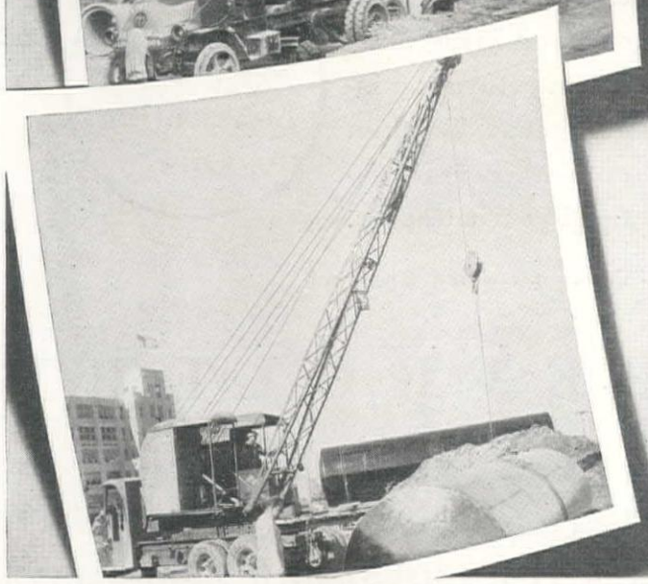


SHOVEL?
CLAM?
CRANE?

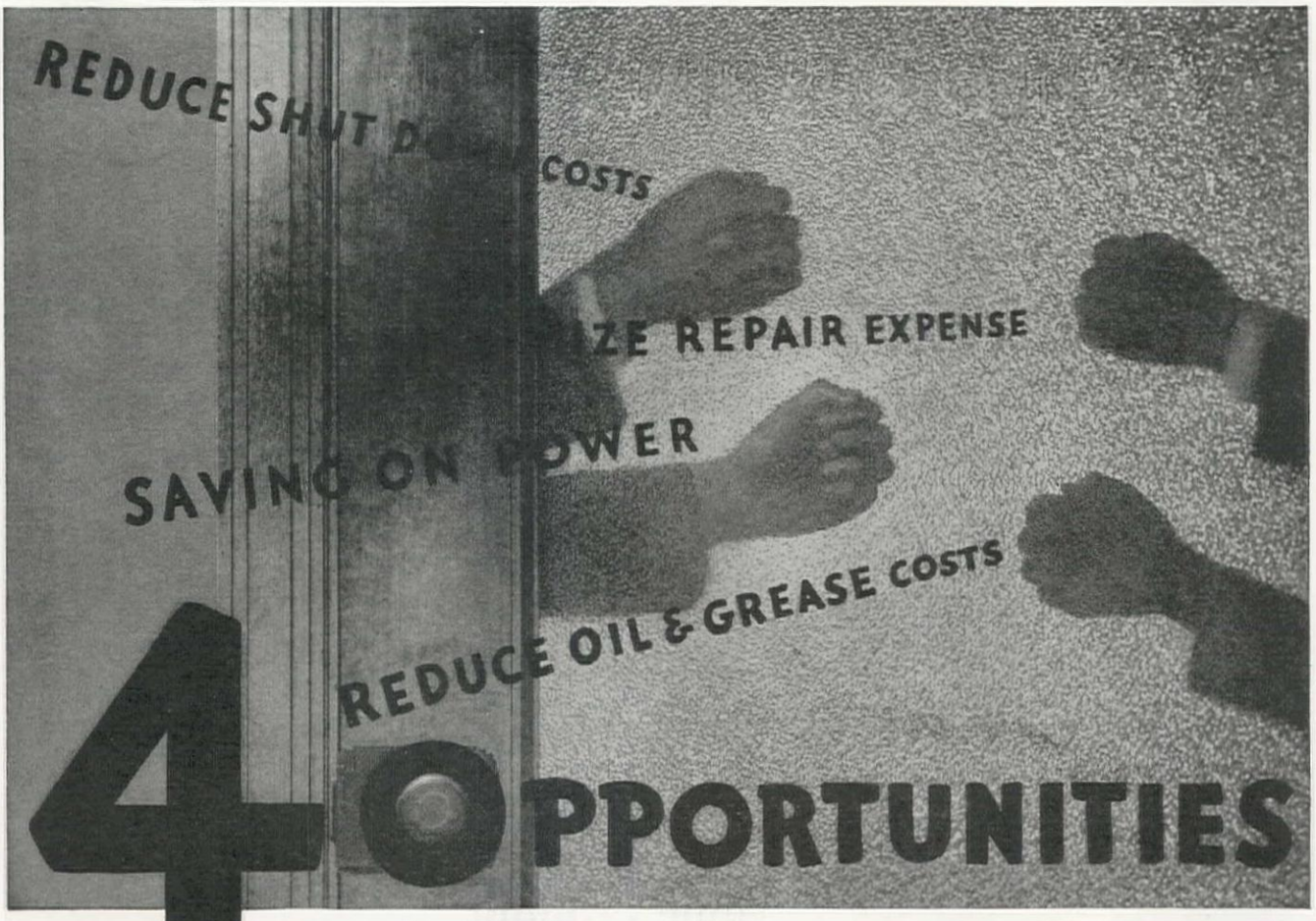
MOUNT IT ON A MOTOR TRUCK *for* MAXIMUM MOBILITY—

● The winter work program calls for thousands of smaller jobs . . . and the smaller the job the more important mobility becomes . . . There is no easier, faster, less-costly method of getting the correct, profit-making equipment from job to job than with a motor truck mounted Universal-Lorain . . . it's always loaded and ready to rush to the job, whether it be a two hour or a 200 hour job of digging, material handling or steel erecting . . . The turntables are Center Drive Lorain 40-37-30's, built as ¾ yd.—⅜ yd. shovels; as 8½ ton—6½ ton cranes . . . fast, rugged, powerful and highly mobile.

THE UNIVERSAL CRANE CO., LORAIN, OHIO

***Universal* • LORAIN**

THE UNIVERSAL CRANE CO., 355 Fremont Street, San Francisco — Distributors: THE RIX COMPANY, Los Angeles; HALL PERRY MACHINERY CO., Butte; FEENAUGHTY MACHINERY CO., Portland, Seattle, Spokane; ASSOCIATED EQUIPMENT CO., LTD., San Francisco, Calif.; McCHESNEY-RAND EQUIPMENT CO., Santa Fe, N. Mex.; AMBLER-RITER, Salt Lake City; H. W. MOORE EQUIPMENT CO., Denver.



KNOCK AT YOUR DOOR

when the G.P. *man* calls*

You want to wring all the profits possible out of your plant this year. Let us take it for granted that you have a thorough knowledge of the operation of your plant. Yet there is just a chance that you are overlooking certain hidden extra profits.

The General Petroleum Engineer may uncover them for you. He has done it for many others. Again, he may not. But certainly it is worth the chance of sending for him if only to see just what he can suggest.

One sure thing—he can show you how correct lubrication can lower operating cost and bring maximum returns on investments. Try him out—there is no obligation whatsoever.

GARGOYLE Lubricating Oils

**General Petroleum's Socony-Vacuum trained Engineer*

GENERAL PETROLEUM CORPORATION

A Socony-Vacuum Company

PACIFIC COAST MARKETERS OF GARGOYLE INDUSTRIAL LUBRICANTS

759 shots without a misfire

Halafax Explosives

Boss Powderman Runs Perfect Score

Uniformity at the point of manufacture is one thing, but Uniformity at the point of *use* is the main thing. Halafax Explosives retain their work-ability *in the field* irrespective of age, temperature and other affecting conditions. They do not sacrifice the labor involved in setting a charge. Why hazard a delayed shot?

HALAFAX EXPLOSIVES ASTONISH VETERAN OPERATOR—READ HIS LETTER:

Halafax Explosives Co.,
Los Angeles, California

October 31, 1935.

Gentlemen:

I have just finished shooting seven hundred and fifty-nine holes for a large commercial development, using Halafax Explosives exclusively. I never had a mis-shot out of the seven hundred and fifty-nine.

I have been handling powder for the past fifteen years in mines, in all kinds of construction jobs, and also in shooting holes for the two hundred miles of tower line for the.....Company,* and never in all my handling of powder have I had such success.

I highly recommend Halafax Explosives for all kinds of work, as I have found it to be the best I have ever used.

Signed (and notarized)
Arthur Gordon
712 East Rose Avenue
Bellflower, Calif.

*Name on Request

HALAFAX EXPLOSIVES

UNIFORMITY
1 No leaking fluids; no bleeding, creeping or separation of ingredients in storage.
2 Uniformity in every cartridge resulting from stable consistency.

ADAPTABILITY
3 Adaptable to all explosive requirements — industrial, agricultural, engineering, mining, quarrying.

ECONOMY
4 Light weight means more work per pound at the same cost.

EXPERIENCE
5 Engineering and chemical experience, and research facilities back of every stick.
6 Modern plant and production methods.

DEPENDABILITY
7 Financial stability and reliability of the organization.

HALAFAX EXPLOSIVES COMPANY

Write or phone today for a copy of this interesting booklet—"What is Halafax?"—the story of the development and manufacture of Halafax Explosives

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Los Angeles, Calif.

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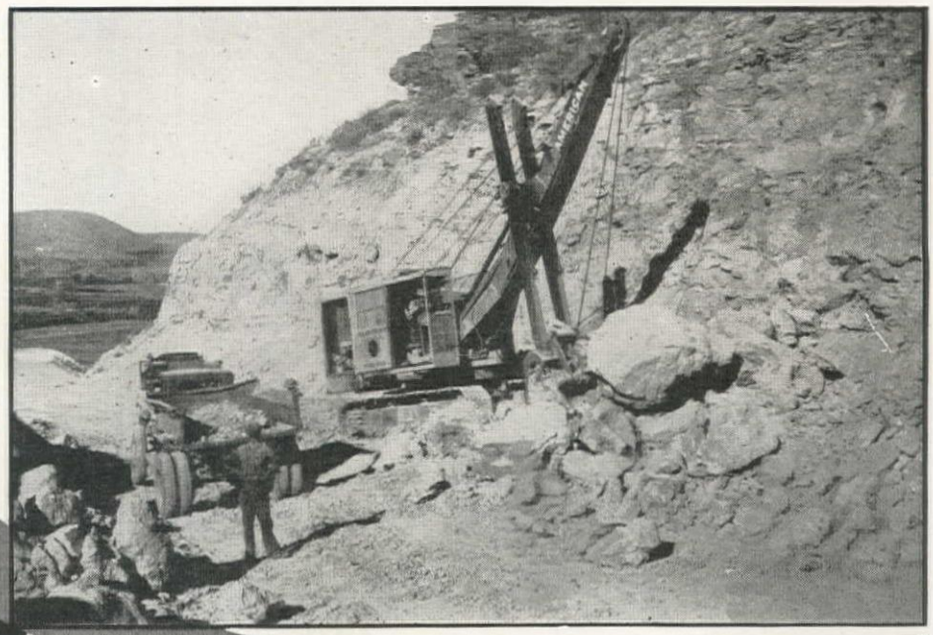
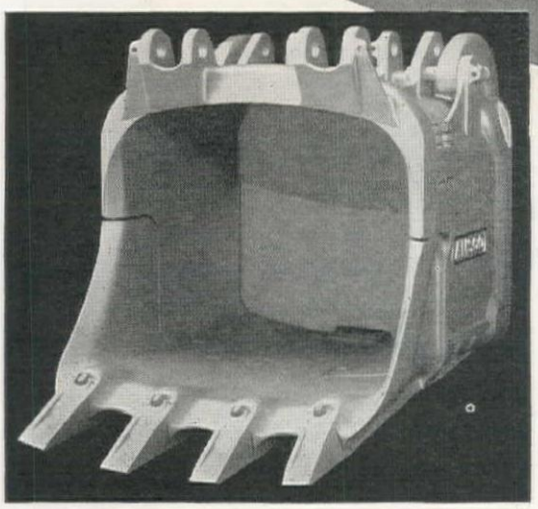


IN ZION NATIONAL PARK!



Smooth inside body design provides for faster digging, bigger loads and quicker dumping.

Illustrated is a 1½ yard, Model 450 American Gopher, doing a tough digging and handling job on a new mountain highway in Zion National Park. Equipped with an AMSCO Renewable Lip Dipper (U.S. Patent No. 1,945,064) this shovel is giving a good account of itself in yardage moved daily.

The AMSCO Renewable Lip All-Manganese Steel Dipper cuts digging costs! It consists of a one-piece cast manganese steel body available with easily renewable or interchangeable lips. It is furnished with the type of lip best suited the digging conditions; double wall with teeth for hard digging and rock handling; single wall with teeth for loose material digging, stock piling and rehandling; and a thin, serrated edge cutter lip for mucking and clay digging.

Lips are quickly and easily changed in the field — no trouble — no delay. Simply knock out four keys, loosen two U-bolts and the lip is off. No rivets to punch out or renew.

To get maximum efficiency and greater yardage from *your* shovels, equip them with AMSCO Renewable Lip Dippers. Made for all shovels in all sizes from ¾ yard up. Without separate lips in ⅜, ½ and ⅝ yard sizes.

Our nearest office or your shovel manufacturer will be glad to give you complete details — write for them today!

AMSCO

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Division of American Brake Shoe & Foundry Company

402 East 14th Street, Chicago Heights, Ill.

Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

Remember! when buying a Shovel, Dragline or Crane~

(1) Lima Type 601, 1½ yard shovel working on a highway job in Arizona.

(2) Lima draglines everywhere are making new records for high yardages and low operating costs.

(3) Lima Type 302 Crane handling timbers on a bridge job in Ohio.

that LIMAS are built in 3/4 YARD CAPACITY and LARGER

SHOVELS
CRANES
DRAGLINES
HOES

LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL AND CRANE DIVISION
LIMA, OHIO, U. S. A.

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3-4 YARD TO 2 YARD SHOVELS
1-2 YARD TO 3 YARD DRAGLINES

WATCH a modern Bucyrus-Erie dig . . . notice the sureness with which the dipper holds the grade, the freedom with which it is safely dropped into the pit, the swift thrust through the bank, the invariable heaped load, the quick acceleration of the swing, the sharp stop over the truck and the quick dump. You can't get speed like that without accurate, effortless control . . . and Bucyrus-Eries have it to a superlative degree.

control

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

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LOS ANGELES: CROOK COMPANY, 2900 Santa Fe Ave.; SEATTLE: CLYDE EQUIPM'T CO., 3410 First Ave., South

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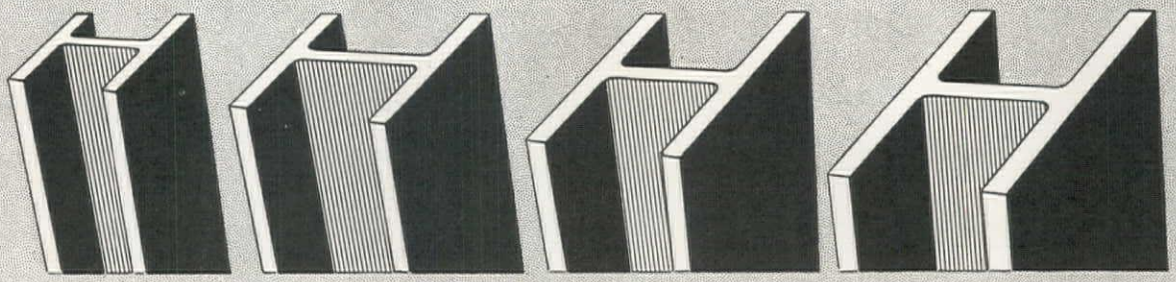


The sound and economic solution to many a foundation problem

THE rolling of steel H-sections, pioneered by Bethlehem Steel Company in 1908, placed in the hands of construction engineers a new type of bearing pile of enormous possibilities.

The ability of steel H-piling to stand up under hard, continuous driving when conditions require considerable penetration in hard ground materials, and its consequent great load-carrying capacity, and other advantages, led to its extensive use. Today steel H-piling is recognized as offering the sound and economic solution to many foundation problems —for bridges, piers, buildings, industrial plants and other structures.

Bethlehem Steel H-Piling is rolled in a complete range of weights and sizes, including a group of newly-designed sections which further broaden its usefulness to the construction engineer.

Other products for the construction industry supplied by Pacific Coast Steel Corporation include:

STEEL SHEET PILING; REINFORCING BARS; STRUCTURAL SHAPES; GALVANIZED STEEL SHEETS; DRILL STEEL; BOLTS, NUTS AND RELATED PRODUCTS; WELDED STEEL PIPE

PACIFIC COAST STEEL CORPORATION

Subsidiary of Bethlehem Steel Corporation

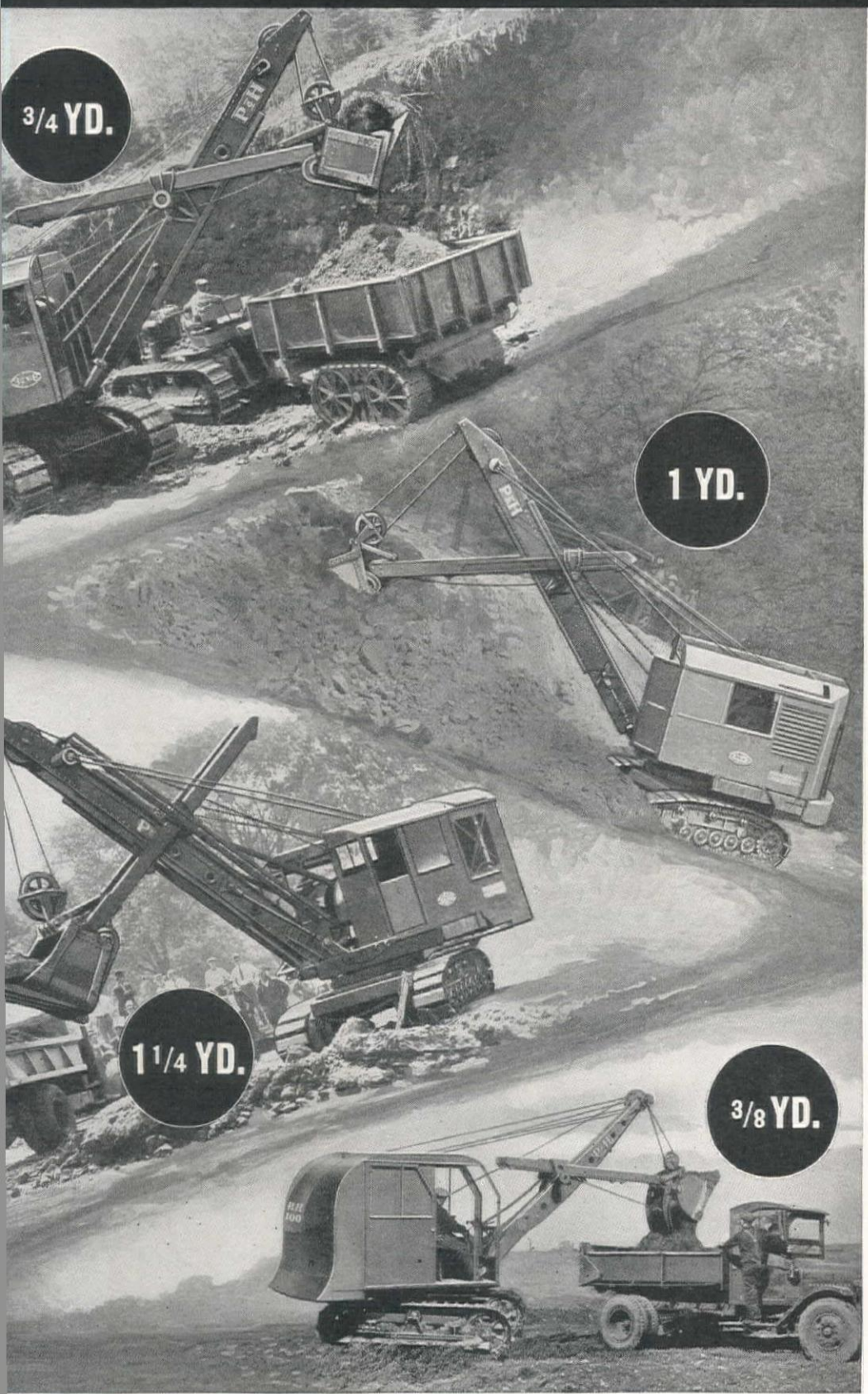
Sales Offices: San Francisco, *20th and Illinois Sts.;* Los Angeles, *Slauson Ave.;* Seattle, *West Andover St.;* Portland, *American Bank Building;* Salt Lake City, *Kearns Building;* Honolulu, T. H., *Schuman Building.*

BETHLEHEM STEEL

"WE SERVE THE COAST"

BETHLEHEM Steel H-PILING

YOU'LL BID LOWER ON ROAD JOBS—



with these HIGH SPEED P&Hs

SHARP pencils are working 1935 road bids! High speed equipment is setting the pace with lower costs.

Get down to brass tacks at the start. Ask yourself if you can match the high speed —low cost production of a modern P&H with Split Second Control.

Sure, the P&H rapid reversing chain crowd enables you to dig within 1 inch of grade — to keep it up day after day. And maintenance is only 1/10 of the cost for other types. But there's more than that! There's the shock absorbing construction that protects you against costly repairs and lost time. Super smooth swing clutches combined with snappier dipper action greatly shorten up the digging cycle. These are some of the features that keep P&H machines dependably on the job and keep follow-up machinery moving faster all along the line.

Claims alone won't convince you of P&H superiority on road work. But comparative performance will! There's a P&H on the job somewhere near you. Let's get out together and watch it work!

Write for Bulletins on various models.

P&H BANTAM WEIGHT
(Model 100 — 3/8-yd.)

The small machine that is knocking down dirt-moving costs. Has Split Second features found on highest priced P&H models. All-welded construction makes it light, fast, economical. Powered by Ford V-8 motor, renewable on the Ford replacement plan.

Write for your copy of Bulletin No. 100.

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4490 W. NATIONAL AVE. *Established 1884* MILWAUKEE, WIS.

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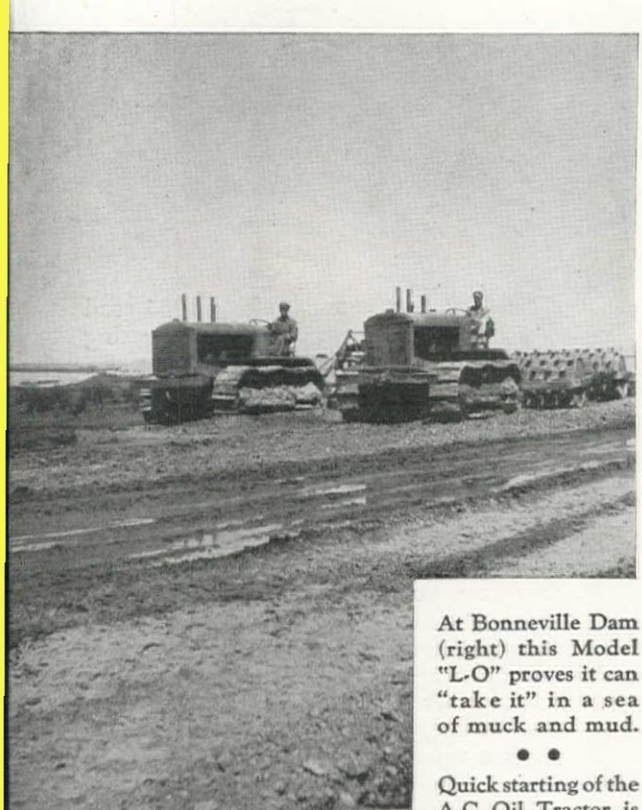
SEATTLE DALLAS LOS ANGELES SAN FRANCISCO

P&H PERFORMANCE SPEEDS UP YOUR PROFIT PACE

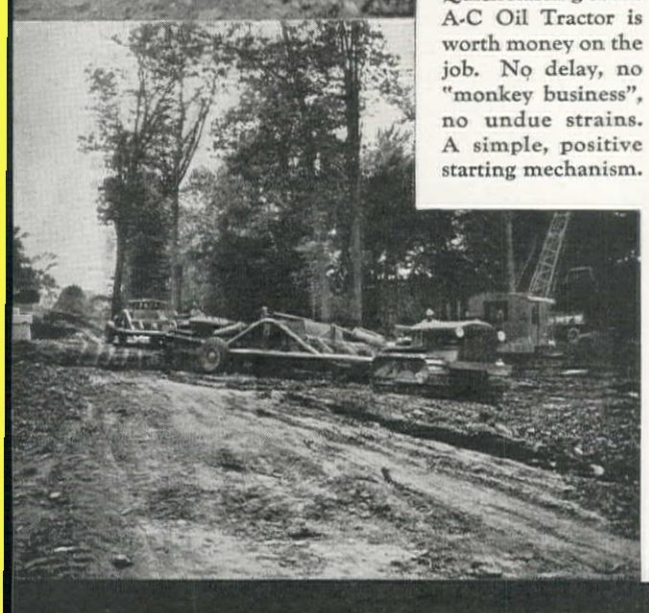
THE A-C HAS *What*



At Bonneville Dam (right) this Model "L-O" proves it can "take it" in a sea of muck and mud.

• •

Quick starting of the A-C Oil Tractor is worth money on the job. No delay, no "monkey business", no undue strains. A simple, positive starting mechanism.



FOR SCRAPING .. GRADING .. BULLDOZING .. ROLLING

WHEN tractors are bought on actual performance records, Allis-Chalmers Oil Tractors are first choice. They have what it takes—not only Diesel Fuel economy but a simplicity of design that permits maximum work with minimum upkeep. In the mud and muck of Bonneville Dam... in the white hot heat of the All-American Canal... on big jobs from coast to coast... A-C Oil Tractors are demonstrating that the "low compression" principle is an outstanding forward step... that smoother operation and reduced wear have an important bearing on tractor costs. Don't rely on hearsay. Get complete, accurate facts about the new, improved principle of A-C Oil Tractors. See for yourself what they will do—on your job.

ALLIS-CHALMERS OIL TRACTORS

TRACTOR DIVISION—MILWAUKEE, U. S. A.

ASK THESE ALLIS-CHALMERS DEALERS

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17th and Folsom Sts.,
San Francisco, Calif.

Barnett & Lee Tractor Co.,
2130 Chester Ave.,
Bakersfield, Calif.

Brewer Tractor & Equip. Co.,
Medford, Oregon.
Klamath Falls, Oregon.

Browning Motor Company,
Box 616, St. Anthony, Ida.

Byers Bros.,
Gilroy, California.

Chandler Tractor & Equip. Co.,
LaGrande, Oregon.
Elgin, Oregon.

Clyde Equipment Company,
555 Thurman St., Portland.
3410 First Ave., Seattle.

Crook Company,
2900 Santa Fe Ave.,
Los Angeles, California.

East Side Lumber Company,
Idaho Falls, Idaho.

Farmers Hardware & Imp. Co.,
San Luis Obispo, California.

W. F. Gage & Sons,
Chico, California.

Harvester Supply Company
Walla Walla, Washington.
Pendleton, Oregon

Hayes Motor Company,
Rupert, Idaho.

Hazard-Gould & Co.,
302 5th Ave., San Diego.

Intermountain Tr. & Equip. Co.,
Boise, Idaho.

C. H. Jones Machinery Co.,
Salt Lake City, Utah.

Kelly Motor Company,
Shoshone, Idaho.

King Tractor & Equip. Co.,
Centerville, California.

Harry Kunkel
Corral, Idaho.

Ladd Hardware Co.,
Hollister, Calif.

Lampert Implement Co.
Yakima, Washington.

Lewiston Clarkston Lbr. Co.,
Lewiston, Idaho.

E. C. Livingston,
Paso Robles, Calif.

R. H. Manning,
Ashton, Idaho.

Neil B. McGinnis Co.,
1401 Central Ave.,
Phoenix, Arizona.

Carl F. Menke,
14 East Alisal Street,
Salinas, California

Moore Equipment Co.,
Stockton, California,
Modesto, California.

Mountain Tractor & Mach'y Co.,
Missoula, Montana.
Ronan, Mont.

Nampa Tractor Company,
Nampa, Idaho.

National Mach'y Co., Ltd.,
Vancouver, B. C., Canada.

North and Cole,
Corcoran, California.

C. W. Paul Hdwe. & Mach'y Co.,
515 Railroad Ave., Elko, Nev.

Peerless Bean Sales & Service,
1755 Broadway, Fresno, Calif.

Peoples' Motor Service
Richfield, Idaho.

Race & Landers Hdwe. Co.,
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Redwine Motor Co.,
Mt. View, Calif.

Rossi Bros.,
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Sacramento Tr. & Equip. Co.,
1730 16th Street,
Sacramento, California.

Scott Motor Co.,
Reno, Nevada.

L. A. Snow Company,
Spokane, Washington.

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Colusa, California.

Tractor Equipment Co.,
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FACTORY BRANCHES: 2533 Peralta St., Oakland, Calif.; 1305 S. E. Union Ave., Portland, Ore.; 602 First Ave., Pocatello, Ida.; 25th and Fourth Ave., Billings, Mont.

Height of quarry face: 225 feet. Formation: Dry, Blocky Sandstone. Pitching seams.

Results of blast: Tons of rock broken—400,000 (approximate). Tons of rock per pound of powder 4.44. Powder cost per ton of rock $0.021.

400,000 Tons Ready for the Shovel

Atlas supplied the explosives for this sizeable blast in which *controlled force* laid the stone down in fine condition for full shovel buckets and low cost rock production.

Atlas Explosives and Atlas Service mean high tonnage per pound of explosives—good fragmentation—and reduced losses of time and explosives' energy.

Call on—or call in—the Giant Division Atlas Representative.

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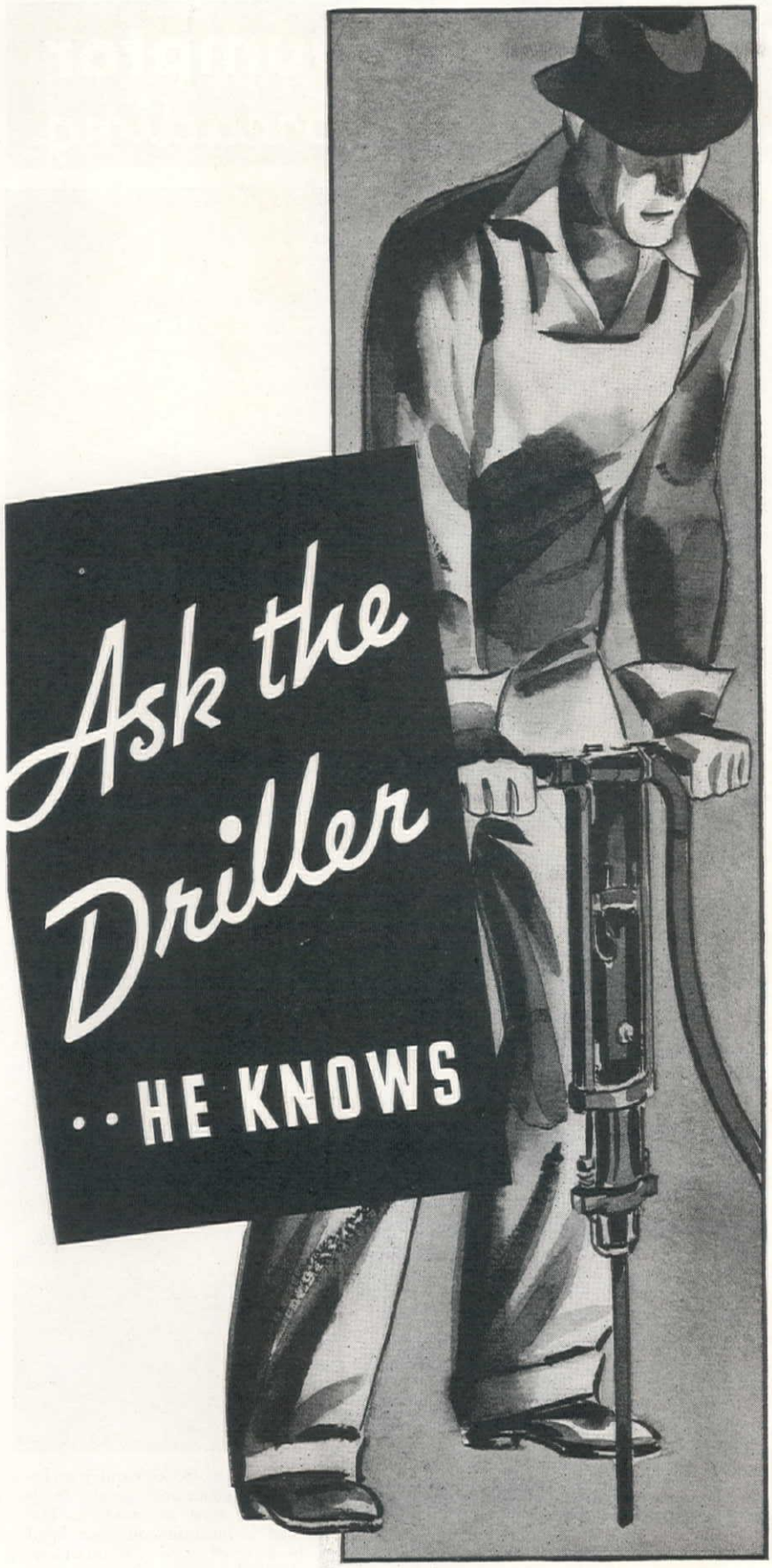
ATLAS EXPLOSIVES

ATLAS EXPLOSIVES



ASK the driller — he knows the many advantages of drilling with Timken Rock Bits.

He has experienced their faster drilling qualities, ability to drill more footage per bit, maintenance of gauge, and changeability on the job.

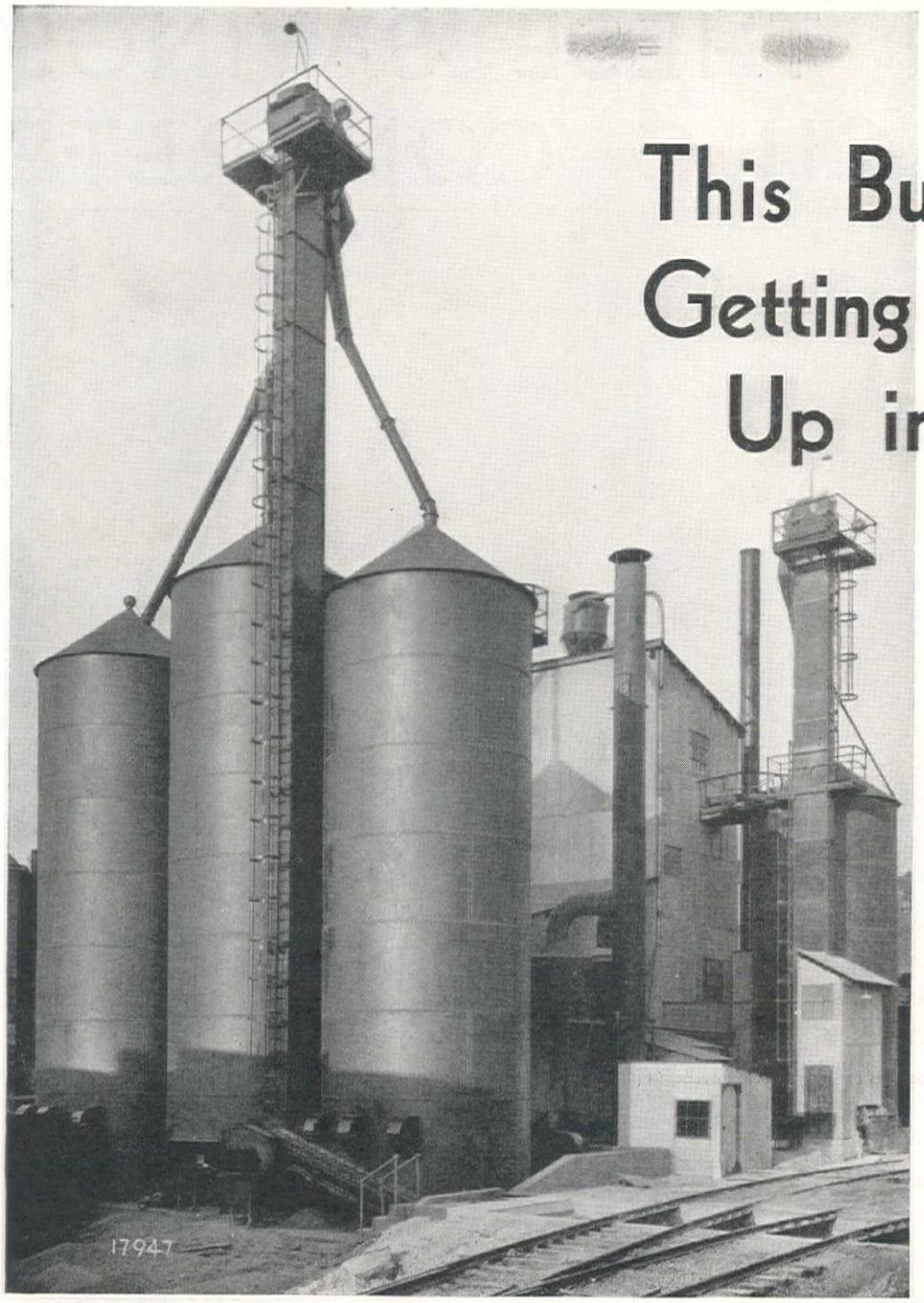
But Timken Bit economies go much farther than that. Major savings come from the elimination of reforging and transportation of reforged steels to and from the job plus a radical reduction in the number of steels required.

Try Timken Rock Bits now... test them in competition with reforged steels or any other bits. Write for complete information.

Complete Stocks Maintained in Principal Distributing Centers

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS



This Business of Getting Materials Up in the Air

● Is an important job in any man's plant.

The start of almost any conveying job is lifting material up in the air . . . so that something further can be done with it. You will search far before you will find a better device for doing this than a Jeffrey Bucket Elevator.

Every Engineer knows that a Jeffrey Bucket Elevator in his plant means years of satisfactory, efficient, trouble-free service. Jeffrey builds good Bucket Elevators . . . has built them for years. Strong chain—buckets that stand wear—sprockets that stay with the job—excellent frames and welded steel casings—built with plenty of reserve strength and durability.

Any style, size, capacity you need . . . intermittent or continuous . . . vertical or inclined . . . single or double strand chain . . . Malleable or steel buckets . . . light, medium or heavy chain . . . Jeffrey has all of these.

Capacities of Jeffrey Bucket Elevators range from 6½ to 750 tons per hour. The nature of the material handled may vary from non- or semi-gritty materials, such as coal, grains and similar materials to gritty substances as ashes, ores, coke, sand, gravel, etc.

A Jeffrey Sales Engineer will be glad to assist you in working out your elevator requirements. Write today.

The Jeffrey Mfg. Co.

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Jeffrey Manufacturing Company, Ltd., of Canada
Head Office and Works, Montreal
Branch Offices: Toronto, Calgary, Vancouver

OBTAIN THESE SAVINGS IN PLACING CONCRETE

When completed, Wheeler Dam will be over a mile long. Floating mixing plants offered the simplest and most practical means to mix and place concrete for a dam of this size. Three of the four mixing plants are shown above. Each is served by one Portable Fuller-Kinyon Pump. Fuller-Kinyon Pumps are the only conveyors capable of unloading barges. Note how the cement barge is located to avoid interference with the handling of aggregates. Another pump handles cement for the Lock, which will be seen at the upper left of the illustration.

FLEXIBILITY - SPEED - RELIABILITY - LOW COST

Fuller-Kinyon Portable Cement Pumps are the only conveyors capable of handling cement under all plant conditions. They unload box cars and barges and recover cement from simple storage sheds with equal facility. For additional information on the advantages of these conveyors write for our bulletin.

Many millions of barrels of bulk cement have been handled by Portable Fuller-Kinyon Pumps in building the World's greatest concrete structures. They have proved that the design and arrangement of concrete mixing plants may be based solely upon economy and convenience in handling aggregates and placing concrete, by eliminating the necessity for straight line and short distance cement conveying. As at Wheeler Dam, they have permitted the economical use of bulk cement where it would otherwise be impractical. Their capacity and rapid movement, under their own power, have assisted in establishing new records in the placing of concrete, as at Norris Dam where only two pumps were required to unload cement from box cars.

Fuller Company
CATASAUQUA, PENNA. U.S.A.

Pacific Coast Branch Office
564 Market Street, San Francisco, California

Life Saving nightsight for drivers on CONCRETE

During 1933 the rate of death per accident was 43.5 per cent greater during darkness than daylight.

•

A resolution of the Motor Vehicle Lighting Committee of the Illuminating Engineering Society, adopted at its meeting, April 24, 1934.

Whereas seeing, which is requisite to safety in driving at night, on unlighted highways, depends upon light reflected back from the road surface or from objects upon it;

And whereas modern driving speeds necessitate quicker seeing at longer distances;

And whereas the lighter colored roads and matte surfaces reflect several times as much light back to the driver as do the darker roads or the glossy surfaces,

BE IT RESOLVED: That the attention of all those concerned with highway construction and maintenance and with public safety be called to the fact that a very large contribution can be made to the conservation of life, limb and property by:

(1) The use of light pavement surfaces,
(2) The use of matte rather than glossy surfaces,
(3) The use of white edge and/or lane markings on dark road surfaces.

•

Statement of I. E. S. Committee on Street Lighting included in *"Principles of Street Lighting"* submitted before the International Illumination Congress in 1928, as reaffirmed with slight modification at a meeting of the Committee in June, 1934:

"The street surface should be of as favorable light-reflecting quality as practicable. From the illumination standpoint, light colored pavements are preferable."

QUICKER seeing at longer distances depends upon the light reflected back from the road surface. The reflection factor is much higher for concrete than for dark types of pavement. Better visibility in favor of concrete! A better safeguard for night-driving motorists!

There is wide appreciation of the need for a better opportunity to see. The importance given to light reflection is evidenced by the repainting of bridges, culvert headwalls, guard rail posts, in white, and the use of white or yellow signs.

Road hazards stand out against the light gray pavement of concrete—shoulders, ditches, obstructions, pedestrians are clearly defined by the increased reflected light. And eye strain is reduced by the absence of glare.

Concrete's safety, far from being an extravagance, is an actual economy. The first cost of concrete is less than any other pavement of equal load-carrying capacity. Its maintenance cost is far lower. And car owners save in gas, oil, tires and car repairs.

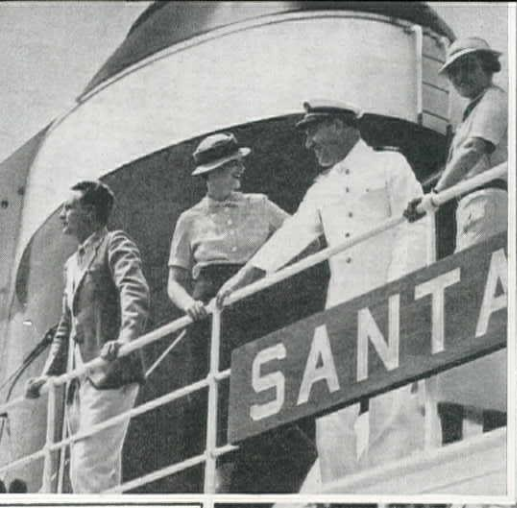
PORTLAND CEMENT ASSOCIATION
Dept. 1011, 816 W. Fifth St., Los Angeles, California
564 Market St., San Francisco, California

PORTLAND CEMENT ASSOCIATION
Please send me "An Open Letter to Henry Ford" giving facts on the performance, economy and safety advantages of concrete pavements.

Name.....

Address.....

City.....*State*.....



Enjoy every of your trip Convention

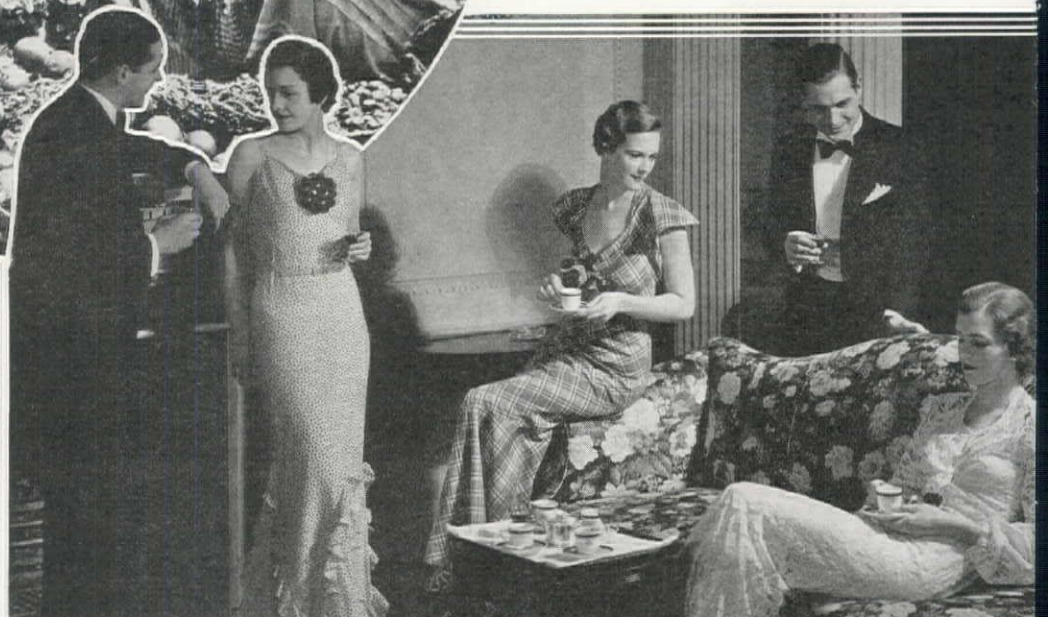
Right:
A vendor of vegetables at the Mercado Central, Guatemala City.

FAMOUS GRACE 'SANTA' SHIPS

offer unduplicated luxuries in a cruise of old world fascination. Only these celebrated liners cruise the Route of Romance . . . offering visits ashore in six countries en route . . . Mexico . . . Guatemala . . . El Salvador . . . Panama . . . Colombia . . . Cuba . . . with delightful one day shore excursion in Guatemala.

All outside rooms with private, fresh water baths; dining room on promenade deck, with roll-back dome which opens to the sky; Dorothy Gray Beauty Salon; pre-release talkies; outdoor, built-in tiled swimming pool. The public rooms, designed by John Russell Pope, decorated by Elsie Cobb Wilson, are typical of the good taste which characterizes every stateroom.

Below: Ancient monolith, Quirigua, Guatemala.



Above: After dinner interlude aboard a luxurious "Santa" liner.

Below: Afternoon relaxation at th outdoor tiled swimming poo

moment to Eastern

'Round America Tours offer conventioners something in the way of relaxation and comfort travel that is never to be forgotten. Sail to the National Conventions by "Santa" ship ... return by rail, or vice versa. You'll be refreshed, ready for the problems ahead upon arrival at your destination.

This combination water, land travel affords the variety, the vacation element that is so essential to contractors and engineers after a strenuous year. Group trips are being discussed among those planning to attend the American Road Builders Association and Annual Road Show in Cleveland, January 20; the American Society of Civil Engineers, meeting in New York, December 9–12; the Associated General Contractors, meeting in Miami; and the Associated Equipment Dealers convention in Cleveland, January 18–19. Here, "Santa" ships offer an excellent opportunity, and extends a cordial welcome to such groups.

Personally conducted tours to world-known points of interest en route is a feature of Grace Cruises that the entire family will enjoy. Yes, the rates on "Santa" ships are reasonable enough to permit the family to take advantage of the "luxury" of sea travel.

May we have the privilege of discussing your convention travel plans with you? The nearest Grace Line office will be happy to receive your inquiry about rates and sailings to suit your needs. Meantime, Grace Line wishes each of you a most enjoyable and profitable time.

Grace Cruises

DESIGNED for PLEASURE TRAVEL

WITH the sea-going habit obtaining an increasingly strong hold on travelers and with cruises rapidly growing in popularity, larger, finer and faster ships are sailing the routes most favored by travelers. The Grace Line offers its three new super-express liners Santa Rosa, Santa Paula and Santa Elena operating on a regular eighteen day schedule between San Francisco, Los Angeles and New York via Mexico, Guatemala, Salvador, the Panama Canal, Colombia and Cuba. These three new liners, superb in appointments and trim in design, beckon the traveler on a zestful voyage of exploration, and relaxation.

After leaving Los Angeles harbor, last American port of call, the Grace liner heads south for Mazatlan, Mexico. The very entry into this Mexican seaport is unusual—the great white bluffs rising sheer above the water; the island lighthouse topping a mass of rock that challenges Gibraltar, greets the traveler. A shore excursion at this quaint seaport reveals all the drowsy atmosphere of Old Mexico.

San Jose de Guatemala is the liner's next destination—here the tourist travels by rail to Guatemala City and passes through a country of amazing splendor and variety. The train passes through many native villages and finally arrives at Guatemala City situated on a great plateau, five thousand feet above sea level where the temperature of the thermometer registers perpetual spring. Mayan ruins at Antigua will intrigue travelers who are students of Indian folklore.

The Grace liner next steams into the harbor of La Libertad, El Salvador, for a stop of several hours. From there the liner sails on to Balboa in the Panama Canal Zone. The traveler may take a short trip to Panama City with its laughter and allurement to all tourists—its tempting bazaars, displaying wares from the four corners of the earth.

On the twelfth day of the journey the ship passes through the Panama Canal. This interesting trip through the locks takes about seven hours and can be enjoyed from a comfortable deck chair. A guide is aboard to explain every section as it is traversed and also point out the mechanism and operation of the locks.

Sailing from Cristobal at the Atlantic entrance to the Canal, the ship now heads for Cartagena, the first South American port of the voyage. Cartagena is the finest medieval city in the western hemisphere and one of the few walled cities left in the world. The ancient ruins and the eight outlying forts of this port will probably be the high spot of interest to the tourist on the cruise. After a short visit at Puerto Colombia the ship heads for Havana, Cuba.

From the moment of entrance into Havana's gloriously protected harbor, two miles in length, with Morro Castle towering on its cliff, the tourist knows that there is an unusual treat in store for him. Havana is a city of the connoisseur—with its gay night clubs, metropolitan bars, gambling salon, race tracks and everything that might be demanded in the way of sophisticated entertainment. Havana is the Monte Carlo and Paris of the west, and has been compared with Seville of Old Spain.

Reluctant farewell is bidden to gay Havana, and the Grace liner starts the three-day voyage to New York and the conclusion of the cruise, with the tourists cherishing memories of their ten-day visit in the Spanish Americas.

The feature of a Grace line cruise is that a traveler can enjoy all the comforts of a first class hotel while aboard the liner. Alike in every detail, these new "Santas" embody features never before found in an American liner. All outside rooms with private bath, all rooms equipped with telephone and mechanical ventilation; charming Georgian living room; stately dining room—extending two and a half decks high into a dome with a roll-back ceiling, removable at will so that passengers may dine under an azure sky or a tropical moon; built-in, outdoor tiled swimming pool, the largest on any American liner; gay club with specially designed dance floor; smart orchestra; fully equipped gymnasium, talking pictures, library, beauty shop and novelty store.

In short—the skill and artistry of America's foremost marine architects and interior decorators have been enlisted to assure the utmost in comfort, luxury and beauteous surroundings for those who make this delightful trip by way of the glamorous Spanish Americas and the Panama Canal.

Consult your travel agent or

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MILLIONS *of* HOURS *of* WORK

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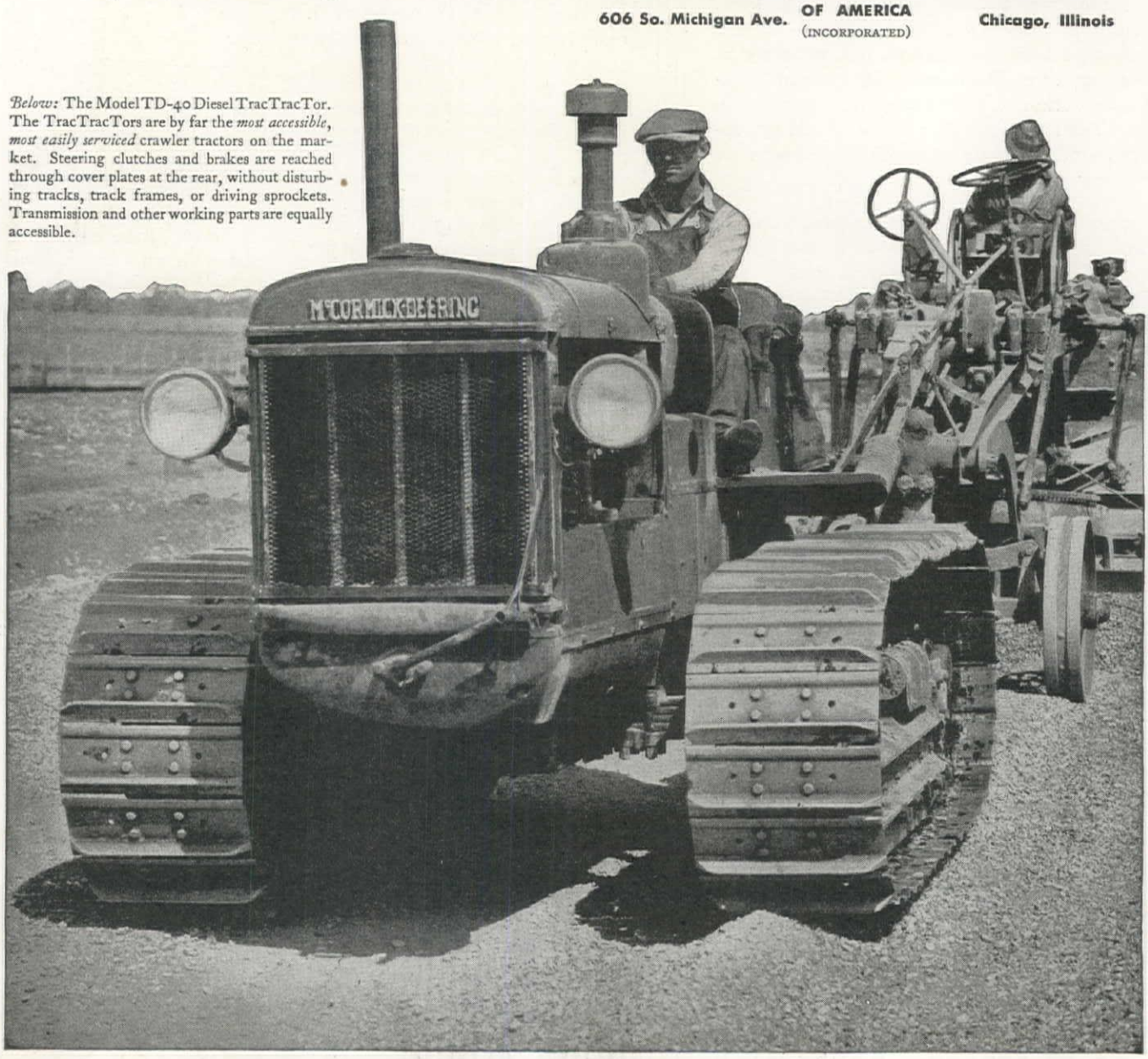
WHEN the need for industrial power arises, bank on this wealth of experience. Let it be your guide in selecting power—be satisfied with nothing less than this proved performance which is a guarantee of what this power can do for you. Furthermore, you will be getting the benefits of low operating and maintenance costs that have appealed so strongly to users in every field.

If your jobs call for powerful crawler or wheel tractors (gasoline or Diesel); for compact, mobile small tractors to handle difficult work in cramped areas; for power with inbuilt equipment of great variety; for fixed power units (gasoline or Diesel) of lasting quality, consult the nearest International Harvester branch or industrial distributor. Write us for information.

INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(INCORPORATED)
606 So. Michigan Ave. Chicago, Illinois

Below: The Model TD-40 Diesel TracTracTor. The TracTracTors are by far the *most accessible, most easily serviced* crawler tractors on the market. Steering clutches and brakes are reached through cover plates at the rear, without disturbing tracks, track frames, or driving sprockets. Transmission and other working parts are equally accessible.



McCormick-Deering Industrial Tractors are distributed by J. D. Adams Co., Los Angeles and San Francisco, Calif.; O. S. Stapley Co., Phoenix, Ariz.; Ronstadt Hardware & Machinery Co., Tucson, Ariz.; H. W. Moore Equipment Co., Denver, Colo.; Howard-Cooper Corp., Portland, Ore., Seattle, Spokane, Wash., Twin Falls, Ida.; The Lang Co., Salt Lake City, Utah.

International Harvester branches at Los Angeles, San Francisco, Portland, Seattle, Spokane, and Salt Lake City.

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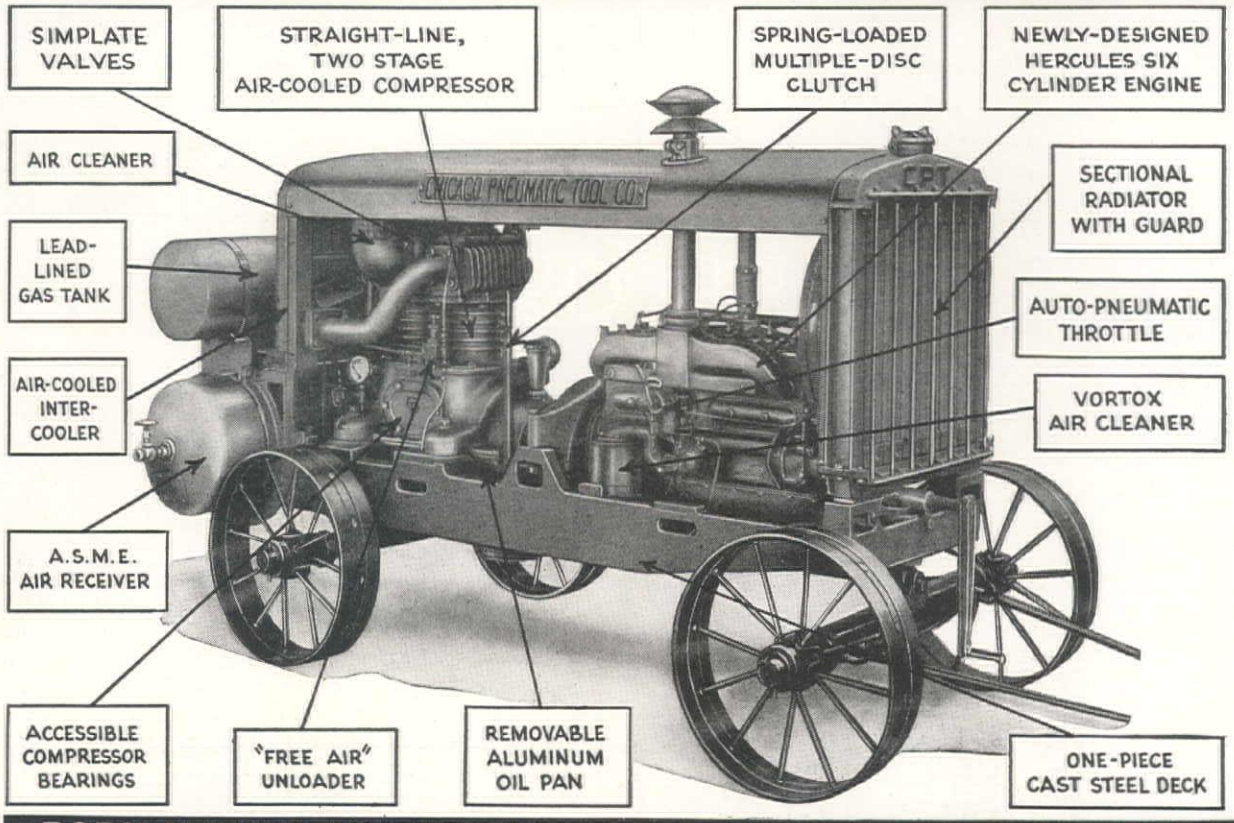
TWO-STAGE AIR-COOLED PORTABLE COMPRESSOR

THE GREATEST COMPRESSOR VALUE EVER OFFERED!



BORN OF THIRTY YEARS COMPRESSOR-BUILDING EXPERIENCE

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nd BETTER
ecause of:

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vo-stage compression with erfect intercooling; low air locities through enlarged lve areas; economical force-ed lubrication; improved en-ne fuel economy.

SIMPLICITY
o more parts than single-age type; only one connect-g rod on each crank pin.

ACCESSIBILITY
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SIX-CYLINDER ENGINE GASOLINE OR DIESEL
treme smoothness of opera-n; easy starting.

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INLET VALVE UNLOAD-ING SYSTEM
ost economical; lowest tem-erature.

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mple, durable, efficient.

FULL FORCE FEED LUBRICATION
sitive, economical, no "oil umping".

SELF-ADJUSTING TROUBLE-FREE CLUTCH
pring-loaded, multiple-disc pe; requires no adjustments.

CAST STEEL DECK
nequalled for rigidity and ecurity.

IN every phase of operation . . . NEW and GREATER ECONOMY! In every detail of design . . . NEW and GREATER SIMPLICITY! In every point of construction . . . NEW and GREATER RUGGEDNESS! Economy . . . Simplicity . . . Ruggedness . . . combined in this new and better Two-Stage Air-Cooled Portable Compressor to produce THE GREATEST COMPRESSOR VALUE EVER OFFERED! Proof . . . in part . . . is given briefly in the adjoining column. Proof . . . in detail . . . is available for the asking . . . in Bulletin No. 758. Send for your copy . . . now!

AVAILABLE in sizes of 60, 105, 160, 210 and 315 c.f.m. actual capacity; and five types of mountings . . . Steel Wheels, Rubber Tired Wheels, 4-Wheel Trailer, 2-Wheel Trailer, and Skid-Mounted. Can also be mounted on Motor Truck.

CHICAGO PNEUMATIC TOOL COMPANY

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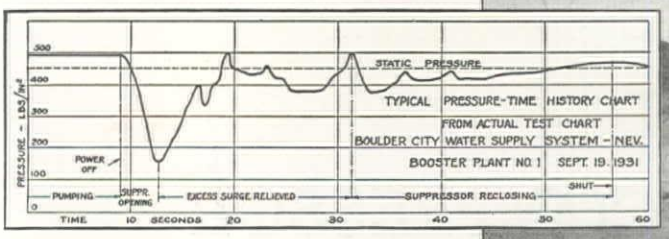
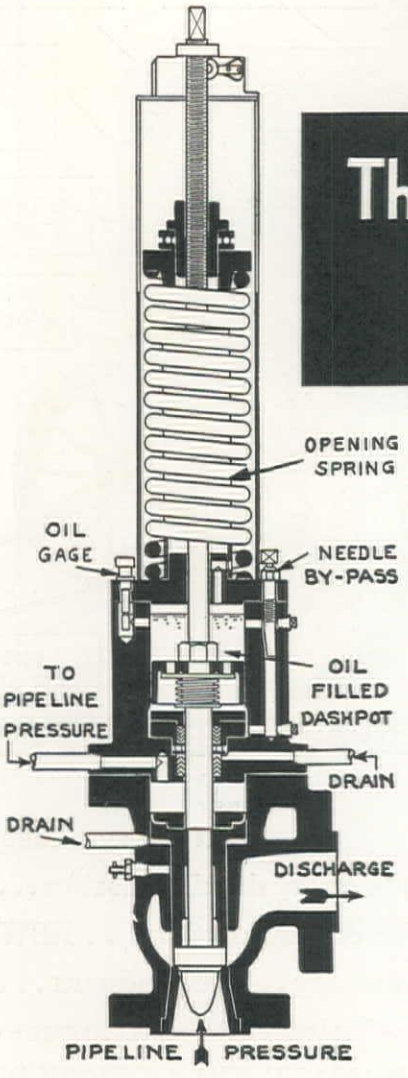
OIL WELL ROCK BITS, REAMERS & TOOL JOINTS



The Chart Tells The Story



POWER interruption occurs. Three pumping units, delivering a total of 1350 g.p.m. against 1130 ft. head, cease to operate. The main line check valve must function immediately to prevent dangerous reverse rotation. Such an emergency, as in the case of Boulder City, precipitates a potential water hammer sufficient to break the discharge line were it not for a Pelton surge suppressor installed to relieve the excess pressure.

The suppressor opens immediately by action of a compressed spring as the line pressure drops, remaining open to relieve the returning surges, actually limiting line pressure to that of initial pumping pressure. When the water column has come to rest, the line pressure automatically recloses the surge suppressor, restoring normal conditions.

Such performance typifies that of other Pelton pressure control units for water works systems, including altitude valves, check valves, pressure regulators, automatic gate valves, air valves, flap valves, and throttle valves. All are described in our new bulletin No. 29. Copies mailed on request.

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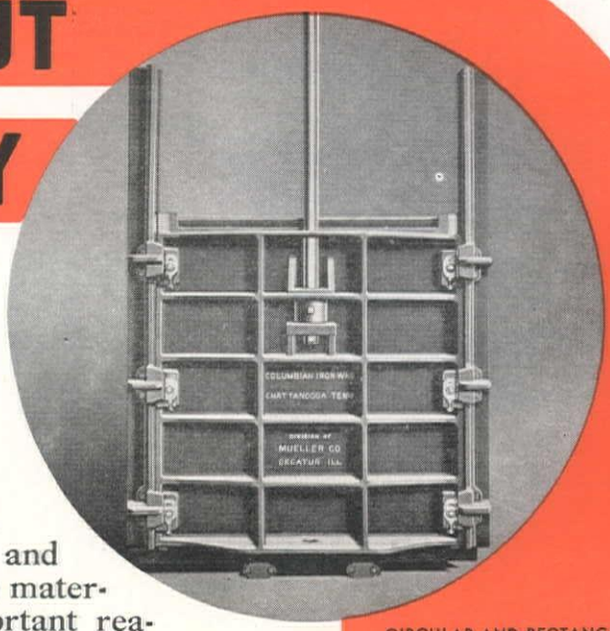
Exclusive Western Representatives for BALDWIN-SOUTHWARK CORPORATION, DE LAVERGNE ENGINE COMPANY, CRAMP BRASS & IRON FOUNDRIES CO., WOODWARD GOVERNOR COMPANY, *and* CHAPMAN VALVE MFG. COMPANY

PELTON

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

Make the LAYOUT *justify the* OUTLAY *by choosing* COLUMBIAN CONTROL EQUIPMENT



HAND WHEEL, GEAR AND POWER OPERATED FLOOR STANDS

Columbian hand wheel floor stands are built in plain and ball bearing types for maximum stem diameter of 2 inches. Enclosed geared ball bearing stands in single and two speed types. Sizes up to maximum stem diameter of 4½ inches with maximum capacities of approximately 60,000 lbs. Power operated types for remote control and the solution of special gate control problems are part of Columbian service.

PRECISION manufacturing plus the best design and the highest quality in materials are mighty important reasons for the selection of Columbian control equipment for sewage disposal, pumping, or filtration plants.

When you choose Columbian sluice gates, floor stands and valves you wipe out a lot of future maintenance troubles . . . and you do it without any increase in the first cost. That is why Columbian equipment is installed in many of the most modern plants in the country.

Then, too, Columbian designs fit into modern layouts and the organization has both the willingness and the ability to adapt its line to meet the particular needs of any job. Columbian engineers have had broad experience in all phases of treatment and filtration work and will gladly offer suggestions as to the standard or special apparatus best suited to the conditions.

CIRCULAR AND RECTANGULAR SLUICE GATES

The line of Columbian sluice gates is broad enough to take care of practically any type of project. Circular and rectangular gates are built in sizes up to 96x96 inches. They are fully bronze mounted, having bronze seats, side wedges. Built with rising or non-rising stem. Sizes 20 inch wide and under are suitable for unseating pressures. Sizes larger than 20 inch can be provided with top and bottom wedges for unseating pressures. May be operated with wrench or hand wheel or extension stem with nut, hand wheel or stand.

FLAP VALVES AND SHEAR GATES

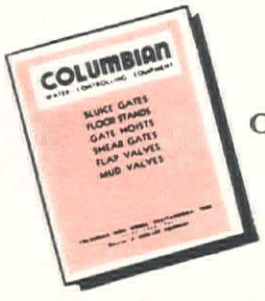
Bronze mounted flap valves are built in sizes from 4 to 24 inches flanged spigot, or hub end. Shear gates also built in sizes 4 to 24 inches have bronze seat and disc rings, bronze pin and bronze faced adjustable stop. Lifting handle, wall fastening included.

GATE VALVES FOR LOW PRESSURE

Gate valves for low pressures in sizes from 2 to 72 inches are built with the well known Columbian "Four Point Contact" principle. Either electrical or hydraulic operating mechanism can be supplied. Gate valves with non-rising or rising stem are included in the Columbian line and for all connections.

DRAIN OR MUD VALVES

Drain valves, also called mud or plug valves, are built in sizes from 4 to 24 inches with flange frame to bolt to pipe, short spigot to use with bell end pipe. Non-rising stem or rising stem with stand or hydraulic cylinder.



Write for your copy of
BULLETIN S-1

COLUMBIAN IRON WORKS
Chattanooga, Tennessee
Division of MUELLER CO.
Decatur, Ill.

COLUMBIAN
WATER CONTROLLING EQUIPMENT

—"and it taught me we must buy Water Meters of *Quality*"

That recently-quoted instance of a Water Service Corporation "astounding" the Public Service Commission by demonstrating how the *interchangeability of parts* of Trident Water Meters eliminated DEPRECIATION even after 42 years of service . . . is one example of Water Meter QUALITY. That proves it does not pay to buy cheap water meters. Today, with the abandonment of hand-to-mouth buying and the resumption of long-term planning, Trident and Lambert Meters offer (as they have for a generation) a self-sustaining investment . . . these "Cash Registers of the Water Works Field" are made in types to meet every requirement. Neptune Meter Company (Thomson Meter Corp.), 50 West 50th Street (Rockefeller Center), New York City . . . or . . . Neptune-National Meters, Ltd., Toronto, Canada.

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Over 6 MILLION Made and Sold

Why TRIDENT and LAMBERT are Water Meters of QUALITY

What interests you is not so much how these water meters are made, but how long they last and how accurately they serve. Nevertheless, these brief glimpses of production will help explain the reasons for their prestige in the field.

INDICATOR GAUGES

. . . accurate to the thousandth of an inch . . .

check and recheck the fine work of each lathe that turns the DISC CHAMBER. Shoulder, Ball Socket, Angle and "Sweep" are gauged for maximum precision — for in this, the "heart of the meter," the disc must run smoothly for years with sustained accuracy and sensitivity. Precision is a cardinal precept in the interchangeability of parts in these famous meters.

Pioneers in Meter Progress

Yesterday

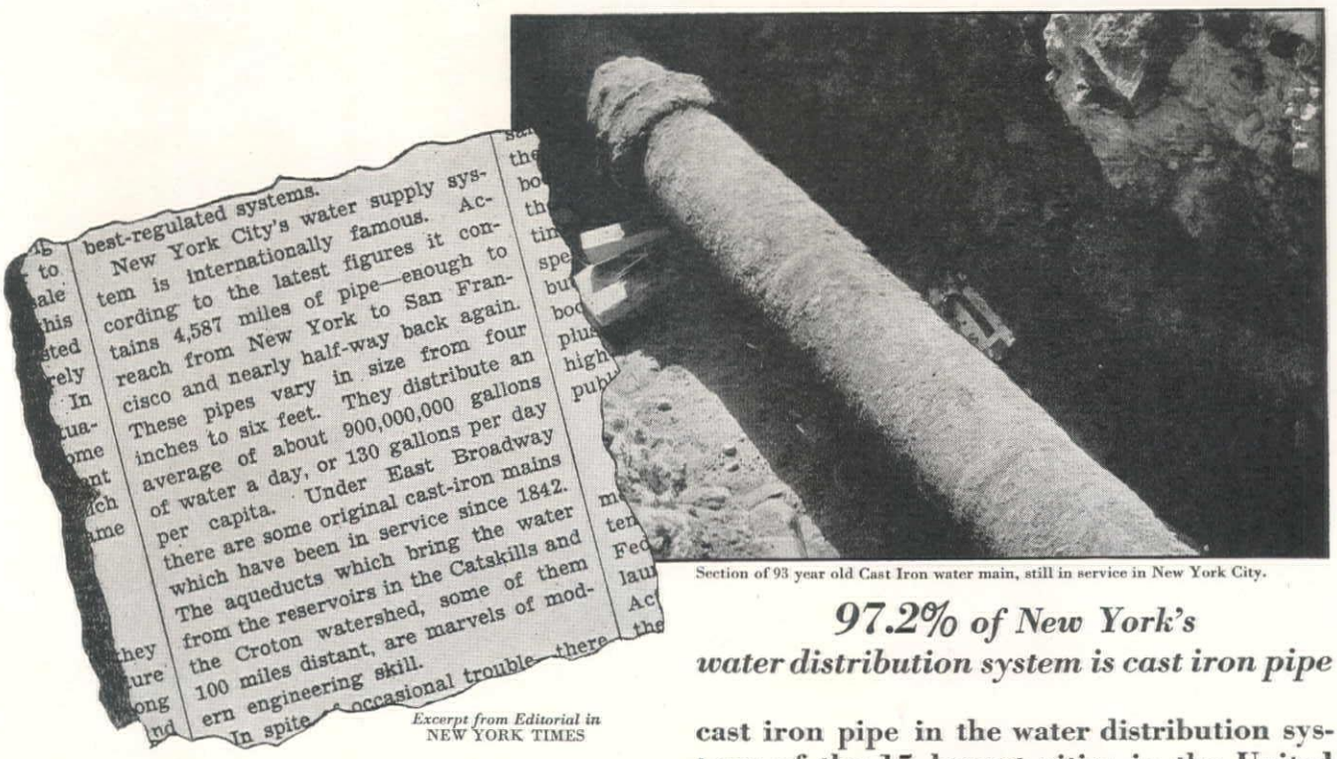
TODAY

Tomorrow

NEW YORK'S . . .

Underground Empire

(4587 MILES OF WATER MAINS)



best-regulated systems.

New York City's water supply system is internationally famous. According to the latest figures it contains 4,587 miles of pipe—enough to reach from New York to San Francisco and nearly half-way back again. These pipes vary in size from four inches to six feet. They distribute an average of about 900,000,000 gallons of water a day, or 130 gallons per day per capita. Under East Broadway there are some original cast-iron mains which have been in service since 1842. The aqueducts which bring the water from the reservoirs in the Catskills and the Croton watershed, some of them 100 miles distant, are marvels of modern engineering skill.

In spite of occasional trouble there

Excerpt from Editorial in NEW YORK TIMES

Section of 93 year old Cast Iron water main, still in service in New York City.

97.2% of New York's water distribution system is cast iron pipe

APPROXIMATELY two million lengths of pipe of which 97.2% is cast iron pipe distribute water to the five boroughs of New York City — 4587 miles of distribution mains which if laid in a straight line would reach from New York to San Francisco and nearly half way back again—this is New York's "underground empire." These mains distribute 900,000,000 gallons of water per day. Some sources are more than 100 miles distant. Capacity of storage reservoirs is 283,000 million gallons. The average percentage of cast iron pipe in the water distribution systems of the 15 largest cities in the United States is 95.6%.

Cast iron is the standard material for water mains. Cast iron pipe costs less per service year and least to maintain. Its useful life is *more than a century* because of its effective resistance to rust. It is the one ferrous metal pipe for water and gas mains, and for sewer construction, that will not disintegrate from rust.

For further information address The Cast Iron Pipe Research Association, Thos. F. Wolfe, Research Engineer, 1015 Peoples Gas Building, Chicago, Illinois.

CAST IRON PIPE

METHODS OF EVALUATING BIDS NOW IN USE BY ENGINEERS RATE THE USEFUL LIFE OF CAST IRON PIPE AT 100 YEARS

TRADEMARK REG.

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The "Caterpillar" Diesel Tractor has shown engineers and contractors the road to big savings and more profitable contracts—because it can move dirt and do a hundred other jobs at a fraction of former costs. Because it has the stamina for long hours, hard jobs, heavy work. Because its low fuel costs are matched by low maintenance costs. No wonder it is first choice everywhere—the 9-to-1 favorite on the country's biggest construction jobs. Get the story of the complete "Caterpillar" SHOW-DOWN from your dealer. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

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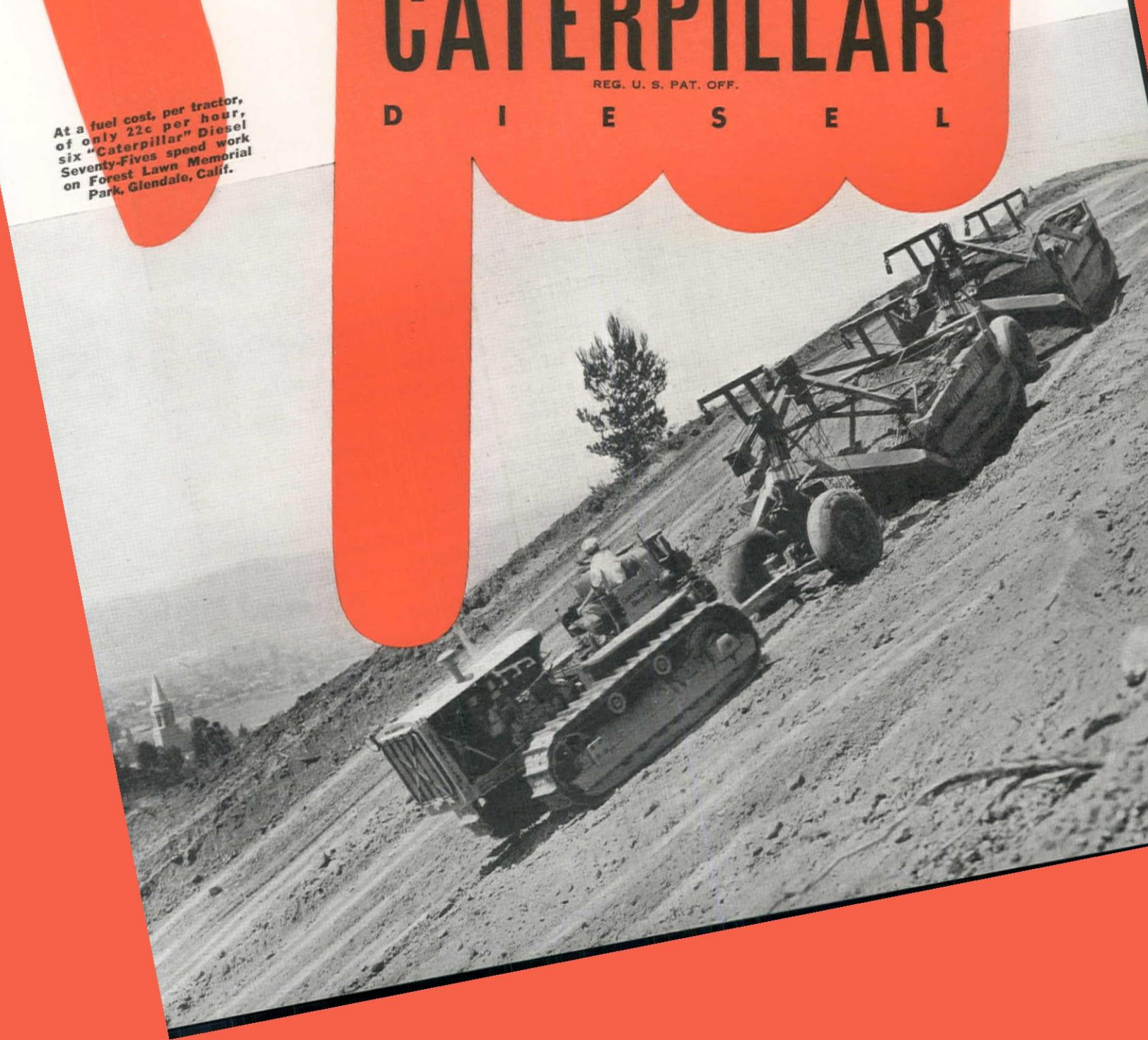


At a fuel cost, per tractor, of only 22c per hour, six "Caterpillar" Diesel Seventy-Fives speed work on Forest Lawn Memorial Park, Glendale, Calif.

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

November, 1935 Vol. 10, No. 11

J. I. BALLARD, Editor
G. E. BJORK, Northwest Editor
H. W. PYERITZ, News Editor

Successful Contracting Is Based on Planning

MANY repetitions cannot overemphasize the fact that careful planning and the programming of construction operations are the distinguishing features of jobs carried out by successful contractors. Conversely, lack of foresight and a day-to-day approach to a job can turn any contract into confusion that makes financial loss inevitable. Time spent in laying out a schedule of operations and anticipating problems and difficulties that may be expected, is one of the most profitable efforts expended by a contracting organization. The larger the job, the more essential is this principle and the more tangible are the results.

Laborers on any job are interested in their immediate work and, at most, are thinking of their efforts for about one shift. The foreman of a crew should have his attention fixed, not on the work of the day, but the work he will be doing the following day, with a definite plan in his mind for at least a week. If a foreman cannot outline to his superior a program for his work for the coming week, then the superintendent had better get another foreman. The superintendent on the average size job should not be immediately concerned with the operations of the day or week, but should be laying plans for a month or two in the future. This, in turn, allows him to give out weekly allotments to foremen in keeping with an advancing program, for their detail consideration. If a superintendent cannot review for his boss his program and plans for a month in advance, he is not up to the responsibilities of his position.

In a small organization the contractor himself—or in a larger company, an individual of experience and planning ability—must be standing back viewing the job as a unit, foreseeing problems that may arise months ahead, considering the closing up of the work and the time when key individuals and equipment will be released for other work. If a contractor or a superintendent finds himself planning work for the immediate day or week on the job there is something wrong with the organization. Of course, it is necessary to render decisions on daily problems but this should be incidental to the broader planning.

Self analysis should indicate whether this primary requisite to successful contracting exists in any organization. In every contracting organization there must be a planner who has the time and ability to stand aside from the immediate problems of the job and look at the forest instead of the trees.

•

Problems of the Engineer Trained in Work-Relief

TODAY, engineers may be divided into two general classifications: (1) those working for regularly constituted agencies carrying out work along established lines of construction procedure and (2) those working on work-relief type of projects represented by the functioning of the CWA, FERA and WPA, where employment of men and getting money into circulation constitutes the impelling motive behind the operations. Engineers in the first classification are, for the most part, functioning according to the established principles of the art and their basic training.

In the second classification there is much which contradicts the very essence of engineering. For the older engineers, with a background of legitimate engineering training and experience, this period and these temporary modifications in principles should not prove a serious handicap. However, there must be many recent graduates and younger engineers who have received most of their experience via the CWA, FERA and WPA route. How are they to evaluate the ideas of construction received in this type of work with their schooling in the fundamentals of engineering? How will they be able to fit into either an engineering or contracting organization at a future date where private money is involved and where the essence of the old formula of "Doing for $1 what any fool can do for $2" is the governing principle? They will have to re-orient much of their newly acquired approach.

Normal construction operations involve careful engineering study to secure the most economical design, followed by a program of work to secure the most efficient use of labor, equipment and materials. This fundamental concept of construction can not, and does not, coincide with much of the work-relief operations. In this work the engineers are required to focus attention on the rapidity of getting funds into circulation and the use of the maximum amount of labor, with a blurred background of results-for-the-money. A word of caution is in order for these young engineers, who have been serving in this type of work-relief employment, that they do not lose sight of their schooling and the principles of economy in design and construction lest they have difficulty in readjusting their attitude to fit into the normal channels of their profession.

•

Emphasis on Quality

THE WEST has emerged from the stage when public water supplies were evaluated in terms of adequacy and safety, and the emphasis indicated at the recent meeting of the California Section, A. W. W. A. shows the trend is toward the consideration of quality, taste and softness. This means that the western states will witness increasing activity in this field of engineering, as the public make their demands known with accelerating volume, and the result will be the building of more and more treatment plants. They will be directed toward the improvement of palatability, as the primary objective, with provisions for the subsequent treatment to reduce hardness where the quality of the raw supply makes this desirable. Western cities are relatively young and people are not long removed from pioneer hardships with the accompanying acceptance of all water as just "water." Many of these communities are supplying water which is below the present accepted standard for potable supplies. Each new treatment plant demonstrates the striking improvements that may be accomplished. The answer will be the insistence on the part of the public for more complete treatment in an increasing number of communities.

WESTERN CONSTRUCTION NEWS
NOVEMBER, 1935

Rebuilding the Main Conduit On Tacoma's Water System

Renewal program costing $2,000,000 will replace original Green River gravity line of wood stave, built in 1913, with steel and concrete pipe

By W. A. KUNIGK
Supt. Water Division
Dept. of Public Utilities, Tacoma, Wash.

EXTENSIVE improvements are being carried forward in the Green River gravity water system of Tacoma, Wash. by the water division of the Department of Public Utilities of that city. The present program which was started in the fall of 1934 will be completed in the latter part of 1936. These improvements are being financed by three PWA loans and grants aggregating $1,857,000 and additional funds of the water division totaling about $200,000.

The Green River gravity system, which is Tacoma's primary source of water supply, consists of a single pipe line 43 mi. long, ranging in diameter from 36 to 85 in. This supply system was completed and put in service early in 1913. Approximately 41 mi. of this pipe line was originally built of untreated continuous wood stave pipe. By 1923 serious leakage and trouble had developed on widely separated sections of the wooden pipe and, in order to insure the continuity of Tacoma's water supply, a thorough investigation of the physical condition of the pipe line was made.

Many sections of the wooden pipe were found to be in a perfect state of preservation while other sections had decayed to a point that made replacements within a short time imperative. Test pits were put down along the entire wooden portion of the pipe line and at each hole a record was made of the station, normal working pressure, diameter of pipe, thickness of staves used, band spacing, maximum depth of decayed wood, nature of soil, depth of backfill, ground water conditions, estimate of remaining years of useful life in the staves and bands and of such other conditions that would be of help in preparing plans and estimates of replacement costs. At that time it was estimated that all wooden pipe would have to be rebuilt by 1936.

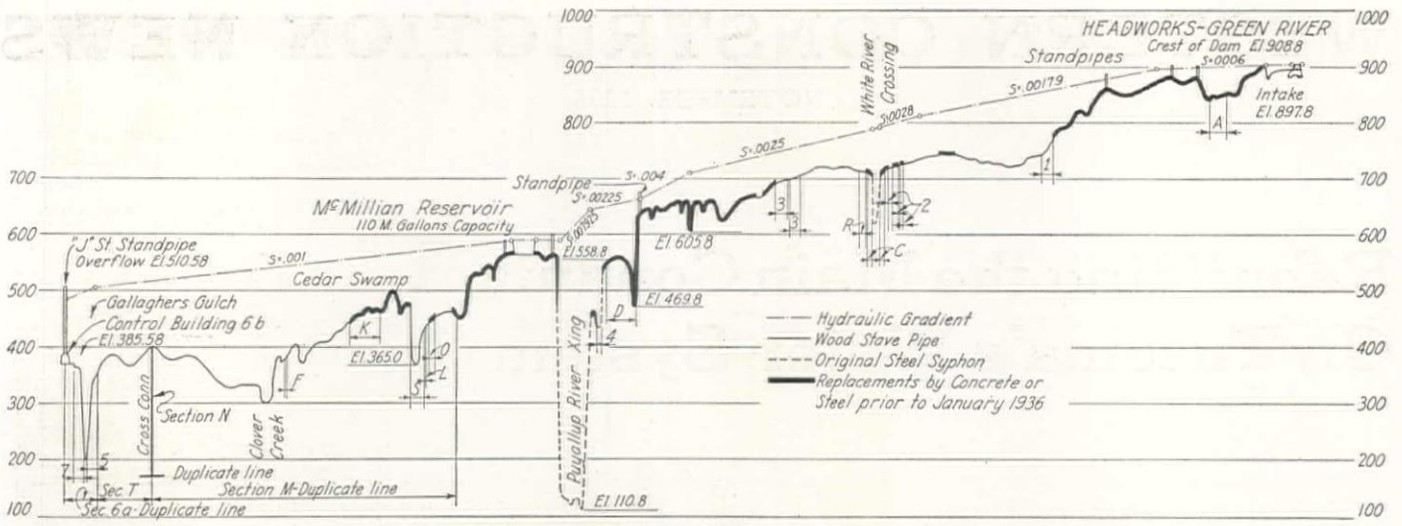
A periodical recheck of the pipe line since 1923 has brought out the fact that replacement of some of the sections which showed more or less decay at the time of the original examination had to be carried out much sooner than was planned and again other sections that were comparatively sound at that time, would last six or seven years longer than was originally anticipated. In other words, the reconstruction program that was scheduled for completion by 1935 can be extended over a period until about 1942.

The hazards of carrying out the reconstruction program as outlined, while maintaining service through a single pipe line, along with the constantly increasing demand for low-cost water for industrial purposes, necessitated the development of a secondary water supply from wells. An additional water supply of 25 m.g.d. capacity of excellent quality was developed during 1931 and 1932 at the low cost of less than $142,000. Adding to this supply, that of the gravity system of 48 m.g.d. and some 12 m.g.d. available from the Mason Gulch Springs and the original air-lift well system, gives Tacoma a total supply capacity of 85 m.g.d.

The program of reconstruction and extensions under the three PWA loans and grants which is now under way is, therefore, part of a major long range plan began during 1924 and to be completed during 1945.

General program

In order to study the desirability and practicability of this long range program, it was necessary to work out general engineering plans of all improvements contemplated, including the reconstruction and extensions of the gravity system and additional storage and trunk main facilities throughout the city, of sufficient capacity to take care of the ever-growing domestic and industrial demand. Estimates were then prepared and the cost of the various units tentatively scheduled over a period of years until 1945. An analysis was then made of the estimated revenues and proposed expenditures cov-



Profile of the 41-mi. Green River gravity system showing sections which are being replaced because of deterioration in the original wood stave line, now more than 20 years old. The replacement program follows a plan based on careful study of the existing line, cost of the improvements and revenues of the department.

ering the entire redemption period of the present and proposed bond issues.

In the proposed expenditures were included operation and maintenance costs, interest and redemption of existing and proposed bond issues for new construction and depreciation. With this complete picture the feasibility and soundness of the general plan was apparent not only from the engineering standpoint, but also from the economical aspect. The units of the general plan of betterments (see table) that were scheduled for the period from 1934 to 1936, inclusive, are now under construction or will shortly be advertised for bids, respectively.

Steel pipe

The steel pipe specifications for all units of this type call for fully shielded arc electric welded pipe, permitting hand or automatic welding. Specifications for plates of steel pipe call for Grade B steel plate of structural quality for forge welding (Serial Designation A-78-33). The shop test requires hydrostatic pressure sufficient to produce a tensile stress of 18,000 lb. per sq. in. and vigorous hammering with a 2-lb. hammer in the vicinity of the joints while under full pressure. The usual practice of cutting test coupons for the various tests is followed.

Field test requires a water-tight line for a period of 2 hr. while a pressure equal to 150% of the normal working pressure is maintained on the highest point in the line. All pipe is cleaned by sand-blasting. The coal-tar enamel coating of the steel pipe is tested with a 15,000 volt spark-gap detector for defects before being drapped with two layers of asbestos paper for mechanical protection. The electrical conductance of the enamel coating must be less than 0.001 micro-ohms, per sq. ft. if determined from the formula:

$$\frac{1{,}000{,}000}{\text{resistance in ohms} \times \text{area in sq. ft.}}$$

Concrete pipe

Centrifugally spun concrete pipe is tested for tightness in the manufacturer's yard for 30 min. under an hydrostatic pressure equal to 125% of the designed working pressure. For the external loading test, specifications require the load to be sufficient to produce a stress of not less than 16,000 lb. per sq. in. in the reinforcing steel. During the field test this pipe is to be tested for a period of 4 hr. under an hydrostatic pressure equal to 150% of the maximum pressure under which the highest part of the section being tested will be operated. While under this pressure the leakage shall not exceed 150 gallons per inch of diameter of pipe per mile in 24 hr.

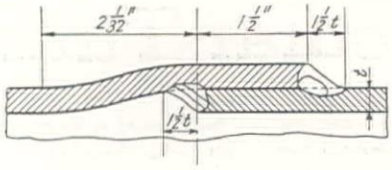
The steel cylinders for the lock joint concrete pipe on Section N were tested in the same manner as the regular steel pipe and the finished pipe had to withstand an external loading equal to an edge load of 2,750 lb. per lin. ft. of pipe. The hydrostatic field test requirements for this pipe are the same as those required for the centrifugally cast concrete pipe except that the permissible leakage per inch of diameter per mile in 24 hr. shall not exceed 100 gallons.

It is expected that the construction program authorized under the three PWA loans and grants as outlined, will be completed in the fall of 1936.

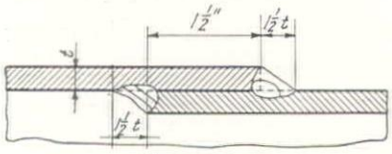
Plans for the trench section provide for a 3 ft. 6 in. covering of back fill over the pipe. Pipes are laid in sand and gravel to a minimum depth of

Characteristics of the Green River Conduit

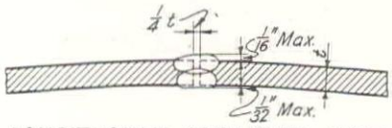
Section	Length in Feet	Diameter in Inches	Wall Thickness in Inches	Kind of Pipe	Contractor
				Units of Construction, financed by PWA loan and grant of $1,000,000 plus $50,000 of water division funds.	
A	1,355	63	5¼	Centrifugally Spun Concrete	Am. Concrete Pipe Co., Tacoma
A	1,356	63	⅜	Steel—Painted	Birchfield Boiler Co., Tacoma
C	1,568	52	⅜	Steel—Concrete Encased	Birchfield Boiler Co., Tacoma
D	3,799	52	5½	Centrifugally Spun Concrete	Am. Concrete Pipe Co., Tacoma
D	2,724	52	⅜	Steel—Painted	Birchfield Boiler Co., Tacoma
F	406	58	⅜	Steel—Painted	Birchfield Boiled Co., Tacoma
K	3,076	58	6	Centrifugally Spun Concrete	Am. Concrete Pipe Co., Tacoma
K	2,927	58	⅜	Steel—Painted	Birchfield Boiler Co., Tacoma
L	197	58	⅜	Steel—Painted	Birchfield Boiler Co., Tacoma
O	919	58	⅜	Steel—Painted	Birchfield Boiler Co., Tacoma
M	180	54	⅜	Steel—Painted	Birchfield Boiler Co., Tacoma
M	33,950	54	6	Lock Joint St'l Cylinder Conc.	Am. Concrete Pipe Co., Tacoma
N	10,800	42	⅜	Steel—Enamel Coated	Puget S'nd Mach. Depot, Seattle
				Units for which bids will be opened October 18, financed by PWA loan and grant of $317,000 plus $150,000 of water division funds.	
1	2,772	52	⅜ or 5½	Steel—Painted, or Centr. Sp. Conc.	
2	1,672	52	⅜	Steel—Painted	
3	4,605	52	⅜ or 5½	Steel—Painted, or Centr. Sp. Conc.	
4	942	52	⅜	Steel—Painted	
5	567	58	⅜	Steel—Painted	
5	1,147	42	⅜	Steel—Painted	
6a	5,698	48	⅜ and ⅜	Steel—Painted	
6b	"J" Street Standpipe Control Building and Appurtenant Equip.				
7	1,913	42	⅜	Steel—Painted	
				Units to be advertised for bids financed by PWA loan and grant of $540,000.	
R	2,061	52	⅜ or 5½	Steel—Painted, or Centr. Sp. Conc.	
S	4,232	58	⅜ or 5½	Steel—Painted, or Centr. Sp. Conc.	
T	18,915	48	⅜ or 5	Steel—Painted, or Lock Joint St. Cylinder Conc.	



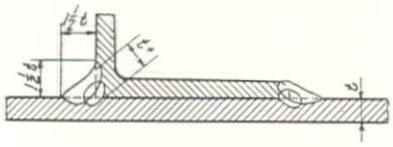
BELL AND SPIGOT CIRCUMFERENTIAL JOINT



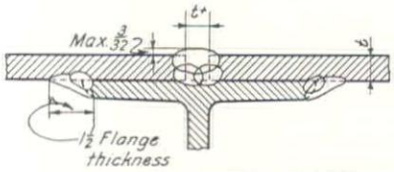
IN AND OUT CIRCUMFERENTIAL JOINT



LONGITUDINAL OPEN BUTT JOINT

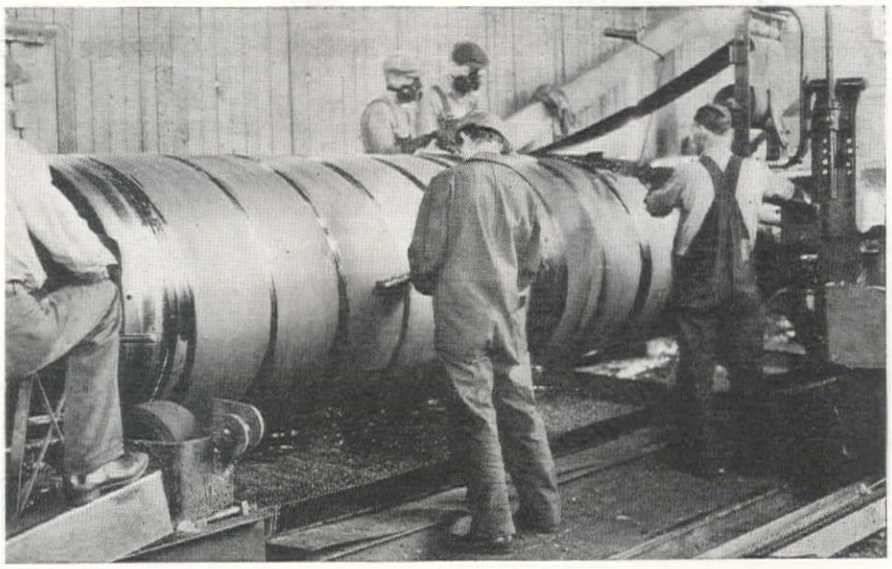


ATTACHING STRUCTURAL SHAPES



STIFFENED GIRTH JOINTS

Types of welded joints (left) required by the specifications for the steel pipe sections of the line.



Putting two coats of asbestos paper (above) over the coal-tar enamel on the steel pipe to protect it against mechanical injury.

Testing the coal-tar enamel pipe coating on the 42-in. steel pipe with a 15,000-volt spark-gap tester.

8 in. in hard pan or other material that cannot be screeded to fit the shape of the pipe accurately. Selected material is used to back fill up to the center line of the pipe as cradling. This material is placed and tamped in 6-in. layers. Over the pipe, a protective covering of selected material is placed and the back fill, where the pipe is laid in roadway areas, is to be tamped in place and settled with water. The back fill material is to be pit run sand and gravel if suitable material is not available from the excavation.

Where the pipes rest on fill, this material is placed on ground, after stripping, and tamped in 6-in. layers. Further, this fill is built up 5 in. above grade and then screeded to furnish grade line. All temporary blocking under the pipes is to be removed. The side slopes of the fill are 1½:1 and the minimum cover over the pipes is 3 ft. 6 in.

Progress

On sections A, C, D, F, K, L, and O (Docket No. 1135), excavation, backfilling, building of concrete structures, roads, maintenance of old gravity pipe line, etc., were handled by the water division by force account. Steel pipe for the same sections was furnished and installed by the Birchfield Boiler Co. of Tacoma and the centrifugally cast concrete pipe was furnished and installed by the American Concrete and Steel Pipe Co. of Tacoma.

The total contract for Section M for furnishing all labor and material for approximately 34,000 feet of 54-in. diameter steel cylinder lock joint concrete pipe was let to the American Concrete and Steel Pipe Company of Tacoma on their bid of $526,224.99 and a similar contract for Section N covering about 11,000 feet of 42 in. x ⅞ in. steel pipe with enamel coating and asbestos paper wrap covering was let to the Puget Sound Machinery Depot of Seattle on their bid of $124,597.75. Both sections M and N will be completed before the end of this year.

This work was designed and is being carried out under the direct supervision of the writer as chief engineer. Lothrop Crosby is assistant chief office engineer, J. A. Kuehl is the resident engineer in charge of construction and J. G. Eernisse is mechanical engineer for the Water Division. The Water Division is under the general direction of Ira S. Davisson, Commissioner of Public Utilities.

●

Work Starts on Conchas Dam

Construction work was started on the $9,000,000 Conchas dam on the Canadian River near Tucumcari, N. M. The dam will be 250 ft. high and results from 25 years of effort on the part of residents of the community. The main dam will be more than 1,000 ft. long, and wing dams will make the entire barrier nearly five miles across. About 4,000 men will be employed on the project. It has been estimated that enough damage to rail and highway structures has been done by the rampant Canadian to pay for the dam outright. It will be a conservation and flood control project carried out under the direction of the U. S. engineers.

●

The Denver water board has announced that the way is clear to make available $5,400,000 for the Fraser River (Moffat tunnel) water diversion project and extension. The question of depositories for the funds was a temporary stumbling block, but this problem has been solved.

Fourth Vehicular Tunnel Major Traffic Route in

Last hill barrier on northern extension of Figueroa St. being pierced with 755-ft. bore—Tunnel is now ready for lining—Pioneer drifts, arch ring stoping and steel supporting ribs are features of construction procedure

EXCAVATION has been completed which will permit placing concrete lining in the fourth and last Figueroa Street tunnel being built by Los Angeles to improve an important traffic artery, and the lining work will be followed by the removal of the core material and paving. The tunnel is 755 ft. long, provides a 40-ft. roadway and is about 30 ft. high at the crown. Since work began about the first of May, the operations have included: driving two wall drifts, stoping out the arch ring and placing the steel ribs, and the construction of the portal structures. The project is scheduled for completion in April, 1936.

The present tunnel project will add another unit to the extension of Figueroa Street through Elysian Park to effect a major traffic improvement between the business section of Los Angeles and the area to the north. In 1930 three tunnels were built (461,130 and 405 ft. long respectively) as the first part of this development. Work remaining to be done includes a section of open cut excavation and paving to connect the south portal of tunnel No. 4 now under construction with the existing street.

All of the tunnels provide for a 40-ft. roadway with a 5-ft. sidewalk along one side. The concrete lining is 3½ ft. thick at the crown, increases to 6 ft. at the springing line and rests on footings 10 ft. wide and about 6 ft. thick. This lining is reinforced with two sets of ⅞-in. bars at 2-ft. spacing, in addition to encasing the steel supporting ribs. The inside of the lining is finished with a ½-in. plaster coat and the lower 7 ft. of the walls are covered with white tile.

Preliminary drifts

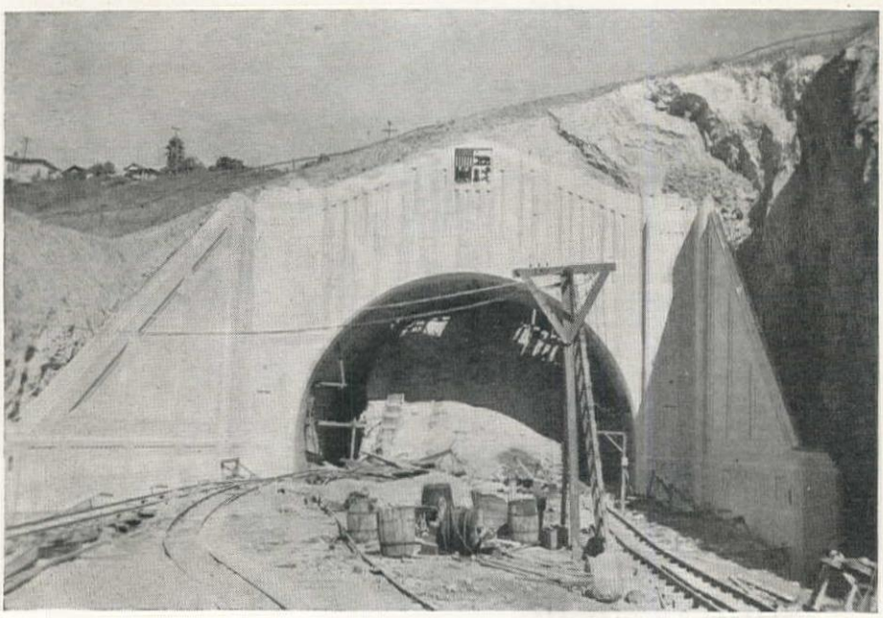
The first tunneling operations consisted of driving two drifts along the line of the wall footings. These drifts were about 10 by 11 ft. in section and were driven at the same time from the south end of the tunnel. The material is sand, sandstone and a few layers of relatively hard rock.

Drilling was done with jackhammers using detachable bits, and 6-ft. rounds were pulled. After the round was shot, the material was hand mucked onto a conveyor belt which discharged into 5-yd. cars. This loading rig was built for the job and proved very satisfactory for the particular loading problem. It was simply an inclined belt operated by a 3 h.p. electric motor and mounted on a light steel frame which was fastened to carriage moving on the rails in the tunnel. Four muckers could work efficiently at this loader which was kept crowded into muck pile and on one occasion five men were timed in loading a 5-yd. car in 2½ min. One of these loaders were used in each drift.

Hauling was done with battery locomotives to bunkers, from where the material was trucked away. The motors moved single cars to the loader, using a switch at the portal, supplemented by a second switch installed at the halfway point. Driving speed averaged about 25 ft. per day on 24-hr. operations. The drifts were timbered with 10x10 in. sets on 6-ft. centers.

After the drifts had been completed the next step was to pour the footing sections which support the arch concrete. The drifts were driven wide enough to permit the placing of these foundations which were 10 ft. wide and about 5 ft. thick. With the footings completed the stoping out for the arch ribs could be started.

Portal structure at the south end showing the core in place which will be removed after the concrete lining has been poured.



Beginning at the center of the tunnel, a stope was raised from the two drifts along the arch line to connect at the crown. This hole permitted the placing of the first steel rib support. These ribs consist of eight sections of 8-in. steel H sections and weigh 3,180 lb. They rest on the concrete footings and are spaced at 4-ft. intervals along the entire tunnel length.

Following the placing of the first rib, crews of ten men started stoping this arch ring section, working toward the portals and placing the steel ribs as they advanced. This stoped area was between 6 and 8 ft. deep and the ground was held by timber stulls against the solid core until the steel ribs were placed and lagged.

The material from this stoping operation was mucked down the sides and trapped into the cars, which ran on the tracks re-established on the concrete footings. Excavation ran about 18 cu. yd. per linear foot. After completion of the supporting steel the top and inside timbering of the drifts was removed leaving the arch ring clear and ready for the concrete lining.

Lining methods

Timber forms will be used in 28-ft. sections; this is the designed spacing between construction joints. One form will be set up on each side of the center line and the work advanced toward the portals. Each 28-ft. section of lining will be placed in one continuous pour, after which the forms will be stripped and moved ahead. The 2x6-in. timbers on the inside of the forms will not be dressed because the specifications provide for a ½-in. plaster coat.

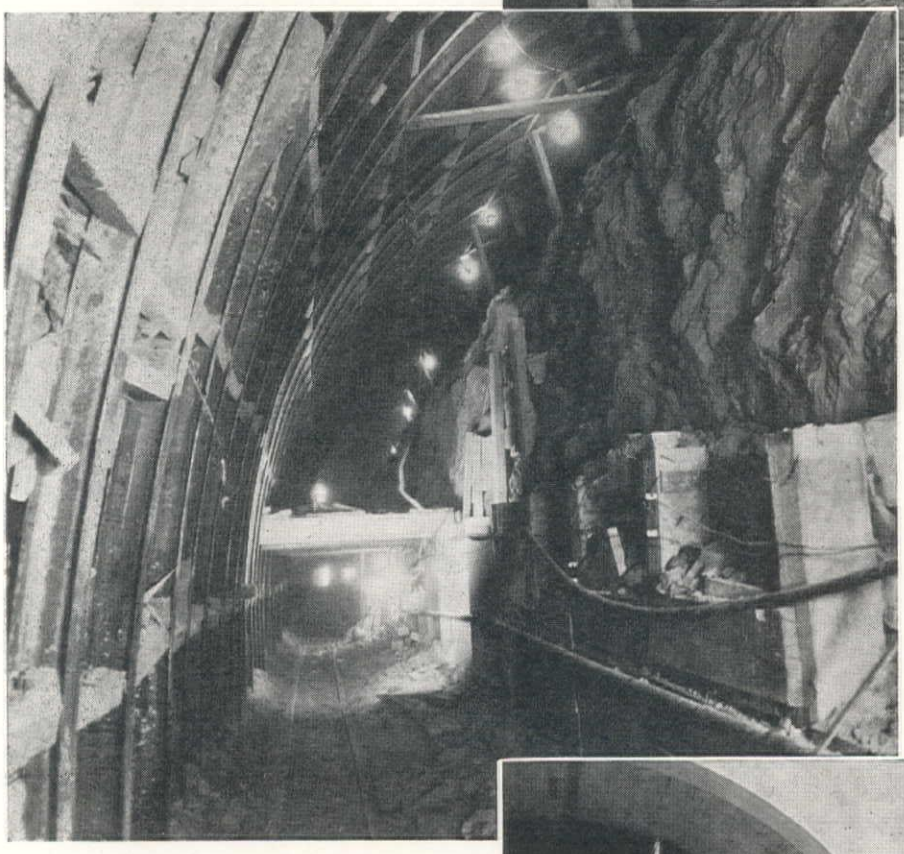
Keyed construction joints and copper water stops are provided at 28-ft. spacing. Along the back side of each construction joint a 4-in. line of cast iron pipe is to be installed with loose joints surrounded with a gravel pocket to take care of drainage. These drains discharge into horizontal cast iron pipe installed along the back of the footings.

For placing the lining concrete a

to Improve Los Angeles

2-yd. Hackley gun will be installed outside of both portals with the discharge pipe leading up and along the arch crown to the point of pour, beginning at the center. Concrete will be delivered to the job by mixer truck.

Power for compressors, battery charging and lights is produced on the job with a 200 h.p. diesel engine generating set. During the driving of the drifts a 400-ft. Sullivan compressor provided air for the jackhammers, but a 1,000-ft. machine of the same make has recently been installed to handle the concrete guns.



Looking along the crown of the arch (above) after it had been stoped and the ribs set. The stulls are resting against the core, still in place, and will be changed to support the lining forms. This stoped area varies from 6 to 8 ft. in depth.

Looking along one of the drifts (left) after the arch had been stoped, the steel ribs set, and the tunnel timbers removed ready for placing the concrete lining forms. The tracks have been reestablished in the drift on top of the concrete footing, which was placed to support the ribs.

Concrete for the high portal structure and wing walls was delivered by mixer truck and elevated with a small hoisting tower and chuted into place.

After the concrete lining has been completed the core will be excavated by power shovel and trucks. The final operation will be the pouring of the 8-in. paving slab, curbs and sidewalks.

Organization

The tunnel is being built by the City of Los Angeles under the general direction of Lloyd Aldrich, city engineer. Merrill Butler is deputy engineer and R. W. Stewart is division engineer in charge of design. Contract was awarded in April to L. E. Dixon Co., Bent Bros., Inc. and Johnson, Inc. of Los Angeles, on a low bid of $366,607. Mr. Dixon is personally directing the work with H. J. King, general superintendent and Leonard Bury, job superintendent.

Muck train entering the side drift to be filled with stoped material trapped through the roof of the drift. This excavated rock was dumped into bunkers and trucked away.

Preparing Millions of Yards of Aggregate for Grand Coulee Dam

Preparation of gravel into four grades of coarse aggregate and sand blended from three sizes will be carried out at rate of 1,000 tons per hour—Deposit handled entirely by belt conveyor from bank to mixers—Volume of material to be handled dictates plant design

TO PREPARE the millions of cubic yards of aggregate required for the concrete which will go into Grand Coulee dam, being built on the Columbia River in eastern Washington, the Mason Walsh Atkinson Kier Co. has just completed a million dollar plant that represents the last word in equipment and methods for preparing gravel to meet rigid specifications for mass concrete. This plant represents one of the major elements in the Grand Coulee dam construction operations and its completion marks an important milestone in the progress on this gigantic construction project. The design and operation of this aggregate plant are described in this article.

The plant is located at the Brett gravel pit, about 1½ mi. northeast of the dam. This huge deposit of gravel forms a plateau about 900 ft. above the east shore of the Columbia River. Nearness to the dam and elevation, makes the location of the deposit almost ideal. Test pits show the gravel banks are more than 200 ft. deep and extend far back into the hill of which the deposit is a part. The exact limits of the deposit have not been definitely determined, but government explorations show there is more than enough gravel available to meet all of the construction needs of the Grand Coulee dam.

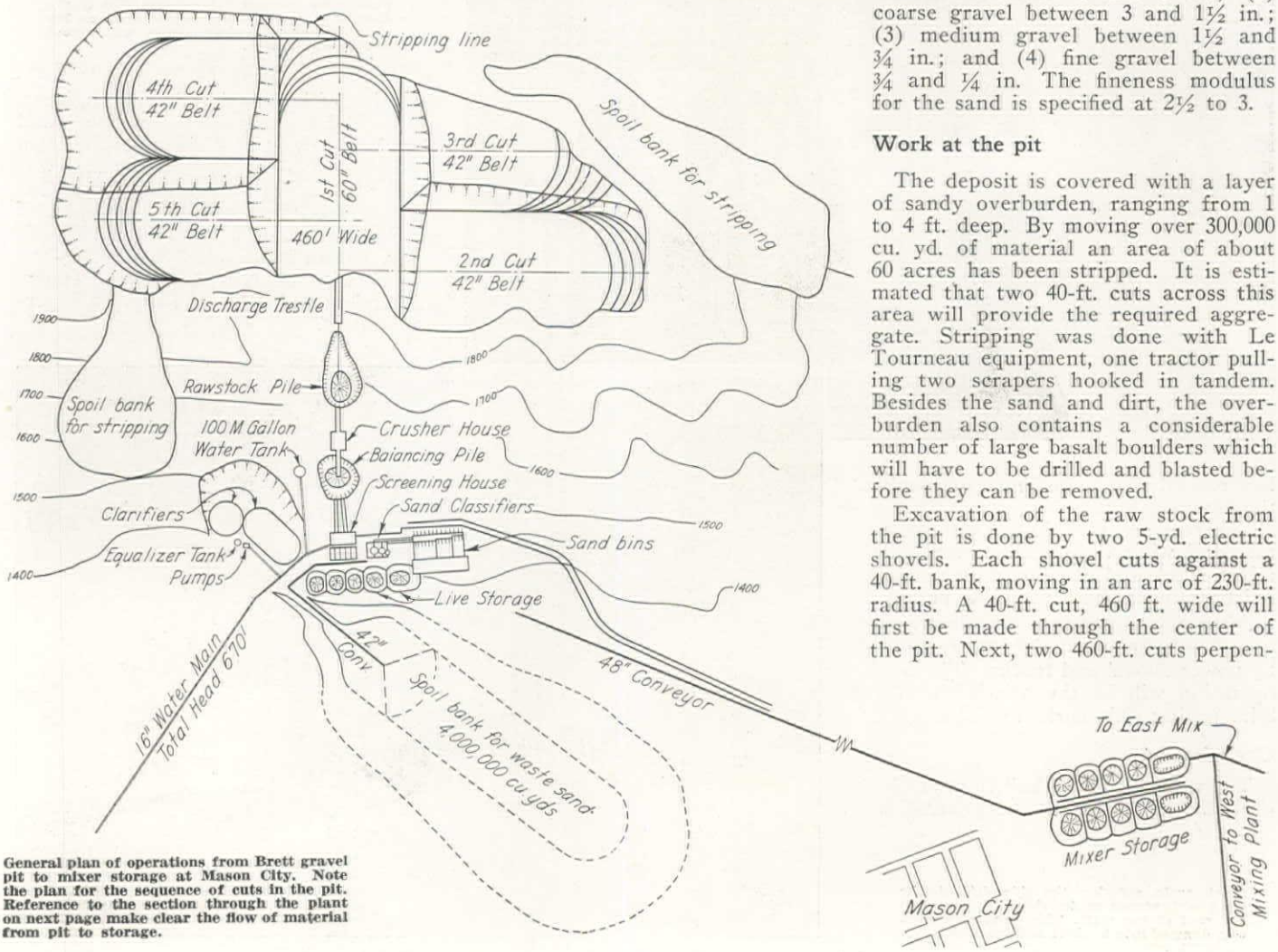
The quality of the pit run material from the Brett banks is by no means ideal. It contains an undesirable amount of fines. Tests made from test pit samples indicate that 55% of the raw stock will have to be disposed of as waste. Thus, keeping down the cost of handling the material, has been a criterion in the design of the plant. In producing the aggregate for the high dam, a waste pile of about 13,000,000 cu. yd. will be accumulated. There will also be a small percentage of oversize material remaining in the pit from the first cut, which must be disposed of. On page 312 is a typical analysis from one of the government test pits.

Specifications call for four sizes of gravel: (1) cobbles of screen classifications between 6 and 3 in.; (2) coarse gravel between 3 and 1½ in.; (3) medium gravel between 1½ and ¾ in.; and (4) fine gravel between ¾ and ¼ in. The fineness modulus for the sand is specified at 2½ to 3.

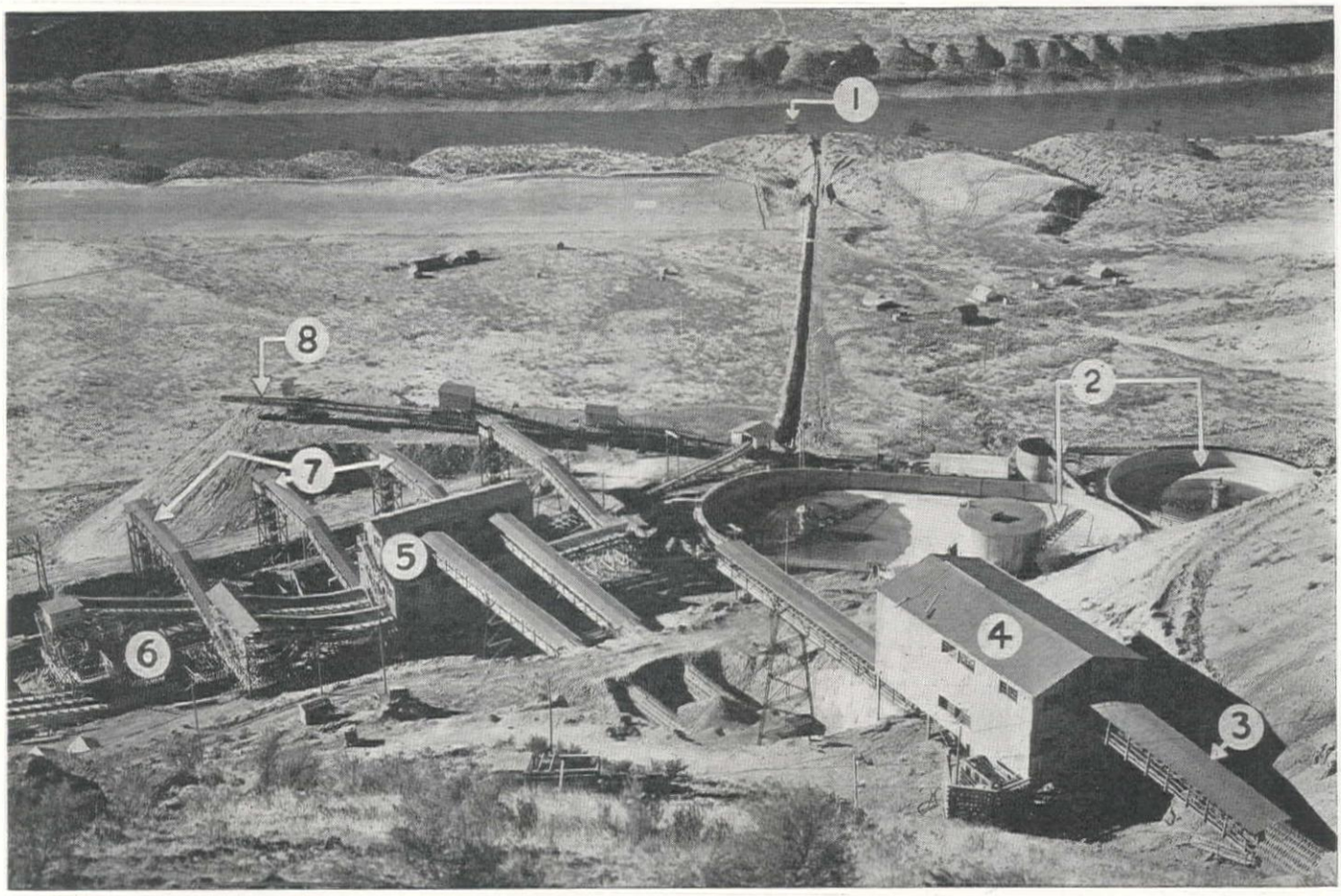
Work at the pit

The deposit is covered with a layer of sandy overburden, ranging from 1 to 4 ft. deep. By moving over 300,000 cu. yd. of material an area of about 60 acres has been stripped. It is estimated that two 40-ft. cuts across this area will provide the required aggregate. Stripping was done with Le Tourneau equipment, one tractor pulling two scrapers hooked in tandem. Besides the sand and dirt, the overburden also contains a considerable number of large basalt boulders which will have to be drilled and blasted before they can be removed.

Excavation of the raw stock from the pit is done by two 5-yd. electric shovels. Each shovel cuts against a 40-ft. bank, moving in an arc of 230-ft. radius. A 40-ft. cut, 460 ft. wide will first be made through the center of the pit. Next, two 460-ft. cuts perpen-



General plan of operations from Brett gravel pit to mixer storage at Mason City. Note the plan for the sequence of cuts in the pit. Reference to the section through the plant on next page make clear the flow of material from pit to storage.



Principal features of the aggregate plant include: (1) pumping plant at the river, (2) clarifiers for reclaiming wash water, (3) conveyor from raw stock pile, (4) crusher house, (5) screening house, (6) sand classifiers, (7) gravel conveyors to plant storage and (8) waste stacker. From this plant the aggregate will be moved by conveyor belt 4,000 ft. long to the mixer storage.

dicular to the original cut will be made on the south side of the pit, followed by two identical cuts on the north side of the pit. This plan of excavation will then be repeated in a second 40-ft. cut across the pit.

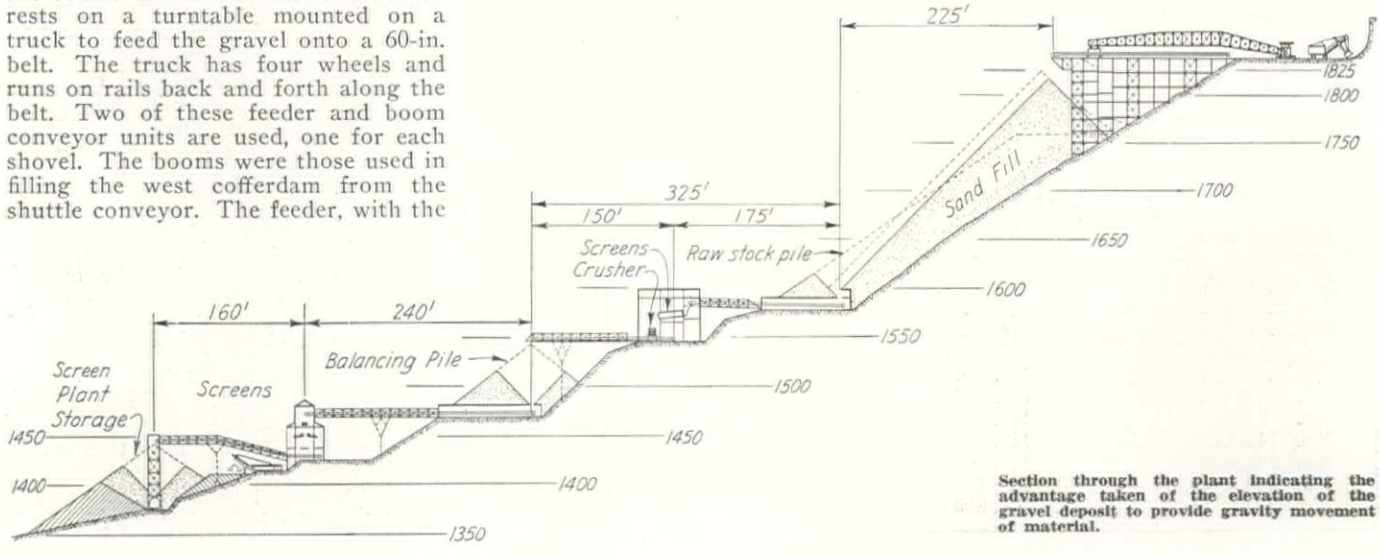
Each shovel loads onto a 16-in. grizzly, on top of a vibrating feeder, mounted on crawler treads. This grizzly scalps all oversized material, and is hinged at one end and connected to hydraulic jacks at the other end. When the grizzly becomes covered with oversize rocks, the jacks are engaged and the material is dumped off.

The feeder is connected to one end of a 200-ft. boom and discharged onto a 42-in. conveyor belt running through the boom. The other end of the boom rests on a turntable mounted on a truck to feed the gravel onto a 60-in. belt. The truck has four wheels and runs on rails back and forth along the belt. Two of these feeder and boom conveyor units are used, one for each shovel. The booms were those used in filling the west cofferdam from the shuttle conveyor. The feeder, with the 200-ft. boom as a radius, and the turntable as a moving center, follows the shovel, doing away with intermediate haulage. Whenever the turntable trucks have been pulled back to the end of the rails, the 60-in. conveyor is extended and paralelled with more rails. This conveyor will be extended in the initial cut through the center of the pit. For the cuts on each side of the pit, 42-in. laterals will be extended perpendicular to the 60-in. belt.

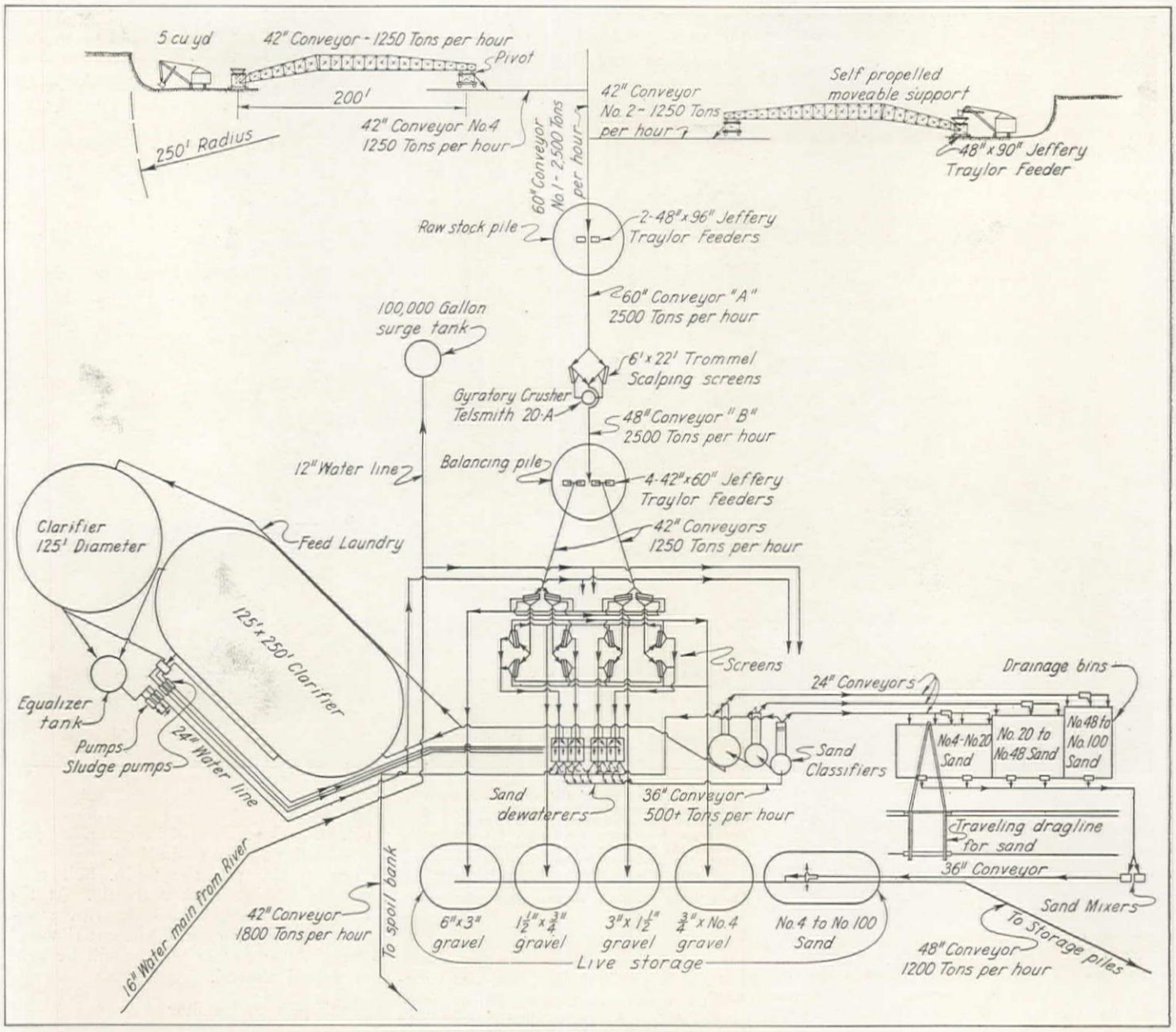
From the pit, the 60-in. belt runs out on a high timber trestle. At the end, it discharges into the raw stock pile. For the second 40-ft. cut through the pit, the timber trestle will be lowered and altered.

Stock pile to crusher

It is estimated the raw stock pile will hold enough material to keep the plant running two or three days. Raw stock from the trestle conveyor discharges at El. 1,825. At El. 1,575, farther down the hill is the feeder gallery. This is a heavy, reinforced concrete



Section through the plant indicating the advantage taken of the elevation of the gravel deposit to provide gravity movement of material.



Flow diagram showing all steps in the screening and classifying of aggregate from the preliminary scalping screen to the finished product of four grades of coarse gravel and a prepared, blended sand.

structure just inside the toe of the raw stock pile. In the top of the gallery are two openings leading to vibrating feeders. Raw stock comes through the openings in the roof of the gallery and into the vibrating feeders. The two feeders, one on each side, discharge onto a 48-in. conveyor, which runs through a laminated timber tunnel to the crusher house.

The use of laminated timber tunnels is one of the features of the plant. The tunnels are made in arch and box sections, with laminations of 4x8-in. to 4x12-in. members, the 4x12-in. timbers forming the wall. The arch sections are formed with short tangent sections, alternate laminations containing four and five tangents. The box sections are formed by extending the horizontal and then the vertical segment to form a series of slip tenon splices at the corners. Lumber for the tunnels was cut, bored and numbered at the mill.

TYPICAL ANALYSIS OF PIT RUN GRAVEL

Passing Screen with	Retained on Screen with	Per Cent by Weight	Cumulative Per Cent
6 -in. mesh	3 -in. mesh	7.0	7.0
3 -in. mesh	1½-in. mesh	7.62	14.62
1½-in. mesh	¾-in. mesh	6.30	20.92
¾-in, mesh	⅜-in. mesh	6.00	26.92
⅜-in. mesh	No. 4 mesh	1.91	28.83
No. 4 mesh	No. 8 mesh	5.93	34.76
No. 8 mesh	No. 14 mesh	12.20	46.96
No. 14 mesh	No. 28 mesh	16.05	63.01
No. 28 mesh	No. 48 mesh	13.70	76.71
No. 48 mesh	No. 100 mesh	7.67	84.38
No. 100 mesh	No. 200 mesh	15.62	100.00

Crusher and screening houses

The crusher house is a steel frame building. Material coming into the crusher house is divided and dumped into trommel screens. These screens, lined with manganese steel to reduce wear, contain round 6-in. holes. Material passing the screen goes into a hopper and onto a 48-in. belt, and the oversize falls from the end of the screens into a Tellsmith crusher. The crusher reduces all rocks to a maximum diameter of 6 in. and drops them onto the belt containing the material that has passed through the screen.

Controls for all of the machinery in the crusher house are located in one room and operated by one man. A few oilers and mechanics will be all the other help necessary to operate this part of the plant. From the crusher house, the 48-in. conveyor extends out on a high steel trestle and dumps its load into the balancing pile. Just in-

side the toe of the balancing pile are two feeder galleries, smaller but almost identical in construction to the raw stock feeder gallery. Each feeder gallery serves a 42-in. belt. These run through tunnels and out onto steel trestles leading into the screening house.

The screening house is a five-story steel frame building. On the fifth floor, two hoppers receive the material from the conveyors leading in from the balancing pile. As the material is dumped into the hoppers, reclaimed water under a pressure of about 80 lb. per sq. in. is sprayed onto the material. In the center of each hopper is a gate by which the material may be diverted to the screens below. With two intakes from the balancing pile and gates in the hoppers, the plant may be run at half and quarter capacity. Between the two hoppers is the control room for the screening house and various material classifying and handling units. It consists of two large switch panels, containing forty-one switches, and a push button control board. All operations are synchronized and one man handles the controls.

Screening operations

Screening of the material begins on the fourth floor. Under each of the two hoppers on the fifth floor, are two double deck Symons vibrating screens. Over each screen are twelve nozzles, spraying fresh water under a pressure of about 90 lb. per sq. in. onto the material. Each of these sets of screens contains a 3-in. and a 1½-in. square mesh. As the material passes through these screens, 6 to 3-in. and 3 to 1½-in. aggregate is removed and dumped into stone chutes leading to the conveyor room on the second floor.

Material passing the 1½-in. screens falls into a hopper leading to the third floor. On the third floor are eight double deck Symons vibrating screens. These screens contain ¾-in. and ¼-in. mesh. Material from the screens on the fourth floor is divided and distributed to the eight screens on the third floor. Twelve nozzles mounted over each screen wash the material with fresh water as it passes. The first deck of the screen removes the 1½ to ¾-in. gravel, and the next takes out the ¾ to ¼-in. material. Gravel chutes at the lower end of each screen carry the material to the aggregate conveyors on the second floor. Material that has passed through the ¼-in. mesh screens (known as —4 material) is caught in hoppers and washed to the dewatering tanks through steel flumes.

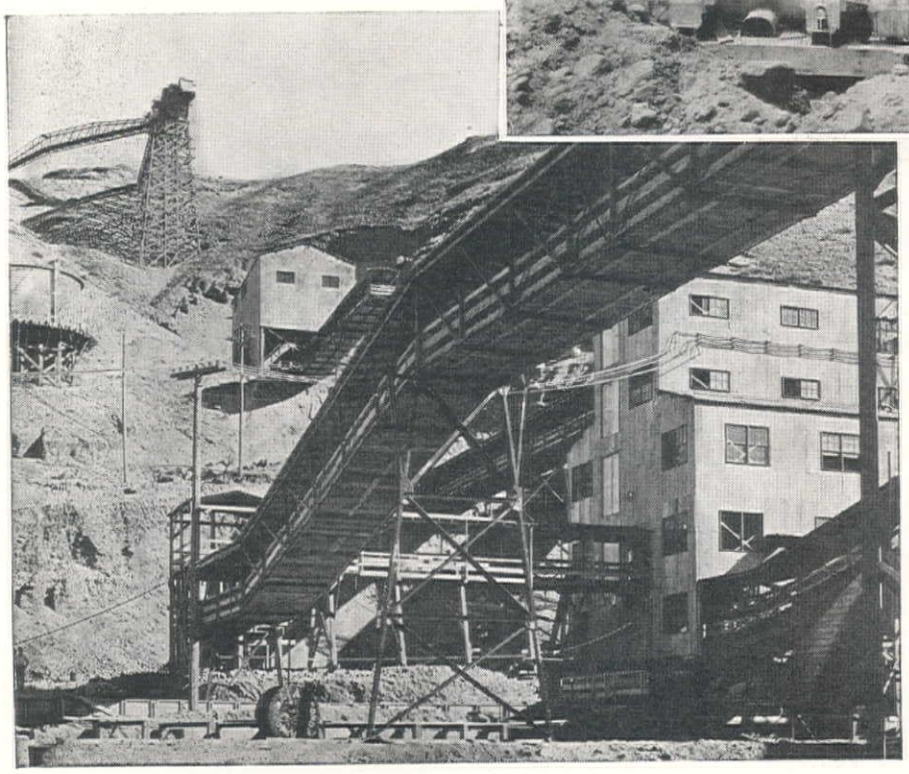
On the second floor of the screening house are six conveyors. The chutes from the screens converge on these belts, which carry the aggregates to their respective piles in the plant aggregate storage yard. The gravel is deposited in the storage piles by means of stone ladders to reduce breakage.

The ground floor contains an office and the plant workshop and repair room.

Four steel flumes take the —4 material and dirty water from the screening house to the dewatering tanks. There are four of these concrete tanks each 5 ft. deep and subdivided into two units. At the front of the tanks is a concrete incline. Dirty water and —4 material is poured into the dewatering tanks by distributor gates, and as the mixture moves through the tanks the heavier material, up to —100, falls to the bottom and is removed by sand rakes. The dirty water escapes over a weir in the end of the tanks.

The sand rakes are endless chains carrying steel channel sections that drag the sand from the bottom of the dewatering tanks. Most of the water escapes from the sand as it is slowly dragged up the concrete incline. Each rake dumps into a double chute leading to two conveyors. One belt carries the sand to the classifiers. The

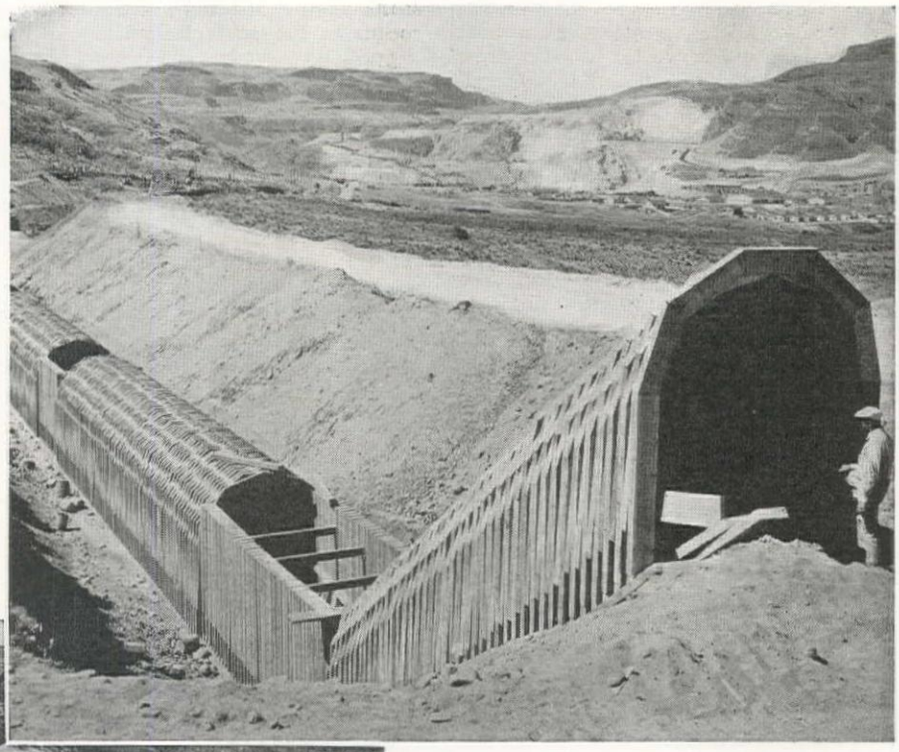
Grizzly at the pit with 16-in. spacing feeds the 42-in. belt on the movable boom. This grizzly is crawler mounted and moves with the shovel; loading is direct, without intermediate haul. Hinges at one side and hydraulic jacks at the other permit the grizzly to be tilted to dump off the oversize material.

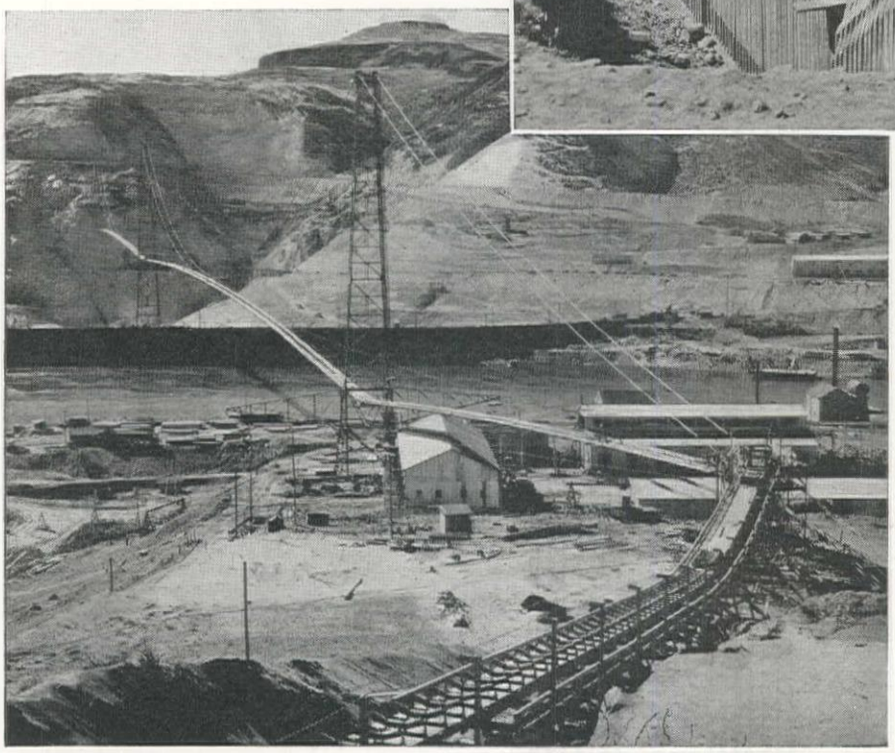


At the plant, looking up hill to the discharge trestle and the boom conveyor. The crusher house is halfway up the hill and the screening house is shown at the extreme right.

other conveys the excess sand to the stacker, where it is distributed on the waste dump. The stacker is a long, narrow steel truss, through which runs a 48-in. conveyor. It is pivoted on one end, and supported on crawler treads near the other end. The purpose of the stacker is to distribute material properly in the waste dump. About half of the material removed from the dewatering tanks is wasted.

The sand is fractioned into three sizes by three Dorr bowl and rake classifiers. Before the material enters the first classifier, water is added. The operating principle of the classifiers provides a flow of water, carrying the sand in suspension, running through the classifier fast enough to allow only a certain size of material to fall out. The classifiers are large steel bowls with vertical metal strips on the bottom. Fins on rotating arms scrape the classified sand into a concrete vat beneath the classifier.





Laminated timber tunnels under stock piles are a feature of the plant. Lumber for these tunnels was cut, bored and numbered at the mill. Arch sections are 4 x 8 and 4 x 12-in. timbers.

To take aggregate across the river to the west mixing plant, a suspension bridge 3,500 ft. long between anchors has been built to carry the 36-in. conveyor.

Material from —4 to No. 20 falls out of suspension and is removed by the first classifier; No. 20 to No. 48 size is removed by the next; No. 48 to No. 100 is taken out by the last classifier. All dirty water and No. 100 material is diverted back to clarifying tanks.

The material removed by each classifier falls into a concrete vat, where it is washed and raked out into a double chute. One of the chutes feeds onto a conveyor leading to the sand drainage bins. A conveyor leading to the waste pile passes under the other chute. When sand is being produced, until the classifiers have been regulated so that the material meets government specifications, it is diverted to the waste pile. The properly classified material is taken to the sand drainage bins by conveyors. Sand is removed from the conveyors by moving trippers which distribute the sand in layers in the drainage bins. Each size of sand is placed in a separate bin. A series of tile drains remove the water draining from the sand.

Beneath the storage bins is a tunnel, carrying a conveyor, and air jets around each feeder opening are used to keep the sand from clogging. Sand in the correct proportion is taken from each of the three bins, fed onto a belt and conveyed to a sand blender, where it is properly mixed. It is then carried by conveyor onto a high steel trestle and dumped into the plant aggregate storage. The total capacity at the plant for all sizes of material is 1,000 tons per hour.

Beneath the plant aggregate storage piles is a 10x8-ft. laminated timber tunnel. Through this tunnel runs a 42-in. conveyor. Under each pile of aggregate are two opening in the top of the tunnel. Automatic feeders, controlled at the live storage yard, nearly a mile away, feed the material onto the belt. Air jets are provided around the sand intakes to loosen the sand if it becomes packed.

Material is taken from the plant storage piles at the discretion of the operator at the live storage yard. As one size of aggregate is depleted at the live storage, the operator merely presses a button, which engages the feeders at the plant aggregate storage and starts delivery of the desired aggregate. The 42-in. belt from the plant aggregate storage feeds the material onto a 48-in. conveyor for delivery to the live storage yard. This 48-in. line is composed of several sections and is nearly 4,000 ft. long.

The live storage yard is located about 1,000 ft. below the east abutment of the dam. Material is taken from the delivery belt by an airplane tripper. The airplane tripper has two hinged arms, and is a device for distributing the aggregate into the various piles without breakage. Enough aggregate can be stored at the live storage for about 16 hr. of concrete mixing. Beneath the live storage piles are two tunnels, equipped with feeder systems similar to the one at the plant storage piles. Conveyors running through the tunnels deliver the aggregate to the conveyor leading to the mixing plant.

A 36-in. conveyor to the west mixing

plant is carried across the Columbia River and the west excavation by a suspension bridge. Three steel towers, one on the east side, one on the west cofferdam and one on the west abutment support the two 2½-in. cables. The bridge is 3,500 ft. long from anchor to anchor.

Wash water

Because of the large amount of water required for washing the aggregate, and the high pumping head, the used supply is reclaimed. Dirty water is collected from the dewatering tanks and the sand classifiers by a wooden flume and taken to the clarifying tanks. There are two of these tanks, a larger one, oblong with semicircular ends and the other circular. In each end of the oblong tank and in the center of the circular tank is a 125-ft. diameter Dorr sludge rake. These rakes are mounted on hollow concrete pillars, and make one revolution about every 2 min. The bottoms of the tanks slope toward the center of the rakes. The dirty water enters the tank through a distributor box on one side. As the water moves slowly across the tank, most of the material in suspension falls to the bottom, where it is scraped into the sludge outlet by the rakes. The reclaimed water passes over a weir near the top of the tank on the side opposite the dirty water intake, and into a 120,000 gal., steel, storage tank.

At the center of each sludge rake is a sludge outlet and three 4-in. pipes connect each outlet with a sludge storage box in the plant pump house. A 6-in. pipe has been connected to one of the sludge outlets, to be used for experimental purposes by the government. Three Kimball Krogh, 50 h.p. sludge pumps remove the sludge from the sludge box.

Water from the reclaimed water storage tank is taken into the pump house through a 24-in. pipe. Three 6,000 g.p.m., Worthington single-stage pumps put the water under pressure for re-use in the screening plant. The pumps operate automatically, being controlled by three float controls in the reclaimed water storage tank.

Fresh water for aggregate washing in screening operations is pumped against a 600-ft. head from the Columbia River to the plant through a 16-in. pipe. The pumps are Worthington, six stage, 2,500 g.p.m., 500 h.p. The water is stored in a 100,000-gal. wooden tank, above the screening house.

Between thirty and forty men will be required to operate and maintain the aggregate plant. It is electrical throughout, having a connected load of about 4,200 h.p. Westinghouse electrical equipment is used almost exclusively. The combined length of conveyors in the plant is nearly 22,000 ft. The conveyor belts were furnished by the United States Rubber Co. and the Goodyear Rubber Co. Drives, drive frames, idlers, brackets and other conveyor equipment were furnished by the Jeffrey Manufacturing Co.

The plant was designed by the engineers of the Mason Walsh Atkinson Kier Co., under the direction of Francis Donaldson, chief engineer, and C. D. Riddle, job engineer. The general layout and mechanical design was directed by G. F. Dodge. The structural design was under the direction of D. O. Nelson. Over 200 drawings were required in the design of the plant. The plant was erected by the construction department of the company, under the direction of Harvey Slocum, general superintendent.

Opening of Construction Nears On California State Water Plan

WITH bids called for an exploratory drill to sink 36-in. test holes into rock at dam sites, the stage of actual construction work is approaching on the $170,000,000 Central Valley project of water conservation in California, being carried out under the direction of the Bureau of Reclamation for the state. At present $15,000,000 is available for the beginning of this major construction program and Walker R. Young, construction engineer of Boulder Dam, has established headquarters in Sacramento and will be in charge of the work for the Bureau.

The general features of this program are assumed to be well known in the West. Studies have been under way for several years in the office of Edward Hyatt, state engineer, under whose direction the comprehensive program was prepared and who, for the past year or more, has spent much time in Washington in the interest of securing federal funds, to undertake this important conservation work. Briefly, the program will provide for the conservation and use of the water supplies in the Central Valley of California to relieve flood menace in those sections where the supplies are above normal requirements and transfer additional water to areas of deficient supply.

The largest single unit will be the Kennett Dam on the upper waters of the Sacramento River system which will provide for flood control, conservation, and power development. In the upper sections of San Francisco Bay, the Contra Costa conduit is planned to convey a supply of fresh water to industries and communities located on salt water. In the upper San Joaquin Valley the Friant dam is the principal storage planned and the Madera and Friant-Kern canals will be provided to convey this storage and the natural flow of the San Joaquin River into areas which, at the present time, are decidedly deficient in water supply over extensive irrigated areas. The remaining feature of the program will consist of a series of dams and pumping plants located on the lower San Joaquin River which will be used to pump the surplus water of the Sacramento River upstream on the San Joaquin to take care of existing requirements in this section and release water to be stored in the Friant dam and utilized in the upper sections of the valley. This constitutes a very general review of the major features of the program which were described in more detail in *Western Construction News*, December, 1933.

At the present time, the definite steps in the construction of the project are unsettled pending further studies by the Bureau of Reclamation. Elements which are definitely being considered for immediate construction operations include:

Friant Dam	$14,000,000
Madera Canal	1,500,000
Friant-Kern Canal	4,500,000
Contra Costa Conduit	2,500,000
Steam plant and power lines	3,500,000

These elements represent a cost exceeding the present $15,000,000 available for the work and plans are being made to determine the work which will be scheduled for immediate construction.

Friant dam, according to the preliminary plans made for this structure, would provide a 250-ft. concrete gravity dam on the San Joaquin River about one mile above the town of Friant. The structure would have a crest length of 3,800 ft. and contain about 1,300,000 yd. of concrete. The reservoir would provide 270,000 ac. ft. of effective storage. A power plant of 30,000 kva. would be possible in connection with this development.

The Madera canal, with a capacity ranging from 1,500 to 500 sec. ft., would extend for a distance of 35 mi. from the Friant dam to the Chow Chilla River and deliver gravity water to areas now under irrigation but with a deficient supply.

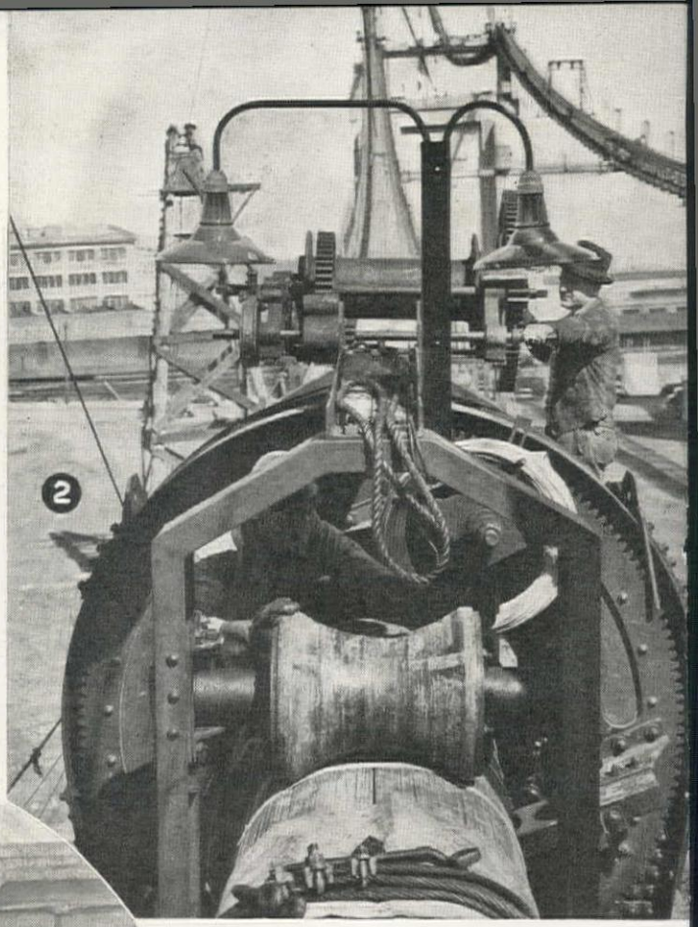
The Friant-Kern Canal would extend 160 mi. through Fresno, Tulare, and Kern counties from the Friant dam to the Kern River. This canal is planned for a capacity of from 3,000 to 1,500 sec. ft. and would require about 12,000,000 cu. yd. of excavation.

The Contra Costa conduit of 120 to 20 sec. ft. capacity will provide a supply of fresh water from the delta region to the cities and important industries along Suisun Bay which have been handicapped by a serious encroachment of salt water. This work will involve 700,000 cu. yd. of excavation.

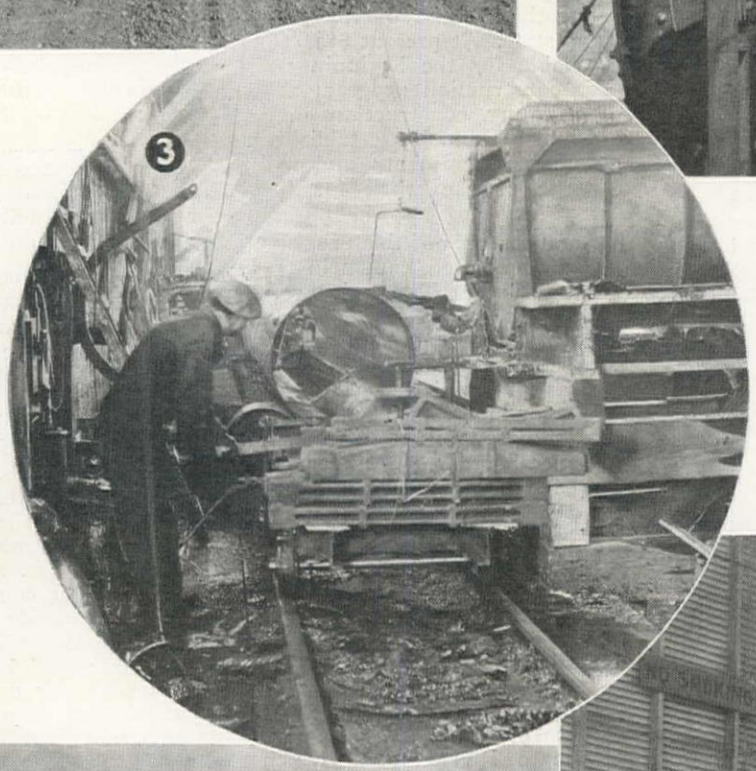
As soon as more definite plans have been made for the carrying forward of the elements of construction, the program and the work to be done will be reviewed in more detail in *Western Construction News*.

On the Western Construction Front

1—In New Mexico, Cook & Ransom Construction Co. are operating these Caterpillar, diesel auto patrols on grading work in the San Miguel Pass, out of Las Vegas.

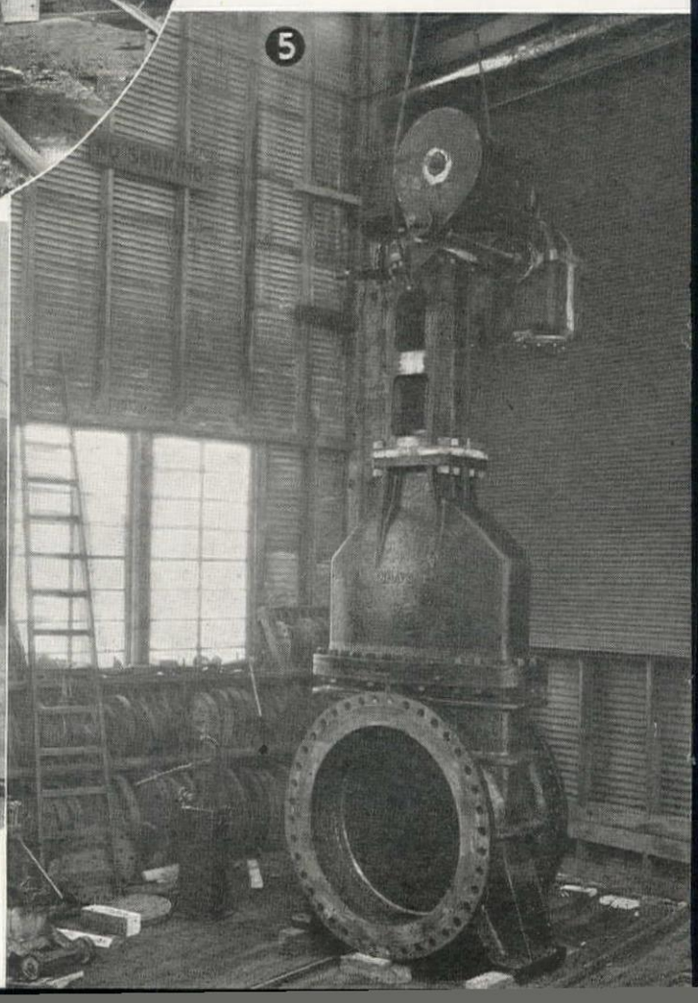


2—Squeezing machine to compact the cables of the San Francisco-Oakland bridge into circular form. Six 75-ton screw jacks, operated by compressed air, compact the 17,464 wires in the cable to a 29-in. diameter circle. At present the cables are squeezed and seized with a spiral wrapping every 3 ft. After the weight is on the structure the cables will be completely wrapped between the suspender castings.

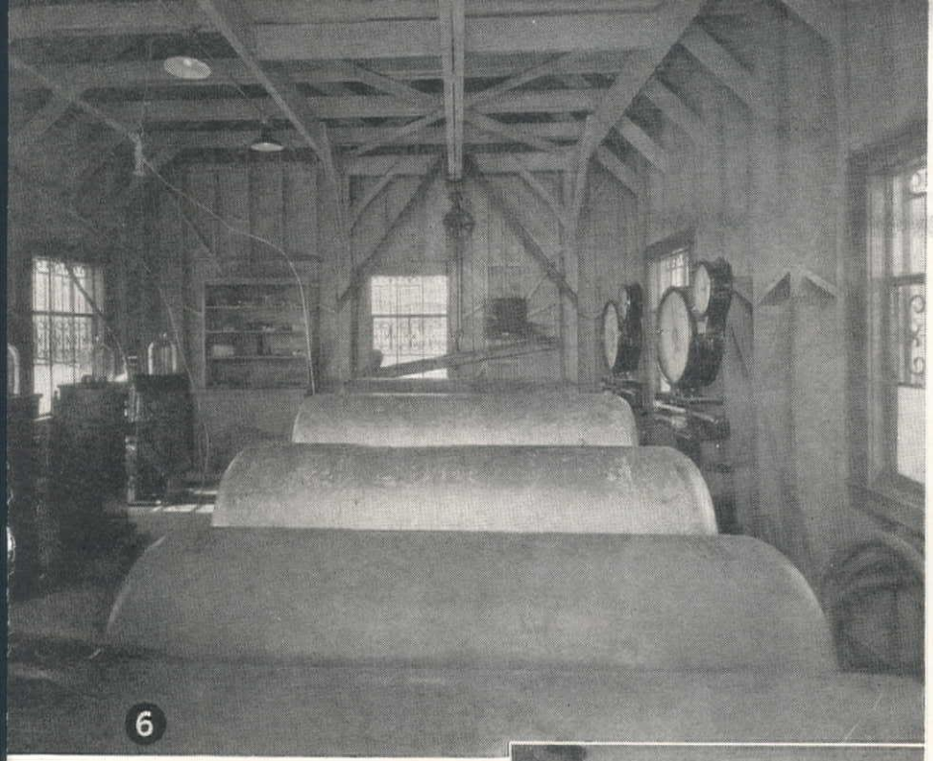


3—Placing spun enamel coating inside a 42-in. steel pipe for the Tacoma water supply line at the plant of the Puget Sound Machinery Depot, Seattle.

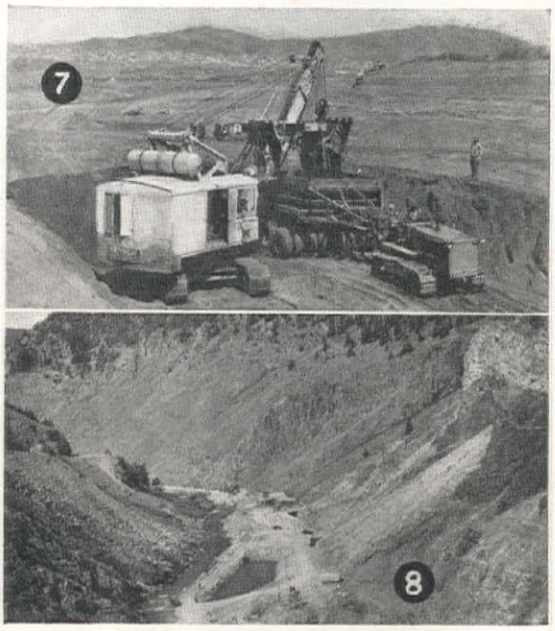
4—In Montana, this portable crusher plant of the Tomlinson & Arkwright Co. is producing rock for a highway resurfacing job. Powered by a Caterpillar diesel engine (130 h.p.) the Pioneer Gravel Equipment Co. unit turned out 100 tons per hour.



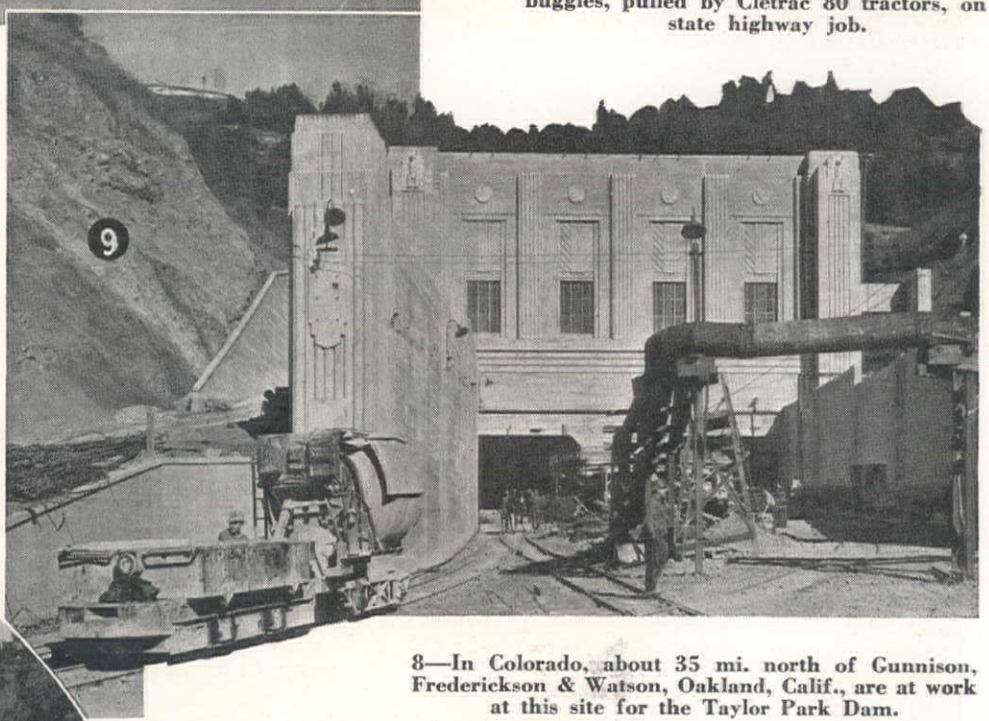
5—A Chapman valve, operated by Pelton water wheel, is one of the several to be installed on the new line delivering Hetch Hetchy water to San Francisco. Use of a water-motor to operate large size valves has become general practice with the San Francisco Water Department.



6—Chlorinator house recently completed on the system of the San Francisco Water Department. The installation is typical of modern design for large capacity. Wallace & Tiernan chlorinators are shown along the left wall.

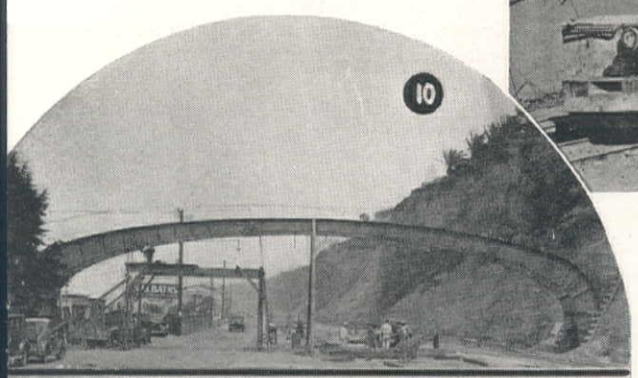


7—The Peninsula Paving Co., near Daly City, Calif., is using a Northwest shovel, operating on butane gas, to load 30-yd. LeTourneau buggies, pulled by Cletrac 80 tractors, on a state highway job.



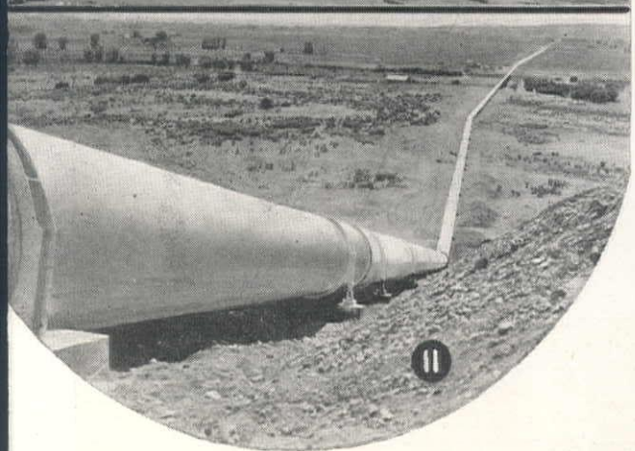
9—Portal structure for the Broadway Low Level Tunnel, Oakland, Calif., being driven by Six Companies, Inc. Wallace Boggs is chief engineer of the joint highway district.

10—All welded steel plate girders, weighing 20 tons each, built by the Lacy Manufacturing Co., Los Angeles, were erected by D. A. Loomis, general contractor, Glendale, Calif., for a pedestrian overpass to the beach at Santa Monica, Calif.



8—In Colorado, about 35 mi. north of Gunnison, Frederickson & Watson, Oakland, Calif., are at work at this site for the Taylor Park Dam.

12—Building the aggregate plant at Grand Coulee Dam (see article in this issue), showing clarifiers at right and screening plant at left.



11—Malheur River siphon on the Owyhee project in eastern Oregon. This unit is 80-in. steel pipe, 4½ mi. long with a maximum head of 275 feet. Concrete and earthwork was done by Parker-Schram Co., Portland, and the pipe was furnished and erected by Consolidated Steel Corp., Ltd., Los Angeles.

Idaho Acquires Abandoned To Solve Difficult Highway

Route of existing railroad in narrow canyon forces early county road to inferior location — Use of right-of-way essential to important state highway—Economics and reconditioning reviewed

By J. A. CHAMBERLIN
Engineer
Idaho Bureau of Highways

IDAHO has acquired the 22-mi. Intermountain Railway, a common carrier, and is converting it into a section of the Boise Basin Highway, a 125-mi. cut-off route from Boise to Stanley and the Sawtooth Mountains. The securing of this line provides the state with 22 mi. of grading, six heavy steel bridges, and 22 mi. of right of way through placer mining country, as well as the only watergrade entry into the Boise Basin.

The Boise Basin Highway, between Boise and Stanley, will extend 16 mi. from Boise up the north bank of Moores Creek, up Moores Creek 12.8 mi. to Steirman, the end of the railway section and the beginning of the Forest Highway section, then 10.5 mi. to Idaho City in the basin. From Idaho City the ascent continues to Moores Creek summit, then descends into the Payette Canyon and ascending again passes Grandjean and crosses over the Sawtooth Mountains to Stanley Basin, connecting with the Sawtooth Highway, U. S. 93, the total distance being 125 mi.

This route affords a cut-off from Boise to the Stanley Basin recreational district and the Idaho Alps—the Sawtooth Mountains. The distance is shortened 117 mi. as compared to the present route via Shoshone. It is far from the trunk highways which lie out in the flatter Snake River Valley and is intended for forest protection, logging, mineral development and recreation. It strikes directly across some of the most difficult country in the state and opens wide a country rich in Idaho history.

There are but 42 mi. of standard highway on this route at present, of which 37 mi. is Forest Highway, Idaho City to Lowman. The work now to be undertaken will add 23.5 mi. by the state—Barber to Steirman; and 10.5 mi. by the Bureau of Public Roads—Steirman to Idaho City; thus completing an aggregate of 76 mi. of the total 125 miles.

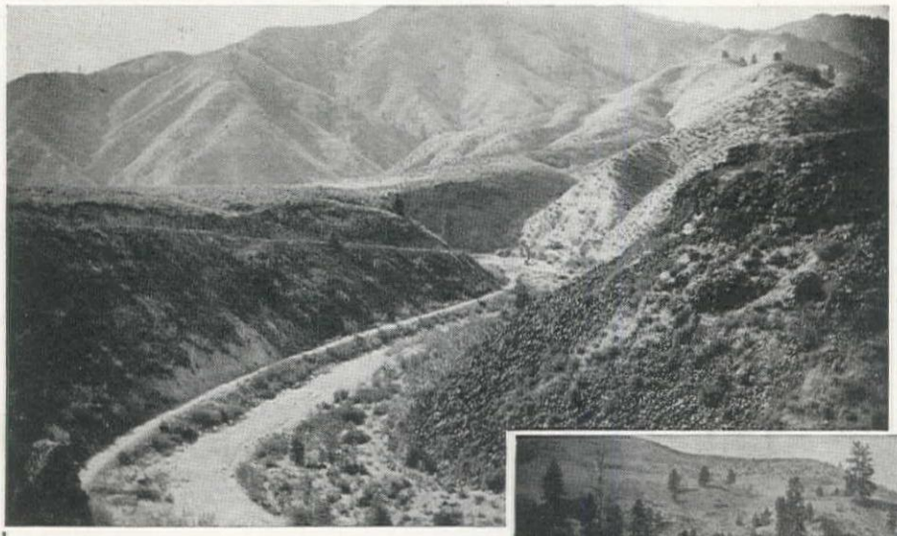
History of area

One would suppose that the Boise Basin, scarce 40 mi. from the capital of the state, and famous for its gold and timber and water storage, would long since have been provided with at least one standard highway, but primitive pioneer roads still obtain, that rise and fall along the mountain slope and traverse hummocky flats of placer tailings. The sequence of state highway development militated against the building of a standard highway into the Boise Basin as the essential factors did not coincide.

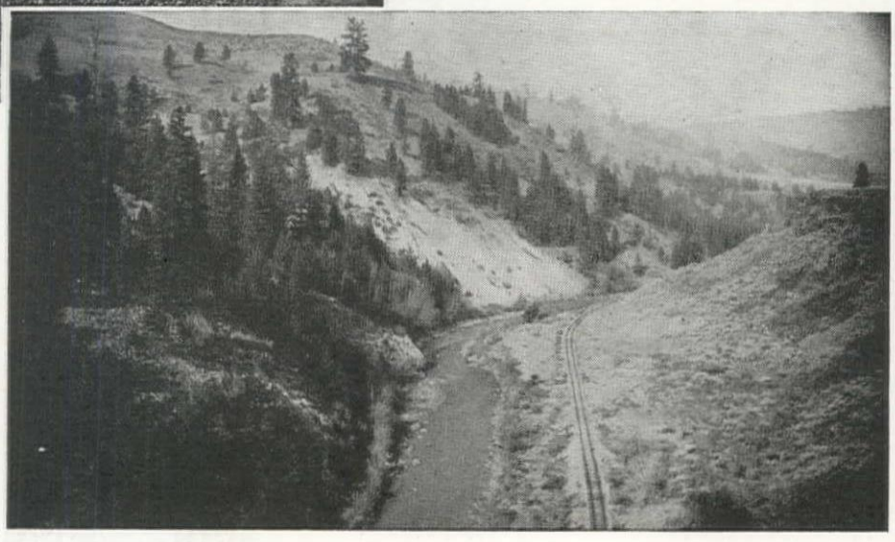
The district was far off the routes of through travel and the gold dredging operations that following earlier mining disrupted the valleys. Logging later blocked the logical entrance through Moores Creek Canyon and with its cessation the area began to decline. Time passed. Then the last dredge shut down, the last log was loaded and industry in the terms of big interests departed. The big scale show was over.

With the passing of organized operations the period of the little operator has arrived. The small transporter, the small logger, the woodcutter, the portable mill man and the small miner are the present interests which will rework the Boise Basin and enter the National Forests. A highway now becomes imperative to realize upon what is left, to revive if possible and to afford an opportunity for individual initiative, to reach recreational areas, and to administer the National Forests.

These individual efforts are, in a way, subsidized by state highways with the result that a great value in natural products is expected to be recovered through small operators and small capital investment. It is not consistent



In this section of the canyon the railroad location forced the subsequent county road to climb out at various points. Note the road climbing the far side of the canyon on a steep grade.



Typical view in the canyon showing the old railroad line occupying the only economical location along Moores Creek. The grades and alignment of the railroad are well adapted to modern highway use.

Railroad Line Location

that railway branches continue to serve border line areas wherein large scale operations have ended and where individual production from natural resources is possible. Railway facilities are out of character with the business to be handled.

Branch railways vs. highways

The great difficulty in making a comparison between highway and railway branch line service lies in the fact that they are not fully comparable. When highly organized mass transportation is replaced by individual transportation, dependability declines though flexibility increases. Also from a psychological point of view there is an informality and promptness in using a highway that can never be approached by a railway on account of the exaction of specific time of use and immediate visible payment. The freedom of highway use eliminates the need of any coöperation whatever, when movement is undertaken, with a result that the highway becomes a personal facility while the railway appears foreign. It is difficult to apply a monetary valuation to these characteristics.

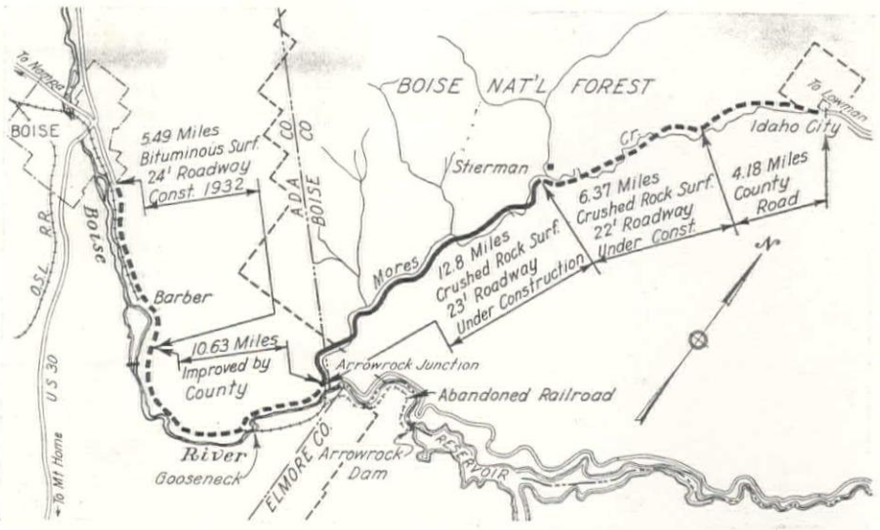
The economy of replacing railway branches with highways for the service of economic border line areas will be more readily recognized as time passes, not only by the people but by the Interstate Commerce Commission.

Railway branches were developed to the last mile of profitable return. Today these last miles do not produce return. Therefore, a highway affords a means of transport where each transports himself in proportion to his needs and resources. Transportation of low fixed charge at the cost of the transporter on an apparently personal highway. Some sort of highway is required regardless of railways so a standard highway is but an improvement of an existing public facility.

The Intermountain Railway

The 22-mi. Intermountain Railway extending from Barber to Steirman (see map) has served a triple purpose. The money spent upon it has served in building the Arrowrock Dam, logging the Boise Basin and now it will afford the base for a state highway. The railway was first built as a construction road from Boise up the Boise River, passing the mouth of Moores Creek, to Arrowrock dam site. Before the dam was finished the Boise Payette Lumber Co. secured the right to operate over the railway out to Moores Creek. The lumber company then built a branch up Moores Creek 12.8 mi. to Steirman at the junction of Moores and Grimes Creeks.

On April 6, 1917, upon completion of Arrowrock Dam the lumber company purchased the government railway and operated as the Intermountain Railway, a common carrier. The transportation of passengers and freight was then undertaken with log hauling as the primary purpose. Later difficulties in getting the I. C. C. to grant abandonment of a 13-mi. extension on Grimes Creek caused the later extension of the railway from Steirman to Idaho City to be merely a private logging road on leased right of way. In 1935, the company, with the assistance of the state, secured the abandonment of the entire line which the state immediately acquired for highway purposes.



Route of the mining railroad up the Mores Creek canyon, above the Arrow Rock Dam junction, which is now being used for a major state highway from Boise into the Stanley Basin recreational area.

From Barber, 5 mi. up river from Boise, the railway runs up the northerly river bank through a semi-canyon for 10.6 mi. to the mouth of Moores Creek. The river is crossed twice, once on a bridge of two 125-ft. steel trusses on concrete, and once on four 85-ft. deck plate girders on concrete.

Over this section the present county road is wedged between the railway and the toe of steep high basalt slopes for 6.5 mi. to Gooseneck where the railway makes the first crossing. The new highway will occupy the railway grade at least to Gooseneck. The alternates of revamping and using the two steel bridges and the 3 mi. of grade between them as compared to holding to the route of the present road on the north bank are still under consideration.

The bridges are the result of the varied uses to which this railway has been put. The first bridge was put in to get over to the south side of Arrowrock Dam. The second bridge was put in at a later date when the logging extension was built up Moores Creek. At the mouth of Moores Creek, the outlet of Boise Basin, the logging railway leaves the original railway that extended on up the river to Arrowrock Dam and runs north up Moores Creek canyon 12.8 mi. to Steirman. It is this long canyon bottleneck that has deterred the highway for years.

Prior rights affect location

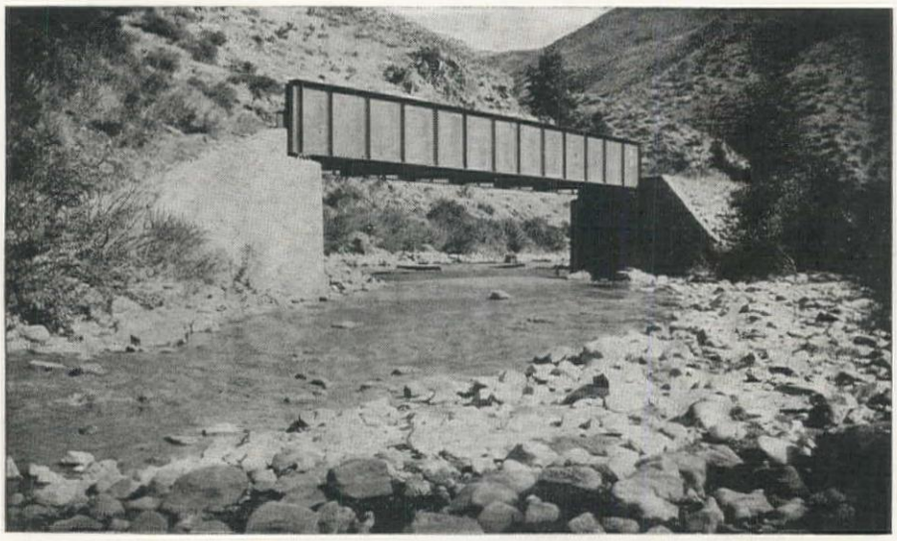
The county road had prior rights for 3 mi. up Moores Creek but the railway crowded it over and it now takes the opposite side, crossing back as the railway crosses over. At Robie Creek the real canyon begins, and the railway goes on through but the present road deterred by rock walls, creek and placer claims, takes abruptly to the eastern mountain side, encountering every feature most objectionable for a road. Then forced from the slope down to the creek by cliffs, and side draws, it climbs again only to be forced down once more when nearing Steirman. For 2 mi. it fights its way along the railway and creek, crossing and recrossing until the broad Boise Basin opens ahead. There it leads an ambulating way over sand and rock and tailing piles to Idaho City.

The section along the railway from the Boise River up to Steirman, the end of the railroad, is the critical one for the highway. The canyon is a fracture in the great lava flow which buried all the lower country but left exposed the granite of the Boise Basin. The deep fracture of the canyon and the erosion of the broad streams, together, exposed the ancient gravels below the lava flow along Moores Creek and the river.

Placer claims, new and old, cover every accessible area, confused and overlapping, abandoned and active, waiting to entrap the seeker of highway right of way. The railway, however, held title to a width of 200 ft. which the state has now acquired.

Railroad location

The location of the railway is excellent, the construction good and the slopes well protected from the stream. Culverts are of rubble masonry, bridges of steel on concrete. The railway was built near the close of the railway expansion era, and there is the touch of skill in each successive mile of its deft location. The grade is 1%, the maxi-



One of the through girder bridges on the railroad line which is to be remodeled into a deck girder highway bridge, with cantilever extensions on the sides to provide the necessary width.

mum curvature 12%, the roadway width 12 to 14 ft.

Three 70-ft. through plate girder bridges on heavy concrete abutments cross Moores Creek; they are set well above the water to meet all eventualities. In fact, they are set so high that for highway use the bridge seats are now to be cut away and the girders lowered about 6 ft. to afford deck plate girder bridges with timber decks. The three bridges are designed for Coopers E 30 loading, and the girders are on centers varying from 15 ft. 4 in. on tangent to 18 ft. 10 in. on the maximum curve.

Plans were made for comparing the reconstruction of these bridges with new 50-ft. concrete spans, both to the original railway grade line. It is found that by removing a part of the gravity section concrete abutments and seating the girders about 6 ft. lower, without alteration of the girder details, adequate clearance from the high water was still assured and a suitable timber deck could be applied.

The timber deck was designed for a 24-ft. roadway with appropriate widening on curves, and consists of 6 x 18-in. floor beams carrying 2 x 6-in. laminated floor having a 1-in. wearing surface of mineralized asphaltic plank. The comparatively light timber floor beams were made possible by placing a timber bent between the steel girders and setting it on the original steel floor beams.

This type deck stressed the girder to a maximum unit stress of 12,000-lb. per sq. in. for two 15-ton trucks passing, and brought it to about 16,000 lb. for A. A. S. H. O. Specifications for the H 15 loading.

The cost of this remodeled structure was compared with a 50-ft. concrete design of the same road width and it was found that this concrete structure would cost about $16,000, while the cost of the remodeled girder bridge totaled only $5,200. Thus the saving on one remodeled structure over the new concrete structure was nearly enough to pay for the rebuilding of the other two girder bridges.

Highway design

The highway center line does not fully coincide with that of the railway. Slight diversions in alignment were made to fit the highway section to the existing grade, as the railway has a constant section while that of the highway varies by extra width on curves, heavy superelevation, flat ditch slopes, etc. Considerable ingenuity was required in the fitting of the line to save riprap in place, to keep off the high side of large rock cuts and, in general, to utilize existing work. The railway grade of 1% was maintained on the highway and as a result all adjustments were made by line shifts. The economy resulting from the utilization of the railway grade and structures is about 50% the cost of the highway.

The highway will be 24 ft., with 6 in. of selected backfill capping and 6 in. of crushed rock. This width is double that of the railway grade. Eighty per cent of the length of the line is through rock or heavy slide rock formation with the creek at the toe of the slope. The line is fitted closely, well above high water and requires a considerable amount of protection.

The railway valuation of the Intermountain Railway (I.C.C. report of 1935) was $582,112 or $26,457 per mile. The estimated cost of paralleling the railway with a highway was $22,000 per mile. The estimated cost of the 12.8 mi. of reconstruction along Moores Creek, now under contract, is $148,533 or $11,308 per mile. Purchase price paid by the state as a purchase of bridges was $45,000 or $2,045 per mile.

On the basis of $22,000 per mile for a parallel highway; $11,308 per mile for reconstruction; and $2,045 per mile for purchase, the net saving to the state was $8,647 per mile or a total of $191,234 for 22 miles.

The work is financed as a regular Federal Aid project on the basis of 59.84% federal funds and 40.16% state funds with no local coöperation. Under federal authority of April 1, 1935, the limitation on unit mile costs was removed.

The 12.8 mi. section along Moores Creek is now under contract to the Triangle Construction Co. of Boise and the date of completion is July 1, 1936.

G. E. McKelvey is commissioner of public works, and J. H. Stemmer, director of highways, for Idaho. Lewis Roberts is district engineer (District No. 4), J. J. Byers, bureau of grade separations, bridge engineer, and Gus Anderson, resident engineer on the project.

Colorado Construction Items of Interest

Denver Water Project Work

Approximately 1,000 men are now working on the original Fraser River water diversion project of Denver, and engineers are rushing work so that all contracts on the extension of the project may be let by Dec. 15. It has been announced that the $1,000,000 filter plant, part of the extension, will be built 2½ mi. west of the city. The site of the $1,300,000 Ralston Creek reservoir has been explored with good results, and the contract will soon be let on the extension of the canal from Dry Creek to Ralston Creek.

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Denver Sewage Plant

The Denver city council has authorized the manager of improvements to buy land for construction of a sewage disposal plant for the city. The council also passed on final reading ordinances approving sale, already provided for, of bonds totaling $500,000 for the disposal plant. This is a part of the $2,000,000 voted recently for the plant. It has also been announced that the city will advertise for bids on equipment for the preliminary treatment plant of the disposal plant. The equipment, to cost between $200,000 and $250,000, will include settling and digestion tanks, screens, shredders and grit removal machinery.

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Out of the $2,631,567 allotted Colorado by the Federal Government for grade crossing construction, $1,238,400 has already been approved for expenditure by Governor Johnson and J. A. Elliott, district engineer for the Bureau of Public Roads. The remainder of the program will be set up and approved within a short time.

Western State Laws for Licensing of Contractors

Essential features of the six acts in the eleven western states which require the registration and licensing of general contractors

LAWS have been enacted in six western states which require the registration or licensing of general contractors before they are legally qualified to engage in the practice of contracting. Although these laws in Arizona, California, Idaho, Montana, Nevada and Utah, are fundamentally similar in purpose and requirements, they have individual characteristics and the purpose of this review is to set forth the important provisions contained in the acts.

At the outset, it should be distinctly understood that the following applies only to the state laws covering the licensing of general contractors. In addition to these laws, general contractors may be affected by any or all of the following additional legal restrictions:

1. Registration and licensing in municipalities
2. Registration as a corporation in the state
3. Requirements for the prequalification of bidders on state highway and other work
4. State laws affecting contractors and contracting as distinct from licensing acts
5. Recent acts which require business licenses as revenue producing measures

The most essential provisions of the licensing acts are outlined in the accompanying table. The following paragraphs expand this information relative to the individual state laws.

Arizona

Passed in 1933, the Arizona act provides for the licensing of all contractors, but contains exceptions applying to the federal government, state government, political subdivisions including irrigation districts, public utilities, and the building of houses by owners. The obtaining of a license necessitates, among other requirements, the filing of five letters of recommendation from: (1) a banking institution, (2) a bonding company, (3) a reputable citizen from the applicant's city, (4) letters from two engineers familiar with the applicant's work.

Grounds for revocation include seven specific acts or omissions stated in the act which may be used as reasons for complaint. The law requires that the citation of a complaint must be answered by the contractor within ten days after he receives the citation from the registrar. Failure of the licensee to answer the complaint is deemed an admission of the acts charged and the license may be revoked or suspended immediately. If an answer is filed, a time and place is fixed for hearing after which the registrar has ten days to render a decision. Following the rendering of this decision, the matter may be carried forward to a rehearing and on into the state courts.

If a license is suspended, the registrar may renew it upon proof that the contractor has complied with the provisions of the judgment rendered.

H. C. Sparks is Registrar of Contractors and may be addressed at the State Building, Phoenix, Ariz.

California

Passed by the 1929 legislature, the California Contractors' License Law is the oldest and probably the most comprehensive, as to established rules and regulations, of the laws in the western states. The act applies to all contractors with the usual exceptions of the federal government, state, municipalities, utilities, and private individuals. The law is particularly specific in its definition of contractors and "contracting business." Operations under contract which do not exceed $200 do not require registration.

The Contractors' State License Board consists of seven members "all of whom shall be contractors actively engaged in the contracting business for a period of not less than five years" and acts through an executive secretary or director.

For the obtaining of a license, applications must indicate, to the satisfaction of the board, that: (1) the applicant is of good character and (2) has never been refused a license or had a license revoked. If the application is considered satisfactory the registrar is to issue a license within ten days. The California licenses expire at the end of each fiscal year (June 30). Applications for renewals must be on file not later than that date.

Grounds for complaint are rather comprehensive in the California law and include twelve acts or omissions on the part of the contractor which may result in suspension or revocation of the license. These grounds for complaint are indicated briefly in the table. The act provides that after a verified complaint has been filed, the director proceeds with the usual hearing of the case and the result may be revoking or suspending of the license if the ground for complaint is sustained. The act provides for rehearing or appeal to the state courts for a contractor whose license has been taken away.

Note: The latest amendment to the California law, which became effective September 20, makes it impossible for two individually licensed contractors or firms of contractors to jointly submit a bid or undertake work as a contractor without securing a new license for the combination organization.

William G. Bonelli is Registrar of Contractors, Sacramento, Calif.

Colorado

There is no law requiring the licensing of general contractors in the State of Colorado. However, this statement does not cover any legal requirements for licenses in municipalities or other state laws which may effect the operations of contractors.

Idaho

The licensing law of Idaho, passed in 1933, applies to "public works contractors." The act carries the usual exemptions as to governmental agencies and fixes a minimum of $5,000 for the limit below which no public works contractor needs to be licensed. Application for license requires information relative to experience, financial condition, a list of equipment, and a registration fee of $100.

ESSENTIAL PROVISIONS OF CONTRACTORS LICENSING LAWS FOR WESTERN STATES

Requirements	Arizona	California	Idaho	Montana	Nevada	Utah
Contractors affected	All	All	"Public works"	"Public" (See explanation)	"Public works"	All
Registration fee	$15.00	$10.00	$100.00		$200.00	$10.00
Renewal fee	$10.00	$5.00	$50.00	.....	$100.00	$10.00
Date of expiration	June 30	June 30	Dec. 31	Dec. 31	June 30	Dec. 31
Time required for issuing	20 days	10 days	30 days	30 days	10 days	10 days
Period required prior to bidding	.....	none	30 days	none	none	none
No license required (up to)	.....	$200	$5,000	$1,000	$10,000	.....
GROUNDS FOR COMPLAINT MENTIONED IN ACT						
Abandonment of contract	Yes	Yes	Yes	Yes	Yes	Yes
Diversion of funds or materials	Yes	Yes	.....	Yes	Yes	Yes
Departure from plans or specs	Yes	Yes	.....	.....	.....	Yes
Violation of building code	Yes	Yes	.....	.....	.....	Yes
Failure to keep complete records	Yes	Yes	.....	.....	.....	.....
Misrepresentation in application	Yes	Yes	.....	Yes	.....	.....
Failure to complete at price fixed	.....	Yes	.....	.....	.....	.....
Use of license for another	.....	Yes	.....	.....	.....	.....
Noncompliance with act	.....	Yes	.....	.....	.....	.....
Fraudulent act injuring another	Yes	Yes	Yes	Yes	Yes	Yes

The law requires the registrar to grant or refuse a license within thirty days after the filing of the application and the licensee is not to engage in contracting until after a thirty-day period has elapsed, following the issuance of the original license.

The usual clause provides for renewals and the expiration date is on December 31. Grounds for complaint against contractors include only two specific statements: (1) the abandonment of a contract and (2) any fraudulent act which results in injuring another. The registrar is authorized to investigate complaints, hold hearings, and cancel or suspend licenses. Appeals from these decisions may be taken into the state courts through the specified legal procedure.

The administration of Idaho act is under the Department of Public Works. J. H. Stemmer is director of highways at Boise, Idaho.

Montana

Passed by the 1935 legislature the Montana act went into effect recently and is a law which "provides for the registration of public contractors," for any contract which exceeds $1,000.

The particular feature of the Montana law is the dividing of contractors into three classes. The holders of a Class A license are entitled to engage in public contracting without limit as to the value of any single contract and this type of license requires a registration fee of $200. Holders of Class B licenses may engage in contracting up to a fixed limit of $50,000 for any one contract and the registration fee for this license is $100. The holders of the Class C type of license are entitled to carry out contracts which do not exceed $25,000 in value and the registration fee for this license is $10. The renewal fee for each class of license is 50% of the original registration fee.

The act provides for the usual information to accompany the application including statements of experience, qualification, and the review of the work done by the applicant during the previous five years. The registrar is required to pass upon an application within a thirty-day period. Licenses run for the calendar year and application for renewal must be made on or before March 1 of each successive year.

Grounds for complaints specifically mentioned in the act are four, including: (1) abandonment of contract, (2) diversion of funds or property, (3) any fraudulent act, and (4) false statements in the application. Further, the act provides for the usual hearings before the registrar and decisions by him followed by recourse to the courts as an appeal.

The act is administered by the State Board of Equalization, George Fowlie, Secretary, Helena, Mont.

Nevada

Passed in 1931, the Nevada law requires registering of "public works contractors." Registration is not required for contracts under $10,000. The usual requirement for information to be contained in the application is provided, to indicate fitness of the applicant and a $200 registration fee is required. Licenses expire on June 30 each year and renewal fee is $100.

Grounds for complaint specifically mention three which are abandonment of contract, diversion of funds or property and fraudulent acts, with the usual arrangement for hearing before the registrar and appeal to the courts if the decision suspends or revokes the license.

Henry C. Schmidt is State Controller and ex officio contractors' license registrar, Carson City, Nevada.

New Mexico

New Mexico has no law for the registration or licensing of contractors although such a bill was introduced into the last session of the legislature. However, highway contractors are required to take out a state business license under the New Mexico "Emergency School Tax (sales tax) Act."

Oregon

There is no law in the State of Oregon for the registering of general contractors.

Utah

Passed in the session of 1933, the Utah act provides for the licensing of all contractors, carrying the usual exemptions for governmental agencies and public utilities. The exemption based on the size of contract is fixed at $200.

Applications, including a $10 registration fee, are required to be filed providing information as to the applicant's business reputation, and the fact that he has never had a license revoked. Licenses are to be issued within ten days after receipt of application.

Expiration date is set at December 31 and the fee for renewal is the same as for registration, $10.

Grounds for complaint against contractors, specifically stated in the act, include: (1) abandonment of contract, (2) diversion of funds or property, (3) departure from plans or specifications, and (4) disregard for any building code. Further, the act provides for the hearing on the complaint with the authority to cancel or suspend the license following the decision of the department. Appeal from the decision is provided for in the state courts.

The act is administered by the Department of Registration, State Capitol Building, Salt Lake City, Utah.

Washington

There is no law providing for the registration or licensing of general contractors in the State of Washington.

Wyoming

There is no law providing for the registration or licensing of general contractors in the State of Wyoming.

Contractors' License Board

Appointments have been made by Governor Merriam of California to the newly formed Contractors' License Board for that state. This new administrative group will organize immediately and carry forward the duties of the board.

Members of the board include: Warren A. Bechtel, Jr., San Francisco, representing the engineering contractors; Hugh McNulty, Fresno, Ralph Homann, Los Angeles, and S. G. Johnson, Oakland, representing general contractors; Stephen L. Ford, Long Beach, plastering; Wm. Nies, Los Angeles, plumbing; and Roy N. Butcher, San Jose, electrical.

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Nevada Licensing Act

About 125 Nevada engineers have been granted certificates as Registered Professional Engineers by the board of registration in that state, which was appointed under a law passed by the 1935 legislature. In the future, applicants are required to pass an examination prescribed by the board. The law covers all branches of engineering and a uniform certificate, without specific designation, is issued to applicants meeting requirements of the board.

The objective of the board, according to George W. Malone, chairman, is to establish standards of professional training, practice and ethics in the State of Nevada which will permit reciprocal relations with other states and promote the best interests of the public and the profession.

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Book on Road Materials

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E. W. Burritt, state engineer of Wyoming, has announced that work has started on final surveys for the $484,000 Bear River irrigation project in Western Wyoming, which has been held up by litigation of interests in other states. A temporary injunction to prevent construction of this project was denied in federal court. PWA funds have been allotted for the project.

Construction Design Chart

II. . . . . Timber-beams in Shear

By JAMES R. GRIFFITH

Professor of Structural Engineering
Oregon State College

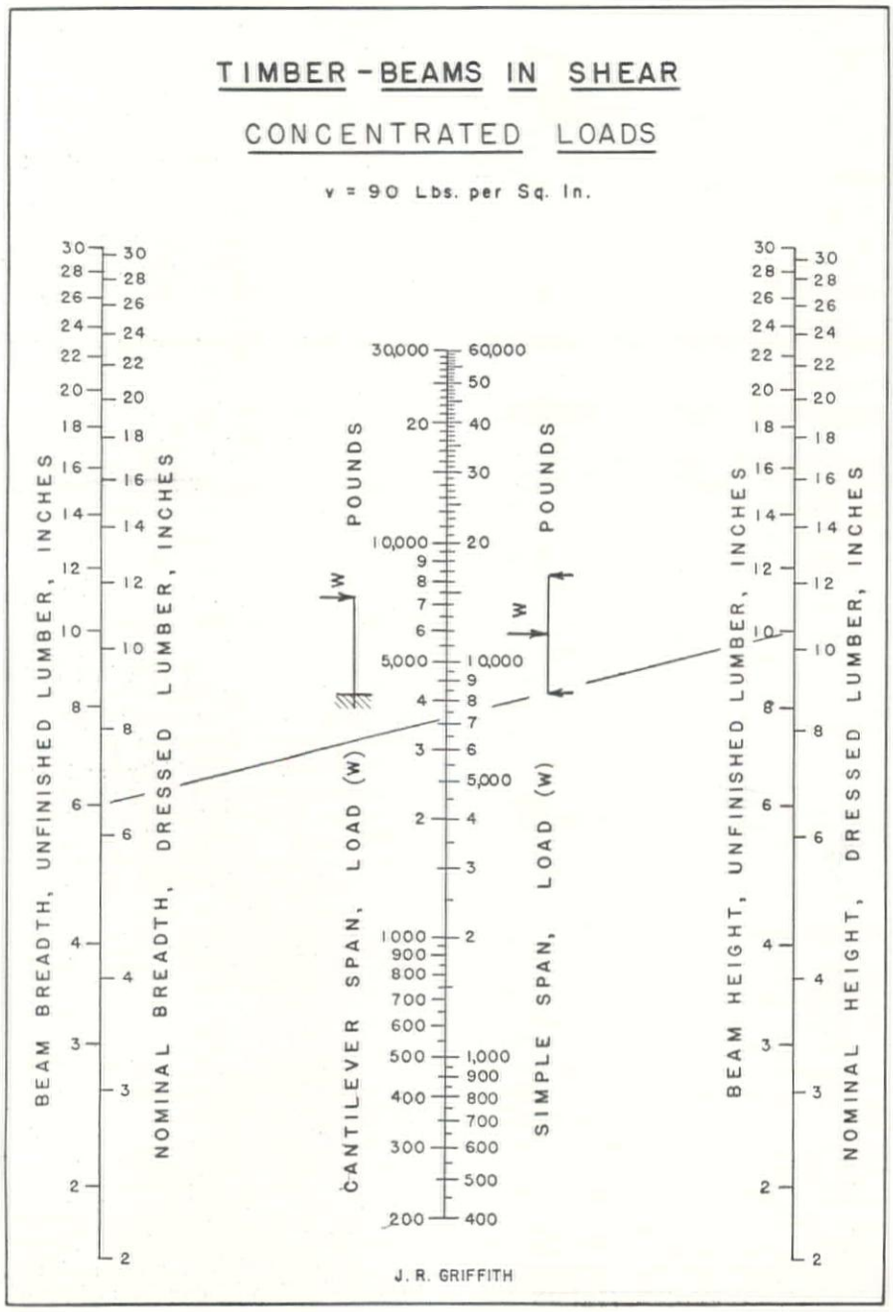
IT is probably true that in the majority of cases when a timber beam has been adequately designed for flexural stresses it is amply strong for other stresses. However, that is no excuse for not investigating the beam for all conditions.

The accompanying chart has been designed to give the allowable load on a timber beam when horizontal shear is the controlling factor. Two loadings have been provided for: a single concentration at the end of a cantilever span; and a single concentrated load in the center of simple span.

The fundamental equation involved in computing the amount of horizontal shear in a beam of rectangular section is

$$v = \frac{3V}{2bh}$$

v = unit horizontal shear, lb. per. sq. in.
V = total shear on section, pounds.
b = breadth of beam, inches.
h = height of beam, inches.



In the construction of this chart, a value of 90 lb. per sq. in. has been assumed for the allowable unit horizontal shear.

To obtain a solution on the chart, it is only necessary to use a single straight line intersecting all three scales. It's use can be better illustrated by the following problems.

In the September issue of *Western Construction News*, a problem was solved wherein it was found necessary to use a 6 x 10-in. unfinished timber beam to support a 2,000-lb. load in the center of a simple 15-ft. span. On the accompanying chart a line has been drawn through these same sectional dimensions of the timber. On the Simple Span scale, it will be noted that a load of 7,200 lb. is permissible, in so far as shear is concerned. Substituting in the formula for a check of this solution

$$v = \frac{3V}{2bh} \quad \text{or} \quad V = \frac{2vbh}{3}$$

$$V = \text{total maximum shear} = \frac{W}{2}$$

$$\frac{W}{2} = \frac{2 \times 90 \times 6 \times 10}{3}$$

W = 7,200 lb. total allowable load.

Since this beam section is good for a total load of 7,200 lb. in shear, while it was good for only 2,000 lb. in flexure, obviously the smaller load will control for this particular span.

If the reader is concerned as to what span and load would bring both the flexural stress and shear to their maximum allowable values, this can be quickly determined. Since the shear is independent of the span, the 7,200 lb. load is the maximum that the section can carry. On the previous chart a line is already indicated between the sectional dimensions. Through the present intersection on the "support" another line can be drawn to this new load of 7,200 lb. on the Simple Span scale. This line will then indicate on the Span scale a value of 4.2 ft. which is the maximum.

In the September issue a second problem was solved involving a 1,000 lb. load at the end of a cantilever span, resulting in a 6 x 8-in. nominal dimensions for a dressed timber. If a line is drawn between these values on the shear chart, it will be noted that the beam is good for a total load of 2,500 lb. as controlled by shear.

The fact that shear is so seldom the controlling factor in the design of timber beams, makes this step the more important. The beginner and the occasional designer soon forget that shear does sometimes control. As evidenced in the above problems, shear is the controlling factor only in short spans of heavy concentrations. I have personally had occasion to investigate but one failure of a timber beam which could be attributed to shear.

San Gabriel Dam No. 1 Work Following Approval of

Modified design provides impervious rolled-fill section backed by rock fills on both sides — More effective use of quarry material results — Design reviewed and present operations outlined

CONSTRUCTION operations have been resumed on the San Gabriel Dam No. 1, being built by the Los Angeles Flood Control District, in accordance with a modified design which received approval of the state engineer on August 12. Subsequently, the court approved the necessary changes which had to be made in the specifications and the existing contract of the West Slope Construction Co. and the work was started again after a shut down of about nine months. The present design, which will involve a volume of fill approaching 10,000,000 cu. yd., and the construction operations which are now under way are reviewed in the following.

Previous history

Construction of the rock fill dam at this site began in the spring of 1933 following the award of contract (not including spillway) to the West Slope Construction Co. on a bid of $8,600,527. The contract called for completion in June, 1938. Operations of quarry stripping, stream bed excavation and diversion tunnel driving were described in *Western Construction News*, May, 1934. This work continued to include completion of the diversion tunnel, stripping of more than 1,000,000 cu. yd. from the quarry site and the beginning of the rock fill behind the concrete cut off wall.

When the yardage of quarry stripping began to exceed the estimate, as compared with the material which was suitable for fill, under the existing specifications, the work was stopped. An agreement was reached by the district and the contractor to suspend operations pending the approval of a modification in the design.

In September, 1934, E. C. Eaton resigned as chief engineer of the district and was succeeded by Samuel B. Fisher. He was succeeded by C. H. Howell, as chief engineer, who was appointed by the board of supervisors in January, 1935. Mr. Howell was formerly chief engineer of the Middle Rio Grande Conservancy District, New Mexico.

A redesign of the structure was prepared under the direction of Mr. Howell, with W. P. Creager and L. F. Harza acting as consulting engineers. This design was submitted to the state for approval as to features of public safety. The plans were reviewed by the consulting board consisting of C. D. Marx, F. C. Herrmann and W. L. Huber, which had been serving the Departmen of Public Works for several years in connection with the design requirements for San Gabriel Dam No. 1. Following disapproval of the first design submitted (WCN June, 1935), several changes were adopted to meet state requirements and the modified design was recommended for approval and the permit was issued August 12 by State Engineer Edward Hyatt.

The problem was unusually complicated because of the existing contract, the desirability of maintaining this agreement, the limited funds available for the project and the paramount question of safety for this record-breaking size structure located above the San Gabriel Valley.

Revised design

The following description of the modified design is illustrated by the accompanying drawing showing the maximum section. Beginning at the upstream side of the structure, Zone 1 will consist of loose rock fill obtained from abutment excavation, grizzly rejects or from the quarry. It will provide an upstream face of slopes and berms with a theoretical slope of 3:1. The downstream side of Zone 1 will meet the 1.5:1 slope of Zone 2.

New requirements call for sluicing all rock fill: 2 cu. yd. of water to 1 cu. yd. of rock.

Zone 1 is intended to provide:

"1. Upstream support for the body of the dam.

"2. Protection from wave action.

"3. Compression on Zone 2 to assist it to conform to a settlement (if any) and closure of cracks or fissures due to earthquake movements in Zone 2.

"4. A medium to prevent circulation of air above the rolled fill of Zone 2, thus retarding evaporation and drying out of that zone.

"5. Protection of the surface of Zone 2 from damage when emptying the reservoir."

Material in Zone 1 will be graded, in so far as possible, from the coarsest rock on the face to a 5-ft. layer of grizzlied material (6x9-in.) next to Zone 2. Placing will be in 25-ft. layers with each lift scarified before the next is started. "All material in Zone 1 will be consolidated by sluicing with a nozzle pressure of approximately 60 lb. per sq. in. Approximately 2 cu. yd. of water to 1 cu. yd. of rock will be applied."

Zone 2 will be the most impervious part of the structure and will consist of a clayey-sand rolled fill, which is to be excavated and placed in such a manner to secure desired gradation, compaction, impermeability and stability. The fill will be placed and rolled in 6-in. layers and is to contain no stones having a maximum dimension of more than 5 in. It will be compacted with sheep's foot rollers to give a minimum dry weight in the completed fill of 115 lb. per cu. ft. (See section for the position of Zone 2.) This impervious fill rests directly against bed rock and connects, at its upstream limit, with the concrete cutoff.

Zone 3 occupies the main body of the dam and has an upstream slope of 1.2:1 and a downstream slope of 1:1. "The function of Zone 3 is to provide an unyielding and relatively impermeable support for Zone 2. Being relatively impervious, it reduces the differential pressure on Zone 2, the abutments on which it rests and the cutoff. This fill will consist mainly of

Is Resumed New Design

soft, fractured and near surface rock (wasted in previous operations) with the maximum size limited to that passing a 6x9-in. grizzly.

Material in Zone 3 will be placed in 6-in. layers and rolled similarly to the operations in Zone 2. Moisture control is required to obtain necessary compaction. The number of trips to be made with sheepsfoot rollers over the 6-in. layers shall be sufficient to produce a dry weight of the finds of at least 120 lb. per cu. ft.

Zone 4 (see illustration), in keeping with the basic theory of the design, is to be less dense than Zone 3 and will be built with rock taken from the quarry and placed in 25-ft. lifts. The material in this zone will be quarry run rock with the larger sizes and pieces placed in the downstream side of the zone and grading into Zones 5 and 6. There is no distinct line of demarkation between zones 4, 5, and 6. The general intent being to increase the size of rock and porosity of the fill on the downstream side of Zone 3. This material in Zone 4 is to be consolidated with sluicing of about 2 cu. yd. of water to each yard of rock, under nozzle pressure of about 60 lb. per sq. in. Each lift of rock is to be scarified before the next lift is started.

Zones 5 and 6 are to be principally large rock providing free drainage and additional weight behind the impervious sections of the structure. The material in these zones also provides protection against erosion from rainfall on the downstream slope. The fill material will come from the rejects of the grizzly, produced from quarry operations for Zone 3, and selected large rock. It will be placed in 25-ft. lifts and sluiced the same as Zone 4.

Zone 6 will consist partly of rock fill which will be removed from beneath Zones 2 and 3, supplemented by rock from the quarry. This rock will be principally large pieces to provide an extremely porous and heavy toe on the downstream side of the dam.

Cut-off and grouting

The concrete cut-off wall has already been completed across the stream bed and, in the new design, will occupy a position at the base of the most impervious section of fill (Zone 2). This cut-off wall will be extended up the abutments under Zone 2 as the fill is advanced. It will be excavated into and founded on sound rock.

Rock under the cut-off wall is to be grouted with a double row of holes which will have a maximum depth of 100 ft. in bed rock in the upstream row and 50 ft. in the downstream row of holes. The plan is to drill exploratory holes first at a spacing of about 30 ft. and conduct leakage tests to indicate any appreciable seams, from which information the final details of the grouting program will be prepared.

Looking upstream through the dam site showing the contractors' shop building near the downstream toe of the dam.

Renewed Construction

Preliminary construction operations which have been going forward since August under the revised design include: Removal of the 400,000 cu. yd. of rock fill placed in stream bed behind the cut-off wall under the original program, constructing a water supply system to carry out the required sluicing of the rock fill sections (Zones 1, 4, 5 and 6), moving the contractors' main shop building to a position beyond the downstream toe of the new design. In addition, abutment stripping has been started and rock placing in Zones 1 and 6 is under way as well as drilling to re-open the quarry (Quarry 10).

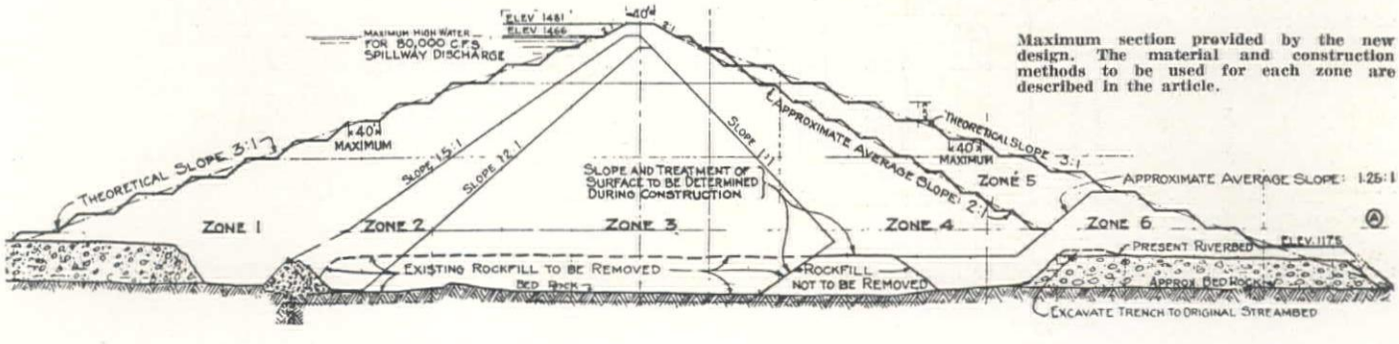
The principal work item required to permit renewal of major construction operations has been the removal of the 400,000 cu. yd. of rock fill from the stream bed. This work was carried out as a large scale operation with a 120-B Bucyrus-Erie shovel and a similar size drag line loading into trucks which hauled this reclaimed rock fill to Zone 6. Here it was dumped and sluiced with water pumped from a temporary sump. At times 10,000 cu. yd. of this rock were being handled per day. At the present time, more than half of this rock has been cleared out.

With the bulk of this fill removed the channel of the stream is being hydraulicked to rock where Zones 2 and 3 will be placed. After this final clean-up the rolled fill material will be started at once. These filling operations are scheduled to start during November.

In the meantime, abutment stripping has been started near the cut-off wall extension and this material is being used to carry up the rock fill in Zone 1. Excavation for the spillway, which will be carried forward under a separate contract, will also provide waste which can be used in Zone 1.

Water supply system

An extensive water supply system is necessary to handle the new specification requirement for sluicing every yard of the rock fill with 2 cu. yd. of water under pressure. For this purpose a sump immediately down stream



Maximum section provided by the new design. The material and construction methods to be used for each zone are described in the article.

from the toe of the dam is being equipped with a pumping installation consisting of two 2,250 gal. per min. Byron-Jackson electrically driven pumps. These pumps discharge into a 16-in. welded steel line extending to a 1,500,000 gal. steel tank being built on the east abutment of the damsite. The elevation of this tank, about 130 ft. above the crest of the dam will provide the necessary sluicing and flushing pressure. A 12-in. welded steel discharge line will deliver this water supply to headers placed on the rock fill as it is raised in 25-ft. lifts. Lines of hose will connect with these headers and discharge through nozzles, as shown in the accompanying illustration. The use of the tank permits economy in pumping operations and the equalizing of the pumping load.

In the quarry a grizzly has been built which will pass material up to a 5-in. size and has a capacity designed for a maximum output of 1,000 tons per hr. Trucks will operate between the shovels in the quarry and this grizzly, with another fleet of trucks taking material from this point in the operations to the dam. Incidentally, the contractor's plant, equipment, and original operations were described in *Western Construction News*, May, 1934.

Because of the greater base width in the new design, the contractor's extensive garage and shops are being moved a distance of about 200 ft. This has required extensive concrete foundations to be prepared and the structure moved in sections to the new location.

San Gabriel Dam No. 1 is being built under the general direction of C. H. Howell, chief engineer of the Los Angeles County Flood Control District; Paul Baumann is engineer in charge of the Mountain Division. W. B. Ream is office engineer and W. E. Christenson is chief designing engineer. E. R. Stuver is resident engineer.

The contract is held by the West Slope Construction Co., a special combination including Foley Bros., Inc.; Bates & Rogers Construction Co., Inc.; J. C. Maguire, and The Lawler Corp.

Grants Pass Sewage Plant Financed on Rate Basis

Design includes sedimentation, separate sludge digestion and chlorination during recreational season—High flood levels in river present special problem

By JOHN W. CUNNINGHAM
Consulting Engineer
Portland, Oregon

RESIDENTS of the Rogue River Valley in southern Oregon are particularly conscious of stream pollution conditions. Nearly everyone is a fisherman and accustomed to personal contact with the waters of the Rogue in pursuit of its famous steelheads and trout. Growth of the tributary communities has brought pollution to a stage no longer tolerable, and Grants Pass and Medford are being followed by the smaller communities in construction of modern sewage treatment plants.

Grants Pass is situated directly on the banks of the Rogue River. Its water supply comes from this river, through a modern filtration plant built in 1931, and the sewage from its 5,000 population is discharged from an outfall sewer below the city. The stream is not used for water supply below this point, and the low water flow of 1,200 sec. ft. gives sufficient dilution to prevent any really serious condition, but stranded sewage solids have been apparent to fishermen along the banks.

To meet this condition, the sewage plant now under construction as a PWA project will give primary treatment only, by sedimentation followed by chlorination during the seasons of recreational use. Sludge will be digested in a heated tank with gas collection, and dried on covered beds. The plant is laid out with the idea of future additions for more complete treatment, by trickling filters, aeration tanks, or chemical precipitation.

An unusual factor, affecting the plant layout, was the variation of about 35 ft. between low and high water levels in the river, and the sloping streambank site which had to be used. From past flood records the probabilities of various stages were determined. It was found that the settling tank, at an elevation which avoided sewage pumping, would be submerged for a short time about one year in five, so the motors driving the mechanism were placed in an elevated location. The motors for the sludge pumps were made removable. Sludge dying beds were placed higher, anticipating overflows once in fifteen years, reaching the glass once in twenty years.

Even the operating and laboratory floor may be flooded about once in thirty years. Only the top of the digester is above all recorded floods. Due to the site and these conditions, a rather unusual, and still very convenient operating layout has been developed. The laboratory, chlorine room, and all electrical controls are on the second floor of the operating house, approached by a walk on an embankment.

The principal factors used in the design of the Grants Pass plant are:

Present population—5,000 (4,666 in 1930)

Present average flow—600,000 g.p.d.

Design population—7,500

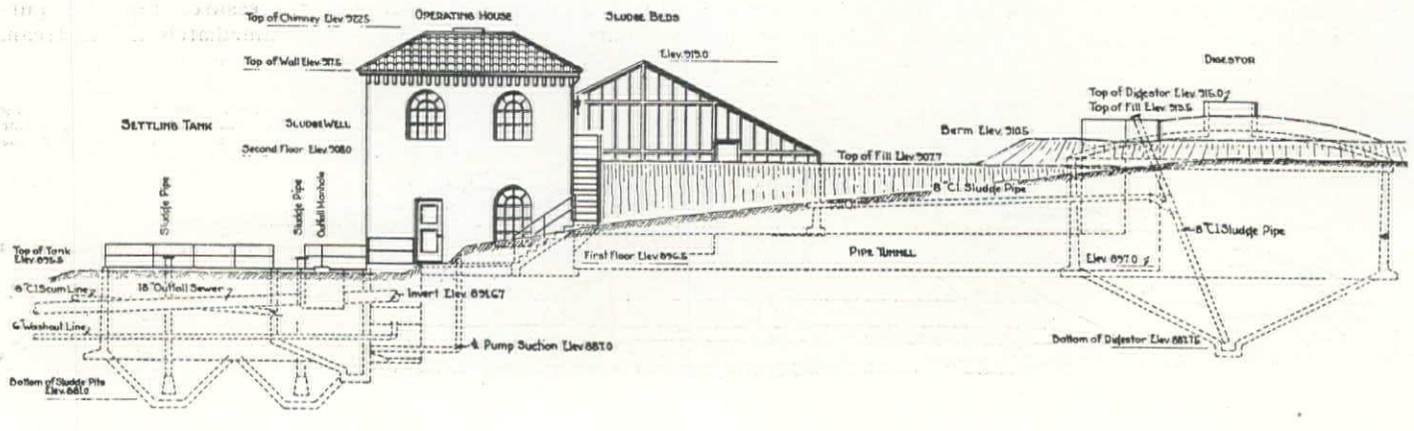
Design capacity—1,125,000 gallons daily or 150 gallons per capita

Settling period—2 hr. at average rate

Chlorination contact period—15 min.

Digestion capacity—2 cu. ft. per capita

Sludge bed (covered)—0.4 sq. ft. per capita.



Section through the plant: a 35-ft. variation between low and high water stage made it economical to provide for occasional flooding. The settling tank may be under water for a short period once every five years and sludge drying beds may be flooded once every fifteen years.

No grit channel has been provided, since Grants Pass has separate sewers, but a space between the rack chamber permits future addition of a grit channel, or chemical mixing tanks.

Bids were received for both circular and rectangular types of settling tank with equivalent capacity. The combination bid for mechanism and concrete work was found to be lower for the rectangular type, with straight line scrapers. The side-hill location in this case probably made this type the most adaptable. In plan, this basin is 36x68 ft. (outside dimensions) with a total structural depth of 9 ft. 4 in. The 8-in. floor slab is reinforced by ½-in. rd. bars on 12 in. spacing both ways. A chlorinating channel 5 ft. wide extends along one side taking the effluent from the weir discharge end to the existing outfall sewer. Sludge removal is through 8 in. cast iron lines to the digestor. The unique feature of this settling tank design, already mentioned, is the location of the driving motor inside the house on the upper floor.

The 35-ft. diameter digestion tank for the plant has a domed roof. This construction was found economical and preferable to a slab roof, though it was designed by ordinary structural methods, and does not include pre-stressed hoop steel as has sometimes been used. The vertical section of the tank is 13 ft. deep and the bottom slopes 2:1 to a central pit from where the digested sludge is pumped through an 8-in. cast iron line to the drying beds. The total depth of liquor in the digestor is 25 ft.

The digestion tank is covered for insulation purposes, and the digester manhole is connected with the operating house by a concrete conduit for heating pipes, sludge pipes, etc. This makes a layout very convenient for operation, maintenance and possible future alterations.

The covered sludge bed is of ordinary steel frame greenhouse construction. Overhead trolley litter carriers permit removal of sludge either to trucks or to a storage platform at one end of the house.

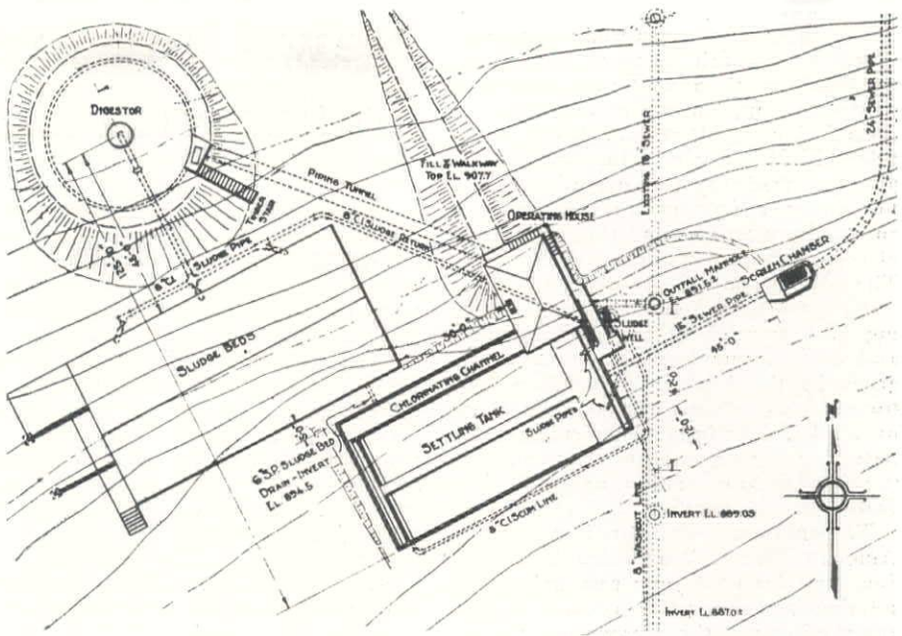
The Grants Pass project has been financed by $32,000 of revenue bonds, sold to PWA together with a grant of $13,000. The revenues are derived from a set of flat-rate charges, added to and collected with the monthly water bills of sewer users, as follows:

Residential Rates

Toilets, each	$0.10
Other fixtures, each	.03

Commercial Rates

Toilets, urinals, not exceeding 5, each	$ .10
Toilets and urinals in excess of 5, each	.05
Other fixtures not exceeding 5, each	.03
Other fixtures in excess of 5, each	.02
Laundries, cleaners, dye works and similar industries	5.00
Dairies, creameries and similar industries	2.00
Canneries, while in operation	2.00
Garages, wash racks	2.00
Restaurants and fountain sinks	1.50



Layout of plant which provides sedimentation, separate sludge digestion and chlorination during the recreational season, with the arrangement providing for future additions to this treatment to include trickling filters, aeration tanks or chemical precipitation.

The PWA state engineer for Oregon is C. C. Hockley. The Grants Pass plant was designed by Baar and Cunningham, consulting engineers of Portland, Ore., with R. E. Koon, also of Portland acting in advisory capacity. Construction is under the direction of C. V. Signor, city engineer. Warren-Northwest, Inc. are the general contractors.

Report Reviews Accident Records on The San Francisco Bridge Projects

THE San Francisco-Oakland Bay Bridge has a record of 355 men injured per million man hours, and the Golden Gate Bridge has injured 376 men for each million of man hours, according to reports issued to the authorities of each bridge by L. K. Reinhardt, supervisor of engineers, construction section of the California Industrial Accident Commission. On the construction of the San Francisco-Oakland Bridge, 1,913 men have turned in accident reports as against 637 on the Golden Gate Bridge. The total of man hours on the San Francisco-Oakland Bridge is about three times that of the Golden Gate Bridge. Two-thirds of the accidents on each bridge are those which do not require any loss of time.

The Industrial Accident Commission charges the San Francisco-Oakland Bay Bridge with fifteen deaths to date, and one for the Golden Gate Bridge.

"The expectancy in heavy construction of the nature of these bridges is one death per million dollars expended," Dr. E. M. Parlett, chairman of the Contractors' Safety Committee, said, in explanation of the reports. "The San Francisco-Oakland Bay Bridge has expended almost forty million dollars, so their fifteen deaths are not a high ratio.

"The East Bay section of the San Francisco-Oakland Bay Bridge provides two miles of the most hazardous work in industry. Insurance rates for structural steel erection at great heights are $22.18 per hundred compared, for example, to $6.60 per hundred for cable spinning such as that which is in progress on the West Bay section of the San Francisco-Oakland Bay Bridge and the Golden Gate Bridge.

"Suspension bridge building is rated by insurance actuaries as three times as safe as structural steel erection. This is borne out by our experience on the Bay Bridge where no man has been killed on cable spinning but seven have been killed on structural steel erection.

"The Bay Bridge had an unusual drowning hazard which they very ably overcame by installing, under our direction, strong hand railings, safe stairways, and other accident preventive measures on caissons.

"The San Francisco-Oakland Bay Bridge has twenty-seven piers surrounded by deep water which is twenty-seven times as many piers surrounded by water as we had to contend with on the Golden Gate Bridge, and consequently we had more drownings on the San Francisco-Oakland Bridge although the number fell below expectations."

New Convention Record for California Section A.W.W.A.

Annual meeting at San Diego reaches new high for attendance and exhibits—Dinners are outstanding successes—Officers reelected to direct National Convention in Los Angeles next June

WITH a registered attendance of 835 and a full display of exhibits, the 16th annual convention of the California Section, American Water Works Association, held at San Diego, October 23-26 sustained the continuing progress made by this organization in the forwarding of social contacts among its members and the presenting of technical information at its sessions. The dinner meetings were well attended and were climaxed by a gathering of nearly 900 at the dinner dance and entertainment on Friday evening given by the Water Works Manufacturers Association under the direction of R. W. Martindale, chairman. On Saturday the convention adjourned to the San Diego exposition as the closing feature of the meeting.

The national convention of the American Water Works Association in Los Angeles next June resulted in the nominating committee recommending the retaining of the present officers for 1936. The convention, therefore, unanimously re-elected the following officers for the ensuing year: H. A. Van Norman, president; R. F. Brown, vice-president; J. E. Phillips, secretary-treasurer. N. A. Eckart was elected national director and will take office following the Los Angeles convention next June. The Purification Division took similar action and re-elected: Ray L. Derby, chairman; G. E. Arnold, vice-chairman; and C. M. Hoskinson, secretary.

Outstanding action taken at the business session was the recommendation and approval of the principle of voluntary licensing for water works operators using three grades of membership in accordance with the recommendations of the national body. Further, the appointment of a committee was authorized to classify existing operators under the three grades of membership and to arrange for certificates to be prepared for those who are voluntarily licensed.

A committee, C. G. Gillespie, chairman, reported on the Hotel San Diego where the convention was held and stated that, with the coöperation of the management, the sanitary conditions of the building were given the approval of the committee. This marks one of the first times where this has been done on the Pacific Coast.

Golf prizes

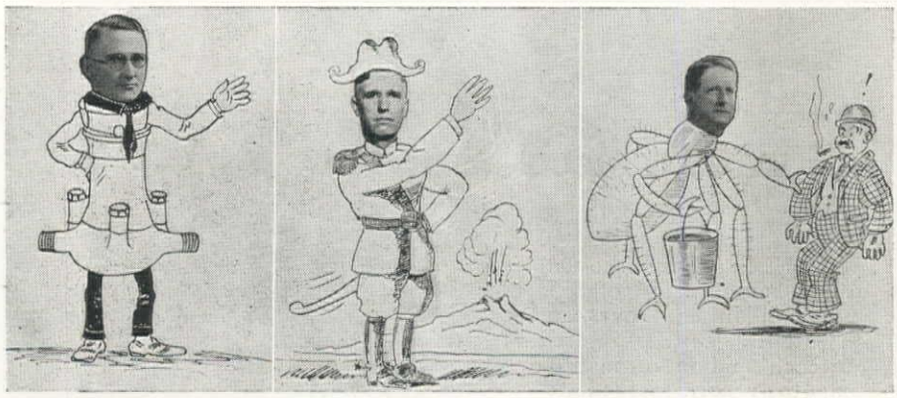
Golf occupied the attention of many of the delegates during the first day and those who exhibited sufficient skill, or luck to receive one of the numerous prizes, are listed:

Low Gross—Gil Cochrane.

First Flight—Low Net, Robert W. Martindale; Second Low Net, E. W. Greene.

Third Flight—Ralph W. Hyde; Second Low Net, W. O. Weight.

Fourth Flight—Low Net, W. P. Woodridge; Second Low Net, A. L. Fricke; Most Pars, K. W. Brown; Most Birdies, Richard Young; Odd Holes Low Score, T. A. Lugo; Even Holes Low Score, W. R. Jones; Mystery Holes Low Score, C. H. DuBoise.



(Above—left to right):

J. R. BARKER—"No need to tell you anything about this one. Everybody knows Jim Barker, or at least they should by this time. Jim's a big noise in the meter business and our prized digger-upper when it comes to finding money for putting on conventions. Jim's all set to cut loose with that annual blast of his on Friday night, only this year he is going to establish a new record and completely unwind himself in thirty minutes flat."

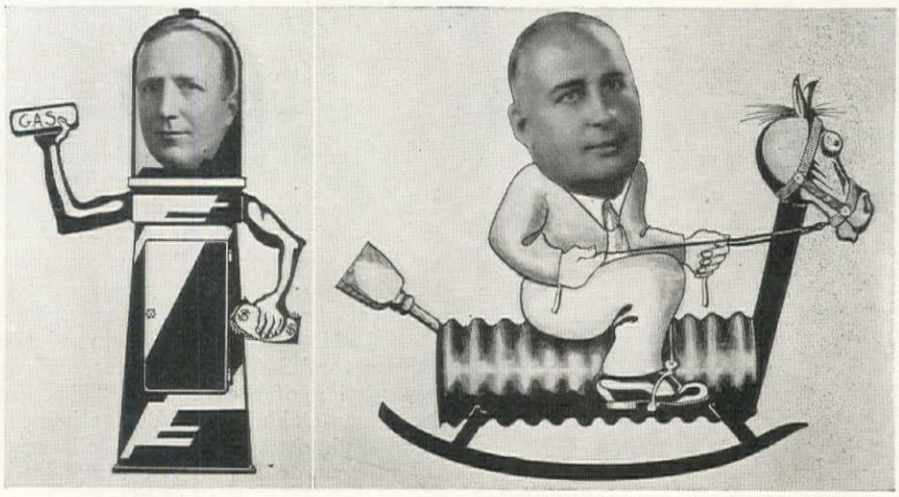
C. G. GILLESPIE—"Russia has its Stalin, Germany its Hitler, Italy its Mussolini, and California its Il Duce Gillespie, who for many years has been after Ethiopians in the woodpile, in the form of transgressors of public health laws and regulations, and with his mailed fist crushes all opposition."

N. A. ECKART—"Spider Eckart. An active, aggressive spider who has spun his web firmly over the San Francisco Water Department. His web is most effective in snaring politicians and keeping them out of the way while he runs the water works. The name has followed him from his college days when he was known as Spider Eckart, manager of the U. C. baseball team. Like all good water spiders, he keeps away from black widows."

(Below—left to right):

ALEX BELL—"Windy Bell holds in his hands a bottled up quantity of material used for high pressure sales talk. The upper part of the contraption consists of a vacuum jar, the perfect vacuum being in the bell dome. These trinkets sell for a mere trifling sum, as little as $1,500."

CLAUDE FAW—"Claudius Faw rides to work, to war, and to play on his horse, Wrinkled Pipe the First, sired by Calco, and damned by competitors. Our hero threatens to make great progress in sales, with the help of the ladies, since he guarantees that water after passing through his wrinkled tubing automatically marcels even the most stubborn hair."



Dinner meetings

Under the sponsorship of the Purification Division, a dinner meeting and entertainment was the feature for Wednesday evening, in accordance with the established practice. Nearly 300 members and guests were entertained, following the dinner, by a skit prepared and presented by members of the division which featured a scene in a water works laboratory and concluded with a series of lantern slides showing many well-known members of the section disguised as water organisms or exhibiting other characteristics. Some of these cartoons appear as illustrations on these pages. The concluding social event was the dinner dance and entertainment put on by the Manufacturers Association for the delegates and guests. An overflow crowd was provided with entertainment under the direction of R. W. Martindale, with J. R. Barker, acting as toastmaster.

General sessions

The problems of municipal water softening and recent installations of the Zeolite process were reviewed in a paper by Eskel Nordell of the Permutit Co. of New York.

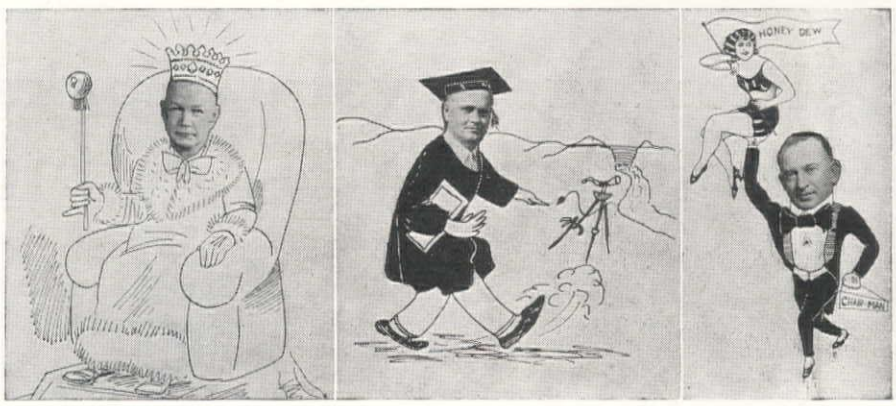
The general features of the Colorado River aqueduct, including its purpose, design and construction methods, were described in an illustrated talk by Prof. Franklin Thomas of the California Institute of Technology. This major construction project has already been reviewed in *Western Construction News* with considerable detail both as to design and construction.

The long and interesting history of the development of the municipal water supply for San Diego was reviewed in a paper by Fred D. Pyle, hydraulic engineer, San Diego water department. This paper traced the development since the building of the Mission dam in 1812 to the recent construction of the El Capitan dam. The unique feature of the water supply program for this city is the necessity for complete conservation of stream flow and to regulate for a hold-over period of eleven years. The paper presented detailed information on the physical properties comprising the system, the water yield of the areas and the quality of the supply.

"Practical Problems in Water Distribution" were reviewed by E. W. Breitkreutz, assistant engineer, Los Angeles Bureau of Water Works. The paper reviewed the procedure of the Los Angeles department in the maintaining of 40,000 gate valves and other distribution facilities. He recommended that valves on trunk lines be operated at least once every six months and inspected every ninety days while smaller valves on the distribution mains should be operated every year and inspected every six months. He pointed out the problems which result from the preference given to other utilities over water mains in the streets of Los Angeles. This results in water mains being crowded out of their logical position in the street, maintenance is rendered difficult and they are more frequently damaged by construction operations. The essential value of water mains to the community should permit them to occupy first place in the location of utilities.

Specific cases of cross connection contaminations and back siphoning were reviewed in a paper by G. E. Arnold, water purification engineer, San Francisco Water Department. His remarks were confined to experiences in the San Francisco department and directly to a recent survey which found 221 active cross connections between private supplies and the municipal system. The correction of these cross connections with the installation of approved double check valves, turned the attention of the survey to sanitary conditions existing in building plumbing. A supplemental survey, which was carried out to the extent of the available funds, indicated that 30% of the downtown buildings examined had dangerous cross connections in the plumbing and sanitary facilities. One of the interesting points brought out by Mr. Arnold was the fact that, in spite of the activity of the U. S. Public Health Service, the federal buildings in the city were among the offenders and nothing could be done to rectify this situation.

In discussing this paper, Prof. S. B. Morris, Stanford University, pointed

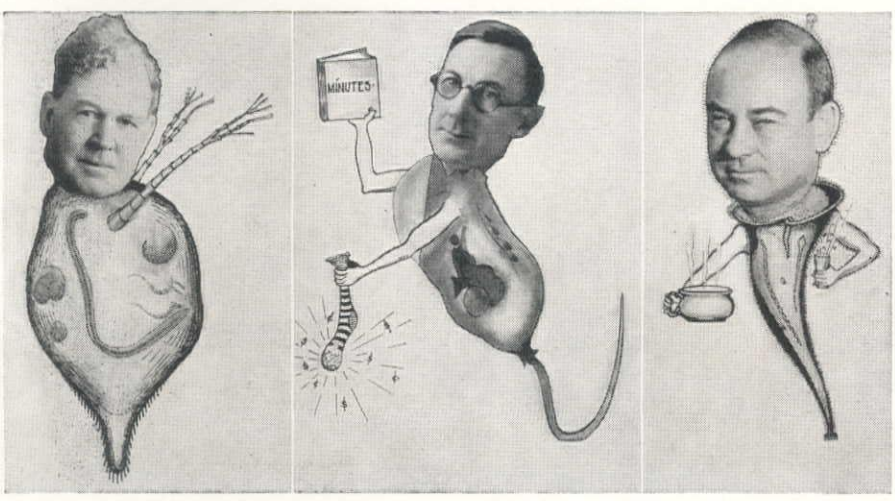


J. E. PHILLIPS—"This pleasant monster goes by the name of Fullopus, and is particularly active during October of each year. As a matter of fact, some authorities go so far as to say that for the other eleven months of the year it develops a characteristic known as suspended animation. However, a lot of the high powered water workers here tonight would never have gotten to San Diego were it not for the annual coming to life of good old Fullopus."

R. F. GOUDEY—"Suidapod Gouicnus—This genus is pictured as found in its native habitat, at both ends of the water problem. In one hand the sparkling product of the Los Angeles Water Department and in the other equally sparkling output of the Griffith Park sewage plant. Studies have shown that this organism produces the same results working at either end of the water system. Goudicanus drinks either or both."

(Below—left to right):

H. A. VAN NORMAN—"This is B. Presidenticus, the type feared by politicians who seek to horn in on municipal water departments. The likeness of the Owens Aqueduct is plainly seen. Note the characteristic siphon formation."



(Above—left to right):

G. W. PRACY—"His majesty, Pracy the First, exalted ex-ruler of our National Association. His knaves perform the modern miracle of keeping water running up hill, up the seven hills of San Francisco."

S. B. MORRIS—"Getting over Tehachapi in one jump, Sam Morris left Pasadena and made a non-stop flight to the Stanford Campus. After building and carving his initials on a dam, which was constructed to give Mr. Hoover something to dedicate, he got in return a job at the Palo Alto institute for broken-down football players."

R. W. MARTINDALE—"A magician—ladies and gentlemen—you can see he has plenty up his sleeve as he pulls from his hat the entertainment for the men who make water. His skill he ascribes entirely to his cast iron background. He says 'It's a Pipe.' "

out that the emphasis in the matter of contamination to public water supplies has swung, during the past few years, from the cross connections to private supplies to the problem of defects in plumbing facilities. He suggested a requirement providing for inspection and permits in the installation or alteration of piping in buildings, to correct this situation.

The requirements of the Board of Fire Underwriters in the design of distribution systems for public water supplies was reveiewed in a paper by Robert E. Andrews, assistant chief engineer, National Board of Fire Underwriters.

Water purification

The design and operation of the water treatment plant of Boulder City was reviewed in a paper by D. M. Forrester, Bureau of Reclamation, who was in charge of the plant during the first three years of its operation. The design and general features of this plant were described in *Western Construction News* October 25, 1931.

Papers by W. W. Wyckoff and R. R. Proctor, engineers of the Los Angeles Bureau of Water Works, presented detail information on the design of earth fill dams. The papers covered the relation of side slopes to percolation followed by detailed data on the gradation and moisture content of the fill material to secure the maximum compaction and imperviousness. This general subject has received considerable attention in technical conventions and publications since the outstanding work of Mr. Proctor in connection with the construction of the Bouquet Canyon Dam.

The papers presented under the direction of the Water Purification Division in a joint session with the entire section, included some interesting reports on developments carried out by the Los Angeles Bureau of Water Works in the improvement of existing methods for the application of copper sulphate to reservoirs and the control of algal growths in the new Morris Reservoir by the City of Pasadena. Abstracted reviews of these papers will be presented in forthcoming issues. A paper on the activated carbon plant at Culver City described the installation which was reviewed in an article in *Western Construction News*, April, 1934, by C. P. Harnish, chief engineer of the American States Water Service Company.

California Sewage Works Association Fall Meeting

Sanitary group inspects plants on San Francisco peninsula followed by technical sessions

FOLLOWING an inspection trip which included five sewage disposal plants of communities along the San Francisco peninsula on Sept. 23, the California Sewage Works Association held the technical sessions of its eighth annual convention at San Francisco on Sept. 24, in conjunction with the Engineers and Street Superintendents Section of the League of California Municipalities. Among the important official actions taken by the association was the passage of a resolution approving the principle of licensing operators and requesting a new committee to report on the details of classification and procedure. The highlight of the meeting was the talk by Fred West, operator of the Stockton plant which, although delivered in a "Will Rogers" style, contained much food for thought on the part of designers, operators, and public officials.

Officers elected for the ensuing year are: A. M. Rawn, president; E. A. Reinke, first vice-president; R. F. Goudey, second vice-president; and F. D. Bowles (202 Law Building, Los Angeles), secretary-treasurer.

Business session

The convention started with an inspection of the Palo Alto plant which has been in operation about one year. This plant provides plain sedimentation with separate sludge digestion and discharge of effluent into the Bay.

The group then assembled at the Community Center in Palo Alto where the reports of the committees were received. C. C. Kennedy, reporting for the committee on legislation, reviewed the bills designed to make the financing of sewage works easier, which had been passed by the legislature, but vetoed by the governor. The committee on safety rendered a report read by T. F. Eastman dealing with the precautions to be taken by crews working in sewer manholes.

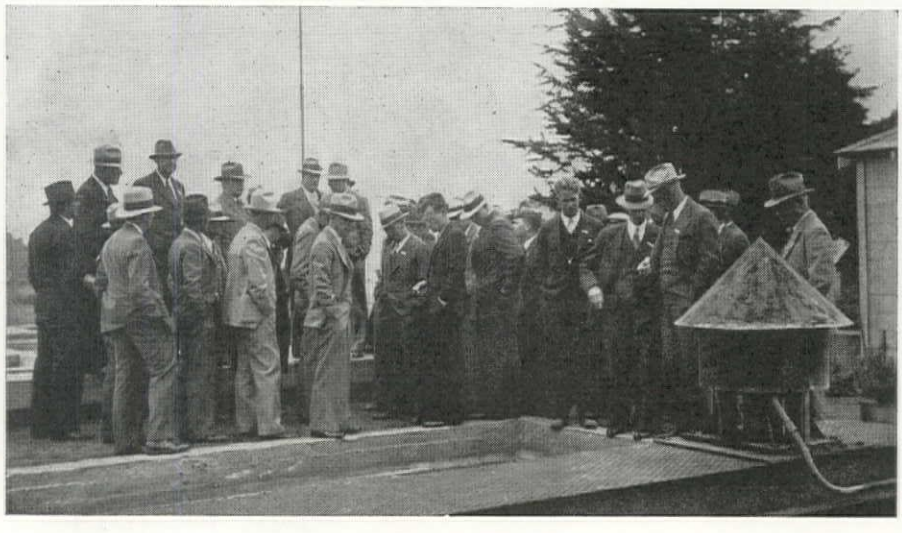
A report of the committee on the licensing of plant operators was read by A. C. Beyer and, as a result, a resolution was passed by the association approving the principle of licensing for sewage plant operators. The resolution also requests the new committee to further the study of this question and to prepare a report on the classification of operators and the methods of procedure in licensing, to be presented at the spring conference in 1936.

On the question of a school for operators, the committee appointed last spring presented its report, read by Harold F. Gray, chairman. Briefly, the report indicated that the committee found a relatively small amount of interest on the matter of an operators school. Replies to questionnaires on the subject total only fourteen out of two hundred letters sent out. As to a recommendation, the committee reported that interest was insufficient at the present time for the inaugurating of an operators school and requested that a new committee be appointed to carry on the survey to the point of either finding a school justified some time in the future or demonstrating the lack of interest. Several comments made indicated that the question of licensing operators and the establishing of a school might have a mutual interest, and one support the other.

Palo Alto plant

The Palo Alto sewage treatment plant was described by H. O. Banks, former plant operator. The plant be-

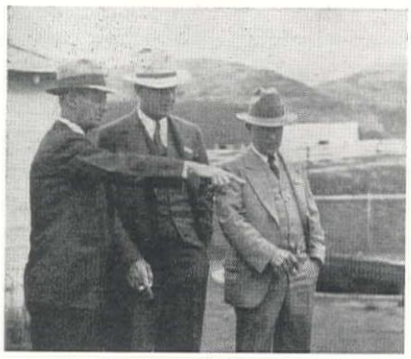
Group inspecting one of the five sewage disposal plants on the trip from Palo Alto to San Francisco.



gan operation in July, 1934, and handles an average flow of about 1.5 m. g. d. or 74 gallons per capita. Plant capacity is 3 m. g. d. The plant provides for plain sedimentation with separate sludge digestion in a 50-ft. diameter reinforced concrete digester. The effluent from the sedimentation tank discharges into San Francisco Bay and the sludge from the digester is dried on beds adjacent to the plant and pulverized as use for fertilizer in the city parks. The screenings, removed by a Link Belt mechanical screen average about 100 gal. per day (screenings and grit) and are removed to the garbage dump. The sedimentation process removes 53% of the solids.

Recently, the plant has installed an engine, operated on the gas from the digester which develops electric power for the pumps and provides incidental heat for the digester. With the heating resulting from the engine operation, the temperature in the digester has risen to about 100 deg. F., and this has increased the efficiency of this unit. The gas from the digester averages about 1 cu. ft. of gas per day per capita.

The cost of operation (first year) has amounted to $12.30 per million



A. W. Wyman directs the gaze of President Rawn and Harold Gray. This scene was at the plant of the San Francisco County Jail.

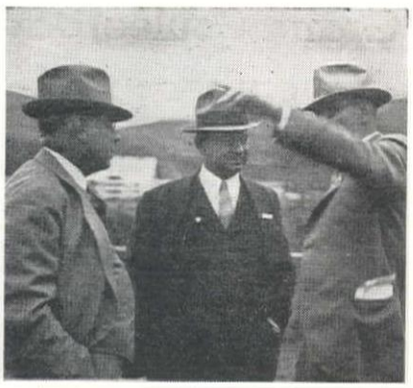
gallons of sewage treated, not including carrying charges on the plant. Without the gas engine operating cost figures were about $15.35 per m. g. and they are estimated to be about $10.70 per m. g. with the gas engine in operation.

Following the morning session the group was guest of the municipality at luncheon, through the courtesy of J. F. Byxbee, city engineer.

Inspection trip

The first stop on the afternoon inspection trip was to view briefly the preliminary construction operations for the plant at San Mateo which will provide for plain sedimentation with separate sludge digested and discharge of the effluent into the Bay. Present work consists of building the pumping plant.

At Burlingame, a stop was made to inspect the recently completed plant which will start operations in October. This plant of 2 m. g. d. capacity will also provide sedimentation and separate sludge digestion with discharge of



Clyde Kennedy and Ray Goudey listen while Ed Reinke explains with that "I'll take a chocolate eclair" gesture.

the effluent into the Bay. These two plants represent an expenditure of nearly $200,000 and serve a population estimated at 30,000.

Continuing on to the San Francisco County Jail, the plant built for that institution was inspected. This plant includes an Imhoff tank as a preliminary stage followed by a mechanical aeration, with chlorination of the effluent, which is used for irrigation of the prison gardens. The plant has a capacity of 0.1 m. g. d. and began operation about a year ago.

In Golden Gate Park the activated sludge plant built in 1932 to provide water for irrigation in the park was inspected. This installation, described in *Western Construction News*, August, 1934, provides for complete treatment by the activated sludge process with chlorination of the effluent. Sludge is dried on adjacent beds and used as a fertilizer in the park.

The convention dinner held that evening was attended by about eighty members and guests who listened to an address by Mayor Pomeroy of South Gate on the field of usefulness for this type of organization in municipal and state government.

Joint sessions

The second day of the convention was devoted to joint technical sessions held with the engineers and water superintendents section of the League of California Municipalities.

The first paper was a review of "The San Francisco Sanitation Problem" by John J. Casey, city engineer. The essential features of this program which is now approaching the construction stage was reviewed in *Western Construction News*, July, 1935. The serious problem of sewer pipe disintegration at Long Beach was reviewed in a paper by J. W. B. Blackman, city engineer and director of public works. Although sewer lines in Long Beach are not unusually long, grades are flat and temperatures are high resulting in a serious hydrogen sulphide condition. The city has devoted a large amount of study to this problem and the measures which are now being considered include control by chlorination and the use of a lead spray to protect the sewers.

The increasing importance of the problem of industrial wastes in sewage, which provided the subject of discussion on several occasions during the convention, was reviewed with respect to the condition at Stockton, California, by W. T. Ingram of the San Joaquin County Health Department. This paper presented the results of a study which has extended over about three years covering the contamination of the San Joaquin River with particular reference to the industrial wastes resulting from increased commercial activity in and around that city. The severe conditions resulting from handling industrial wastes which double and treble the load on the existing disposal plants and adjacent water ways was described in detail.

Gas engine symposium

A symposium on gas engines operated by sludge gas occupied the afternoon session. These papers were: "Six Months' Experience with a Two-hundred Horsepower Engine," by Carl F. Tennant, chief operator, Los Angeles County Sanitation Districts; "Eastern Experience with Gas Engines," by Samuel A. Greeley, Greeley & Hansen, Chicago, Ill.; "Adaptation of Gas Engines to Use of Sludge Gas Fuel," by A. K. Hegeman, sales engineer, Smith-Booth-Usher Co.; "Ontario's Experience with a Gas Engine," by Austin Burt, city engineer, Ontario; and "Generation of Electricity at Palo Alto with a Gas Engine," by H. O. Banks. This symposium indicated definitely the increasing trend toward the use of sludge gas in internal combustion engines to provide power and waste heat for use in disposal plants.

Plant operators talk

The meeting closed with short talks presented by plant operators. William Berg of San Bernardino had a paper describing that plant and its operation. Fred West of Stockton made a talk which was the highlight of the convention and an important contribution to the practical aspects of sewage disposal. Beginning with constructive criticisms as to design, Mr. West continued to describe the problems of the operator in so far as the interest of city officials is concerned in plant operation, after the first curiosity has worn off. The talk was in a Will Rogers style, as Mr. West related his trying experiences, but there was much food for thought in the information he presented.

The final talk, presented by A. B. Shearer, Marin County Sanitary Distrist, No. 1, related how Mr. Shearer had improved, redesigned, and rebuilt pumps in the plant he operates to improve efficiency almost three times that obtained when he took over the work. This work included a complete rebuilding of the runners to eliminate clogging and secure greater efficiency. Cost of the work done by Mr. Shearer was only a small fraction of the expenditure which would have been required for new equipment.

Continued Progress on Grand Coulee Dam Indicates Concreting in November

Excavation on east side of river is slower as a result of wet ground—Timber cofferdam completed on east side

PROGRESS in all phases of construction at Grand Coulee Dam has continued through the summer and fall months at the same steady pace at which it has been maintained since work was begun over a year ago by the Mason Walsh Atkinson Kier Co.

Excavation is progressing on the east side of the river, and a conveyor system similar to the one used in the west side excavation is being used for the disposal of the dirt. However, more difficulty has been encountered in the east excavation, and, so far, excavation has been considerably wetter. Pumps have been maintained at all times. The wet condition of the muck, slows down excavation and not as much yardage can be hauled by each tractor. Tractors pulled 16-yd. loads most of the time on the west side, but a large part of the time on the east side, they have been able to handle only about 8 yd. The wet muck has a tendency to stick in the wagons and time is lost in cleaning. Some of the time, mats have had to be used for the shovels, and considerable time is lost in moving the mats.

Conveyor across river

Muck from the east side is carried across the river by a conveyor that ties in with the main line of the west side conveyor. It is dumped in Rattlesnake Canyon, about a mile and a half away. Because of the high fill in Rattlesnake Canyon, some difficulty has been experienced with the stacker, due to shifting of the fill. Two feeders have been kept in operation compared with four in the west excavation. In spite of conditions not as favorable as those on the west side, between 20,000 and 25,000 yd. have been moved each day. Bedrock has been exposed in several areas and it is expected all excavation that can be done at present will be completed by January.

A timber cofferdam has been constructed on the east shore. Wakefield piling, ranging from 30 to 40 ft. long has been driven to form the outside face. Penetration, largely in clay, of this course ranges from 10 to 25 ft. Twenty feet behind the outside face is a crib backwall, tied to the piling with tie rods. The cofferdam is to be filled with sand and gravel. It encloses the east excavation from the river and its purpose is to prevent leaks from the river. It is a temporary structure only and will be submerged by high water next spring. A 3:1 slope, 40 ft. behind the inside of the cofferdam is being excavated to bedrock. This forms a berm between the river and excavation, allowing excavation to be carried on in safety.

Rock excavation on the west side is well under way. An average of 3 ft. is being removed from bedrock to give a suitable footing for the dam. This rock is being used for rip rap on the west tailrace slope. A mat of heavy copper wire has been laid in the west tailrace slope which is to provide for a power house ground.

Construction of equipment for handling cement has been completed. This includes eight cement silos, a compressor plant and an 11-in. pipe line to the west mixing plant. Cement is to be pumped from the blending silo to the mixing plants.

A suspension bridge has been built to transport aggregate from the live storage aggregate yard on the east shore to the west mixing plant. Two 2½-in. cables, supported by three rocking steel towers were used for the three spans of the bridge. A 36-in. conveyor belt carries the aggregate across the bridge.

Only a few minor details remain to be completed on the government steel highway bridge. It will probably be opened for traffic some time late in November. Trains are now making delivery of material to the government warehouse, recently completed just below the west tailrace.

Work on the west mixing plant is nearing completion, and the fabrication of the steel construction trestle to be used in pouring the concrete is well under way.

Several additional cells, connected to the main cofferdam, have been driven behind the west cofferdam. These cells connect two single walls of sheet steel piling, 50 ft. apart. Excavation between these two walls is being carried on as rapidly as possible. As the dirt is taken out, the walls are braced apart with heavy timber trusses. About 15 ft. remains to be excavated to bedrock. It is anticipated the first concrete will be placed there. Activity at the damsite is now centering around preparation for pouring concrete. Present indications are that the first concrete will be placed late in November.

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Preliminary Work Starts On Cajalco Dam Project

Active construction operations have started on the Cajalco dam, terminal structure for the Colorado River Aqueduct, being built by the Metropolitan Water District. Construction crews of the Griffith Co., contractor for building the dam, began erection of camp buildings during the latter part of September. The estimated cost of the project is $6,500,000.

The design of the structure and the principal items in the construction operations were outlined in *Western Construction News*, September, 1935. The Griffith Co. was the low bidder at a figure of $4,646,856.

Personally Speaking.....

J. C. Stevens, consulting engineer of Portland, has been appointed chairman of the general committee to arrange for the annual convention of the American Society of Civil Engineers to be held in Portland next summer. Mr. Stevens has appointed the following subcommittee chairmen: E. B. MacNaughton, C. I. Grimm, J. W. Cunningham, C. P. Keyser, O. E. Stanley, J. H. Polhemus, and Ben S. Morrow.

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John C. Page, for the past four years office engineer for the Bureau of Reclamation on the Boulder Dam project and an engineer with the Bureau since 1909, has been appointed Chief of the Engineering Division, with headquarters in Washington. Mr. Page succeeds George O. Sanford, who was recently named general Supervisor of Operation and Maintenance for the Bureau. Mr. Page, who is well known in western construction circles through his long connection with the Bureau and particularly through his services on the Boulder Dam project, is a graduate of the University of Nebraska. He entered the employ of the Reclamation Bureau in 1909 as an engineer on the Grand Valley project in Colorado and served on this project until 1931, acting in the capacity of superintendent during the last six years. In 1931, he was transferred to the Boulder Dam project as the principal assistant to Walker R. Young, with the title of office engineer.

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C. B. McCullough, bridge engineer and assistant state highway engineer of Oregon has been granted a year's leave of absence to be spent in studying the needs for highway bridges on the Pan-American Highway in Costa Rica. Mr. McCullough left for this new work in October and will make his headquarters in San Jose, Costa Rica, and will be associated with E. W.

James, chief of the division of highway transportation, U. S. Bureau of Public Roads.

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LeRoy J. Snyder, one of the assistant engineers on the Boulder Dam project, has recently been transferred to the Denver office of the Bureau of Reclamation.

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George W. Bohanon has been appointed chief deputy engineer of Spokane County, Washington by Ted Ingels, county engineer. Mr. Bohanon takes the position formerly held by C. F. Griggs, who resigned to accept a position on railroad work for the Diamond Match Co. Mr. Bohanon graduated from Washington State College in 1922 and has had experience on highway work and mining, followed by several years' work in the county engineer's office.

Obituaries . . . . .

John Treanor, civic leader of Los Angeles and president of the Riverside Cement Co., died at his mountain ranch October 20 as a result of an accident when he fell from the roof of one of the ranch buildings. Mr. Treanor was known to the engineering and construction industry because of his interest in the development of low-heat cement at the plant of the Riverside Cement Co. during the past few years.

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H. V. Gates, for many years chief engineer of the Oregon Railway & Navigation Co. and well known utility builder and executive in the Pacific Northwest, died in Portland, October 12, at the age of 89. Mr. Gates was a Civil War veteran and state commander of the G. A. R. at the time of his death. He was the founder of the Gates Pipe Co. and was instrumental in the building of various utilities at Klamath Falls and water and light plants at Dallas, Hillsboro, and Hepner, all in Oregon.

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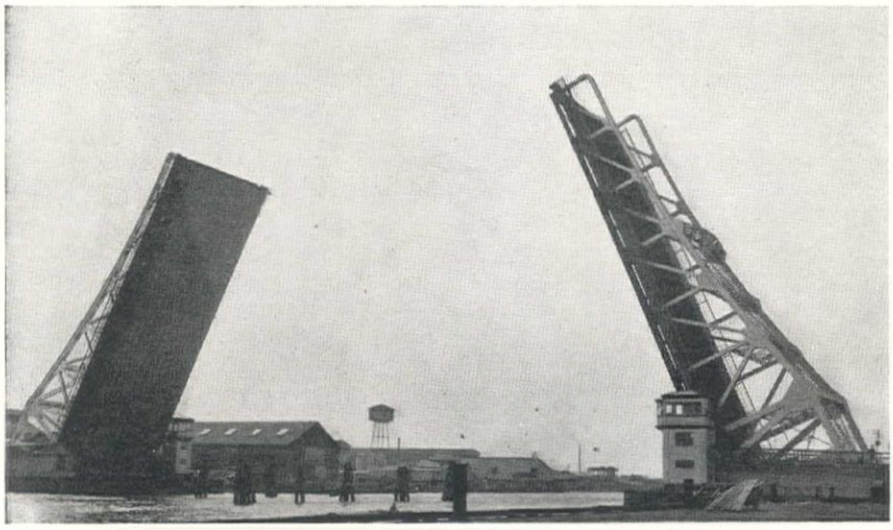
R. J. Spatz, pioneer Wyoming contractor and builder of some of the first improved highways in that state, died at his home in Cheyenne at the age of 64. Mr. Spatz came to America from Germany about 45 years ago and after spending several years in Minnesota and Canada went to Cheyenne in 1907 and entered the contracting business.



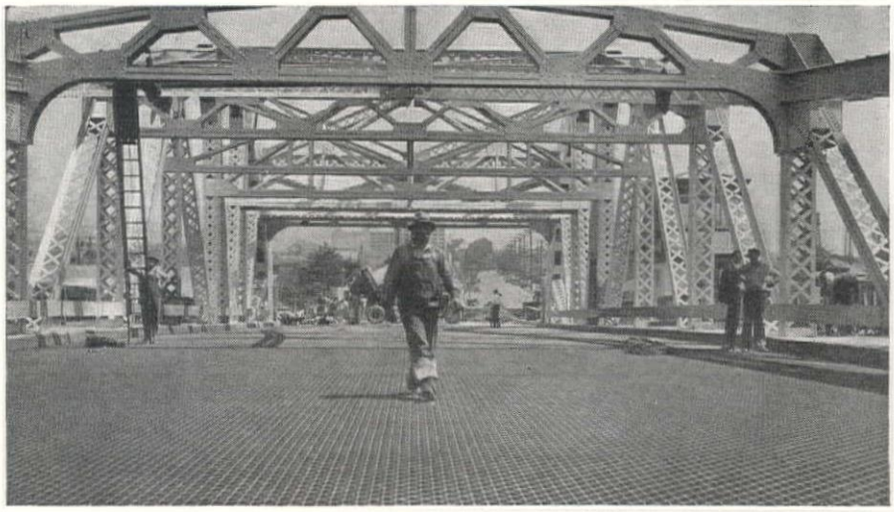
Park St. Bridge Completed at Oakland Forms Important Link With Alameda

TO REPLACE a 40-yr. old swing span across the estuary separating Oakland and Alameda, Calif., the County of Alameda has recently completed and placed in service a double leaf bascule bridge of 240-ft. clear span providing four lanes for vehicular traffic on its 44-ft. roadway. This new structure will form an important link in the transportation facilities between the two cities and tend to relieve the traffic load on the Posey Tube which has become unusually heavy the last few years as a result of the inadequacy of bridge crossings. The work was started in 1934 and the structure was dedicated in October, 1935.

The original swing bridge at this site was erected by the Federal Government in 1894 and in the last forty years of its active service the structure had become badly rusted, obsolete in point of service and its members were distinctly overstressed for modern loads. In addition, the main supporting pier was undercut with the tidal flow in the estuary and these conditions resulted in its condemnation and the decision of the county to construct a new crossing at this location. The County of Alameda had taken over the structure from the government in 1914 for maintenance and repairs.

The new bridge provides a vertical clearance of 21 ft. above mean lower low water which will allow barges and small craft to pass along the estuary without requiring opening of the bridge. The structure will open to provide a clear channel width of 240 ft. between fender systems, as compared with the two 120-ft. channels provided by the old swing bridge. The width of roadway for the new structure is 44 ft. providing two lanes of traffic in each direction which give a capacity of about three times that of the old structure. Incidentally, the deck is an open mesh steel construction which com-

Open mesh steel deck construction used on 44 ft. roadway.



bines the advantages of light weight, low wind resistance, non-skidding surface, and cleanliness.

The construction of the underwater pits which house the 600-ton counterweights constituted a difficult piece of construction work. They were built in the dry, inside heavy cofferdams of steel sheet piling. These cofferdams were 65 x 75 ft. in plan and the head of water was 40 ft. In size they approach the largest structures of their kind ever built without the use of tremie concrete seal.

Each of the two bascule leaves is balanced on 22-in. diameter trunnions, about which the leaves rotate. The distance between the centers of these trunnions is 288 ft. Counterweights for each leaf weigh about 600 tons and are built of heavily reinforced concrete with the majority of the aggregate consisting of magnitite which provides a unit weight of about 187 lb. per cu. ft. for the concrete. These counterweights are of the under slung type, out of sight below the roadway level in the underwater pits.

Bridge operation

The operating mechanism is designed to open both leaves in an interval of one minute against a 20-mi. an hour wind. For higher wind velocities a longer period is required for opening. The alternating current from the main source of supply is converted into direct current at the structure and operates the two 75 h.p. motors for each leaf which work through differential gears and large reduction gears to racks set on 41-ft. radii on each of the two trusses for each leaf.

The leaves are in balance and the work of the motors overcomes friction, inertial resistance, and wind or air resistance while the leaf is in opened position. About 75% of the work done by these motors is to overcome wind or air resistance which indicates the reason for using the open grid type of decking. The steel grid construction for the surfacing provides an 80% reduction in the area exposed to the wind and effects a 30% reduction in wind resistance. A conservative allowance for this reduction in wind resistance provides a substantial saving in operating costs.

Both leaves are controlled by a single operator using a remote control mechanism through an interlocking system which prevents the operator from departing from the proper sequence of steps in opening or closing the bridge.

The total cost of the bridge including approaches and right of way is about $845,000 which was financed by the County of Alameda out of its share of the state gas tax money and a grant from the PWA. The main contract for the structure was carried out by McDonald & Kahn Co. and was awarded Jan. 29, 1934. The bridge was designed and built under the general supervision of Burnett Hamilton, county surveyor, Alameda County.

UNIT BID SUMMARY . . .

Note: These Unit Bids Are Extracted from Our Daily Construction News Service

Pipeline Construction . . . . .

Los Angeles, Calif.—Pipeline—Fontana to Glendora

Contracts awarded to American Concrete & Steel Pipe Corp., 4635 Firestone Blvd., Southgate, Calif., $1,968,633 (SCHEDS. 4P & 5P) and to United Concrete Pipe Corp., Box 1, Sta. H, Los Angeles, $1,127,786 (SCHED. 8P) by Metropolitan Water Dist., Los Angeles, for construction of precast concrete pipe, steel pipe or cast-in-place concrete pipelines and appurtenant works of the Colorado River Aqueduct distribution system, between Stations 926 plus 00 and 2257 plus 50 of the Upper Feeder, involving 25.09 mi. of pipeline between point 10 mi. west of City of San Bernardino and point ½ mi. north of the City of Glendora, under Spec. No. 115.

SCHEDULE 4P—American Concrete & Steel Pipe Corp., 4635 Firestone Blvd., Southgate, $1,040,055 for construction of precast concrete pipe for the Upper Feeder betw. Sta. 926-0 to 1185-40. Pipe dia. 12′ 8″; length 25,867 ft. ALT. to Sched. No. 4C. Bids from:

(1) American Concrete & Steel Pipe....$1,040,055 (2) Chicago Bridge & Iron Works.....$1,370,025

		(1)	(2)
465,000	cu. yd. exc. for pipe, side slope treatment	$.31	$.44
1,300	cu. yd. excavation for structures	1.00	1.50
200,000	cu. yd. backfill	.21	.30
450	cu. yd. concr. in struct. reinforced	17.50	20.00
50	cu. yd. concr. in struc. plain	12.50	20.00
10,000	cu. yd. concrete in cradle	$4.60	$6.50
25,867	lin. ft. precast concr. pipe, cage reinf.	17.10	25.00
46,000	lb. placing reinf. steel in structures	.01	.015
3,700,000	lb. furn. & pl. reinf. stl. in prec. pipe	.038	.04
14,000	lb. furn. & inst. thimbles for MH, air valve	.20	.10
56,000	lb. install. miscellaneous metal	.03	.06
100	ton mi. hauling steel	.40	.50
13,000	ton mi. hauling cement	.10	.10

SCHEDULE 5P—American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate, $1,013,985 for construction of precast concrete pipe for the Upper Feeder, betw. Stations 1185-40 and 1436-00. Pipe diameter 12′ 8″; length 24,895 ft. ALTERNATE to 5C. Bids from:

(1) American Conc. & Steel Pipe Co...$1,013,985 (2) Chicago Bridge & Iron Works.....$1,329,062

		(1)	(2)
31,000	cu. yd. excavation for pipe, vertical tr.	$.74	$.85
417,000	cu. yd. excavation for pipe, side slope tr.	.31	.45
1,600	cu. yd. excavation for structures	1.00	1.50
280,000	cu. yd. backfill	.21	.30
450	cu. yd. concrete in struct. reinforced	17.50	20.00
50	cu. yd. concrete in structures, plain	12.50	20.00
10,000	cu. yd. concrete in cradle	4.60	6.50
24,895	lin. ft. prec. conc. pipe, cage reinf.	16.90	24.50
47,000	lb. place reinf. steel in structures	.01	.015
8,400,000	lb. furn. & pl. reinf. steel in prec. pipe	.038	.04
12,000	lb. furn. & install thimbles for MH	.20	.10
58,000	lb. install miscellaneous metal	.03	.06
100	ton mi. hauling steel	.40	.50
23,000	ton mi. hauling cement	.10	.10

SCHEDULE 8P—United Concrete Pipe Corp., Box 1, Sta. H, Los Angeles, $1,127,785 for construction of precast concrete pipe, Upper Feeder, betw. Sta. 2009-18 and 2257-50. Pipe dia. 10′ 3″; length 24,525 ft. ALTERNATE to Sched. 8S. Bids from:

(1) United Concrete Pipe Corp.....$1,127,785 (3) Amer. Conc. & Steel Pipe.....$1,141,892
(2) Chicago Bridge & Iron Works..... 1,379,133 (4) C. W. Wood & M. J. Bevanda.... 1,586,610

		(1)	(2)	(3)	(4)
202,000	cu. yd. exc. for pipe, vert. tr.	$.39	$1.00	$.52	$1.25
69,000	cu. yd. exc. for pipe, side sl.	.39	.65	.50	.30
2,300	cu. yd. exc. for structures	1.00	1.50	1.10	1.00
161,000	cu. yd. backfill	.35	.27	.35	.25
800	cu. yd. concr. in struc. reinf.	14.00	16.50	17.50	12.50
100	cu. yd. concr. in struc. plain	14.00	20.00	15.00	10.00
650	cu. yd. conc. in anchors	10.00	13.50	7.50	10.00
9,100	cu. yd. concrete in cradle	4.90	6.00	4.90	5.00
2,147	lin. ft. prec. conc. pipe, cage	16.55	19.00	17.50	21.50
22,402	lin. ft. prec. conc. pipe	16.55	20.00	17.25	25.00
105,000	lb. pl. reinf. steel in struc.	.01	.015	.01	.01
11,000,000	lb. furn. & pl. reinf. steel	.045	.045	.0405	.054
13,000	lb. same, thimbles in MH	.30	.10	.20	.20
80,000	lb. install miscell. metal	.05	.06	.04	.02
200	ton mi. hauling steel	.50	.50	.40	.50
23,000	ton mi. hauling cement	.10	.10	.09	.10

Dam Construction . . . . . .

Helena, Mont.—State—Weir and Rock Fill Dam

Contract awarded to S. J. Groves & Co., Wesley Temple Bldg., Minneapolis, $82,731, by Montana State Water Conservation Board, State Capitol Bldg., Helena, Mont., for const. 1 weir and a rock fill dam and appurtenant structures at outlet of Glacier Lake on Rock Creek in CARBON COUNTY, Montana. Bids from:

(1) S. J. Groves & Co.....$82,731 (4) Rue Bros., Bismarck, N. D.....$85,276
(2) Inland Const. Co., Omaha..... 83,956 (5) Leach Bros., Billings, Mont..... 86,750
(3) Utah Const. Co., Ogden..... 84,984 (6) Lobnitz Bros., Townsend..... 89,852

		(1)	(2)	(3)	(4)	(5)	(6)
7,517	cu. yd. loose rock fill embkm. borrow	4.50	4.00	4.00	4.00	5.00	5.00
1,250	cu. yd. hand placed fill embkm. borrow	8.50	8.00	6.50	10.00	8.00	10.00
218	cu. yd. rock exc. tunnel & approaches	18.00	20.00	24.00	20.00	25.00	15.00
615	cu. yd. rock exc. spillw. & trenches	8.00	15.00	13.00	10.00	8.00	15.00
71	cu. yd. concr. (tunnel lining & spillw.)	60.00	60.00	75.00	70.00	55.00	70.00
295	cu. yd. concr. (slab facing)	53.00	60.00	59.00	65.00	55.00	50.00
20,240	lb. wire mesh reinforcement	.28	.20	.20	.20	.20	.20
2,740	lb. round bars, reinforcement	.15	.20	.16	.20	.20	.15
0.07	MFBM lumber	$300	$200	$225	$500	$200	$300
L. S.	control works, gate, etc.	$1,850	$2,000	$3,500	$2,000	$2,000	$1,500
L. S.	Cippolletti weir	$900	$650	$1,830	$400	$500	$1,000
1,610	lb. trash rack struc. iron	.15	.30	.25	.20	.50	.20
100	lin. ft. drill grout holes	3.00	4.00	3.50	2.00	5.00	1.00
25	cu. ft. cement grout	6.00	8.00	10.00	20.00	10.00	6.00

Street and Road Work

Los Angeles, Calif.—State—Grade and Pave—Orange County

Mundo Engr. Co., 2305 E. Ninth Street, Los Angeles, $154,922, low, to Calif. Div. of Highways, Los Angeles, for const. grade separation struc. and 0.8 mi, grading and asph. conc. and conc. pav. at Newport Beach Bridge, ORANGE COUNTY. Bids from:

(1) Mundo Engineering Co., L. A. $154,922
(2) Sharp & Fellows, Los Angeles 173,459
(3) Oscar Oberg, Los Angeles 176,688
(4) M. B. McGowan, San Francisco 177,686
(5) J. E. Haddock, Ltd., Pasadena $181,747
(6) R. R. Bishop, Long Beach 188,340
(7) Griffith Co., Los Angeles 199,363
(8) Daley Corp., San Diego 208,068

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
54	sta. clearing & grubbing	$3.00	$5.00	$4.00	$12.00	$10.00	$5.50	$4.00	$10
2,000	M gals. water	.60	.75	.53	.60	.75	.70	1.25	.75
84,100	cu. yd. roadway excavation	.24	.245	.29	.32	.26	.35	.32	.41
130,000	sta. yd. overhaul	.007	.005	.003	.01	.01	.005	.01	.01
4,600	cu. yd. structure excavation	.80	.90	1.20	.85	2.25	2.00	1.00	.80
14,100	sq. yd. blend. subgrade	.05	.065	.06	.06	.10	.04	.06	$1¼
18,000	sq. yd. subgrade preparation	.10	.12	.11	.11	.12	.085	.10	.12
51	sta. finish roadway	5.00	5.00	3.50	.750	10.00	2.10	5.00	$5
10	tons liq. asph. SC2, prime ct.	$20	$13	12.50	8.00	15.00	$14	$10	$10
128	tons same, SC2, shoulders	$10	9.20	12.50	8.00	10.00	$10½	$10	$10
10,000	sq. yd. pre. mix & shape shldrs.	.05	.06	.08	.06	.10	.065	.06	.07
10	tons liq. asph. 90-95 seal ct.	$20	18.70	19.00	20.00	20.00	$19	$25	$19
130	tons screening seal coat	3.00	2.35	2.50	2.40	3.00	2.10	2.00	2.50
3,300	sq. yd. asph. paint binder	.03	.05	.03	.02	.02	.03	.03	.03
2,300	tons asph. conc. base & level crs.	3.60	3.70	3.82	3.60	4.00	4.30	3.50	4.00
1,100	tons asph. conc. "A" surf. crs.	3.85	3.85	4.80	3.85	4.30	4.40	3.70	4.00
2,280	cu. yd. "A" conc. pavement	6.00	8.90	7.27	7.00	8.00	8.40	7.00	9.75
3,100	pavement dowels	.15	.12	10.00	.10	.13	.13	.10	.15
410,000	lb. reinforcing steel	.045	.0395	.04	.045	.044	.04	.05	.0475
500	cu. yd. "A" conc. structure	16.00	16.00	12.00	15.00	16.00	18.75	$20	$18½
2,030	cu. yd. "A" conc. bridge	15.70	18.65	17.90	15.00	19.60	18.75	17.38	$25½
76,000	lb. structural steel	.066	.06	.06	.065	.064	.067	.08	.065
600	lb. cast steel	.20	.24	.17	.16	.18	.23	.40	.25
1,062	lin. ft. furn. tr. D. F. piles	.60	.55	.24	.60	.54	.65	.60	.50
2,734	ft. furn. untr. same & test piles	.27	.26	.20	.25	.29	.25	.30	.25
140	ea. drive D. F. piles & test piles	10.00	12.00	7.00	20.00	14.00	9.00	$10	$15
3,131	ft. furn. reinf. conc. piles	1.50	1.55	1.60	1.25	1.70	1.50	5.00	2.60
84	ea. drive same	$35	$57	$61	40.00	$25	$45	$80	$45
350	lin. ft. 18" std. centr. reinf. C. P.	2.20	2.20	2.15	3.00	2.65	2.75	3.00	2.15
1,110	lin. ft. 24" same	3.00	3.00	2.85	3.60	3.30	2.90	4.00	2.75
210	lin. ft. 30" same	4.00	4.50	4.15	4.50	4.65	4.50	6.00	4.25
26	lin. ft. 8" corr. metal pipe	1.00	1.15	1.50	1.00	1.00	1.00	1.00	.80
60	lin. ft. 12" corr. metal pipe	1.30	1.40	1.65	1.25	1.25	1.50	2.00	1.00
1	spillway assembly	$20	$17	$15	$10	$15	$20	$20	$15
300	cu. yd. "A" conc. curbs, gutters	$13	$16	$16.40	$11.25	$11½	$10½	$14	$16
220	lin. ft. curb armor	.90	.80	.80	.75	.75	.80	1.00	.90
4,700	lb. miscell. iron & steel	.15	.125	.11	.10	.12	.11	.12	.12
40	lin. ft. laminated guard rail	1.00	1.50	1.00	2.00	1.00	1.50	2.00	1.25
3	culvert markers	3.00	2.00	3.50	1.00	3.00	1.50	2.50	3.00
36	guideposts	3.00	3.25	2.50	1.00	2.50	3.00	2.00	2.50
100	lin. ft. pipe handrail	1.50	2.65	2.80	2.00	3.00	2.70	2.50	2.50
60	lin. ft. bank protect. fence	4.00	3.55	4.00	4.00	4.00	5.00	5.00	4.00
280	cu. yd. rem. concrete	2.00	2.25	1.40	5.00	4.00	3.50	3.00	2.75
1	only remove traffic stripe	$100	$115	$20	$200	$27	$100	$200	$100
1	remove bridge	$1,000	$4,250	$1,500	$1,000	$1,700	$1,475	$1,500	$800
1	remove railroad trestle	$850	$1,725	$4,800	$8,000	$750	$1,200	$5,000	$2,000
1	remove railroad bridge	$3,100	$1,675	$7,100	$8,000	$3,500	$4,500	$4,000	$1,200
6	remove & store electr.	8.00	21.00	12.00	50.00	10.00	10.00	$10	$10
32	light standards	$140	$144	$125	$125	$154	$150	$120	$135
4,400	lin. ft. 1" conduit (copper wire)	.40	.49	.40	.50	.40	.46	.35	.40
1	lot miscellaneous work	$500	$1,000	$2,450	$829.80	$500	$3,000	$3,000	$500

Carson City, Nevada—State—Grading and Surfacing—Clark County

Contract awarded to Fredrickson & Watson Const. Co., and Fredrickson Bros., and Jones & King, P. O. Box 2026, Reno, $219,669, by Nev. State Highway Comm., Carson City, Nev., for 15.13 mi. grav. surf. betw. Jean and Bard, Sections B and C1, Rt. 6, in CLARK COUNTY, Nev. Bids from:

(1) Fredrickson & Watson & Fredrickson Bros. & Jones & King, Reno. $219,669
(2) Pacific Const. Co., S. F. 234,627
(3) Peninsula Pav. Co., S. F. 235,945
(4) W. W. Clyde & Co., Springv. 243,569
(5) Isbell Const. Co., Reno 244,589
(6) Dodge Const. Inc., Fallon $246,476
(7) Oswald Bros., L. A. 246,639
(8) Olof Nelson, Logan, Utah 264,240
(9) Reynolds-Ely Const. Co. 283,920
(10) V. R. Dennis Const. Co., S. D. 318,833
(11) Engineers estimate 262,677

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
266	ft. remov. culv. pipe	.62	.50	.50	.50	1.00	1.00	.65	1.00	1.00	1.00	.50
22	ea. remov. culv. headw.	5.00	5.00	5.00	8.00	4.00	5.00	5.00	3.00	$10	5.00	5.00
68,600	cy. roadw. exc.	.24	.30	.26	.35	.40	.40	.39	.45	.50	.30	.35
47,505	sta. yd. overhaul	.02	.02	.02	.02	.02	.05	.02	.03	.02	.02	.02
35,259	cy. imp. borrow	.37	.35	.35	.35	.42	.38	.33	.50	.30	.40	.35
1,540	cy. struc. excav.	1.00	1.00	1.00	1.00	1.00	1.50	1.25	1.00	1.00	1.00	1.00
15.13	mi. subgrade	$125	$175	$225	$100	$150	$200	$175	$100	$100	$500	$175
15.13	mi. shoulders	$125	$175	$300	$80	$150	$100	$80	$100	$100	$300	$150
15.13	mi. finish roadway	$200	$125	$150	$100	$100	$200	$130	$100	$100	$300	$100
63,200	tons cr. gr. or stone	.50	.52	.50	.50	.47	.47	.60	.70	.50	1.00	.70
45,600	tons pl. mix cr. grav. or stone base	.88	.90	1.00	1.15	1.00	.85	.93	1.00	1.50	1.30	1.10
25,900	tons pl. mix asphalt surf.	1.03	1.20	1.20	1.25	1.30	1.40	1.18	1.40	1.75	1.60	1.45
2,344	M gallons water	2.00	2.00	3.00	3.00	4.00	3.00	3.00	3.00	3.50	2.50	2.50
90	tons asph. rd. matl. MC-2	$25	$25	$25	$21½	22.00	$21	27.00	$21	$23	$30	$20
1,295	tons asph. rd. mtl. SC-4	$19½	$20	$20	$17½	17.00	$18	18.00	$18	$18	$20	$17
445	tons asph. rd. mtl. SC-2	$15¼	$15	$16	$13	14.00	$15	14.75	$13½	$14	$18	$15
422	tons asph. rd. mtl. SC-1A	$15	$15	$15	$13½	14.00	$13	14.75	$13	$14	$17	$15
592	cy. A concrete	$23	$25	$25	$24	25.30	$28	25.00	$24	$25	$28	$30
33	cy. B concrete	$28	$30	$24	$25	25.30	$28	25.00	$24	$25	$25	$30
63,962	lb. reinf. steel	.05	.05	.05	.055	.05	.05	.05	.05	.07	.06	.06
592	ft. 18" CMP, dipped	1.95	2.50	2.00	1.85	1.90	2.25	2.00	1.70	2.00	3.00	2.00
988	ft. 24" CMP, dipped	2.80	3.75	2.75	2.60	2.60	3.00	3.00	2.50	3.00	4.00	2.50
138	ft. 30" CMP, dipped	3.70	4.25	4.00	3.50	3.50	4.00	4.00	3.00	5.00	4.50	3.50
264	ft. 36" CMP, dipped	5.60	6.50	5.00	5.00	5.10	5.50	6.00	5.00	6.00	6.50	5.00
30	ft. relay culv. pipe	.62	1.00	.50	.50	.75	1.00	1.00	1.00	2.00	3.00	1.00
56	mov. culv. headw.	9.00	$10	$10	$10	10.00	$10	10.00	$15	$10	$10	$10
103	ea. monuments	3.00	3.00	2.50	3.00	3.50	3.00	3.00	5.00	5.00	3.00	3.00
128	ea. culv. markers	3.00	2.50	2.50	2.00	2.50	4.00	2.50	1.00	2.00	3.00	2.50
15.13	mi. salv & relay surf.	$470	$500	$350	$700	$500	$660	$700	$600	$500	$1,000	$500
400	hrs. opr. grader	4.00	5.00	4.00	3.50	4.50	4.00	3.50	3.00	3.00	4.00	5.00
400	hrs. opr. tractor	4.00	5.00	3.50	3.50	5.00	4.50	5.00	3.00	3.00	4.00	5.00
400	hrs. opr. 10' grader	1.00	1.00	2.00	2.00	1.00	1.00	2.00	1.00	3.00	1.00	1.00
200	hrs. opr. scraper	4.50	4.50	3.00	4.50	5.00	6.00	6.00	4.90	5.00	6.00	4.50
200	hrs. opr. truck	2.00	2.00	2.50	2.25	2.00	2.50	2.50	1.50	2.00	2.50	2.00

Chapman–Pelton Combine Their Western Facilities

An agreement has been completed between The Chapman Valve Manufacturing Company of Indian Orchard, Massachusetts, and The Pelton Water Wheel Company of San Francisco, California, a subsidiary of the Baldwin Locomotive Company, which involves an interchange of patents, manufacturing facilities and sales efforts on valves for waterworks purposes.

This arrangement also consolidates the engineering and research data of both companies and makes available to engineers the combined experience of 114 years of service in the waterworks field.

The Pelton Water Wheel Company was established in 1880. Their line includes butterfly valves, needle valves, surge suppressers, and free discharge valves for all forms of hydraulic service.

The Chapman Valve Manufacturing Company, manufacturers of valves since 1874, has by various consolidations and agreements during the past few years, added to its line the product of several other manufacturers. This latest connection with The Pelton Water Wheel Company gives to each company a complete line of special and standard equipment for waterworks, pumping plants, filtration and sewage disposal plants.

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Factory Representative For Sullivan

Harry H. Kellogg will be the new factory representative for the Sullivan Machinery Company with headquarters at the Crook Company in Los Angeles. Mr. Kellogg is taking the place of Al Naylor, who has been transferred to the Sullivan offices in Claremont, New Hampshire.

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Clifford Named as Republic District Manager

George E. Clifford has been appointed District Sales Manager of Republic Steel Corporation in the Los Angeles, Calif., District, according to an announcement by N. J. Clarke, Vice President in Charge of Sales for Republic. Mr. Clifford was appointed following the resignation of George F. Emanuels who has been in charge of Republic's Los Angeles office for several years.

Mr. Clifford attended the University of Pittsburgh, class of 1918, but left college in 1917 to join the Royal Flying Corps. He received his discharge from the Corps in December, 1918. From February, 1919, until 1925 he was connected with the sales department of the Atlas Powder Co., at Pittsburgh, Pa. He then became District Representative in Cincinnati, Ohio, for the A. M. Byers Co. Two years later he was made manager of the Central District for Byers and afterwards was made manager of their Pittsburgh District. He joined Republic Steel Corporation in August, 1930, as Assistant Manager of Sales in the Pipe Division.

The promotion of Mr. Clifford enables him now to devote his time to the direction of sales of all Republic products in the Los Angeles territory.

Blaw-Knox Appoints Three

The Blaw-Knox Company announces the appointment as its distributors in San Francisco for the Northern California Territory the following: Edward R. Bacon, concrete clamshell buckets; C. H. Grant Company, truck mixers; Spears Wells Machinery Company, finishing machines and road equipment.

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Moreland Receivership Lifted

The Moreland Motor Truck Company of Burbank, Calif., announced through its president, Watt L. Moreland, that the friendly receivership entered into by the company in 1933 was lifted on October 14.

Moreland has been building trucks for 25 years, largely to order, for the rigorous West Coast hauling requirements. Its personnel is made up of men well known in their field, many of them having spent almost a lifetime with the company. The factory is one of the most modern in the industry and occupies 25 acres of ground in the outskirts of Burbank.

Advices from the Moreland factory reveal that a completely re-designed line of trucks for 1936 are now in production and will be shown to the public at an early date. The company builds both gasoline and Diesel powered trucks together with a complete line of commercial bodies and four and six-wheel trailers and semi-trailers. A line of six-wheel conversion units in capacities from 1½ to 5 tons is now being made, it was stated.

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Gar Wood Promotes Two Los Angeles Men

Stephen R. Faatz, manager of Gar Wood Industries Los Angeles Branch, has arrived in the east to become branch manager for the same company at Baltimore, Maryland, succeeding George F. Head, resigned.

John B. Work of the Los Angeles office will take over the former duties of "Steve" Faatz on the west coast.

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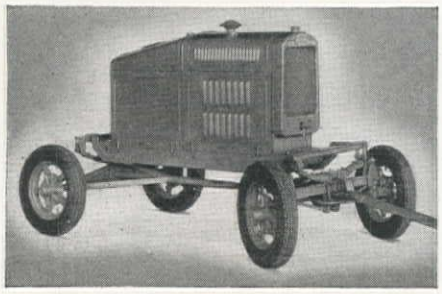

Engine-Driven Arc Welder

A portable engine-driven arc welding machine, which, it is claimed, is of particular interest to the highway field, is announced by J. D. Adams Company, Welding Division, Indianapolis, Ind.

Since the widespread adoption of the electric welding process in the fabrication of road machinery, many highway departments and contractors have become interested in this process, for the repair of all kinds of machinery, bridges, etc.

Sacramento, Calif.—State—Grading and Asphalt Concrete Paving—Alameda County

Contract awarded to Hanrahan Wilcox Co., 582 Market St., San Francisco, $247,253, by Calif. Div. of Highways, Sacramento, for 4 mi. grading & asph. concr. paving betw. S. F.-Oakland Bay Bridge and Folger Avenue in ALAMEDA CO. Bids from:

(1) Hanrahan Wilcox Co., S. F. $247,253
(2) Union Paving Co., S. F. 263,456
(3) Fredrickson & Watson, Fredrickson Bros. and Jones & King 266,412
(4) Peninsula Pav. Co., S. F. $268,938
(5) Heafey Moore Co., Oakland 277,934
(6) A. Teichert & Son, Sacramento 278,343
(7) Southern Calif. Roads Co., L. A. 321,622

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
75,000	cu. yd. roadway excavation	.26	.15	.20	.20	.22	.20	.32
616,000	sta. yd. overhaul	.01	.003	.005	.01	.01	.005	.01
3,860	cu. yd. struc. excavation	1.40	1.20	1.00	.70	1.00	.70	1.00
210	sta. finish roadway	10.00	15.00	8.50	10.00	5.50	6.00	5.00
45,500	tons imported base material	.80	.95	.75	.80	.80	.90	.90
41,500	tons crusher run base	1.40	1.70	1.57	1.35	1.50	1.50	2.00
80	tons liq. asph. SC-2 (shoulders)	12.00	12.00	11.00	12.00	11.00	12.00	13.50
370	tons screenings	2.00	3.00	2.40	2.50	2.00	4.00	2.50
31,515	tons asphalt concrete	2.76	3.00	3.46	3.78	3.85	3.75	4.10
119	cu. yd. "A" concrete (pavement)	10.00	10.00	14.50	10.00	9.50	7.00	10.00
97,400	lb. reinforcing steel	.05	.05	.05	.05	.05	.05	.05
262	cu. yd. "A" concrete (struc.)	16.00	17.00	15.50	18.00	21.00	22.00	22.00
860	lin. ft. 12" corr. metal pipe	1.50	2.50	1.30	1.35	1.25	1.40	1.20
1,370	lin. ft. 18" corr. metal pipe	2.00	3.50	1.90	2.00	1.70	1.90	1.60
400	lin. ft. 6" vitr. clay pipe	.45	1.20	.73	.60	1.25	.60	.50
610	lin. ft. 8" vitr. pipe (underdr.)	.50	1.25	.85	.70	1.50	1.00	.75
210	tons broken stone (sub-drainage)	2.50	3.50	1.85	3.00	2.25	4.00	4.00
916	cu. yd. "A" concrete (curbs)	16.00	12.50	17.00	13.50	11.75	15.00	15.00
500	lin. ft. lam. guardrail	.80	1.40	.90	1.00	1.00	1.00	1.00
400	ea. guide posts	1.40	1.50	2.50	1.75	1.50	2.00	1.50

Sacramento, Calif.—State—Grading and Asphalt Concrete Paving—Solano County

Contract awarded to Union Paving Co., Call Bldg., San Francisco, $178,696, by Calif. Div. of Highways, Sacramento, for 3.8 mi. grad. & asph. concr. OR concr. paving betw. 3.7 mi. north of Fairfield and 0.6 mi. south of Vacaville in SOLANO COUNTY, Calif. Bids received from:

(1) Union Pav. Co., S. F. $178,696
(2) Hanrahan Wilcox Co. 184,918
(3) Fredrickson & Watson and Fred. Br. and Jones & King 191,152
(4) A. Teichert & Son, Inc., Sacramento $194,199
(5) Peninsula Pav. Co. 195,728
(6) A. G. Raisch, San Francisco 204,989

		(1)	(2)	(3)	(4)	(5)	(6)
149	sta. clearing & grubbing	30.00	20.00	27.50	12.00	10.00	10.00
2,200	M gallons water	.40	.75	1.25	1.50	1.10	.75
625	cu. yd. ditch excavation	.50	.60	.62	.75	.50	.80
2,425	cu. yd. struc. excavation	1.00	1.00	1.25	.80	1.00	1.00
201	sta. finish roadway	10.00	7.00	10.00	4.00	5.00	5.00
565	cu. yd. salv. surfacing base	.60	.50	.81	.80	1.00	1.00
550	tons untr. cr. grav. or stone surf.	2.50	2.40	2.00	2.20	2.50	2.25
650	cu. yd. "A" concr. (structures)	16.00	20.00	17.75	19.00	19.00	22.00
7	cu. yd. "F" concr. (railing)	60.00	55.00	50.00	75.00	45.00	50.00
63,000	lb. reinforcing steel (struc.)	.04	.05	.05	.05	.04	.044
732	ft. furn. steel piling	2.00	1.80	1.62	1.80	1.50	2.00
28	ea. drive steel piles	15.00	40.00	18.75	30.00	20.00	30.00
516	lb. bronze expansion plates	.40	.30	.38	.35	.30	.60
232	ft. 8" corr. metal pipe	1.30	.90	.95	1.00	.90	1.00
252	ft. 30" corr. metal pipe	4.50	3.20	3.50	3.00	3.00	4.00
94	ft. 66" corr. metal pipe	16.00	15.50	13.00	12.50	12.50	15.00
312	ft. 18" corr. met. pipe siphons	3.50	2.10	2.25	2.10	2.00	3.00
248	ft. 36" corr. met. pipe siphons	8.00	5.70	6.25	5.50	5.50	6.25
42	ft. rem. clean & salv. cor. met. pipe	.80	.40	.56	.50	.50	.50
40	ft. rem. clean & relay cor. met. pipe	1.00	.60	.70	.75	1.00	1.00
300	ft. 90" multiplate cor. met. pipe	24.00	16.00	15.45	15.00	15.00	20.00
15	ea. 18" concrete joints	15.00	11.00	10.95	10.00	9.00	10.00
16	ea. 36" concrete joints	20.00	22.00	16.55	18.00	18.00	15.00
112	lin. ft. laminated guardrail	1.50	1.00	.95	1.25	1.00	1.00
1	mi. new property fence	$400	$450	$375	$500	$380	$700
1	mi. remove & reset property fences	$250	$250	$220	$500	$300	$400
10	ea. drive gates	15.00	20.00	18.75	20.00	20.00	15.00
1	only remove bridge	$1,500	$1,200	$1,000	$1,000	$600	$300
76	ea. monuments	3.00	2.70	3.00	3.00	3.00	3.00
ALTERNATE "A"—(ASPH. CONCRETE)							
96,700	cu. yd. roadway excavation	.24	.32	.32	.30	.33	.35
43,000	cu. yd. imported borrow	.56	.50	.60	.50	.65	.68
337,000	sta. yd. overhaul	.01	.0075	.005	.01	.01	.003
815	cu. yd. remove concrete	5.00	1.00	1.25	3.00	1.25	7.00
42,350	sq. yd. subgr. preparation	.10	.10	.10	.08	.09	.08
502	tons liq. asphalt SC-2	12.50	13.00	13.00	12.00	12.50	12.00
63,700	sq. yd. prep. mix & shape shoulders, slopes, gutters & detours	.06	.04	.05	.055	.05	.08
20	cu. yd. "A" concrete (slabs)	15.00	12.00	16.00	14.00	12.00	10.00
2,200	lb. reinforcing steel	.06	.05	.05	.10	.05	.044
18,840	tons asphalt concrete	3.30	3.79	3.84	4.36	4.15	4.00
1,164	ft. 18" corr. metal pipe	2.50	1.60	1.80	1.65	1.60	2.00
68	ft. 24" corr. metal pipe	3.50	2.50	2.85	2.50	2.50	3.00
2	ea. remov. & reset headwalls	10.00	12.00	10.00	15.00	15.00	10.00
4,350	sq. yd. asphalt. paint binder	.02	.03	.02	.03	.02	.02

Los Angeles, Calif.—State—Grading and Surfacing—Imperial County

Contract awarded to Hazard & Sons, P. O. Box 1438, San Diego, $151,293, by California Division of Highways, Los Angeles, for 12.5 mi. grading and plant mix surfacing medium curing type between East Highline Canal and Midway Wells in IMPERIAL COUNTY. Bids from:

(1) R. E. Hazard & Sons, San Diego $151,293
(2) V. R. Dennis Constr., San Diego 165,563
(3) Oswald Bros., Los Angeles 167,990
(4) Mundo Engr. Co., Los Angeles 170,318
(5) Daley Corp., San Diego 177,706
(6) Gibbons & Reed, Burbank $177,852
(7) Sharp & Fellows, Los Angeles 194,817
(8) J. A. Casson, Hayward 195,611
(9) Griffith Co., Los Angeles 221,239

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
134,000	cu. yd. roadway excavation	$.14	$.20	$.225	$.18	$.21	$.28	$.30	$.20	$.30
155,000	sta. yd. overhaul	.02	.02	.006	.008	.005	.01	.02	.02	.01
135	cu. yd. structure excavation	1.50	.75	.75	.80	.75	.80	1.00	1.00	1.00
660	sta. finish roadway	6.00	5.00	2.75	5.00	2.50	5.00	2.00	5.00	7.00
44,700	tons min. aggr. plant mix	1.45	1.44	1.49	1.80	1.75	1.45	1.70	2.30	2.20
1,790	tons, liq. asph. MC 5	17.50	20.00	17.60	18.00	18.00	21.00	18.50	18.00	18.00
75	tons liq. asph. SC 2	12.00	12.50	13.50	12.00	13.00	13.25	18.50	12.00	16.00
1,440	tons liq. asph. SC 2 subgr. shl.	11.50	12.50	13.50	11.00	13.00	13.25	16.50	10.00	16.00
233,600	sq. yd. prepare, mix and shape and compact subgrade and shoulders	.035	.04	.052	.04	.055	.042	.05	.04	.07
25	tons liq. asph. SC 2 detours	30.00	30.00	27.00	20.00	37.75	15.00	35.00	12.00	18.00
60	tons liq. asph. SC-1A, slopes	25.00	25.00	40.00	15.00	31.00	25.00	35.00	12.00	30.00
290	lin. ft. 24" corr. metal pipe	3.00	3.50	2.75	3.00	2.65	2.75	2.50	3.00	3.00
12	culvert markers	2.50	2.00	2.25	3.00	3.00	2.50	3.00	3.00	3.00
50	guideposts	2.50	2.00	2.25	3.00	3.00	2.50	2.00	4.00	3.00
3,600	lin. ft. remove wooden side forms	.02	.01	.015	.03	.02	.02	.02	.05	.015
74	monuments	2.00	2.00	3.00	3.00	3.00	2.50	3.00	4.00	3.00

An electric welding machine (engine-driven) makes field repairs economical any time or place.

The Adams Arc Welder is mounted on steel skids in which form it occupies very little space. When required for field use the machine can either be hoisted into a truck or mounted on a steel trailer with rubber tires as illustrated.

A feature of the Adams Arc Welder is a remote control switch in the electrode holder which enables the operator to start and stop the engine at will though his machine may be located several hundred feet from where the operator is working. This eliminates waste of fuel and destructive engine idling between welds.

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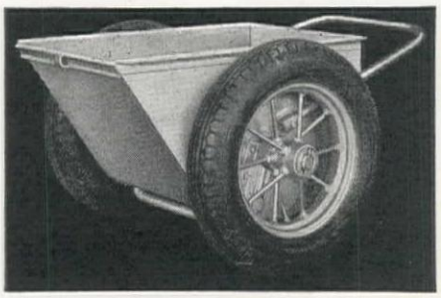

New Concrete Carts

Included in the line of wheelbarrows and material carts recently added to the general line of contractor's equipment manufactured by Construction Machinery Company, are two new sizes of carts. The No. 9 holds nine cubic feet and is suitable for handling bulk cement.

The other new size, the No. 11, has a capacity of eleven cubic feet. Both the No. 9 and No. 11 are offered with balloon pneumatic tired roller bearing wheels as well as regular steel tired wheels. On pneumatics, they are easy to handle and the majority are sold so equipped. The rubber tired wheels are of the drop center rim type using standard 18"x5.25" tires, insuring low replacement cost.

A booklet showing the entire line will be gladly sent free on request.

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P & H Bantam Weight Trailer

Low center of gravity and ease of loading and unloading have been stressed in the new trailer unit especially designed for the P & H Bantamweight excavator introduced earlier this year by the Harnischfeger Corporation of Milwaukee.

Loading is simplified by removing the front axle and placing ramp blocks to allow the machine to crawl above the

Boise, Idaho—State—Grading and Surfacing—Teton County

Contract awarded to Olof Nelson, Box 413, Logan, Utah, $144,671, by Comm. of Public Works, Boise, Ida., for 8.969 mi. const. roadbed, drain, struc., cr. rock surf. and plant mix bitum. mat on South Yellowstone Highway, Newdale-Canyon Creek in FREMONT and MADISON CO.; and 9.240 mi. const. a plant mix bitum. mat and cr. grav. shoulders on the South Yellowstone Highway, Victor to Driggs in TETON CO., Idaho. Bids from:

(1) Olof Nelson, Logan.....$144,671
(2) Triangle Const. Co., Boise..... 158,958
(3) G. D. Lyon & Co. & J. C. Compton 167,942
(4) J. C. Maguire Const. Co..... 172,181
(5) Hoops Const. Co., Twin Falls..... 182,945
(6) Morrison-Knudsen Co., Boise.....$190,109
(7) Western Const. Co., Pocatello..... 195,253
(8) W. C. Burns, Idaho Falls..... 200,355
(9) S. Birch & Sons, Great Falls..... 231,044
(10) Engineers estimate..... 159,267

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
56,000	cu. yd. unclass. excavation	.25	.25	.24	.28	.23	.30	.30	.35	.40	.22
460	cu. yd. struc. excavation	1.00	1.00	.75	1.50	1.00	1.00	1.25	1.00	2.00	1.00
18,400	sta. yd. overhaul	.03	.04	.03	.03	.04	.02	.06	.03	.04	.04
6,000	mi. yd. haul	.15	.20	.15	.20	.20	.20	.20	.20	.40	.18
2,660	tons cr. grav. surf. (shoulder)	.60	.75	.82	.72	1.00	1.10	1.00	1.25	1.40	.90
30,000	tons cr. rock surf.	1.10	.90	1.06	.975	1.40	1.10	1.15	1.35	1.40	1.00
4,900	cu. yd. binder	.10	.20	.35	.30	.30	.30	.25	.30	.40	.25
4,900	mi. yd. haul binder	.10	.20	.15	.20	.20	.25	.20	.30	.40	.18
741	M gallons sprink. water	1.00	1.50	3.00	3.00	2.00	2.00	1.50	2.00	3.00	2.00
66	days rolling	$10	$15	$15	$25	$20	$20	$15	$24	$30	$20
1	ea. furnish roller	$100	$200	$175	$250	$100	$150	$500	$200	$200	$100
5	cu. yd. "A" concrete	$30	$30	$40	$30	$30	$30	$35	$30	$30	$30
70	lb. reinforcing steel	.10	.20	.12	.20	.10	.10	.10	.10	.20	.08
350	ft. 12" galv. ir. pipe	1.30	1.00	1.20	1.48	1.25	1.50	1.15	1.25	2.00	1.40
1,410	ft. 18" galv. ir. pipe	1.80	1.50	1.61	1.90	1.70	2.00	1.50	1.60	2.50	2.00
50	ft. 24" galv. ir. pipe	3.00	2.50	2.48	2.75	2.50	3.00	2.50	2.50	4.00	2.90
30	ft. 36" galv. ir. pipe	5.50	3.50	4.70	5.50	5.00	6.00	5.00	5.00	5.00	5.50
300	ft. 18" galv. ir. pipe relay	1.00	1.00	.60	.50	1.00	.40	.60	.60	.50	.90
23	ea. 18" connec. bands	2.50	1.50	2.25	2.60	2.50	2.50	2.50	1.40	2.00	2.50
2	ea. 36" connec. bands	5.00	3.50	4.75	5.10	4.00	5.00	5.00	5.00	3.00	$10
850	ft. const. small ditches	.10	.10	.20	.10	.05	.10	.10	.06	.50	.10
30	cu. yd. gravel backfill	1.00	1.50	3.00	2.50	1.00	1.50	1.50	2.00	1.00	1.50
450	ft. move guard fence	.50	.60	.35	.60	.50	.50	.60	.60	.50	.50
22	ea. remove conc. headwalls	5.00	5.00	3.00	7.50	3.00	5.00	3.00	4.00	$15	5.00
4	ea. project markers	5.00	$10	7.00	$10	$10	5.00	6.00	5.00	5.00	5.00
85	ea. right-of-way markers	3.00	2.50	3.50	5.00	3.50	3.00	4.00	4.00	5.00	3.00
1,270	bbl. liq. asph. MC-1 (prime ct.)	4.00	4.50	4.60	4.61	4.25	5.00	3.85	5.25	6.00	4.25
7,990	bbl. liq. asph. MC-3 (bit. mat)	3.50	4.30	4.40	4.08	4.35	4.80	4.23	4.65	6.00	4.00
1,270	bbl. liq. asph. MC-3(seal ct.)	4.00	4.80	4.55	4.71	4.50	5.00	3.96	5.25	6.00	4.25
13,400	tons bit. mat. plant mix (AG)	1.45	1.90	1.96	2.20	1.95	2.26	2.75	2.40	2.10	1.75
1,250	tons cover coat material	1.50	2.00	2.25	2.50	2.00	2.00	2.50	2.50	3.00	2.00
17,600	tons bit. mat. pl. mix (DE)	1.45	1.65	1.70	1.74½	$2	2.13	2.40	1.75	2.50	1.75
1,450	tons cover coat matl.	1.50	1.50	2.00	2.50	2.50	2.50	2.50	2.25	3.50	2.00

Portland, Ore.—State—Grading, etc.—Clatsop County

Contract awarded to Fred H. Slate, Multnomah, Oregon, $345,730, by Oregon State Highway Commission, Portland, Ore., for 2.59 mi. grading and an additional 3.05 mi. clearing on Nehalem River-Rock Creek Sec. of Wolf Creek Highway in CLATSOP COUNTY (WPH 181-E). Bids from:

(1) Fred H. Slate, Multnomah.....$345,730
(2) Jacobsen-Jensen, Portland..... 346,655
(3) Myers & Goulter, Seattle..... 386,305
(4) McNutt Bros., Eugene..... 387,455
(5) Joplin & Eldon, Portland..... 389,209
(6) Guthrie-McDougall Co..... 397,192
(7) Parker Schram Co., Portland.....$398,362
(8) J. A. Lyons, Portland..... 399,270
(9) Kern & Kibbe, Portland..... 410,402
(10) Orino, Berkemeier & Saramel..... 410,810
(11) P. L. Crooks & Co., Portland..... 413,845
(12) Malcom & Bell, Portland..... 539,575

(A) L. S. clear & grubb. Units A & C.
(B) L. S. clearing, Units B & D.
(C) 1,500 sq. ft. fell trees.
(D) 2,309 cu. yd. trench excav.
(E) 500,000 cu. yd. common excav.
(F) 126,000 cu. yd. solid rock excav.
(G) 1,014,000 sta. yd. overhaul.
(H) 194,000 mi. yd. truck haul.
(I) 2.58 mi. finish roadbed & slopes.
(J) 15,000 lin. ft. round cutbanks.
(K) 250 ft. 8" porous drain tile.
(L) 1,500 ft. 12" perf. cor. metal pipe.
(M) 450 ft. 12" extr. str. perf. ir. pipe.
(N) 60 ft. 24" corr. metal pipe.
(O) 60 ft. 36" corr. metal pipe.
(P) 850 ft. 18" concrete pipe.
(Q) 850 ft. 18" extr. str. concr. pipe.
(R) 400 cu. yd. rock backfill (drains)
(S) 400 cu. yd. "D" concrete.
(T) 60,000 lb. reinforcing steel.
(U) 15,000 cu. yd. selected topping.
(V) 20,000 mi. yd. haul topping.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(A)	$45,000	$45,000	$45,000	$79,000	$53,000	$55,000	$45,000	$49,500	$60,000	$47,600	$75,000	$55,670
(B)	$35,000	$35,000	$30,000	$62,000	$37,000	$45,000	$30,000	$36,000	$33,000	$28,250	$25,000	$42,000
(C)	.50	.30	2.00	1.00	2.20	1.00	1.00	.75	2.00	1.00	1.00	1.80
(D)	2.00	1.00	1.00	1.00	1.00	1.25	1.50	1.50	1.50	1.00	1.50	1.80
(E)	.27	.21	.30	.25	.25	.26	.28	.25	.30	.40	.32	.55
(F)	.27	.50	.60	.40	.64	.55	.65	.65	.55	.40	.52	.55
(G)	.02	.02	.02	.01	.015	.015	.015	.02	.01	.01	.01	.01
(H)	.18	.20	.15	.10	.18	.20	.20	.20	.16	.15	.15	.20
(I)	500.00	250.00	500.00	500.00	400.00	500.00	500.00	500.00	500.00	$2,500	500.00	600.00
(J)	.10	.10	.20	.10	.10	.10	.10	.20	.10	.10	.10	.12
(K)	.50	.50	.50	.80	.50	.45	.50	.50	.40	.75	1.00	.80
(L)	1.50	1.25	1.50	1.50	1.50	1.50	1.60	1.75	1.45	1.40	1.60	1.75
(M)	1.60	1.50	2.00	1.75	1.70	1.70	2.00	1.85	1.65	1.75	2.00	2.00
(N)	3.00	2.75	3.50	3.00	3.75	3.30	3.50	3.50	3.20	3.25	4.00	3.00
(O)	6.00	5.50	7.00	6.50	6.75	6.20	6.50	6.00	5.80	6.00	7.00	6.00
(P)	2.50	2.25	2.00	2.35	2.75	2.20	2.25	2.35	2.15	2.00	2.40	2.50
(Q)	2.60	2.35	2.20	2.60	3.00	2.40	2.50	2.50	2.35	2.40	2.70	2.65
(R)	2.00	6.00	2.00	3.00	2.50	1.65	2.00	1.00	1.50	1.50	3.00	2.50
(S)	30.00	23.00	30.00	30.00	25.00	25.00	32.50	27.00	25.00	30.00	30.00	30.00
(T)	.06	.05	.06	.07	.0575	.06	.06	.07	.07	.06	.06	.06
(U)	.40	.60	.60	.50	.60	.75	.75	.75	1.50	.40	.80	.65
(V)	.15	.20	.20	.10	.16	.18	.15	.20	.15	.20	.20	.18

Phoenix, Ariz.—State—Grading and Surfacing—Apache County

Contract awarded to Lee Moor Contracting Co., 205 Bassett Tower, El Paso, $198,519, by Arizona State Highway Comm., Phoenix, for 18.2 mi. placing aggr. base course, shoulder material and cutback plant mix seal coat on the Holbrook-Lupton Highway beginning at the Navajo-Apache County line about 21 mi. northeast of Holbrook, in APACHE COUNTY, FA83-D, AFE 6650. Bids from:

(1) Lee Moor Contracting Co.....$198,519
(2) Southern Calif. Roads, L. A.....214,855
(3) J. A. Casson, Phoenix.....$232,957

Bids received on:		(1)	(2)	(3)
425	gals. sprinkling	3.15	$4.25	$4.00
7,000	cu. yd. stripping pits	.19	.15	.25
35,577	cu. yd. aggregate base course	1.00	.70	1.00
248,545	cu. yd. mi. aggr. base course haul	.09	.09	.08
5,814	cu. yd. shoulder material	1.00	.70	1.00
35,586	cu. yd. mi. shoulder material haul	.09	.09	.08
29,068	tons plant mix	2.40	3.40	4.00
1,105	tons cutback asphalt	27.50	26.00	24.00
445	tons emulsified asphalt	31.00	30.00	27.00
18.138	mi. placing plant mix	315.00	325.00	100.00
1,554	cu. yd. screening	5.00	5.50	4.00
100	hours rolling	3.50	2.50	3.00
550	sq. yd. placing intersections	.25	.20	.50
8,202	lin. ft. standard line fence	.065	.065	.07
350	cu. yd. stockpile aggregate	1.25	3.45	4.00

There Is A Difference In Wire Rope . .

Most wire ropes (unless identified by a distinguishing strand), look alike, but they vary in quality as do all other commodities.

The difference in wire rope quality begins to show up after the rope is put to work. There is the real test. There is where "HERCULES" (Red Strand) Wire Rope proves its exceptional value—on the job. There is where acid open-hearth steel wire, rigid tests, careful inspection, and our 78 years of practical manufacturing experience count.

"Quality" in wire rope, which means those properties that insure *consistent* durability, is never a matter of chance—and we are always glad to give full particulars on our products to anyone interested in saving money on his wire rope purchases. Feel free to write us at any time.

The "Red Strand" in "HERCULES" Wire Rope is our guarantee that its high quality is constantly maintained. It is the original colored strand wire rope.

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BILLINGS
Connelly Machinery Company

BOISE
Olson Manufacturing Company

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Wm. H. Ziegler Co., Inc.

IDAHO FALLS
Westmont Tractor & Eqpt. Co.

LOS ANGELES
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Westmont Tractor & Eqpt. Co.

PHOENIX
Pratt-Gilbert Hardware Co.

SALT LAKE CITY
Z. C. M. I.

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Made Only by **A. LESCHEN & SONS ROPE CO.** Established 1857

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frame, the front of which is then hoisted with the dipper so that the front wheels may be positioned as the machine settles onto the trailer. The process is reversed in unloading. An average of only ten minutes is required for loading; ten minutes for unloading.

With four dual wheels and a wheelbase of 174", the unit has a turning radius of only 30'. Swift travel is made safe with modern mechanical brakes on rear wheels as well as an additional emergency hand brake. Low center of gravity permits the unit to be towed safely on highly crowned roads.

•

Culvert Coupling Spreader

Brights Culvert Coupling spreader is used in joining two lengths of corrugated culvert together when longer than stock length is needed.

By clamping the jaws of spreader over the angle iron flanges of the coupling and turning the speed wrench the coupling is forced open which allows the ends of the lengths of culvert to be inserted. Then by reversing the action of the speed wrench the coupling is pulled together until it fits snugly onto the culvert lengths, holding them firmly in place. The speed wrench will also fit the set screws which clamp the jaws of the spreader onto the angle iron flanges of the coupling and the nuts of the bolts which hold the coupling on the culvert. The spreader will be found useful and a time saver as it enables the workman to connect the culvert lengths in a fraction of the time in which the operation was originally done. It is also easily operated by any workman.

Manufactured and distributed by Bright Blacksmith & Welding Shop, 128 Soquel Avenue, Santa Cruz, California.

•

Two New Ransome Mixers

Recent developments of Ransome Concrete Machinery Company, Dunellen, New Jersey, are the Two-Wheel, Trailer Type, End Discharge Concrete Mixers in the 7-S and 10-S sizes.

These Trailer Type Mixers are of lightweight but heavy-duty construction and are arranged on shock-absorbing springs with steel or rubber tired truck wheels equipped with roller bearings. Mixers are compact and balanced for towing and easy maneuvering on jobs, permitting mixers to be located in limited spaces.

Other features and refinements in these new mixers are: positive water control with non-by-passing water valve; all steel drum with drum shell and mixing blades of high carbon wear resisting steel; solid steel roller tracks welded to drum and machined to true diameter; discharge chute also of high carbon wear resisting steel; each roller equipped with Two Timken tapered bearings; speedy power loader skip of streamline design that elevates to a 50-degree angle, dumping its load into the drum fast and clean without any pounding; countershaft revolving in Hyatt bearings in self-aligning boxes. Operating levers arranged at one end for easy one-man control.

Denver, Colo.—Government—Grading—Yellowstone National Park

Award recommended to Peter Kiewit Sons' Co., Omaha, Nebraska, $104,749 by Bureau of Public Roads, Denver, Colo., for 7.679 mi. earthgraded and drained highway on Proj. RTEC 8-A-2 of the Tower Junction-Cooke City Highway, located in Yellowstone National Park, Wyoming. Bids from:

(1) Peter Kiewit Sons' Co. $104,749
(2) Morrison-Knudsen Co., Inc. 107,221
(3) Taggart Const. Co. Cody 107,572
(4) Olof Nelson, Logan 123,656
(5) J. L. McLaughlin, Great Falls, Montana $125,210
(6) S. J. Groves & Sons Co. 142,949
(7) Engineers estimate 125,516

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 acre clearing	300.00	100.00	100.00	300.00	500.00	200.00	200.00
152,000 cu. yd. uncl. excavation	.38	.37	.35	.50	.39	.55	.50
7 mi.cu. cut slope treatment	300.00	500.00	300.00	400.00	800.00	400.00	500.00
1,000 cu. yd. excav. for struc.	1.50	2.00	1.25	2.00	2.00	1.75	2.00
450,000 sta. yd. overhaul	.01	.015	.015	.01	.015	.02	.02
L. S. provide & maintain water pl.	250.00	400.00	200.00	500.00	100.00	400.00	400.00
1,000 M. gallons water	2.50	3.50	2.00	2.00	3.00	4.00	2.00
33 cu yd. "A" concrete	30.00	30.00	26.00	30.00	30.00	40.00	25.00
230 cu. yd. masonry	22.00	25.00	20.00	25.00	25.00	25.00	20.00
4,400 lb. reinf. steel	.06	.08	.08	.08	.10	.10	.07
2,730 lin. ft. 24" corr. met. pipe	2.25	2.50	2.25	2.20	2.50	2.50	2.50
124 lin. ft. 30" corr. met pipe	2.75	3.00	3.50	2.50	3.25	3.00	3.50
1,200 cu. yd. handlaid riprap	3.00	3.50	4.00	3.00	6.00	3.50	2.50
12 cu. yd. handlaid rock embkm.	3.50	3.50	3.00	4.00	6.00	3.50	2.00
L. S. extra work, mainten. & detours	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
L. S. force account items, misc. wk.	2,000	2,000	2,000	2,000	2,000	2,000	2,000
8,000 cu. yd. mi. overhaul	.40	.30	.30	.25	.25	.25	.25
12,000 cu. yd. special overhaul (mi.)	.40	.20	.30	.25	.20	.30	.25
21,000 cu. yd. selec. surf. material	.40	.40	.75	.50	.90	.65	.40

Bridges and Culverts

Sacramento, Calif.—State—Undergrade Crossing—Alameda County

Contract awarded to J. F. Knapp, 1401 Park St., Oakland, $359,932, by Calif. Div. of Highways, Sacramento, for constructing undergrade crossing at Peralta Street, Adeline and San Pablo Avenue, in Oakland and Emeryville, consisting of reinf. concrete rigid frame underpass structure and retaining wall approaches and paved street connections, in ALAMEDA COUNTY, Calif. Bids from:

(1) J. F. Knapp, Oakland $359,932
(2) Bates & Rogers, Oakland 379,790
(3) Clinton Const. Co., S. F. 382,300
(4) Lindgren & Swinerton, S. F. 385,318
(5) Barrett & Hilp, S. F. 399,786
(6) MacDonald & Kahn Co., Ltd. $406,463
(7) Union Paving Co., S. F. 419,012
(8) Eaton & Smith, S. F. 429,936
(9) Peninsula Paving Co., S. F. 439,905
(10) Bodenhamer Const. Co. 449,390

(A) 1 lot clearing site.
(B) 75,000 cu. yd. excavation.
(C) 13,000 cu. yd. B concr. (struc.).
(D) 370 cu. yd. B concr. (railings).
(E) 1,530 cu. yd. B concr. (pavement).
(F) 210 cu. yd. B concr. (Curb & gutter).
(G) 2,000 bbl. extra cement.
(H) 2,200,000 lb. reinforcing steel.
(I) 650 lin. ft. 8" cast ir. pipe.
(J) 685 lin. ft. 10" cast ir. pipe.
(K) 44 lin. ft. 14" cast iron pipe.
(L) 60 lin. ft. 16" cast iron pipe.
(M) 14,000 lb. special castings.
(N) 7,000 tons selected base material.
(O) 475 tons crusher run base.
(P) 7,000 tons asphalt concrete.
(Q) 1 lot remov. & replace sewers.
(R) 1 lot pumping equipment.
(S) 1 lot electric light. system.
(T) 1 lot miscellaneous work.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(A)	$4,500	500.00	$2,645	$2,896	700.00	$6,000	$6,000	$2,100	$1,000	$20,000
(B)	.60	.55	.64	.56	.68	1.00	.90	1.00	.93	1.20
(C)	10.00	10.80	10.70	10.20	11.00	12.00	10.80	11.26	12.00	13.00
(D)	44.00	36.30	27.00	45.00	37.00	29.00	50.00	39.00	45.00	30.00
(E)	8.00	12.60	9.70	11.41	12.00	9.00	9.00	9.00	10.00	8.50
(F)	15.00	20.25	13.00	16.30	18.00	14.00	15.00	17.00	12.50	12.00
(G)	2.00	2.30	2.00	2.00	2.00	2.15	2.15	2.50	2.50	2.10
(H)	.035	.036	.036	.038	.037	.03347	.04	.04	.0425	.035
(I)	1.50	2.35	3.00	2.75	2.50	1.25	2.45	1.90	2.50	2.00
(J)	2.00	3.00	3.40	3.50	3.40	1.85	2.75	2.20	3.00	2.50
(K)	3.00	5.00	5.00	6.50	5.50	3.30	4.0075	3.50	5.00	3.10
(L)	3.75	6.00	6.50	2.50	7.00	4.00	5.25	4.00	6.00	3.80
(M)	.05	.065	.07	.05	.06	.05	.07	.06	.08	.08
(N)	.80	.68	.83	1.25	1.10	.80	1.50	1.25	.75	1.00
(O)	1.60	3.15	1.80	2.00	2.00	1.60	1.50	1.60	2.00	2.25
(P)	3.50	3.65	4.80	4.50	4.00	4.00	3.80	4.00	5.00	3.00
(Q)	$14,000	$20,000	$16,860	$17,975	$20,000	$10,740	$14,000	$15,000	$14,500	$6,000
(R)	$2,000	$2,000	$2,800	$2,096	$3,000	$2,025	$2,000	$2,200	$2,000	$2,000
(S)	$12,500	$16,000	$12,000	$12,000	$13,750	$10,000	$15,000	$19,000	$12,000	$17,000
(T)	$5,000	$3,000	$4,000	$3,800	$5,000	$3,800	$3,600	$4,000	$5,000	$4,000

Sacramento, Calif.—State—Overhead Crossing—Alameda Co.

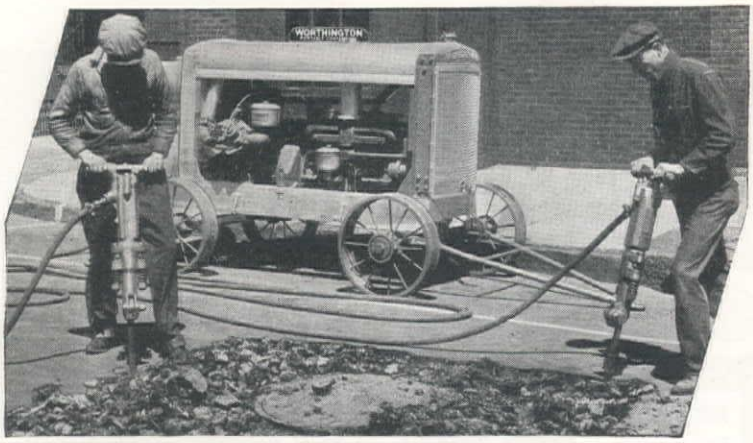
J. F. Knapp, 1401 Park Ave., Oakland, $249,281 low to Calif. Div. of Highways, Sacramento, for constructing an overhead crossing over the tracks of the Southern Pacific Company near El Cerrito Hill in the City of Albany, consisting of a reinforced concrete girder span and steel girder spans with concrete deck having a total length of approximately 1500 ft. in ALAMEDA COUNTY, Calif. Bids from:

(1) J. F. Knapp, Oakland $249,281
(2) Bodenhamer Const., Oakland 251,297
(3) Lindgren & Swinerton, S. F. 251,798
(4) Pacific Bridge Co., S. F. 262,692
(5) Healy Tibbitts Const. Co. 265,727
(6) Fredrickson & Watson Const. Co. & Fredrickson Bros., Oakland $269,617
(7) MacDonald & Kahn Co., Ltd., S. F. 272,163
(8) Clinton Const. Co., S. F. 278,262
(9) M. B. McGowan & C. W. Caletti 283,786

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
50 cy cy. remove conc.	5.00	2.00	1.60	4.00	10.00	5.00	6.00	10.00	4.00
2,200 cy. struc. excav.	1.50	1.50	2.50	1.25	2.00	2.00	1.00	2.50	3.50
240 cy. A conc. (ftg. blks.)	12.00	14.50	12.00	8.00	12.00	13.00	10.00	16.00	10.00
5,600 cu. yd. A concrete (structures)	17.00	16.50	18.00	18.50	21.00	20.00	21.50	20.80	20.00
270 cu. yd. A concrete (railing)	30.00	45.00	30.00	50.00	35.00	40.00	28.00	27.00	25.00
50 cu. yd. A concrete (sewer)	20.00	16.00	23.00	20.00	22.00	14.00	16.00	20.00	16.00
1,000,000 lb. reinf. steel	.04	.045	.0384	.04	.043	.04	.04	.043	.045
965,000 lb. struc steel	.065	.066	.0675	.06	.06	.0615	.07	.07	.0775
36,000 lb. cast steel	.12	.06	.15	.15	.11	.15	.15	.12	.18
624 lb. bronze expans. plates	.25	.30	.25	.30	.30	.40	.35	.30	.30
1,400 lin. ft. furn. 14" reinf. concr. piles & test piles	1.75	1.50	1.20	2.25	1.50	2.00	1.50	1.70	1.25
8,400 lin. ft. furn. 16" reinf. concr. piles & test piles	2.00	1.70	1.50	2.50	2.00	2.25	1.75	1.85	1.50
335 ea. drive reinf. concr. piles & test piles	20.00	30.00	23.00	27.00	15.00	30.00	17.00	25.00	30.00
1 lot misc. work	$5,000	$1,000	$1,500	$2,500	$525	$1,000	$2,500	$1,800	$2,481

A POWERFUL TWO-PURPOSE TOOL

for heavy demolition and sheeting work . . .



WORTHINGTON AERO-2-STAGE PORTABLE COMPRESSOR, 105 cu. ft. Steel Wheel Towabout Model, operating two WORTHINGTON No. 10 MASTER BREAKERS

INTERCHANGEABLE HEADS . . .

for breaking or driving

The change from one type of tool to the other is quickly made by removing two head bolts

The WORTHINGTON No. 10 MASTER BREAKER and SHEETING DRIVER

- Hits a hard slugging blow
- Easy to operate
- Does not wear operator down
- Low air consumption
- Built for long life

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CONTRACTORS EQUIPMENT & MACHINERY COMPANY, San Diego VANDERCOOK COMPANY, Sacramento

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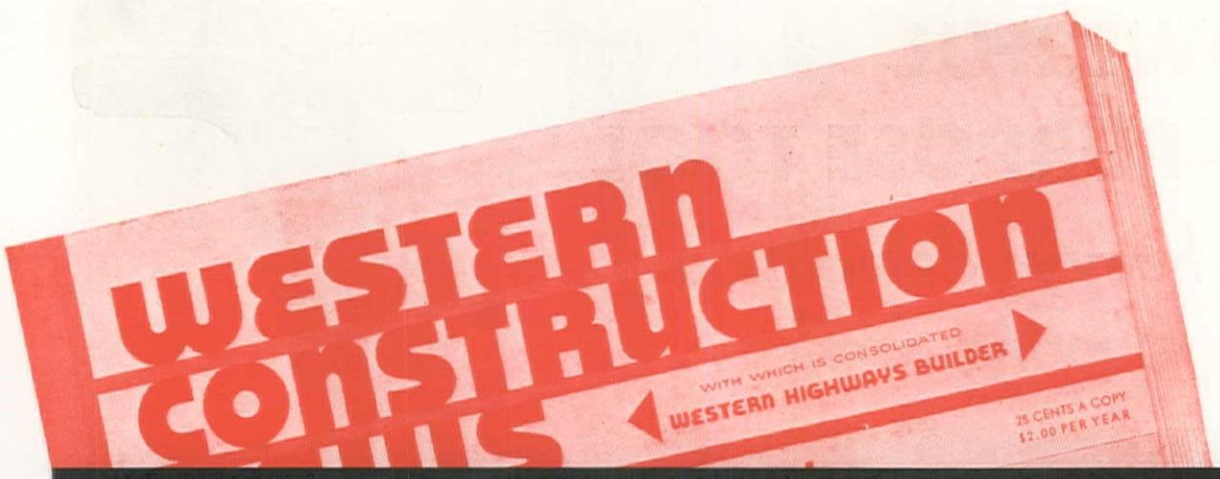

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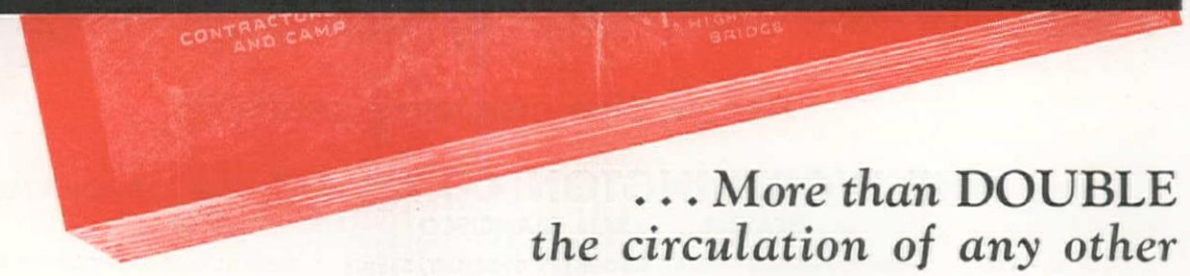

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publication for complete coverage of the West's billion dollar engineering-construction market. By virtue of this fact, "Western Construction News" presents your *cheapest*, surest, therefore your most logical means of cultivating this industry. But don't take our word for it—Make your own investigation. Or, may we have an opportunity to prove it?

Western Construction News, 114 Sansome Street, San Francisco

• Jacobson - Jenson Company works two 8 - YARD CARRYALLS in muddy going on the Wilson River Road near Tillamook, Oregon.

• Theodore Arenz uses two LE TOURNEAU ANGLE-DOZERS, two 12-YARD CARRYALLS, and a heavy-duty ROOTER to make a highway channel change along the Willamette River in Oregon.

ON THE JOB . . . AND WORKING

Today more than 600 LE TOURNEAU CARRYALL SCRAPERS and 500 BULLDOZERS and ANGLEDOZERS are working on the jobs of successful contractors from Cape Cod to Bonneville Dam; from Iraq to the Dutch East Indies, cutting the world's earth-moving costs. To the buyer these units, on the job and working, are definite assurance of tried and proved ability; assurance that LE TOURNEAU performance will not have to be "guess-timated"; assurance such as new and untried tools can not give, that LE TOURNEAU equipment can and does handle greater yardages profitably.

R. G. LeTOURNEAU, Inc.

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CONSTRUCTION

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 . . . . .

WORK CONTEMPLATED

Wharf and vegetable oil terminal at Alameda for the Santa Cruz Oil Co., S. F. Est. cost $500,000.

Waterworks, sewer, street, and building construction for Sacramento, Calif. P. W. A. grants approved; bonds to be voted. Est. cost $1,077,000.

Dams, reservoir, etc., for Santa Barbara, Calif. Bonds voted and P. W. A. grants approved. Est. cost $679,600.

Municipal light plant for Whittier, Calif. Bonds to be voted November 26th. Est. cost $662,000.

Unity Dam on Burnt River, Vale Project, Oregon, for Bureau of Reclamation. Bid call will be issued about December 1st.

Bull Lake Dam on Wind River, Riverton Project, Wyoming, for Bureau of Reclamation. Bid call will be issued about December 2nd.

Outfall sewer and sewage system for San Gabriel, Calif. Bonds to be voted November 18th. Est. cost $450,000.

CALLS FOR BIDS

5 mi. earthwork on All-American Canal for Bureau of Reclamation, Yuma, Ariz. Bids to November 23rd.

Siphon structures on All-American Canal for Bureau of Reclamation, Yuma, bids to November 25th.

Intake and Gene Pumping Plants with inlet works, outlet struc., etc., for Metropolitan Water Dist., Los Angeles, bids to November 19th.

Turbines, generators, gate hoists and powerhouse for Spokane, Wn., bids to November 14th. Est. cost $612,820.

Imperial Dam and desilting works, All-American Canal for Bureau of Reclamation, bids to November 21st.

11.2 mi. grading and conc. paving betw. Carquinez Bridge and Cordelia for Calif. Div. of Highways. Bids to November 13th.

Wharf, retaining wall, dredging, riprap and railroad tracks for Port of Oakland, bids to November 25th. Est. cost $270,789.

Seminoe Dam and power plant, Casper-Alcova Proj., Wyoming, for Bureau of Reclamation, bids to November 26th. Est. cost $2,000,000.

Tunnels Nos. 3, 4, 5, and 6, Casper Canal for Bureau of Reclamation, Casper, Wyo., bids to November 25th.

CONTRACTS AWARDED

Steam power plant for Standard Oil Co., Richmond, Calif., to Stone & Webster Engr. Corp., S. F., $1,800,000.

2 mi. to be graded by dredging betw. Folger Ave. and Gilman St., Berkeley, for Calif. Div. of Highways to American Dredging Co., S. F., $172,313.

2.9 mi. grading, surf., etc., on State Rd. No. 15, Index east, Sec. B, for Director of Highways, Olympia, Wn., to Siems-Spokane Co., Spokane, $256,428.

18.2 mi. base course, shoulder material and asph. conc. seal coat on Holbrook-Lupton Highway for Ariz. Highway Comm., to Lee Moor Contr. Co., El Paso, $198,519.

Island Park Dam, Upper Snake River, Idaho, for Bureau of Reclamation, to Max J. Kuney, Spokane, $478,838.

2.59 mi. grading, etc., on Wolf Creek Highway for Oregon State Highway Comm. to Fred H. Slate, Multnomah, Ore., $345,730.

Undergrade crossing at Peralta St., Adeline and San Pablo Ave. in Oakland for Calif. Div. of Highways to J. F. Knapp, Oakland, $359,932.

Steel and conc. bridge over Marias River, for Oregon State Highway Comm., to Portland Bridge Co., Portland, $198,325.

Power house superstructure and substructure and Bradford Island fish ladder at Bonneville Dam for U. S. Engr. to General Const. Co., and J. F. Shea, Portland, $1,160,300.

Coarse aggregate and sand for Fort Peck dam for U. S. Engr. Office to J. L. Shiely Co., St. Paul, $554,140.

7.444 mi. gravel surf. betw. Calhan and Matheson on State Highway No. 4 for Colorado State Highway Comm. to Larson & Kranz, Denver, $181,714.

Twelve 72" internal differential needle valves for Boulder Dam for Bureau of Reclamation to Thomas Spacing Machine Co., Pittsburgh, Pa., $214,000.

Barracks and mess hall at Pearl Harbor for Public Works Officer, U. S. Navy, to Ralph Wooley, Honolulu, T. H., $563,000.

15.13 mi. grading and gravel surf. betw. Jean and Bard for Nevada Highway Comm. to Fredrickson & Watson Const. Co., Fredrickson Bros. and Jones & King, Reno, $219,669.

Replacements and extensions to the Green River gravity pipeline for Tacoma, Wn., to Steel Pipe and Tank Co., Portland, $217,050 for steel pipe and to American Conc. and Steel Pipe Co., Tacoma, Wn., $102,723 for conc. pipe.

4 mi. grading and asph. concrete paving betw. S. F.-Oakland Bay Bridge and Folger Ave. for Calif. Div. of Highways to Hanrahan Wilcox Co., S. F., $247,253.

25.09 mi. concrete pipeline for Metropolitan Water Dist., L. A., to American Concrete and Steel Pipe Corp., L. A., $1,968,633 for Scheds. 4P and 5P; and to United Concrete Pipe Corp., L. A., $1,127,786 for Sched. 8P.

Street and Road Work . . . . .

WORK CONTEMPLATED

PHOENIX, ARIZ.—Following projects will be called for bids in the early spring by the Bur. of Public Roads, Phoenix, Ariz., and bidders are asked to review the work now, before snow covers the ground: (1) COCONINO COUNTY—32 mi. bitum. treated surf. or base course with bitum. surf. treatment on Rt. 4, Bright Angel Springs-North Entrance Road, and Secs. C, D, E and F of Jacobs Lake-North Rim Approach Road, Grand Canyon Natl. Park, Ariz., involving: 18,200 cy. excav., 82,500 tons cr. grav. base course; 7,580 tons screenings; 51,700 tons bitum. treated cr. gravel and other items. 10-22. (2) COCONINO COUNTY—23 mi. const. a bitum. tr. surf. on Rt. 8, Hermit Rest and the Headquarters Service Roads and Parking Areas and bitum. surf. tr. on Sec. A1 and A2 of Rt. 1, Grand Canyon-Desert View and

NEWS SUMMARY

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

Sec. A1, A2 and B of Rt. 2, Grand Canyon-South Entrance, Grand Canyon Natl. Park, involving: 40,700 tons cr. rock base course, 29,600 tons bitum. tr. cr. rock, 350 tons supplem. cr. rock, 4,770 tons screenings, 300 tons supplem. screenings, 1,004 M gallons watering, 753 tons apply Govt. furn. asph. mtl. for prime coat and seal ct. (3) COCONINO CO.—12.696 mi. cr. rock base course on Secs. G and H, Rt. 7, the Oak Cr. Natl. Forest Highway, Coconino Natl. Forest, involving in main: 310 tons apply Govt. furn. asph. mtl., 6.5 mi. mix asph. tr. material, 6,100 cu. yd. sand for stabilizing, 6.196 mi. mix sand and subgr. material, 25,500 tons cr. rock base course, 2,400 M gallons water. Prospective bidders are requested to inspect to location of the project immediately. 10-17

PALO ALTO, CALIF.—Plans and specifications and cost estimates are being prepared by City Engineer, J. F. Byxbee, City Hall, Palo Alto, for paving of Palo Alto Ave., between Seneca and Hale Streets. 10-15

SAN FRANCISCO, CALIF.—Call for bids will be issued during the winter while snow is on the ground and will be opened in the early spring by Bureau of Public Roads, 461 Market St., San Francisco, for 4.267 mi. grading of Sec. "B," Rt. 27, the Sierraville-Hobart Natl. Forest Highway, Tahoe Natl. Forest, SIERRA and NEVADA COUNTIES, Calif. Prospective bidders are requested to review the proposed work immediately. Work involves: 114,500 cu. yd. unclass. excavation. 10-17

SAN FRANCISCO, CALIF.—Following projects in Yosemite Natl. Park will be advertised for bids shortly, to be opened in the spring by Bur. of Pub. Rds., 461 Market St., S. F., and bidders are asked to review work before snow covers the ground: (1) 5.8 mi. grad. sec. A3 and A4, Rt. 3, Big Oak Flat Rd., involving 43 ac. clear.; 261,000 cy. exc.; 10,500 cy. bor. exc.; 2,470 cy. str. exc.; 575,000 sta. y. overh.; 19,200 cy. mi. haul; 2,004 cy. handl. rock embk.; 4,874 ft. cor. met. pipe; 50 cy. cr. rk., or grav. backf.; 10 cy. concr.; 410 lb. reinf. steel; 7 cast steel grates; and 370 cy. masonry. (2) 5.5 mi. grad. Sec. A2 and B1, Rt. 4, Tioga Road, involving: 35 ac. clear.; 128,000 cy. exc.; 10,000 cy. sod exc.; 11,500 cy. bor. exc.; 2,000 cy. str. exc.; 200,000 sta. y. overh.; 18,000 cu. y. mi. bor. haul; 23,000 cy. subgr. reinf.; 25,000 cy. mi. subgr. reinf. haul; 5,200 cy. handl. rock embnkm.; 3,564 ft. C. M. P.; 25 cy. concr.; 975 lb. reinf. steel; 15 cast steel grates; 82 cy. masonry; and 7 Type A spillw. inlets. (3) Const. South Fork of Tuolumne River Bridge and Approaches on Sec. A, Rt. 4, Tioga Road, involving: 1,516 cy. exc.; 375 cy. str. exc.; 570 cy. masonry; 73 cy. concr.; 12,500 lb. reinf. steel; 64,000 lb. str. steel and 135 ft. steel handrail. 10-16

DENVER, COLO.—The following highway improvement projects are contemplated by the Bureau of Public Roads, Customhouse, Denver, for construction during the 1936 season in Yellowstone National Park and prospective bidders are invited to review the proposed work at the present time before snow covers the ground: (1) Const. 6 minor concr. struc. on 8-A1 sc. of the Tower Junction-Cooke City Entrance road, slab bridges and 3 reinf. concr. box culverts. (2) Road mix base treatm. of about 40 mi. of road consisting of the South Entrance Secs. 4-A1 and A2, E. Entrance Sec. 5-C, D2 and the Grand Loop 1-E1 and 1-E2 sections. (3) Base course surf. on about 12 mi. of Grand Loop 1-F1 and F2 Secs., betw. Canyon Junc. and Lake Junction. (4) Const. 2 concr. and masonry bridges over Gibbon River at Sta. 400 and 465 on the Grand Loop betw. Norris Junc. and Madison Junc. (5) Const. 4 concr. bridges on the East Entrance Approach Rd. betw. the Wapiti Ranger Station and Holm Lodge. (6) Base course surf. on about 12 mi. of East Entrance Approach Road now being graded betw. Wapiti Ranger Sta. and Holm Lodge. 10-14

PORTLAND, ORE.—The following highway improvement projects are contemplated by Bur. of Public Roads, 316 New Post Office Bldg., Portland, Ore., for const. during the 1936 season in Crater Lake Natl. Park, and prospective bidders are invited to review the proposed work at the present time before the snow covers the ground: (1) PROJ. 6-A Grading—consisting of grad., clearing and draining approx. 5.0 mi. from Govt. Camp toward Lost Creek Ranger Station. (2) PROJ. 7-D, Unit 1—consisting of clearing, grading and draining 2.8 mi. on the Rim Road from Kerr Notch to Grayback Ridge. Project involves a considerable yardage of masonry wall. 10-14

CALLS FOR BIDS

LOS ANGELES, CALIF.—Bids to 2 P. M., November 21st, by Calif. Div. of Highways, State Bldg., Los Angeles, for 4.8 mi. grading and Asph. concr. and conc. pav. and pl. mix surf. between Newbury Park and Conejo Creek in VENTURA COUNTY, Calif., involving: 245 sta. clearing and grubbing, 13,000 M gallons water, 770,000 cu. yd. roadway excavation, 1,700 cu. yd. imp. select. mat'l, 3,850 cu. yd. struc. excavation, 3,200 cy. ditch and channel excav., 5,300,000 sta. yd. overhaul, 6,660 cu. yd. "A" concrete (pavement), 13,500 ea. pavement dowels, 63,800 lb, reinforcing steel, 420 cu. yd. "A" concrete (struc.), 1,900 lin. ft. 8" corr. metal pipe, 3,080 lin. ft. 24" corr. metal pipe. 10-29

SACRAMENTO, CALIF.—Bids to 2 P. M., November 20th, by the Calif. Div. of Highways, Sacramento, for: (1) MONTEREY CO.—1.8 mi. grading and bitum. tr. screen. river grav. surf. (roadmix method) betw. 3 mi. N. of Big Sur and Molera's Ranch, involving: 123,000 cu. yd. excavation and other items. (2) LASSEN COUNTY—9.2 mi. grading and bitum. seal coat betw. Long Valley Creek and 2.8 mi. North of Route 21, involving: 65 acres clearing and grubbing, 1,000 M gallons water, 222,000 cu. yd. roadway excavation, 3,320,000 sta. yd. overhaul, 5,100 lb. steel I-beams, 750 lb. misc. iron and steel, 430 cu. yd. rock slope protection. 10-29

SACRAMENTO, CALIF.—Bids to 2 P. M., November 20th, by the Calif. Div. of Highways, Sacramento, for 0.4 mile riprap slope protection between Courtland and Freeport in SACRAMENTO COUNTY, Calif. Work involves: 9,700 cu. yd, local borrow, 9,700 tons riprap (150 lb. per solid dry cu. ft.). 10-29

MT. VERNON, WN.—Bids to 2 P. M., November 18th, by Skagit County Comm., Mt. Vernon, Wn., for grading and draining of a section of Cascade Highway (Skagit County Secondary Road project No. 41), involving in the main: 27,466 cu. yd. borrow and excavation. 11-1

OLYMPIA, WN.—Bids to 10 A. M., November 19th, by Director of Highways, Olympia, Wn., for 1.4 miles grading and surfacing with cr. stone on County Road, Whelan Road, Junction Inland Empire Highway, Eastern Route, Easterly WHITMAN COUNTY, Wn., involving: 22,548 cu. yd. excavation, 2,980 cu. yd. cr. stone surfacing, 634 lin. ft. pipe culverts and other items. 10-31

OLYMPIA, WN.—Bids to 10 A. M., November 19th, by Director of Highways, Olympia, Wn., for: (1) SKAGIT and WHATCOM CO. (FAP 191-A)—3.5 mi. concrete paving on St. Rd. No. 1 (Lake Samish Road

Branch), Sec. 1, State Gravel Pit to State Fish Hatchery, and Sec. 2, Lake Samish Vicinity Paving, Wn. (2) COWLITZ CO. (FAP 32)—0.6 mi. grading and bitum. surf. treatm. (plant mix type) and non-skid seal treatment on State Road No. 1, Toutle River Bridge Approaches, involving: 46,880 cu. yd. excavation, 4,140 cu. yd. cr. stone surfacing, and other items. (3) STEVENS CO. (WPSO 260-A)—1.5 mi. grading and surf. with cr. stone on County Road, Colville to Tiger, Narcisse Creek Section, involving: 20,190 cu. yd. excavation, 2,510 cu. yd. cr. stone surfacing, 453 lin. ft. pipe culverts, and other items. (4) PEND OREILLE CO. (WPSO 253-A)—1.0 mi. grading on County Road, Sacheen Lake Vicinity, involving: 16,550 cu. yd. excavation, 232 lin. ft. pipe culverts, and other items. 10-31

SEATTLE, WN.—Bids to 10 A. M., November 18th, by King County Comm., Seattle, Wn., for concrete paving and surf. on 1.25 miles of the Military Road south of Seattle. Paving will connect with the end of existing concr. and continue 6,619 ft. to a connection with State Road No. 1 (the new Seattle-Tacoma Highway). Estimated cost $34,007. 10-26

BIDS RECEIVED

PHOENIX, ARIZ.—E. L. Yeager, P. O. Box 470, San Bernardino, $38,791 low to Arizona State Highway Comm., Phoenix, for grading, draining and furn. and placing select material, gravel sidewalk, curb and gutter and cutback plant mix within the city limits of Winslow, NAVAJO COUNTY, Ariz. 11-2

PHOENIX, ARIZ.—Phoenix Tempe Stone Co., Phoenix, $41,882 low to Arizona State Highway Comm., Phoenix, for 0.8 mi. consisting of widening and resurfacing existing pavement with cutback plant mix, and const. a cement rubble masonry retaining wall, and a concrete culvert, at the east city limits of Bisbee and extending southeast through the town of Lowell, COCHISE COUNTY, Ariz. 11-2

PHOENIX, ARIZ.—Bide received as follows by Arizona State Highway Comm., Phoenix, Ariz., for: (1) COCHISE CO. (WPSS 114-C)—J. A. Casson, Hayward, $91,894 low for 10.2 mi. grading, draining and placing aggregate base course in the town of Elfrida about 25 mi. north of Douglas on the Douglas-Safford Highway. (2) YAVAPAI CO. (Proj. FA 80-I)—Skousen Bros., Albuquerque, N. M., $136,666 low for 10.8 miles grading, draining and placing aggregate base course at the Hualpai Indian Reservation eastern boundary about 60 mi. northeast of Kingman and extending south on the Ashfork-Kingman Highway. 10-26

LOS ANGELES, CALIF.—Bids received as follows by Calif. Div. of Highways, State Bldg., L. A., for: (1) LOS ANGELES CO.—C. O. Sparks, 2309 E. 9th St., L. A., $116,866 low for 3.5 mi. grading and concr. paving on Rosemead Blvd. betw. San Gabriel and Ramona Blvd. (2) SAN DIEGO CO.—Basich Bros. Const. Co., 20530 S. Normandie Ave., Torrance, $30,430 low for 0.7 mi. grading at Santa Margarita River. 10-31

PORTLAND, ORE.—E. C. Hall, 1st Natl. Bank Bldg., Eugene, Ore., $160,059 low to Oregon State Highway Comm., Public Service Bldg., Portland, Ore., for 1.58 mi. grading, surf. and const. bitum. macad. wr. surf. on Gardiner-Reedsport Sec. of Oregon Coast Highway in DOUGLAS CO. (FAP 140-C, E and F), Oregon. 10-11

OLYMPIA, WN.—Paine-Gallucci, Inc., 1521 So. Grant Avenue, Seattle, Wn., $122,267 low to Director of Highways, Olympia, Wn., for constructing 1.9 miles paving on State Road No. 1, South Tacoma Way betw. S. 40th and S. M. Sts. in City of Tacoma, PIERCE COUNTY, Wn. 10-3

CONTRACTS AWARDED

PHOENIX, ARIZ.—To E. L. Yeager, 2506 N. 7th St., Phoenix, $39,544 by State Highway Comm., Phoenix, for 0.3 mi. rem. and salv. old pavem. pl. select material paving with cem. conc. pavement within city limits of Holbrook and extend from the pavement on Porter St., westerly, on Oakland Ave., NAVAJO COUNTY. 10-31

PHOENIX, ARIZ.—To Phoenix Tempe Stone Co., Phoenix, $25,141 by Arizona State Highway Comm., Phoenix, for widening existing pavement with Portland concrete on Geronimo-Solomonville Highway, GRAHAM COUNTY, Ariz. 10-31

PHOENIX, ARIZ.—To Lee Moor Contracting Co., Bassett Tower, El Paso, Texas, $158,804, by Arizona State Highway Comm., Phoenix, for 4.7 mi. grading and draining the Globe Showlow Highway beginning 61 mi. N. E. of Glove, in GILA COUNTY, FA 99-J, AFE 6058. 10-8

PHOENIX, ARIZ.—To Lee Moor Contracting Co., Bassett Tower, El Paso, Texas, $198,519, by Arizona State Highway Commission, Phoenix, Ariz., for placing aggregate base course, shoulder material and either cutback plant mix or LAYKOLD asph. concrete Type "B" seal coat on the Holbrook-Lupton Highway beginning at the Navajo-Apache County line about 21 miles northeast of Holbrook and extending N. E. approximately 18.2 mi. in APACHE COUNTY, Proj. FA 83-D, AFE 6650 10-8

PHOENIX, ARIZ.—To Ken Hodgman and Pearson & Dickerson, 202 N. Central Ave., Phoenix, $124,526, by Arizona State Highway Comm., Phoenix, for placing select matl. and A, B, C, on Flagstaff-Fredonia Highway, COCONINO COUNTY, Ariz. 10-8

PHOENIX, ARIZ.—To Phoenix-Tempe Stone Co., Phoenix, $13,797, by Arizona State Highway Comm., Phoenix, Arizona, for 500 ft. replacing existing pavement with new concrete pavement and constructing a cement rubble masonry retaining wall, within city limits of Bisbee, on the Benson-Douglas Highway, COCHISE COUNTY, FA 79-I. 10-16

PHOENIX, ARIZ.—To Bennett & Taylor, 1978 South Los Angeles St., Los Angeles, $36,136, by Bureau of Public Roads, Phoenix, Ariz., for 4.218 mi. grading, Sec. C of Rt. 11 the Payson-Colcord Mountain Natl. Forest Highway, Tonto National Forest, GILA COUNTY, Arizona. 10-21

PHOENIX, ARIZ.—To Packard Const. Co., Phoenix, $51,498, by the Arizona State Highway Comm., Phoenix, for 9.3 mi. grading and draining on the Kingman-Boulder Dam Highway, MOHAVE COUNTY, Proj. WPSS 102-C. 10-22

ALAMEDA, CALIF.—To N. M. Ball & Sons, 1889 Yosemite Road, Berkeley, $10,480, by Constructing Quartermaster, S. F. and Vicinity, Fort Mason, Calif., for const. concr, pavements at Benton Field Air Depot, Alameda, Calif. 10-14

LOS ANGELES, CALIF.—To Geo. R. Curtis Paving Co., 2440 E. 26th St., Los Angeles, $116,452, by Calif. Div. of Highways, State Bldg., Los Angeles, for 1.5 mi. grading and asph. conc. paving betw. Verdugo Road and Flint Ridge Country Club, in LOS ANGELES COUNTY, Calif. 10-26

LOS ANGELES, CALIF.—To R. E. Hazard & Sons, P. O. Box 1438, San Diego, $151,293, by Calif. Div. of Highways, L. A., for 12.5 mi. grading and pl. mix surf. medium curing type betw. East Highline Canal and Midway Wells in IMPERIAL COUNTY, Calif. 10-23

LOS ANGELES, CALIF.—To Oswald Bros., 366 E. 58th St., L. A., $39,898 by Calif. Div. of Highw., L. A., for 3.2 mi. plac. pl. mix surf. betw. 4 mi. W. of Westmoreland and Trifolium Canal, in IMPERIAL COUNTY, Calif. 11-1

LOS ANGELES, CALIF.—To Geo. R. Curtis, 2440 E. 26th St., Los Angeles, $24,504 by Calif. Div. of Highways, Los Angeles, for 0.8 mi. asphalt concrete pavement through Newhall between RR Avenue and Placentia Road in LOS ANGELES COUNTY, Calif. 10-29

REDDING, CALIF.—To Isbell Const. Co., P. O. Box 2351, Reno, Nev., $14,275 by Dist. Engr., Calif. Div. of Highw., Redding, for 5.3 mi. grading betw. Litchfield and 5.3 mi. easterly in LASSEN COUNTY, Calif. 10-16

SACRAMENTO, CALIF.—To Union Paving Co., Call Bldg., S. F., $178,696, ALT. "A" (ASPH. CONCRETE), by Calif. Div. of Highways, Sacramento, for 3.8 mi. grading and asphalt concrete paving between 3.7 miles North of Fairfield and 0.6 mi. south of Vacaville in SOLANO COUNTY, Calif. 10-23

SACRAMENTO, CALIF.—To American Dredging Co., 255 California St., San Francisco, $172,313, by Calif. Div. of Highways, Sacramento, for 2 miles to be graded by dredging betw. foot of Folger Avenue and Gilman St. in Berkeley, ALAMEDA COUNTY, Calif. 10-4

SACRAMENTO, CALIF.—To Southern California Roads Co., 2235 E. 25th St., Los Angeles, $43,404, by Calif. Div. of Highways, Sacramento, for 1.5 mi. grading and asph. concr. paving betw. Hanford and 1½ miles easterly in KINGS COUNTY, Calif. 10-14

SACRAMENTO, CALIF.—To L. C. Seidel, 680 14th St., Oakland, $16,753 by Calim. Div. of Highways, Sacramento, for 1.2 mi. water supply systems and irrig. system; and concr. curbs and gutters to be const. and portions of roadway to be graded betw. "M" St. Subway and "M" St. Bridge and betw. Ben Ali Subway and Ben Ali Sta. in YOLO and SACRAMENTO COUNTIES, Calif. 10-29

SACRAMENTO, CALIF.—To Hanrahan Wilcox Co., 582 Market St., San Francisco, $247,253 by Calif. Div. of Highw., Sacramento, for 4 mi. fgrading and asph. conc. pav. betw. S. F.-Oakland Bay Bridge and Folger Ave. in ALAMEDA COUNTY, Calif. (See Unit Bid Summary.) 11-1

SAN FRANCISCO, CALIF.—To Independent Const. Co., 46th and Clement St., Oakland, $10,128, by Dist. Engr., Calif. Div. of Highw., S. F., for 2:0 mi. cr. run base and liq. asph. applied betw. Scotts Corner and Arroyo Del Valle Bridge in ALAMEDA CO. 10-11

SAN FRANCISCO, CALIF.—To Frank C. Cuffe, San Rafael, $17,700, by Bureau of Public Roads, San Francisco, for 0.883 mi. grading and placing subgrade reinforcement on Sec. "H" of Route 77, the Mt. Shasta-Mt. Lassen National Forest Highway, Shasta National Forest, SHASTA COUNTY, Calif. 10-8

DENVER, COLO.—To Owen-Baab & Thorkildsen, 1375 Monoco, Denver, Colo., $139,830, by State Highway Comm., Denver, Colo., for 9.035 mi. gravel surfacing between Denver and Hudson on State Highway No. 81, WPH 285-D, in ADAMS and WELD COUNTIES, colo. 10-4

DENVER, COLO.—To Hoops Construction Co., Twin Falls, Idaho, $12,180, by Bureau of Public Roads, Denver, Colorado, for 7.109 miles base treatment on Project 3-A-10, C-5 of the Hoback Canyon Forest Highway Route, located in Teton National Forest, TETON and SUBLETTE COUNTIES, Wyoming. 10-7

DENVER, COLO.—To Larson Const. Co., 1902 Blake St., Denver, Colo., $31,536, by Bureau of Public Roads, Denver, Colo., for 4.483 mi. dense graded bitum. road mix surf. on the Deer Ridge-Moraine Park Highway located in Rocky Mountain Natl. Park, LARIMER COUNTY, Colo. 10-7

DENVER, COLO.—Awards recommended as follows by Bureau of Public Roads, Customhouse, Denver, Colo., for: (1) CUSTER CO. (6-A2, B2)—To Inland Const. Co., 3867 Leavenworth St., Omaha, Nebr., $39,200 for 7.627 mi. open graded bitum. road mixed surf. on the Custer-Newcastle Forest Highw. (2) CUSTER CO. (RTEC "A")—To Inland Const. Co., 3867 Leavenworth St., Omaha, Nebr., $53,050 for 8.602 mi. open graded bitum. road mix surf. on the Custer-Wind Cave Approach Road. 10-14

DENVER, COLO.—Awards as follows by the State Highway Comm., Denver, Colo., for: (1) EL PASO COUNTY (FAP 192-A)—To Larson & Kranz, 1902 Blake St., Denver, Colo., $181,714 for 7.444 mi. grav. surf. betw. Calhan and Matheson on St. Highw. No. 4. (2) ARCHULETA CO. (FAP 243-G)—To Platt Rogers, Inc., P. O. Box 1006, Pueblo, Colo., $146,830 for 7.828 mi. grav. surf. betw. Pagosa Springs and Durango on S. H. No. 10. (3) DENVER CO. (S. H. 185)—To Western Paving Contr. Co., 5230 Washington St., Denver, Colo., $66,654 for 1.138 mi. concrt. paving on Washington St. and 38th St. in City and County of Denver, Colo. 10-17

DENVER, COLO.—Award recommended to W. A. Colt & Son, Lyons, Colo., $59,245, by Bur. of Public Roads, Denver, for 1.483 mi. earthgraded and drained highway on Proj. 25-A of the North St. Vrain Forest Highway Route, located in Roosevelt Natl. Forest, BOULDER COUNTY, Colo. 10-17

DENVER, COLO.—Award recommended to Armstrong & Armstrong, Roswell, New Mex., $79,791, by Bureau of Public Roads, Denver, Colo., for 8.41 mi. bitum. surf. and 0.36 mi. earthgraded, drained and surf. highway on Proj. RTEC A of Walnut Canyon Highway located in Carlsbad Caverns Natl. Park, New Mexico. 10-21

DENVER, COLO.—Award recommended to Taggart Const. Co., Cody, Wyo., $114,040, by Bureau of Public Roads, Denver, Colo., for 2.595 mi. earthgraded and drained highway on Proj. 10-D1, E1 of the Buffalo-Tensleep Forest Highway Route, located in Big Horn Natl. Forest, BIG HORN and Washakie COUNTIES, Wyo. 10-21

DENVER, COLO.—Awards as follow by State Highway Engineer, Denver, Colo., for: (1) HUERFANO CO. (WPGH 263-H)—To R. L. Hanes, 718 Lawrence, Denver, Colo., $119,292 for 9.500 mi. grav. surf. betw. Walsenburg and La Veta Pass on St. Highway No. 10. (2) LINCOLN CO. (WPMH 278-B)—To W. E. Pigg & Son, Commonwealth Bldg., Denver, Colo., $16,035 for 0.654 mi. grav. surf. in town of Hugo on St. Highway No. 8. (3) CUSTER CO. (WPSS 360-C)—To Dominic Leone, 818 Oak St., Trinidad, Colo., $15,563 for 0.842 mi. grav. surf. bet. Wetmore and Greenwood on St. Highw. No. 96. 10-25

DENVER, COLO.—To C. Ryan & Son, 4880 Julian St., Denver, Colo., $24,470 by Bureau of Public Roads, Denver, for 8.55 mi. const. or improv. Proj. 8-B-2, C 2 of the Navajo Canyon Forest Highway Route, located in Carson Natl. Forest, RIO ARRIBA COUNTY, New Mexico. 10-28

DENVER, COLO.—Awards as follow by State Highway Engineer, Denver, Colo., for: (1) MOFFAT CO. (FAP 150-I)—To H. I. Gardner, 1128 Grand, Glenwood Sprgs., Colo., $106,619 for 4.870 mi. grav. surf. betw. Maybell and Elk Springs on St. Highw. No. 2. (2) EAGLE CO. (WPGH 240-H)—To H. C. Lallier C and E Co., P. O. Box 928, Denver, $70,541 for 1.180 mi. grav, surf. betw. Eagle and Gypsum on St. Highw. No. 4. 10-28

DENVER, COLO.—To W. A. Colt & Son, Lyon, Colo., $59,245 by Bureau of Public Roads, Denver, for 1.483 mi. earthgraded and drained highway on Proj. 25-A of the North St. Vrain Forest Highway Route, located in Roosevelt National Forest, BOULDER COUNTY, Colo. 10-31

DENVER, COLO.—Award recommended to Peter Kiewit Sons' Co., Omaha, Nebraska, $104,749 by Bureau of Public Roads, Denver, Colo., for 7.679 mi. earthgraded and drained highway on Proj. RTEC 8-A-2 of the Tower Junction-Cooke City Highway, located in Yellowstone National Park, Wyoming. 10-28

BOISE, IDAHO—To Nick Burggraff & J. W. Brennan, Idaho Falls, Idaho, $7,459, by Comm. of Public Works, Boise, for 0.479 mi. const. roadbed, drainage struc., and cr. grav. surf. on the Roosevelt Highway west from the Malad River Bridge in GOODING COUNTY, Idaho. 10-21

BOISE, IDAHO—Awards as follow by the Commissioner of Public Works, Boise, Idaho, for: (1) TETON CO. (FAP 149-A Reop. D, E, G)—To Olof Nelson, Box 413, Logan, Utah, $144,671 for 8,969 mi. const. roadbed, drainage struc., cr. rock surf. and a plant mix bitum. mat on the South Yellowstone Highway, Newdale-Canyon Creek in Fremont and Madison Co., and 9.240 mi. const. a plant mix bitum. mat and cr. grav. shoulders on the South Yellowstone Highway, Victor to Driggs in Teton County. (2) CUSTER CO. (FAP 7-AB and FLP 8-A)—To Western Const. Co., Pocatello, Idaho, $70,121 for 10.091 mi. grad., drain. and surf. with cr. grav. on Lost River Highway betw. Mackay and Dickey. 10-7

HELENA, MONT.—Awards as follow by State Highway Comm., Capitol Bldg., Helena, Mont., for: (1) McCONE CO. (FAP 253-G)—To inland Const. Co., 3867 Leavenworth St., Omaha, Nebr., $142,470 for 13.141 mi. grad. surf. with grav. subbase matl. and with bitum. surf. tr. top course of cr. grav. and const. small dr. str. on Sec. "C" of Wolf Point-Circle Road. (2) TETON CO. (FAP 275-B)—To Thos. Staunton, Great Falls, Mont., $101,576 for 10.862 mi. grad., surf. with grav. subbase matl. and with bitum. surf. tr. top course of cr. grav. and const. small drain. struc. on Section "B" of Augusta-Choteau Road. 10-16

HELENA, MONT.—Awards as follow by the State Highway Commission, Capitol Bldg., Helena, Montana, for: (1) CHOTEAU CO. (WPGH 252-I)—To E. C. Powell, Missoula, Mont., $21,763 for 4.23 mi. grad., surf. with grav. subbase matl. and with a bitum. surf. tr. top course of cr. grav. and const. small drain. struc. near the town of Fort Benton. (2) PHILLIPS CO. (WPMS 335-A)—To Tomlinson Arkwright Const. Co., Great Falls, Mont., $42,220 for 0.084 mi. grad., surf. with grav. subbase matl. and a top course of cr. grav. and const. small dr. struc. on Sec. "A" and "B" of the Saco North Road. (3.) CASCADE and CHOTEAU CO. (WPSO 336)—To E. C. Powell, Missoula, Mont., $38,377 for 5.425 mi. grad., surf. with grav. subbase matl. and a top course of cr. grav. and const. small drain. struc. on the Great Falls North Road. (4) YELLOWSTONE CO. (WPMH 57 A)—To S. J. Groves & Son, Wesley Temple Bldg., Minneapolis, $8,833 for 0.730 mi. widening present pavement along Main St. in City of Laurel with grav. subbase matl. and a top course of roadmix bitum. tr. cr. grav. (5) CASCADE CO. (WPMH 224)—To S. Birch & Sons, Great Falls, Mont., $42,362 for 0.738 mi. widening exist. pavement on Central Ave. west in City of Great Falls with a 2-course bitum. concrete pavement. (6) MADISON CO. (FAP 244-D)—To Threet Bros., Lovell, Wyo., $50,545 for 2.173 mi. grad., surf. with grav. subbase matl. and bitum. surf. tr. top course of cr. grav. and const. small dr. struc. on Sec. D of Madison Canyon-Ennis Road. (7) LINCOLN CO.—To Lobnitz Bros., Townsend, Montana, $114,265 for 8.578 mi. grading, etc., and const. 2-span 38' tr. timber bridge over Center Creek on Section B of the Libby-Manicke Road. 10-16

MISSOULA, MONT.—Contracts officially awarded, as follows, by Bureau of Public Roads, Missoula, Mont.: (1) BROADWATER CO.—To Tomlinson-Arkwright Const. Co., Gr. Falls, Mont., $66,914 for 9.429 mi. const. or improving the Townsend-White Sulphur Springs Surf. project 31-A2, B3, located in Helena Natl. Forest, Mont. (2) SANDERS COUNTY—To J. C. O'Connor, Butte, Mont., $73,675 for 13.719 mi. surf. on Clark Fork Highway, Project 6-K1, L2, M2, located in Cabinet Natl. Forest, Montana. 10-23

MISSOULA, MONT.—Award recommended to J. A. Gudgel Sons, Inc., Kalispell, Mont., $61,757, by Bureau of Public Roads, Missoula, Mont., for 6.639 mi. const. or improv. the Georgetown Lake surf. slide removal and oil surfacing Proj. FHEC 17-A1, located in Deer Lodge Natl. Forest, DEER LODGE and GRANITE COUNTIES, Montana. 10-17

CARSON CITY, NEV.—Awards as follow by Nev. St. Highw. Comm., Carson City, Nev., for: (1) CLARK O.—To Fredrickson & Watson and Frdr. Bros. and Jones & King, P. O. Box 2026, Reno, $219,669 for 15.13 mi. gr. surf. betw. Jean and Bard, Secs. B and C 1, Rt. 6. (2) ESMERALDA and MINERAL CO.—To U. B. Lee, 1059 Carpentier Ave., San Leandro, $8,981 for 20.86 mi. asph. surf. betw. Coaldale and Rhodes, Secs. F and A1, Rt. 3. 10-23

CARSON CITY, NEV.—Awards as follow by Nev. St. Highw. Comm., Carson City, Nev., for: (1) CLARK CO.—To Gibbons & Reed, 165 E. 4th, S., Salt Lake ity, $65,425 for 5.72 mi. grading and gr. surf. betw. Logandale and Overton, Rt. 12, Sec. B2. (2) ELKO CO.—To Gibbons & Reed, Salt Lake City, Utah, $53,138 for concr. and steel overpass and 0.35 mi. appr. near Deeth, Rt. 1, Sec. D1 and D2. 10-23

CARSON CITY, NEVADA—To Dodge Const., Inc., Fallon, Nev., $123,532 by Nev. St. Highw. Comm., Carson City, Nev., for 11.69 mi. cr. grav. or stone surf. betw. Salt Wells and Sand Springs, Rt. 2, Secs. C2 and C1 in CHURCHILL COUNTY, Nev. 10-30

CARSON CITY, NEVADA—To Isbell Const. Co., P. O. Box 2351, Reno, $116,700 by Nev. St. Highw. Comm., Carson City, Nev., for 4.45 mi. grav. surf. betw. point 5 mi. S. E. of Browns and point 0.6 mi. S. E. of Browns, Geiger Grade, Rt. 17, Sec. A3, WASHOE COUNTY, Nev. 10-30

SANTA FE, N. M.—Award to Geo. W. Orr, El Paso, $107,320, by State Highw. Engr., Santa Fe, N. M., for 11.817 mi. grad., dr. str., 3 concr. box culv., etc., on U. S. Highw. Rt. 366 betw. Barton and Moriarty, SANTA FE and TORRANCE CO. (151-C). 10-19

SANTA FE, N. M.—Award to Wheeler & Silver, Albuquer., $51,937, by State Highway Engr., Santa Fe, N. M., for 12.150 mi. grad., drain. struc., concr. box culverts, etc., on St. Highw. Rt. 6, betw. Albuquerque and Santa Rosa in TORRANCE CO. (179-F). 10-19

SANTA FE, N. M.—Awards as follow by State Highway Engineer, Capitol Bldg., Santa Fe, New Mexico, for: (1) GUADALUPE CO. (Proj. WPGH 97H, Unit 2)—To Brown Bros., Albuquerque, who bid $40,699 for 10.866 mi. grading, minor drain. struc. and one 5-6' x 3' by 38' concr. box culvert and 2 course surf. on U. S. Highw. 60, betw. Vaughn and Fort Sumner. (2) GUADALUPE and QUAY COS. (Proj. 114-B)—To Cook & Ransom, Ottawa, $139,125 for 5.929 mi. grading, base crs. surf. top course surf. and oil processing, rock asph. seal coat, Sta. Highw. No. 66. 10-19

PORTLAND, ORE.—Awards as follow by Oregon State Highway Comm., Portland, Ore., for: (1) JACKSON CO. (WPMH 190-F)—To Harold Blake, 400 N Thompson St., Portland, Ore., $125,012 for 5.12 mi. grading on Ashland-Neil Creek Sec. of Pacific Highway. (2) JACKSON CO. (FAP 190-E)—To Berke Bros., Inc., 2815 S. E. Harrison St., Portland, $81,227 for 0.88 mi. grad. N. Unit, Torrent Creek-Wall Cr. Sec. of Pacific Highway. 10-11

PORTLAND, ORE.—To Lucich & Co., 3001 21st Ave., South, Seattle, Wn., $40,780 (METAL PIPE) by Bureau of Public Roads, Portland, Ore., for const. 1.894 mi. on the Randle-Yakima East Side Highway Grading project 13-R, located in the Snoqualmie Natl. Forest, YAKIMA COUNTY, Wn. 10-23

PORTLAND, ORE.—To Fred H. Slate, Multnomah, Oregon, $345,730, by Oregon State Highway Commission, Public Service Bldg., Portland, Ore., for 2.59 mi. grading and an additional 3.05 mi. clearing on Nehalem River-Rock Creek Sec. of Wolf Creek Highway in CLATSOP COUNTY (WPH 181-E). 10-10

PORTLAND, ORE.—Awards as follow by Oregon State Highway Comm., Public Service Bldg., Portland, Oregon, for: (1) DESCHUTES CO. (FAP 123-G and 123-H)—To Johnston, Hansen & Johnston, Birkenfield, Ore., $38,578 for 2.62 mi. grading on Units Nos. 1 and 5, Redmond-Bend Sec. of The Dalles-California Highway. (2) TILLAMOOK CO. (WPH 191-C)—To Dolan Const. Co., Tillamook, Ore., $19,027 for furn. and instl. approx. 3,200 lin. ft. pipe culverts; also place approx. 450 cu. yd. "D" concr. and 54,000 lb. metal reinforcement in conc. box culv. on Brooks-Jordan Creek Sec. of Wilson River Highway. (3) WASCO CO. (FAP 163-C)—To Fisher Bros., Oregon City, Ore., $119,742 for 4.37 mi. regrad., surf. and bitum. mac. wr. surf., etc., on Clear Lake-Clear Creek Sec. of Wapinitia Highway. 10-10

PORTLAND, ORE.—Awards as follow by the Oregon State Highway Comm., Portland, Oregon, for: (1) MALHEUR CO.—To Dunn & Baker, Box 431, Klamath Falls, Ore., $104,319 for 9.61 mi. grading FL portions of West Unit, Jordan Creek Sec. of I. O. N. Highway (FLHP 3-D); and 1.64 mi. grading on Private Lands Portions of West Unit, Jordan Creek Sec. of I. O. N. Highway (WPSO 256). (2) UMATILLA CO. (FAP 62A and 118)—To Newport Const. Co. and Kern & Kibbe, 42 E. Salmon St., Portland, $122,416 for 6.95 mi. regrading, surf. and const. bitum. macad. wr. surf. and furn. cr. rock in stockpile on Emigrant Hill-Emigrant Springs Sec. of Old Oregon Trail. 10-11

OGDEN, UTAH—Award recommended to Tony Marrazzo, E. 618 Dalton St., Spokane, Wn., $114,427, by Bureau of Public Roads, Federal Bldg., Ogden, Utah, for 6.368 mi. const. or improv. the Idaho City-Stanley Road, Proj. FHEC 25-J, located in Boise Natl. Forest, BOISE COUNTY, Idaho. 10-16

SALT LAKE CITY, UTAH—Awards as follow by State Road Comm., Salt Lake City, Utah, for: (1) CACHE CO. (FAP 127-E)—To Olof Nelson, Box 413, Logan, Utah, $22,229 for 4.774 mi. grading betw. Logan and Smithfield. (2) SAN JUAN CO. (FAP 106-B)—To W. W. Clyde & Co., Springville, $35,297 for 1.013 mi. grav. surf. at Vega, Wash., east of Monticello on U. S. Highw. 450. (3) SEVIER CO. (WPSS 146-A)—To Lynch-Cannon Engrg. Co., Kearns Bldg., Salt Lake City, Utah, $8,792 for 1.9 mi. const. drain betw. Sugar Factory and Monroe. 11-1

SALT LAKE CITY, UTAH—Awards as follow by the Utah State Road Commission, Salt Lake City, Utah, for: (1) WEBER CO. (WPSS 132-D)—To F. B. Bothwell, 1173 E. 9th So., Salt Lake City, $61,142 for 4.210 mi. grav. surf. road betw. Beaver Creek and Monte Cristo. (2) CACHE CO. (WPMH 127-F and G)—To A. O. Thorn, Springville, Utah, $48,314 for 6.457 mi. earthgr. road between Logan and Wellesville. (3) TOOELE CO. (WPH 86-A and B)—To F. B. Bothwell, 1173 E. 9th South, Salt Lake City, Utah, $30,393 for 12.708 mi. widening shoulders of highway between Lake Point and Grantsville. 10-5

EPHRATA, WN.—To Leo J. Levin, Coulee, Wn., who bid $14,890, by Board of Grant County Commissioners, Ephrata, Wn., for 4.13 miles grading and draining of Secondary Road Project No. 18, beginning 3 miles east of Beverly. 10-11

GOLDENDALE, WN.—To H. C. Rogers & Sons, P. O. Box 181, Dayton, Wn., $12,210 by County Comm., Goldendale, Wn., for 9½ mi. surfacing of secondary roads in the vicinity of Goldendale, work officially known as Secondary Road Proj. No. 25. 10-28

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) STEVENS CO.—To Hallstrom & Hallstrom, 949 20th Ave., Seattle, Wn., $25,969 for 1.9 mi. grading, draining and surf. on St. Rd. No. 3, Colville to Palmers Siding. (2) PEND OREILLE CO.—To F. H. DeAtley & Co., 222 2nd Ave., Lewiston, Idaho, $154,693 for 11.7 mi. grading, surf. const. bitum. surf. treatm. and bitum. retread surf. on St. Rd. No. 6, Rogers Pass to Newport. 10-31

OLYMPIA, WN.—To Diesel Oil Sales Co., 2155 Northlake, Seattle, $44,966 by Director of Highways, Olympia, Wn., for 6.8 mi. surf. and const. bitum. surf. tr. and non-skid seal coat on St. Rd. No. 10, Brewster Bridge to Bridgeport in DOUGLAS COUNTY, Wn. 11-1

OLYMPIA, WN.—Awards as follow by the Director of Highways, Olympia, Wn., for: (1) KING CO.—To Erickson Paving Co., 1550 N. 34th St., Seattle, $91,670 for 3.6 mi. grading, draining and surf. State Road No. 5, Enumclaw east. (2) CLARK CO.—To United Contr. Co., 311 Stock Exchange Bldg., Portland, $41,726 for .7 mi. paving State Rd. No. 8, Vancouver barracks-paving. (3) JEFFERSON CO.—To Allen & Govan, Inc., Box 105, Olympia, $79,327 for grad., surf. and const. 150' steel truss with 2 46' reinf. concr. T-beam approach spans on St. Rd. No. 9, Big Quilcene River bridge and approaches. 10-17

OLYMPIA, WN.—Contracts re-awarded as follow by Director of Highways, Olympia, Wn., for: (1) SNOHOMISH CO. (FAP 189-D)—To Halleran Bros., 2352 N. Broadway, Seattle, $92,575 for 1.4 mi. clearing, grading, draining and surf. with cr. stone on St. Rd. No. 15, Index East, Sec. "A." (2) SNOHOMISH CO. (PWP 7713)—To Siems-Spokane Co., 412 Realty Bldg., Spokane, Wn., $256,428 for 2.9 miles clearing, grading, draining, surf. with cr. stone and const. a timber framed trestle on St. Rd. No. 15, Index East, Sec. "B." 10-5

SPOKANE, WN.—To Joslin & McAllister, 3038 E. Trent Ave., Spokane, Wn., $37,233, by County Comm., Spokane, Wn., for 4 miles grading and cr. stone surfacing on the Denison-Chattaroy Road, Spokane County, Wn. 10-8

SPOKANE, WN.—To D. A. Sullivan & Co., Inc., 415 E. Sprague Ave., Spokane, Wn., $49,045, by County Comm., Spokane, Wn., for 6.5 mi. grading, draining and surfacing with cr. stone on the Darnell Road, known as Secondary Project No. 20. 10-22

CHEYENNE, WYOMING—Awards as follow by the State Highway Comm., Cheyenne, Wyo.: (1) CONVERSE CO. (FAP 209-E)—To J. J. Dooling, Denver, Colo., $55,170 for 13.352 mi. grad., drain and misc. work on the Douglas-Gillette Road. (2) JOHNSON & NATRONA CO. (FAP 212-B)—To Peter Kewitt Sons Co., Omaha, Nebr., $128,812 for 14.850 mi. grading, drain. and misc. work on Midwest-Pinetree Road. (3) LINCOLN & UINTA CO. (FAP 217)—To W. W. Clyde & Co., Springville, Utah, $155,790 for 37.051 mi. grading, draining and misc. work on Kemmerer-Evanston Road. 10-28

Bridges and Culverts . . . . . .

WORK CONTEMPLATED

PALO ALTO, CALIF.—Plans and specifications and cost estimates are being prepared by City Engineer, J. F. Byxbee, City Hall, Palo Alto, for widening of bridge over Matadero Creek at Alma Street. 10-15

CALLS FOR BIDS

LOS ANGELES, CALIF.—Bids to 2 P. M., November 21st, by Calif. Div. of Highways, Los Angeles, for const. an overhead crossing over S. P. Co.'s tracks consist. of one 70' steel plate girder span and 4 47' steel beam spans on concr. piers with timber pile foundation near Beaumont in RIVERSIDE COUNTY, Calif. Work involves: 1,050 cu. yd. "A" concrete, 130,000 lb. reinforcing steel, 275,000 lb. struc. steel, 3,200 lb. cast steel, 4,430 lin. ft. furn. treated Douglas Fir piles and test piles, 220 ea. drive Douglas Fir piles and test piles. 10-29

SACRAMENTO, CALIF.—Bids to 2 P. M., November 20th, by Calif. Div. of Highways, Sacramento, for const. undergrade crossing under S. P. Co.'s tracks at San Jose, consisting of 2 concrete abutments and steel superstructure and .14 mi. grade and concr. paving approaches in SANTA CLARA COUNTY, California, involving: 10,000 cu. yd. roadway excavation, 1,000 cu. yd. struc, excavation, 2,225 sq. yd. subgrade pavement, 355 cu. yd. "A" concrete (pavement), 1,190 cu. yd. "A" concrete (struc.), 175 cu. yd. "A" conc. (curbs and gutters), 68 cu. yd. "A" conc. (sidewalks), 93,000 lb. reinforcing steel, 214,000 lb. structural steel, 4,100 lb. cast iron, 10,100 ft. furn. tr. D. F. piles and test piles. 10-29

BOISE, IDAHO—Bids to 2 P. M., November 15th, by Comm. of Public Works, Boise, Idaho, for: (1) BANNOCK CO. (WPH 111-A and WPGH and WPGM 111-A)—Const. 587.7' concr. struc. over the Oregon Short Line RR and the Portneuf River and grading and surf. approaches on 0.789 mi. of Old Oregon Trail Highway at McCammon. (2) BOUNDARY CO. (WPGH 20-A)—Const. 501.6' conc. overhead struc. over the Great Northern RR and grading and surf. approaches on 0.333 mi. N. and S. Highway at Naples. 11-1

BOISE, IDAHO—Bids to 2 P. M., November 15th, by Commissioner of Public Works, Boise, Ida., for: (1) NEZ PERCE CO. (NRH 33-B)—Const. underpass having a concr. substructure and a plate girder superstructure, under the Camas Prairie Branch of the Northern Pacific Railroad, const. a cement concrete pavement under the structure and grading, draining and surfacing the approaches on 0.459 mi. of the Lewis and Clark Highway and raising the grade and placing crushed rock surfacing on 0.126 miles of the North and South Highway at Spalding. (2) NEZ PERCE CO. (MISC. 595 and 608)—Reflooring and painting the 965.3' steel bridge on the Lewis and Clark Highway in Lewiston and reflooring the 507.7' steel bridge on the Clearwater River on North and South Highway at Spalding. 11-1

BIDS RECEIVED

PHOENIX, ARIZ.—Daley Corp., 4430 Boundary St., San Diego, $39,901 low to Arizona State Highway Comm., Phoenix, Ariz., for construction of a concrete overpass structure and approaches on the Ft. Huachuca-Bisbee Highway, Ariz. 10-26

LOS ANGELES, CALIF.—Mundo Engineering Co., 2305 E. 9th St., Los Angeles, $154,922 low to Calif. Div. of Highways, L. A., for const. grade separation struc. and 0.8 mi. grading and asph. concr. and concr. paving at Newport Beach Bridge in ORANGE COUNTY, Calif.

SALT LAKE CITY, UTAH—Eddington & Olsen, Springville, Utah, $109,319 low to Utah State Road Comm., Salt Lake City, Utah, for a through girder underpass with concr. abutments and approaches on 0.265 mi. on West 33rd So. St. Proj. WPGH 121-C in SALT LAKE COUNTY, Utah. 10-28

CONTRACTS AWARDED

JUNEAU, ALASKA—To Siems-Spokane Co., Realty Bldg., Spokane, Wn., $7,827, by Bureau of Public Roads, Juneau, Alaska, for constructing and improving 0.326 mi. of the Glacier Highway Montana Creek bridge, Alaska. 10-7

LOS ANGELES, CALIF.—To E. S. and N. S. Johnson, 424 N. Lake Ave., Pasadena, $25,992 by Calif. Div. of Highw., L. A., for const. overhead crossing over A. T. & S. F. RR ¼ mi. N. of Del Mar to be widened and approaches widened and paved with asph. concrete in SAN DIEGO COUNTY, Calif. 11-1

SACRAMENTO, CALIF.—To J. F. Knapp, 1401 Park St., Oakland, $359,932, by Calif. Div. of Highways, Sacramento, for const. undergrade crossing at Peralta St., Adeline and San Pablo Avenue, in Oakland and Emeryville, consisting of reinf. concrete rigid frame underpass structure and retaining wall approaches and paved street connections in ALAMEDA COUNTY, Calif. (See Unit Bid Summary.) 10-14

DENVER, COLO.—To Geo. W. Condon Co., 208 Grain Exchange, Omaha, Nebraska, $63,737 by State Highway Engineer, Denver, Colo., for const. a bridge across Bijou Creek east of Wiggins on State Highway No. 2, Project E. R. 8, in MORGAN COUNTY, Colo. 10-25

BOISE, IDAHO—Awards as follow by Comm. of Public Works, Boise, Idaho, for: (1) CLEARWATER CO. (NRS 193)—To J. F. Konen, Lewiston, Ida., $92,528, for steel and concr. bridge across N. Fork of the Clearwater River and grading and surf, appr. on 0.311 mi. of Elk River Highw. near Ahsahka. (2) GOODING CO. (SAP 32-C)—To Dan J. Cavanagh, Twin Falls, Ida., $4,470 for timber bridge across Billingsly Cr. on Old Oregon Trail north of Hagerman. 10-21

HELENA, MONT.—Awards as follow by the State Highway Commission, Capitol Bldg., Helena, Montana, for: (1) LEWIS AND CLARK CO. (WPGH 77-A)—To T. G. Rowland, 1558 Yale Ave., Salt Lake City, Utah, $85,440 for 1 reinf. concr. overpass over the Great Northern RR and 1 reinf. concr. overpass over the Northern Pacific RR, together with grading of 0.559 mi. of approach road on Sec. A of the Helena-Three Forks Road. (2) FALLON CO. (WPGH 86-B)—To J. C. Boespflug, Miles City, Mont., $58,673 for const. a 3-span reinf. concr. T-beam overhead crossing of the C. M. St. P. & P. RR Co. track, approx. 2½ mi. southeast of Baker. (3) CHOUTEAU CO. (WPGH 252 F and WPH 252-F)—To Portland Bridge Co., Yeon Bldg., Portland, Oregon, $198,325, for a 1,150.5 ft. steel and concr. bridge over the Marias River and the tracks of the Great Northern Railway Co. near the town of Loma. (4) McCONE CO. (FAP 253-C)—To H. G. Nesbit, Miles City, $20,499, for const. 5 tr. timb. pile trestle bridges and 2 std. tr. timb, pile stockpasses on Sec. C of Wolf Point-Circle Road. (5) TETON CO. (FAP 275-B)—To D. M. Manning, Hysham, Mont., $20,200 for const. 4 tr. timber pile trestle bridges and 1 tr. timber std. stockpass on Sec. "B" of the Augusta-Choteau Road. 10-16

CARSON CITY, NEVADA—Awards as follow by Nev. St. Highw. Comm., Carson City, for: (1) EUREKA CO.—To Dodge Const., Inc., Fallon, Nev., $86,755 for concr. and steel overpass and .6 mi. approaches near Dunphy, Rt. 1, Secs. A2 and A3. (2) LYON CO.—To Dodge Const., Inc., Fallon, $30,790, for concr. and steel underpass and .151 mi. approaches on Rt. 1, Sec. A, near Fernley. 10-30

CARSON CITY, NEV.—To Dodge Construction, Inc., Fallon, Nevada, $49,834, by Nevada State Highway Commission, Carson City, for constructing a concrete and steel overpass and approaches 1 mile west of Wendover, Route 24, Section B2, in ELKO COUNTY, Nevada. 10-5

PORTLAND, ORE.—To Tom Lillebo, Reedsport, Oregon, $28,029, by Oregon State Highway Comm., Portland, Ore., for const, 12 concr. bridges or culverts on Redmond-Bend Sec. of The Dalles-Calif. Highway in Deschutes County and widen and const. concr. sidewalk on bridge over Ochoco Creek at east city limits of Prineville on the Ochoco Highway in Crook County, Proj. FAP 123-B, C, E, G, H, and 175-A. 10-10

PORTLAND, ORE.—Awards as follow by the Oregon State Highway Comm., Public Service Bldg., Portland, Oregon, for: (1) KLAMATH CO. (WPGH 205-C)—To Barham Bros., 1010 N. 18th St., Salem, Oregon, $33,372 for const. a 288' concrete bridge over the S. P. Co.'s tracks on the Klamath Falls-Weed Highway near Midland. (2) MALHEUR CO. (FAP 187-D)—To R. F. Nichol, Vale, Ore., $11,078 for const. 2 bridges over China Creek and 2 culverts on the Juntura-Chimney Creek Sec. of the Central Oregon Highway. (3) MULTNOMAH CO. (FAP 174-C)—To Joplin & Eldon, P. O. Box 5686, Kenton Station, Portland, $87,415 for const. superstruc. for Eagle Creek Bridge on the Columbia River Highway near Bonneville. 10-11

SALT LAKE CITY, UTAH—To Christensen & Gardner, Inc., Vermont Bldg., Salt Lake City, Utah, $106,979, by Utah State Road Comm., Salt Lake City, for const. a through plate girder on concrete abutments and 0.303 mi. const. or improv. approaches on St. Street south of Midvale Junction, NRH 119-F (1935) in SALT LAKE COUNTY, Utah. 10-19

OLYMPIA, WN.—To Wilder & Montfort, Blaine, Wn., $31,416, by Director of Highways, Olympia, Wn., for constructing a reinf. concrete T-beam bridge 256.8' long, over the Great Northern Railway Company's tracks on St. Rd. No. 15, Index East, Sec. "B," Proj. WPGH 189-E in SNOHOMISH COUNTY, Wn. 10-17

OLYMPIA, WN.—To Colonial Const. Co., 326 W. 1st Ave., Spokane, Wn., $9,891, by Director of Highw., Olympia, for reinf. conc. T-beam bridge over S. P. & S. Ry. Co.'s tracks on St. Road No. 8, Cooks E. to Underwood W., WPGH 112-I, in SKAMANIA CO., Wn. 10-17

CHEYENNE, WYOMING—Awards as follows by State Highway Commission, Cheyenne, Wyoming, for: (1) CONVERSE CO. (FAP 209-E)—To Inland Const. Co., Cheyenne, Wyo., $27,994 for const. 8 tr. timb. bridges and 3 reinf. concr. culverts on the Douglas-Gillette Road. (2) JOHNSON and NATRONA CO. (FAP 212-B)—To Peter Kewit Sons, Omaha, Nebraska, $72,431 for const. 1 tr. timber bridge, 1 steel bridge and 6 reinf. concr. culverts on the Midwest-Pinetree road. (3) LINCOLN and UINTA CO. (FAP 217)—To W. W. Clyde & Co., Springville, Utah, $41,184 for const. 13 tr. timber bridges, 7 reinf. concr. culverts on Kemmerer-Evanston Road. 10-28

Water Supply Systems . . . . .

WORK CONTEMPLATED

DOS PALOS, CALIF.—Bonds in amount of $35,200 carried by a vote of 233 "for" and 12 "against" by electorate of Dos Palos, Calif., to help finance construction of improvements to water works system, involving: Filter plant complete, 100,000 gal. elevated storage tank 4", 6" and 8" cast iron pipe for distributing system, P. W. A. grant of $28,308 has been approved. Total estimated cost $63,508. 10-23

GALT, CALIF.—Plans and specifications are being completed by F. D. Talbot, Engineer, Forum Bldg., Sacramento, and call for bids will be issued shortly by Galt Water District, T. R. McCune, President of the Board of Directors, Galt, Calif., for improvements to waterworks system, involving: 18,860 lin. ft. 4" cast iron pipe B & S, 3,675 lin. ft. 6" cast iron pipe B & S, 20 ea. 4" gate valves, 5 ea. 6" gate vales, 39 ea. wharf hydrants 4", 10 ea. fire hydrants 6", 39 pcs. 4" pipe risers, miscellaneous fittings, 75,000 gal. elevated steel tank. Estimated cost $54,300. 10-24

SANTA BARBARA, CALIF.—At a special election held October 8th, the City of Santa Barbara voted $348,180 in bonds to aid in financing eight projects, total $679,600. The projects include: (1) Sheffield Dam and Reservoir (PWA), $202,500; (2) Filtration plant (PWA), $160,000; (3) El Cielito Reservoir (PWA), $28,000; (4) La Mesa Reservoir (PWA), $36,000; (5) Distribution system (WPA), $128,000. 10-11

SUISUN, CALIF.—A $22,000 bond issue carried by a vote of 192 to 12 at an election held by City of Suisun, Calif. Bond issue plus $15,000 grant from P. W. A. will finance cost of replacements to city water mains and improvements to source of supply at the Twin Sisters Section. 10-9

WATSONVILLE, CALIF.—Bond election will be held November 19th by Watsonville, Calif., to vote $50,000 in bonds to help finance improvements to City water system. P. W. A. grant of $41,000 has been approved. 10-28

CODY, WYOMING—Plans and specifications are being completed by Engineer H. F. Bell, Cody, and call for bids will be issued shortly by Cody, Wyo., for waterworks improvements. Estimated cost $74,545. 11-2

SHERIDAN, WYOMING—Plans and specifications are being completed by Engineer, D. J. McQuaid, 1565 Milwaukie St., Denver, Colo., and call for bids will be issued shortly by Sheridan, Wyoming, for construction of repairs and additions to waterworks system. Estimated cost $793,507. 11-2

SUNDANCE, WYOMING—Plans and specifications are being completed by F. F. Palmer, Forsyth, Montana, Engineer, and call for bids will be issued shortly by Sundance, Wyoming, for construction of water works improvements. Estimated cost $38,182. 11-2

CALLS FOR BIDS

SOUTHGATE, CALIF.—Bids to 7:30 P. M., November 18th, by City Clerk, City Hall, Southgate, for drilling a well, 12" and 16" not to exceed 1,000 feet in depth on the Neville Tract near Firestone and Atlantic Sts. 10-24

CLEVELAND, UTAH—Bids to 10 a. m., November 16th, by Town Board, Cleveland, Utah, for const. impr. to waterworks system. Est. Cost $20,000. 10-26

GLENDALE, UTAH—Bids to 2 P. M., November 19th, by Town Clerk, Glendale, Utah, for constructing improvements to waterworks system. 10-26

KANARRAVILLE, UTAH—Bids to 10 A. M., November 16th, by Town Clerk, Kanarraville, Utah, for improvm. to waterworks system, involving: 3,420 lin. ft. 4" cast iron pipe, 400 lin. ft. 4" C. I. flow pipe, 3,380 lin. ft. 3" wrought iron pipe, 9,600 lin. ft. 2" cast iron pipe. Est. cost $15,000. 10-24

MAYFIELD, UTAH—Bids to 2 P. M., November 20th, by Town Board, Mayfield, Utah, for const. impr. to waterworks system. Est. cost $35,000. 10-26

MILLVILLE, UTAH—Bids to 10 A. M., November 19th, by Town Board, Millville, Utah, for const. impr. to waterworks system. Est. cost $25,400. 10-26

MINERSVILLE, UTAH—Bids to 10 A. M., November 18th, by M. Jameson, President of Town Board, Minersville, Utah, for constructing waterworks improvements involving: 5,638 lin. ft. 8" steel pipe, 18,173 lin. ft. 6" steel pipe, elbows and valves. Est. cost $36,600. 10-24

NIBLEY, UTAH—Bids to 2 P. M., November 19th,, by Town Board, Nibley, Utah, for const. impr. to waterworks system. Estimated cost is $29,000. 10-26

OAKLEY, UTAH—Bids to 10 A. M., November 21st, by Town Board, Oakley, Utah, for waterworks improvements, involving: 17,055 lin. ft. 6" and 4" pipe, 8, 195 lin. ft. 4" and 2" pipe, valves, fire plugs and fittings. Est. cost $26,000. 10-26

ORDERVILLE, UTAH—Bids to 11 A. M., November 19th, by Town Board, Orderville, Utah, for const. impr. to waterworks system. Est. cost $15,000. 10-26

PLYMOUTH, UTAH—Bids to 2 P. M., November 23rd, by Town Clerk, Glenddale, Utah, for waterworks improvements, involving: 6,600 lin. ft. 2" cast iron pipe, 3,840 lin. ft. 4" cast iron pipe, 1,600 lin. ft. 3" cast iron pipe, 6,680 lin. ft. 2" cast iron pipe, valves, boxes and fittings, 54 meters. Est. cost $15,000. 10-26

VERNAL CITY, UTAH—Bids to 10 A. M., November 23rd, by City Clerk, Vernal City, Utah, for constructing improvements to waterworks system. Est. cost $30,000. 10-26

BIDS RECEIVED

SAN FRANCISCO, CALIF.—M. J. Lynch, Barneveld and Oakdale Sts., S. F., $15,560 low to Pub. Utilities Comm., San Francisco, for const. extensions to the Upper Alameda Tunnel Outfall located in Santa Clara County at westerly end of the Upper Alameda Tunnel about 1½ mi. southeasterly of Calaveras Dam and 12½ mi. southeasterly of the Town of Sunol, ALAMEDA COUNTY, under Spec. W. D. 92. 11-1

TORRANCE, CALIF.—Bids received as follows by City Clerk, City Hall, Torrance, for completion of water supply system. Bids on: UNIT "B"—Pumping plant. Hoagland Const. Co., 1st Natl. Bank Bldg., Long Beach, $34,970 low. UNIT "C"—1,800,000 gal. steel storage tank. Pittsburg-Des Moines Steel Co., $19,900 low. ALT. welded and riveted tank. Pittsburgh-Des Moines Steel, $21,990. UNIT "D"—(1) B & S C. I. pipe, hydrants, valves, etc.; (2) B & S C. I. pipe, valves, hydrants, etc. Fred W. Weber. (1) $41,692, (2) $7,984. 10-31

SAN FRANCISCO, CALIF.—Bids received as follows by the Public Utilities Comm., S. F., for: (1) M. J. Lynch, Barneveld and Oakdale Sts., S. F., $46,572 low for laying 12" and 16" cast ir. feeder mains on Greenwich St., Brunswick, Washington, Goettingen, Calif., 16th St., and 6th St., under Spec. W. D. 91. (2) Sibley Grading and Teaming Co., Ltd., 165 Landers St., S. F., $13,921 low for laying 36" steel feeder mains on 17th Street, from Bryant to Potrero, under Spec. W. D. 93. 11-1

MOSIER, ORE.—Eugene Ruedy Co., Sherlock Bldg., Portland, Ore., $12,211 low to Mosier, Oregon, for const. water system improvements involving turbine pump, concrete reservoir and a total of 8800 lin. ft. 2", 3", 4", 6" and 8" steel water pipe water mains, together with necessary pipe fittings, gate valves and fire hydrants. 10-19

MABTON, WN.—J. M. DeBlasio, Yakima, Wn., $37,557 low to City Clerk, Mabton, Wn., for furn. material and labor in connection with the installation of cast iron water mains, deep well turbines, well houses, wiring, and repairs to elevated tank in City of Mabton. 10-10

SULTAN, WN.—Arcorace & Coluccio, Securities Bldg., Seattle, Wn., $16,663 low to Town Clerk, Sultan, Wn., for constructing a gravity water supply line. 10-24

CONTRACTS AWARDED

BEVERLY HILLS, CALIF.—Awards as follow (subj. to PWA approval) by City Clerk, Beverly Hills, for const. of the waterworks improvements: CONTR. "A"—To Fred W. Weber, 8442 Calif. Ave., Southgate, $36,650 for 14,545' cast ir. pipe lines, Beverly Hills system. CONTR. "B"—To Larson & McCarthy, 805 Garfield Ave., So. Pasadena, $23,910 for 16,865' cast ir. pipe lines, Sherman System. CONTR. "C"—To Paddock Engrg. Co., 1027 N. Sycamore Ave., L. A., $29,066 for concrete slab and 9 tennis courts over reservoirs. CONTR. "D"—To Campbell Const. Co., 951 Genesse St., Los Angeles, $15,328 for one clarifier basin and drain line. CONTR. "E"—To Roscoe Moss Co., 4360 Worth St., L. A., $5,340 for 600 ft. deep replacement well gravel envelope type. 10-31

CLIFTON, IDAHO—To Mullins & Wheeler, 22½ E. 1st, South, Salt Lake City, Utah, $7,094 by Town Clerk, Clifton, Idaho, for replacement of 9,600 ft. of wooden mains with 4" cast iron pipe. 10-31

WILLAMINA, ORE.—To D. P. Slater, 744 N. Capitol, Salem, Ore., $14,512, by City Recorder, Willamina, Ore., for constructing improvements to the Willamina water system. 10-14

EVERETT, WN.—To Puget Sound Machinery Depot, 322 1st, So., Seattle, Wn., who bid $126,703 on ALT. "B" (USING $\frac{5}{16}$" plate) to the City Clerk, City Hall, Everett, Wn., for const. a water pipeline from California St. and Harrison Ave. to City Reservoir No. 2. 10-8

TACOMA, WN.—Awards as follow by Board of Contracts and Awards, Tacoma, Wn., for const. replacements and extensions to the Green River Gravity Pipeline. (1) To Steel Tank and Pipe Co., Portland, $217,050 on PROP. No. 2, for 12,160 ft. of steel pipe. (2) To American Concrete and Steel Pipe Co., Tacoma, Wn., $102,723 on PROP. No. 3, for 7,090 ft. of concrete pipe. 10-25

Irrigation and Reclamation . .

CALLS FOR BIDS

YUMA, ARIZ.—Bids to 10 A. M., November 25th, by Bureau of Reclamation, Federal Bldg., Yuma, for construction of siphon structures at 120 Wash, 424 Wash, Unnamed Wash and Picacho Wash. The work is located between 5 and 12 mi. northeast of Yuma and involves: 370,000 cu. yd. excavation, 4,700 cu. yd. compacted embankment, 6,850 cu. yd. backfill, 32,880 cu. yd. concrete, 2,200 sq. yd. dry rock paving, 14,000 cu. yd. riprap, 6,482,000 lb. reinf. steel, 116,000 lb. metal and rubber in side wall expansion joints, 270 ea. fabricate and drive 23' reinf. conc. piles, 341,000 lb. steel sheet piling, 820 lin. ft. timber railing, 53,400 lbs. metal handrails, 16,800 lbs. misc. metal work. Under Spec. No. 645. 10-28

YUMA, ARIZ.—Bids to 10 A. M., November 23rd, by Bureau of Reclamation, Federal Bldg., Yuma, Ariz., for construction of 5 mi. of earthwork of the All-American Canal, from Imperial Dam to the Callahan Construction Co. Schedule. Preliminary quantities of work involved are: 1,072,000 cu. yd. common excavation, 542,000 cu. yd. rock excavation, 97,000 cu. yd. stripping for embankment, 25,200 cu. yd. excavation for cut-off and toe trenches, 691,000 cu. yd. compacted embankment, 8,000,000 sta. yd. hauling and placing rock fill on outside slope of canal embankment, 17,400 cu. yd. gravel blankets on inside slopes of canal embankments, 1.440 M ft. b.m. timber sheet piling. Under Spec. No. 647. 10-28

BIDS RECEIVED

NOGALES, ARIZ.—T. A. Allen Construction Co., 500 Central Bldg., Los Angeles, $75,634 low to International Boundary Commission, 627 1st Natl. Bank Bldg., El Paso, Texas, for construction of the main channel and stilling basin, located in the City of Nogales, Arizona, under Spec. No. NFC 459, Unit No. 3. 10-22

ONTARIO, ORE.—J. A. Terteling & Sons, 2223 Fairview Avenue, Boise, Idaho, $17,221 low to Bureau of Reclamation, Ontario, Oregon, for constructing earthwork and structures, North Canal Laterals, Dead Ox Flat Division, Owyhee Project, Oregon-Idaho, under Spec. No. 733-D. 10-29

ONTARIO, ORE.—Brent Sturgill Co., Cascade Locks, Oregon, $53,639 low to Bureau of Reclamation, Ontario, Oregon, for const. earthwork and struc., South Canal, Sta. 1340 to Sta. 2016, Succor Creek Division, Owyhee Project, Oregon-Idaho, under Spec. No. 646. 10-22

ONTARIO, ORE.—George B. Henly, Nyssa, Oregon, $18,178 low to Bureau of Reclamation, Ontario, Oregon, for const. earthwork and structures, North Canal Laterals, Dead Ox Flat Division, Owyhee Project, Oregon-Idaho, under Spec. 726-D. 10-21

ONTARIO, ORE.—Otis Williams & Co., 9151 N. E. Glisan St., Portland, Ore., $19,918 low to Bureau of Reclamation, Ontario, Oregon, for constructing structures, North Canal Laterals N. C. 37.6 to 38.7-1.2, Mitchell Butte Division, Owyhee Project, Oregon-Idaho, under Spec. 725-D. 10-21

ONTARIO, ORE.—Low bids received as follows by Bureau of Reclamation, Ontario, Oregon, for: (1) J. A. Terteling & Sons, 2223 Fairview Ave., Boise, $15,076 for earthwork and struc., Ward Main Drain and Ward Dr. 0.57, Mitchell Butte Div. Owyhee Project, under Spec. No. 724-D. (2) J. A. Terteling & Sons, Boise, Ida., $19,395 for const. earthwork and struc. North Canal Laterals, Mitchell Butte Division, Owyhee Project, Oregon-Idaho, under Spec. 723-D. 10-18

CONTRACTS AWARDED

MODESTO, CALIF.—To Calif. Gunite Co., 1006 N. Sycamore St., Los Angeles, $72,554 by Modesto Irrigation Dist., 823 11th St., Modesto, for repairing old lining by guniting in District's Main Canal. 10-31

ASHTON, IDAHO—To Max J. Kuney Co., 102 E. Augusta St., Spokane, Wn., $478,838, by Bureau of Reclamation, Ashton, Idaho, for constructing the Island Park Dam, Upper Snake River Project, Idaho, under Spec. No. 632. 10-9

HELENA, MONT.—To S. J. Groves & Co., Wesleyk Temple Bldg., Minneapolis, $82,731, by Montana State Water Conservation Board, State Capitol Bldg., Helena, Mont., for const. 1 weir and a rock fill dam and appurtenant structures at outlet of Glacier Lake on Rock Creek in CARBON COUNTY, Montana. 10-3

PORTLAND, ORE.—To General Const. Co., 3840 Iowa Ave., Seattle, Wn., and J. F. Shea Co., Henry Bldg., Portland, Oregon, $1,160,300, on SCH. 3, by U. S. Engineer Office, Portland, Oregon, for constructing powerhouse superstructure; completion of the powerhouse substructure around scroll cases, turbines, and generators, const. of fishway control houses; and const. of the Bradford Island fish ladder; all at Bonneville, Oregon. 10-16

Sewer Construction . . . . . .

WORK CONTEMPLATED

LAGUNA BEACH, CALIF.—The P. W. A. has made grants totaling $65,245 to the City of Laguna Beach to finance construction of sanitary sewers. Total est. cost $144,988. 10-4

MONTEREY PARK, CALIF.—The City of Monterey Park voted for a bond issue of $165,300 to finance construction of a sewage system in a special election held October 18th. 10-21

SAN GABRIEL, CALIF.—A bond issue of $250,000 to finance construction of an outfall sewer and sewage system will be voted by the City of San Gabriel in a special election to be held November 18th. Total est. cost $450,000. 10-21

SONORA, CALIF.—Bonds carried by a vote of 9 to 1 at an election held October 8th by City of Sonora, Calif., to vote $44,000 in bonds to help finance const. of intercepting and outfall sewers and sewage disposal plant. P. W. A. application has been filed for 45 per cent of the cost. 10-10

GRESHAM, ORE.—Bonds were carried by Gresham, Ore., for $118,180 to finance const. of sewers for the city. P. W. A. grant of $53,181 has been allotted. H. L. Gilbert, Couch Bldg., Portland, is Engineer. 10-30

CALLS FOR BIDS

VALLEJO, CALIF.—Bids to 11 A. M., November 15th (tentative date) by City Clerk, City Hall, Vallejo, for const. a storm sewer in Virginia St. betw. Branciforte St. and City bulkhead, involving: 656 lin. ft. 48" reinf. concrete storm sewer on pile foundation. 10-31

BIDS RECEIVED

LOS ANGELES, CALIF.—Mike Radich, 410 N. Formosa Ave., L. A., $6,739 low to Board of Public Works, L. A., for const. storm drain in La Salle Ave. betw. Florence Ave. and 74th St. under Spec. 137. 10-31

PALM SPRINGS, CALIF.—Gogo & Rados, 10024 S. Figueroa St., Los Angeles, $71,021 on (vitr. pipe) and $64,835 on (concr. pipe) low to Palm Springs Sanitary District, Palm Springs, for construction of a sewer system and sewage disposal plant. 10-23

CONTRACTS AWARDED

SEAL BEACH, CALIF.—Award recommended to H. A. Teget, 133 Princeton, Ontario, $44,554, by City Clerk, Seal Beach, for construction of a sewage disposal plant. 10-25

River and Harbor Work . . . . .

WORK CONTEMPLATED

OAKLAND, CALIF.—The Port of Oakland, ft. of Grove St., Oakland, has accepted a grant of $121,855 from the P. W. A. to help finance an extension to the Outer Harbor Wharf. Total estimated cost is $270,789. It is expected bids will be opened on the following dates for the three contracts involved: (1) Bids to 4 P. M., November 25th, for const. the wharf and rear retaining wall, dredging and riprap and railroad tracks. Estimated cost $206,500. (2) Bids to January 13th, 1936, for fill in betw. retain. walls, grading and pav. area betw. retaining walls; street and sewers and paving apron wharf. Estimated cost $51,000. (3) Bids to March 30th, 1936, for sprinkler system and water lines. Estimated cost $13,200. 10-22

CALLS FOR BIDS

THE DALLES, ORE.—Bids to November 15th (tentative date) by Port Commission, The Dalles, Oregon, for const. a ship and barge dock and terminal to be 1,000 ft. long, 110 ft. wide; with a warehouse 960 ft. long by 94 ft. wide. Est. cost $230,000. 10-19

CONTRACTS AWARDED

SACRAMENTO, CALIF.—To J. C. Bolt, 1727 E. Walnut St., Stockton, $5,845 by Calif. State Division of Water Resources, Sacramento, for const. 3 sections of levee on the San Joaquin River, 10 mi. south of Manteca, San Joaquin County, in Reclamation District No. 2064. 10-29

SACRAMENTO, CALIF.—To D. McDonald, 203 23rd St., Sacramento, $92,020, by U. S. Engineer Office, Sacramento, for raising and strengthening existing levee and const. new levee along southerly bank of American River for distance of 6.3 miles. 10-18

PORTLAND, ORE.—To Portland Dredging Co., Lewis Bldg., Portland, Ore., $18,010 by U. S. Engineer Office, Portland, Ore., for bank clearing, bar clearing, grading of river bank, and const. approx. 4,800 lin. ft. protective gravel fill, all along the Willamette River, Oregon, betw. Eugene and Harrisburg, under Invit. No. 698-36-135. 11-1

PORTLAND, ORE.—To Kuckenberg-Wittman Co., Inc., Board of Trade Bldg., Portland, $16,983, by U. S. Engr. Office, Portland, Ore., for bank clearing, bar clearing, grading of river bank, and const. approx. 4,290 lin. ft. protective gravel fill all along the Willamette River, Oregon, between Eugene and Harrisburg, under Spec. No. 698-36-104. 10-18

Tunnel Construction . . . . . .

CALLS FOR BIDS

CASPER, WYOMING—Bids to 10 A. M. (M. S. T.), November 25th, by Bureau of Reclamation, Casper, Wyoming, for construction of Tunnels Nos. 3, 4, 5, and 6, Casper Canal, Casper-Alcova Project, Wyoming, under Spec. No. 649. Work is located from about 13 to 36 miles southwest of Casper, Wyoming, and involves in the main: 166,000 cu. yd. all cl. open-cut excav., 81,500 cu. yd. tunnel excavation, 900 cu. yd. backfill, 1,096 cu. yd. conc. in portal structures and transitions, 17,750 cu. yd. concrete in tunnels, 3,400 cu. ft. pressure grouting, 800 cu. yd. dry-rock paving, 390,000 lb. steel tunnel supports (furn. and install), 132 M ft. b. m. timber lagging and sills for steel tunnel supports (furn. and install), 415,000 lb. steel tunn. liner plates (furn. and install), 11,000 ft. 6" to 10" dia. tunnel drains (construct), 116,000 lb. reinf. bars (place), 1,600 ft. grout holes (drill), 2,300 lb. metal work (install). 10-28

Pipeline Construction . . . . . .

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Awards as follows by Metropolitan Water District, 306 W. 3rd St., L. A., for: SCH. 4 and 5 P—American Conc. and Steel Pipe, 4635 Firestone Blvd., Southgate, who bid $1,968,633.70 for constr. of precast conc. pipe for Upper Feeder, betw. Sta. 926-0 to 1185-40, and Upper Feeder, betw. Sta. 1185-40 and 1436-00. Awarded according to stipulation submitted by above. SCH. 8P—To United Conc. Pipe, Box 1, Sta. H, L. A., who bid $1,127,786 for precast conc. pipe, Upper Feeder, betw. Sta. 2009-18 and 2257-50. (See Unit Bid Summary.) 11-2

Power Development . . . . . .

CONTRACTS AWARDED

RICHMOND, CALIF.—To Stone & Webster Engineering Corp., Russ Bldg., San Francisco, by Standard Oil Co., 225 Bush Street, San Francisco, for constructing a steam power plant at its Richmond Refinery and for converting operating equipment from steam to electricity. Total estimated cost $1,800,000.

FORT COLLINS, COLO.—To Garner Bros., Longmont, Colo., $3,780, by City Commissioners, Fort Collins, Colo., for furnishing all necessary equipment and labor for making the excavation for the power plant. 10-14

NAVAJO, N. M.—To Fairbanks Morse Co., Chicago, Ill., $38,510, by Purchasing Officer, Interior Dept., Wash., D. C., for furnishing and installing Diesel elec. generating equipment in the Navajo Capitol Power Plant, New Mexico, under Prop. No. 897. 10-12

NAVAJO, N. M.—To Industrial Heating and Engineering Co., 828 N. Broadway, Milwaukee, $56,632, by Purchasing Officer, Interior Dept., Wash., D. C., for furn. and installing boilers and auxiliaries in the Navajo Capitol Power Plant, New Mexico, under Prop. No. 897. 10-23

Lighting Systems. . . . . .

WORK CONTEMPLATED

WHITTIER, CALIF.—The City of Whittier will vote on a bond issue of $370,000 to finance construction of a municipal light plant in a special election November 26th. A P. W. A. grant of $292,000 will make up the balance of the cost. 10-17

BIDS RECEIVED

LOS ANGELES, CALIF.—Walker Martin Corp., 1307 W. 48th St., Los Angeles, $16,291 low to Board of Public Works, L. A., for ornamental lighting system in streets adjacent to Griffith Park Playground, etc., under Spec. No. 135. 10-31

Miscellaneous. . . . . .

WORK CONTEMPLATED

ALAMEDA, CALIF.—Application has been made to the U. S. Engineer Office, San Francisco, by Santa Cruz Oil Company, Ltd., 311 California St., S. F., for permit to const. a wharf, 200' long, 30' wide and extending 80' channelward of the pier head line on property at ft. of Willow St., Alameda, Oakland Inner Harbor. A vegetable oil terminal is proposed at the above site, involving construction of buildings and several large oil storage tanks. Estimated cost of entire project is $500,000. 10-5

BIDS RECEIVED

HAYWARD, CALIF.—Bids received as follows by City Clerk, for const. a Municipal Natatorium: GENERAL CONTRACT, DeLuca & Son, 1745 Filbert St., S. F. (low), $60,144. MECHANICAL WORK, Fred W. Snook, 596 Clay St., S. F. (low), $19,086. ELECTRICAL WORK, Abbett Elec. Wks., 126 Spear, S. F. (low), $2,561. EQUIPMENT, Trask & Squier Co., 39 Natoma St., San Francisco (low), $1,353. 10-31

BOULDER CITY, NEVADA—J. B. Martina Mosaic Co., 3412 W. Hayward Place, Denver, Colo., $51,717, low, to Bureau of Reclamation, Boulder City, Nev., for const. terrazzo work for the Boulder Dam and Power Plant, Boulder Canyon Project, Arizona-California-Nevada, under Spec. 642. 11-1

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To J. H. Pomeroy Co., and Raymond Concrete Pile Co., 333 Montgomery Street, San Francisco (cost plus basis not to exceed $117,000) by Golden Gate Bridge and Highway District, San Francisco, for replacement of magazine at the Presidio. 10-31

BALBOA, C. Z.—To Tucker McClure, Balboa, C. Z., $757,350 for constructing roads and sewers at Naval Ammunition Depot, Balboa, C. Z., under Spec. No. 7819. 10-29

PUEBLO, COLO.—To Driscoll Const. Co., 220 S. Main St., Pueblo, Colo., $60,884 by Colorado State Hospital, care Steward, Colorado State Hospital, Pueblo, Colo., for a new tunnel, grading, surfacing, new roads and walks and fence; also a sprinkler system at the Colorado State Hospital. 10-7

Dam Construction . . . . . .

WORK CONTEMPLATED

VALE, ORE.—Official call for bids will be issued by the Bureau of Reclamation, Vale, Oregon, as soon as field investigations are completed and plans and specifications are prepared for construction of the Unity Dam to be located on the Burnt River near Unity, Oregon, Vale Project. It is expected bids will be opened about December 1st, 1935, and prospective bidders are requested to go over the project while weather conditions are favorable. Preliminary quantities of work involved, which may possibly be changed before call for bids is issued, are as follows: 70,000 cu. yd. common exc. open cut, 2,000 cu. yd. rock excav. open cut, 109,000 cu. yd. common exc. borrow pits, 17,000 cu. yd. rock excav. borrow pits, 2,000 cu. yd. tunnel and shaft excavation, 17,000 cu. yd. stripping for dam embankment and borrow pits, 124,000 cu. yd. earthfill in dam, 10,000 cu. yd. struc. backfill, 20,000 cu. yd. rockfill (downstr. slope), 5,000 cu. yd. rock riprap (upstr. slope), 2,000 cu. yd. riprap (about spillway), 1,000 cu. yd. concr, (tunnel chambers and shaft), 4,000 cu. yd. concr. (spillw. and still. basin), 500 cu. yd. concr. (dam), 2,000 lin. ft. grout holes, 2,000 cu. ft. pressure grouting, 440,000 lb. reinforcing bars, 3,000 lin. ft. embankment toe drains and spillway drains, 220,000 lb. inst. gates, valve and metal work. 10-21

RIVERTON, WYOMING—Official call for bids will be issued by the Bureau of Reclamation, Riverton, Wyo., as soon as field investigations are completed and plans and specifications are prepared for construction of the Bull Lake Dam to be located on the Wind River near Riverton, Wyo., Riverton Project. It is expected bids will be opened about December 2nd, 1935, and prospective bidders are requested to go over the project while weather conditions are favorable. Preliminary quantities of work involved, which may possibly be changed, are as follows: 105,000 cu. yd. open cut excav., common; 18,000 cu. yd. open cut excav., rock; 607,000 cu. yd. borrow pit exc., common; 112,000 cu. yd. borrow pit exc., rock; 72,000 cu. yd. stripping, 642,000 cu. yd. earthfill in dam, 7,300 cu. yd. structure backfill, 136,000 cu. yd. rockfill (downstr. slope), 42,000 cu. yd. rock riprap (upstr. slope), 4,500 cu. yd. riprap (spillway), 4,500 cu. yd. concr. (outlet works), 3,900 cu. yd. concr. (spillw. and basin), 1,300 cu. yd. concr. (dam), 1,630,000 lb. reinforcing bars, 5,300 lin. ft. embkm. toe and spillw. drains, 732,000 lb. inst. gates, valve and metal work, 120,000 lb. drive steel sheet piling, 20,000 sq. ft. drive wood piling. 10-21

CALLS FOR BIDS

YUMA, ARIZ.—Bids to 10 A. M. (M. S. T.), November 21st, by Bureau of Reclamation, Federal Bldg., Yuma, Arizona, for constructing the Imperial Dam and Desilting Works, All-American Canal System, Boulder Canyon project, Arizona-California-Nevada, under Spec. No. 644. Work is located on the Colorado River about 18 mi. northeast of Yuma, Arizona. Work involves the following approximate quantities: 572,000 cu. yd. all cl. exc. for dam, 791,000 cu. yd. all cl. exc. (desilt. wks.), 16,000 cy. all cl. exc. for roads, 1,079,300 cy. exc. from borrow pits, 91,500 sq. yd. prep. earth founda. for concr., 60,000 cy. backfill, 1,065,000 cy. compacting embankments, 182,550 sq. yd. dry-rock paving, 45,900 cy. riprap, 38,000 cy. grav. fills and blankets, 47,300 cy. rockfills (canal ambankm.), 10,000 cy. concr. in concr. piles, 65,000 cy. concrete in dam, 55,100 cy. concr. in aprons and paving, 34,700 cy. concr. in desilting works, 400 cu. ft. pressure grouting, 1,710 M ft. b. m. untr. timb, sheet-piling, fabricate and drive; 950 M ft. b. m. tr. timb. sheet-piling (drive), 5,203,000 lb. steel sheet-piling (drive), 182,500 lb. steel sheet-piling in concr. in trenches (place), 13,300 lin. ft. timb. founda. piles (drive), 113,400 ft. concrete piles (drive), 1,600 ft. grout holes (drill), 18,255,000 lb. reinforc. bars (place), 419,300 lb. jet pipe in conc. piles (plc), 19,300 ft. flexible jet-seals (install), 6,600 ft. metal water stops (install), 10,900 ft. mastic filler (place), 2,300 ft. 4" and 12" clay sewer pipe (lay), 4,650 ft. timb. crests on weirs (inst.), 2,450 sq. ft. roof on bldg. (install), 379,000 lb. struc. steel, bridges (erect), 1,184,000 lb. roller gates and hoists (inst.), 1,169,700 lb. radial gates and hoists (inst.), 813,000 lb. trash-rack metal work (instl.), 200,000 lb. metal handrails (install), 2,054,000 lb. revolv. scrapers and drives (inst.), 353,000 lb. met. lining in slots (inst.), 1,400,000 lb. met. pipe, fittings and valves (inst.), 94,500 lb. misc. metal work (install), 1,400 sq. ft. met. doors and windows (inst.), 71,300 ft. elec. met. conduit (install), 13,500 ft. 4-way and 6-way multiple-duct conduit (lay), 10,000 ft. parkway cable (lay), L. S. elec. conductors and apparatus (inst.). 10-19

CASPER, WYOMING—Bids to 10 A. M., November 26th, by Bureau of Reclamation, Casper, Wyoming, for const. the Seminoe Dam and Power Plant, Casper-Alcova Project, Wyoming. Work is located on the North Platte River about 37 miles northeast of Parco, Wyoming, and involve in the main: 606,000 cu. yd. all cl. open cut excv., 22,000 cu. yd. tunnel excv., 700 cy. gravel road surfacing, 3,000 cu. yd. backfill, 1,000 cu. yd. riprap, 400 cu. yd. rubble masonry, 189,680 cu. yd. concrete, 90 cu. yd. porous concrete, 34,600 cu. ft. pressure grouting, 30,400 ft. grout, drainage, weep and anchor bar holes (drill), 2,550,000 lb. reinf. bars and fabric (place), 260 lin. ft. 4" to 6" dia. sewer pipe drains (construct), 800 lin. ft. 4" dia. split sewer pipe drains (const.), 7,000 lin. ft. porous concrete drain tile (manufacture and place), 397,000 lb. met. pipe, tubing and fitngs (inst.), 365,000 lb. power penstocks and outlet pipes (install), 1,535,000 lb. needle valve and misc. met. wk (inst.), 1,002,000 lb. gates and appurtenances (inst.), 180,000 lb. struc. bridge steel (inst.), 13 M ft. b. m. bridge timbers (install), 11,600 ft. met. sealing strips (inst.), 8,400 sq. ft. asph. satur. felt roof (inst.), 25,700 ft. elec. conduit (install), 10,000 ft. elec. cable (install), furn., install and opr. concr. cooling plant, transport 30,000 cwt freight for Government. Spec. No. 630. 10-28

Flood Control Work . . . . . .

WORK CONTEMPLATED

TACOMA, WN.—At an election held October 22nd, voters of Pierce County, Wn., voted favorably for formation of a flood control district, adjacent to the Puyallup, Carbon & Stuck Rivers. E. F. Banker, Olympia, Wn., is Director of Conserv. and Flood Control Work. 10-26

Railroad Construction . . . . .

CONTRACTS AWARDED

STOCKTON, CALIF.—To Biasotti-Willard & Biasotti, 40 W. Clay St., Stockton, $7,939, by Stockton Port Commission, for building extensions to Public Belt System for the Stockton Port Commission, San Joaquin County, Calif. 10-23

EQUIPMENT and MATERIALS SECTION

This is a directory of products made by manufacturers whose advertisements appear in this issue of *Western Construction News*. If you do not find what you want, write for further information to *Western Construction News*, 114 Sansome Street, San Francisco, California.

On the following pages will be found the "Where to Buy in the West" section; and an alphabetical index of advertisers is on the last page of this issue.

Backfillers
Austin-Western Road Mchy. Co.
Harnischfeger Corp.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Batchers, Concrete Aggregates
Western Pipe & Steel Co.

Bearings, Roller
Timken Roller Bearing Co.

Bins, Storage and Hopper
Western Pipe & Steel Co.

Bits, Rock Drilling
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.
Timken Roller Bearing Co.

Blades, Grader and Scraper
Adams, J. D., Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.

Blasting Supplies
Apache Powder Co.
Atlas Powder Co.
Halafax Explosives Co.
Trojan Powder Co.

Bridges
Columbia Steel Co.

Buckets
American Manganese Steel Co.
Bucyrus-Erie Co.
Electric Steel Foundry Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Northwest Engineering Co.
Page Engineering Co.
Wellman Engineering Co.

Bulldozers
Austin-Western Road Mchy. Co.
LeTourneau, R. G., Inc.

Cable, Highway Guard Rail
Columbia Steel Company
Leschen, A., & Sons Rope Co.

Cableways
Columbia Steel Co.
Leschen, A., & Sons Rope Co.

Castings, Steel and Alloy Steel
American Manganese Steel Co.
Columbia Steel Company
Pacific Coast Steel Corp.
Electric Steel Foundry Co.

Cement
Pacific Portland Cement Co.
Portland Cement Association

Cement Pumping Equipment
Fuller Co.

Cement, Tan
Pacific Portland Cement Co.

Chemicals
Great Western Electro-Chemical Co.

Chlorinators
Wallace & Tiernan Co., Inc.

Chlorine
Great Western Electro-Chemical Co.

Clarifiers, Water
Link-Belt Co.

Compressors, Air
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.
Worthington Pump & Mchy. Co.

Conveyors, Belt
Jeffrey Manufacturing Co.
Link-Belt Co.

Cranes, Diesel, Electric, Gas and Steam
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Industrial Brownhoist Corp.
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc.
Link-Belt Co.
McKiernan-Terry Corp.
Northwest Engineering Co.
Thew Shovel Co.
Universal Crane Co.

Crushers
Austin-Western Road Mchy. Co.
Pioneer Gravel Equipment Mfg. Co.

Culverts
Austin-Western Road Mchy. Co.
California Corrugated Culvert Co.
Hardesty Manufacturing Co.
Pure Iron Culvert & Mfg. Co.
Toncan Culvert Mfrs. Assn.
Washington Corrugated Culvert Co.
Western Pipe & Steel Co.

Derricks, and Derrick Fittings
Harnischfeger Corp.
McKiernan-Terry Corp.

Digestors
Chicago Bridge & Iron Works

Drills, Diamond
Chicago Pneumatic Tool Co.

Drills, Rock
Chicago Pneumatic Tool Co.
Ingersoll-Rand Company
Worthington Pump & Mchy. Corp.

Dynamite
Apache Powder Co.
Atlas Powder Co.
Halafax Explosives Co.
Trojan Powder Co.

Elevators, Bucket
Jeffrey Manufacturing Co.
Link-Belt Co.

Engines, Diesel, Gasoline and Steam
Caterpillar Tractor Co.
Chicago Pneumatic Tool Co.
Ingersoll-Rand Company
International Harvester Company of America
Worthington Pump & Mchy. Corp.

Equipment, Rebuilt
(See Opportunity Section)

Equipment for Rent
(See Opportunity Section)

Equipment, Used
(See Opportunity Section)

Excavators, Ditching and Trench
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Excavators, Dragline
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Explosives
Apache Powder Co.
Atlas Powder Co.
Halafax Explosives Co.
Trojan Powder Co.

Fence Posts
Columbia Steel Company

Fence, Wire
Columbia Steel Company

Ferric Chloride
Great Western Electro-Chemical Co.

Fire Hydrants
Columbian Iron Works

Flumes, Metal
California Corrugated Culvert Co.
Chicago Bridge & Iron Works
Hardesty Mfg. Co.
Pure Iron Culvert & Mfg. Co.
Toncan Culvert Mfrs. Assn.
Washington Corrugated Culvert Co.
Western Pipe & Steel Co.

Flumes, Wood Stave
Federal Pipe & Tank Co.

Forms, Concrete
Western Pipe & Steel Co.

Gasoline
General Petroleum Corp.

Generators, Electric
General Electric Co.
Harnischfeger Sales Corp.

Generators, Turbine
Pelton Water Wheel Co.

Governors, Turbine
Pelton Water Wheel Co.

Graders, Road
Adams, J. D., Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.

Gravel Plant Equipment
Austin-Western Road Mchy. Co.
Link-Belt Co.
Pioneer Gravel Equipment Manufacturing Co.

Grinding Machines, Concrete
Mall Tool Company

Hoists, Diesel, Gas, Electric and Hand Power
Chicago Pneumatic Tool Co.
Harnischfeger Corp.
Ingersoll-Rand Company
Link-Belt Co.
McKiernan-Terry Corp.
United Machinery Co.
Wellman Engineering Co.

Hoppers, Steel
Chicago Bridge & Iron Works
Link-Belt Co.
Standard Steel Works
Western Pipe & Steel Co.

Hose, Air, Steam and Water
Chicago Pneumatic Tool Co.

Hydrants
Columbian Iron Works
Pac. States Cast Iron Pipe Co.

Lighting Plants
General Electric Co.
Harnischfeger Sales Corp.

Liner Plates
Western Pipe & Steel Co.

Loaders, Power, Truck and Wagon
Austin-Western Road Mchy. Co.
Link-Belt Co.

Locomotives
Fate-Root-Heath Company

Lubricants, Oils and Greases
General Petroleum Corp.

Lumber
Baxter, J. H., & Co.

Lumber, Redwood
California Redwood Assn.

Lumber, Treated
Baxter, J. H., & Co.

Meters
Neptune Meter Co.

Mixers, Concrete
Koehring Co.

Motors, Electric
General Electric Co.
Harnischfeger Sales Corp.

Paints, Protective
General Paint Corp.

Paving Breakers
Chicago Pneumatic Tool Co.
Gardner-Denver Company
Ingersoll-Rand Company
Worthington Pump & Mchy. Corp.

Penstocks
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Pile Drivers
Harnischfeger Corp.
Industrial Brownhoist Corp.
McKiernan-Terry Corp.

Piling, Creosoted
Baxter, J. H., & Co.

Piling, Steel
Columbia Steel Co.
National Tube Company
Pacific Coast Steel Corp.

Piling, Wood
Baxter, J. H., & Co.

Pipe, Cast Iron
Pacific States Cast Iron Pipe Co.

Pipe, Riveted Steel
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Pipe, Steel
Columbia Steel Co.
National Tube Co.
Western Pipe & Steel Co.

Pipe, Steel, Cement Lined
National Tube Company

Pipe, Welded Steel
California Corrugated Culvert Co.
Chicago Bridge & Iron Works
Columbia Steel Co.
Hardesty Mfg. Co.
Toncan Culvert Mfrs. Assn.
Washington Corrugated Culvert Co.
Western Pipe & Steel Co.

Pipe, Wood
Federal Pipe & Tank Co.

Powder
(See Explosives)

Pumps
Chicago Pneumatic Tool Co.
Layne & Bowler Co.
Pelton Water Wheel Co.
Pomona Pump Co.
Worthington Pump & Mchy. Corp.

Rails and Rail Specialties
Columbia Steel Co.

Reinforcing, Steel Bar and Fabric, for Concrete
Columbia Steel Co.
Pacific Coast Steel Corp.

Road Oils
General Petroleum Corp.

Rollers, Compacting
LeTourneau, R. G., Inc.

Rollers, Road
Austin-Western Road Mchy. Co.

Rope, Wire
Columbia Steel Co.
Leschen, A., & Sons Rope Co.
Roebling's Sons Co., John A.

Scarifiers
Adams, J. D., Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Scrapers
Adams, J. D., & Co.
Austin-Western Road Mchy. Co.
LeTourneau, R. G., Inc.

Screens, Sand and Gravel
Austin-Western Road Mchy. Co.
Link-Belt Company
Pioneer Gravel Equipment Manufacturing Co.

Second Hand Equipment
(See Opportunity Section)

Sewage Disposal Equipment
Link-Belt Company
Wallace & Tiernan Company

Sharpeners, Drill
Chicago Pneumatic Tool Co.
Ingersoll-Rand Company
Worthington Pump & Mchy. Corp.

Shovels, Power
Austin-Western Road Mchy. Co.
Bucyrus-Erie Company
Harnischfeger Sales Corp.
Koehring Company
Lima Locomotive Works, Inc.
Link-Belt Company
Northwest Engineering Co.
Thew Shovel Company

Smoke Stacks
Chicago Bridge & Iron Works

Stand Pipes
Chicago Bridge & Iron Works

Steel, Abrasion Resisting
American Manganese Steel Co.
Columbia Steel Company
Electric Steel Foundry Co.
Pacific Coast Steel Corp.

Steel, Hollow Drill
Ingersoll-Rand Company
Pacific Coast Steel Corp.

Steel, Reinforcing
Columbia Steel Company
Pacific Coast Steel Corp.

Steel, Sheet-Galvanized Corrugated
California Corrugated Culvert Co.
Columbia Steel Company
Pacific Coast Steel Corp.
Toncan Culvert Mfrs. Assn.

Steel, Structural
Western Pipe & Steel Co.
Chicago Bridge & Iron Works

Tanks, Metal
California Corrugated Culvert Co.
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Tanks, Wood
Federal Pipe & Tank Co.

Timber, Creosoted
Baxter & Company, J. H.

Tools, Pneumatic
Chicago Pneumatic Tool Co.
Ingersoll-Rand Company
Worthington Pump & Mchy. Corp.

Torches, Carbide
Air Reduction Sales Co.

Tractors
Allis-Chalmers Mfg. Co.
Caterpillar Tractor Company
International Harvester Company of America

Tramways, Aerial
Columbia Steel Co.
Leschen, A., & Sons, Rope Co.
Roebling's Sons Co., John A.

Trucks, Motor
International Harvester Company of America

Tubing
National Tube Company

Turbines
General Electric Co.
Pelton Water Wheel Co.

Valves
Columbian Iron Works

Valves, Gate
California Corrugated Culvert Co.
Columbian Iron Works
Pacific Pipe Co.
Pelton Water Wheel Co.

Vibrators, Concrete
Chicago Pneumatic Tool Co.
Electric Tamper & Equipment Co.
Mall Tool Company

Wagons and Trailers
Adams, J. D., Co.
Austin-Western Road Mchy. Co.
Koehring Co.
LeTourneau, R. G., Inc.

Water Wheels
Pelton Water Wheel Co.

Welding and Cutting Equipment
Adams, J. D., Co.
Harnischfeger Corp.

Welding Rods and Wire
Adams, J. D., Co.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, etc., required by the Act of Congress of August 24, 1912, of Western Construction News, published monthly at San Francisco, California, for October 1, 1935.

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

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher—Western Construction Publications, Incorporated, 114 Sansome St., San Francisco, Calif.
Editor—J. I. Ballard, 2203 Los Angeles Ave., Berkeley, Calif.
Managing Editor—None.
Business Manager—S. H. Wade, 926 Carmel St., Albany, Calif.

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

WESTERN CONSTRUCTION PUBLICATIONS, INC., 114 SANSOME STREET, SAN FRANCISCO, CALIFORNIA, Western Construction News, Inc., 114 Sansome Street, San Francisco, California, whose stockholders are: S. H. Wade, 925 Carmel St., Albany, Calif.; Arthur F. King, 36 San Leandro Way, San Francisco, Calif.; E. G. Ashby, 1031 Taylor Ave., Alameda, Calif.

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

None.

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

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

S. H. WADE, Business Manager.

Sworn to and subscribed before me this 29th day of October, 1935.

(SEAL) ELEANOR J. SMITH,
Notary Public in and for the City and County of San Francisco, State of California.
(My commission expires December 29, 1938.)

PROFESSIONAL DIRECTORY

WHERE TO BUY IN THE WEST

A directory of distributors and branch offices of the manufacturers whose advertisements appear in this issue of *Western Construction News*. Because of space limitations only the principal centers of the West are listed. If you do not find what you want, or the firm you want, write for further information to *Western Construction News*, 114 Sansome Street, San Francisco, California. In communicating with distributors or branch offices, please mention *Western Construction News*.

A directory of equipment and materials and an alphabetical index of advertisers will be found on the last pages of this issue.

Arizona

Phoenix

Arizona Tractor & Equipment Co.,
134 South First Ave.
3-1146
Bucyrus-Erie Co.
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Fuller, W. P., & Co.,
117 East Jackson St.
4-2123
Reilly Tar & Chemical Corp.

General Electric Company,
441 West Madison St.
3-6139

General Petroleum Corporation of California
24th & Jackson Sts.
4-3119

McGinnis, Neil B., Company,
1401 South Central Ave.
4-1493
Adams, J. D. Co.
Allis-Chalmers Mfg. Co.
Mall Tool Company
Northwest Engineering Co.
Pioneer Gravel Equipment Manufacturing Co.

Mine & Smelter Equipment Co.,
110 South Third Ave.
3-6418
Link-Belt Co.
Page Engineering Co.

Pratt-Gilbert Hardware Co.,
701 South Seventh St.,
3-5145
Air Reduction Sales Co.
Apache Powder Co.
Ingersoll-Rand Co.,
Koehring Co.
Leschen, A., & Sons Rope Co.

Stapley, O. S., Co.,
723 Grand Ave.,
4-1116
Austin-Western Road Machinery Co.
Columbia Steel Co.
International Harvester Co. of America, Inc.

Torson Construction Co.,
220 South 7th Ave.,
Electric Tamper & Equipment Co.

The Western Metal Mfg. Co.
Western Pipe & Steel Co.
611 South Dunlap Ave.
3-5602
Toncan Culvert Manufacturers' Association

Tucson

Corbett, J. Knox, Lumber & Hdw. Co.,
340 North Sixth Ave.
2140
Austin-Western Road Machinery Co.

Fuller, W. P. & Co.,
219 East Congress St.
2278
Reilly Tar & Chemical Corp.

General Petroleum Corporation of California,
503 E. 23rd.
710
International Harvester Co. of America, Inc.

Steinfeld, Albert, & Co.,
119 North Stone Ave.
882
Apache Powder Co.

California

Los Angeles

Adams, J. D., Company,
1202 Mateo St.
TRinity 8381
Adams, J. D., Co.

Atlas Powder Co.,
805 Title Guarantee Bldg.
MIchigan 8896

American Manganese Steel Co., Inc.,
5805 Downey Road
LAfayette 1159

Austin-Western Road Mchy. Co.,
4400 District Boulevard
KImball 4156

Bevis Machinery Co.,
3649 Santa Fe Ave.
KImball 4149
Industrial Brownhoist Corp.

Brown-Bevis Equipment Co.,
4900 Santa Fe Ave.
JEfferson 5221
Electric Tamper & Equipment Co.
Ingersoll-Rand Co.,
Page Engineering Co.

California Corrugated Culvert Co.,
409 Leroy St.
CApitol 13181

California Redwood Association,
117 West Ninth St.
MUtual 8156

Chicago Bridge & Iron Wks.,
608 South Hill St.
TUcker 1938

Chicago Pneumatic Tool Co.,
655 Santa Fe Ave.
MIchigan 2651

Collins, Harry C., Mchy. Co.,
1919 Santa Fe Ave.
TR. 8751
Link-Belt Co.
Plymouth Locomotive Works

Columbia Steel Co.,
2087 East Slauson.
LAfayette 1171

Columbian Iron Works,
2801 East 12th St.

Crook Company,
2900 Santa Fe Ave.
KImball 5137
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.

Electric Steel Foundry Co.,
2205 Santa Fe Ave.
JEfferson 4191

Fuller Company,
1041 South Olive St.

Fuller, W. P., & Co.,
135 North Los Angeles St.
TRinity 0711
Reilly Tar & Chemical Corp.

Garlinghouse Bros.,
2416 East 16th St.
JEfferson 5291
Leschen, A., & Sons Rope Co.,
Mall Tool Co.
McKiernan-Terry Corp.
United Machinery Co.
Worthington Pump & Machinery Corp.

General Chemical Co.,
1031 S. Broadway
PRospect 2269

General Electric Co.,
5201 Santa Fe Ave.
LAfayette 0961

General Paint Corp.,
544 Mateo St.
TRinity 4941

General Petroleum Corporation of California,
508 Higgins Bldg.
MUtual 2311

Halafax Explosives Co.,
810 South Spring St.
TRinity 8528

Harnischfeger Sales Corp.,
2029 Santa Fe Ave.
MAdison 2444

Harron, Rickard & McCone Co.,
2205 Santa Fe Ave.
JEfferson 4191
Electric Steel Foundry Co.
Harnischfeger Corp.—Welders
Koehring Co.
Pioneer Gravel Equipment Manufacturing Co.
Wellman Engineering Co.

Hercules Powder Co.,
Fidelity Bldg.
MUtual 6397

Ingersoll-Rand Company of California,
1460 East 4th St.
ANgelus 6761

International Harvester Co. of America, Inc.,
(Tractors and Power Units)
734 Lawrence St.
TRinity 5132

International Harvester Co. of America, Inc.,
(Motor Trucks)
1628 East 7th St.
TRinity 5132

Layne & Bowler Corp.,
900 Santa Fe Ave.
TRinity 2543

Link-Belt Co.,
361 South Anderson St.
ANgelus 6171

Neptune Meter Co.,
701 East Third St.
TRinity 2879

Northwest Engineering Co.,
3707 Santa Fe Ave.
JEfferson 2196

Pacific Coast Steel Corporation
E. Slauson Ave. and Downey Road
LAfayette 1161

Pacific Portland Cement Co.,
633 East Gage Ave.
ADams 6103

Portland Cement Association
816 West 5th St.
MIchigan 9897

Reilly Tar & Chem. Corp.,
Architects Building
MUtual 0433

Rix Company, Inc., The,
810 Santa Fe Ave.
TRinity 4134
Page Engineering Co.
Thew Shovel Co.

John A. Roebling's Sons Co.
216 South Alameda St.
TRinity 1261

Shepherd Tractor & Equipment Co.,
150 West Jefferson St.
PRospect 0247
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.
John A. Roebling's Sons Co.

Smith Booth Usher Co.,
2001 Santa Fe Ave.
TRinity 6911
Lima Locomotive Works, Inc. (Shovel and Crane Division)
Page Engineering Co.
United Machinery Co.
Worthington Pump & Machinery Corp.

Standard Steel Works,
5001 Boyle Ave.
LAfayette 1138

St. John, A. S., Co., Inc.,
126 West Third St.
VAndike 8865
Apache Powder Co.

Standard Steel Works,
5001 Boyle Ave.
LAfayette 1138

Stevenson Chemical Co.,
641 Gibbons St.
Gt. Western Electro-Chemical Co.

Timken Roller Bearing Service & Sales Co., The
1526 South Olive St.
PRospect 3165

Victor Welding Equipment Co.,
2032 Santa Fe Ave.
JEfferson 6246
General Electric Co.

Wallace & Tiernan Co.,
3923 West Sixth St.
FEderal 6823

Western Pipe & Steel Co.,
5717 Santa Fe Ave,
JEfferson 3131
Toncan Culvert Manufacturers' Association

Worthington Pump & Machinery Corp.
5075 Santa Fe Ave.
JEfferson 6251

Oakland

Allis-Chalmers Mfg. Co.
2533 Peralta St.
Glencort 2530

American Manganese Steel Co., Inc.,
956 Ferry St.
HIgate 1703

Bacon, Edw. R., Co.,
2059 Webster St.
GLencourt 7400
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Page Engineering Co.
United Machinery Co.

Bates, Sam, Co.
1925 Dennison St.
ANdover 4327
Chicago Pneumatic Tool Co.
Page Engineering Co.

California Corrugated Culvert Co.,
5th & Parker St. (Berkeley)
BErkeley 5420

Fuller, W. P., & Co.,
259 10th St.
GLencourt 0167
Reilly Tar & Chemical Corp.

General Petroleum Corporation of California,
Fox Oakland Bldg.
HOlliday 5573

Harron, Rickard & McCone Co.,
2059 Webster St.
GLencort 7400
Electric Steel Foundry Co.
Harnischfeger Corp.
Koehring Co.
Mall Tool Co.
Pioneer Gravel Eqpt. Co.
Wellman Eng. Co.

Industrial Equipment Co.,
Outer Harbor.
GLencourt 5909
Bucyrus-Erie Co.

International Harvester Co. of America, Inc.,
1640 East 12th St.
ANdover 5700

Link-Belt Co.,
526 Third St.
HIgate 4286

Mall Tool Company,
2308 Webster St.
TEmplebar 6878

Pacific Electric Motor Co.,
10th and Oak Sts.
GLencourt 1844
General Electric Co.

Robinson Tractor Co.,
1705 East 12th St.
FRuitvale 2485
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Sacramento

Bacon, Edward R., Co.,
720 I St.
Main 445
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Page Engineering Co.
Roebling, J. A., & Sons Co.
United Machinery Co.

DeHart, S. B.
1051 34th Street
Capital 4475-W
Adams, J. D., Co.

Where to Buy in the West

Fuller, W. P., & Co.,
1013 12th St.
Main 6890
Reilly Tar & Chemical Corp.

General Paint Corp.,
11th and R
Capital 2121

General Petroleum Corporation of California
W. Sacramento
Main 720

Harron, Rickard & McCone Co.,
1431 2nd St.
CApitol 1514
Elec. Steel Foundry Co.
Harnischfeger Corp.
Koehring Co.
Mall Tool Co.
Pioneer Gravel Eqpt. Co.
Wellman Eng. Co.

Sacramento Tractor & Equipment Co.,
1730 16th St.
CApital 1065
Allis-Chalmers Mfg. Co.

Vandercook Gold Co.,
F & M Bldg.
Sacramento
Main 2085
Worthington Pump & Machinery Corp.

Weaver-Rye Tractor Co., Inc.,
1715 2nd St.
Main 4100
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Western Pipe & Steel Co.,
Care of Sutter Club
Main 217
Toncan Culvert Manufacturers' Association

San Diego

Charles N. Bottiger
209 West E.
Main 1657
Lincoln Electric Co.

Contractors Equipment & Machinery Co.
1344 National Ave.
Main 8833
Worthington Pump & Machinery Co.

Fuller, W. P., & Co.,
803 7th Ave.
Main 0181
Reilly Tar & Chemical Corp.

General Electric Co.,
206 W. Market St.
Main 4288

General Petroleum Corporation of California
1302 Crosby
Franklin 7667

Hazard-Gould & Co.,
Fifth and K Sts.
MAin 6174
Allis-Chalmers Mfg. Co.

International Harvester Co. of America, Inc.,
1482 Broadway
FRanklin 1550

San Diego Tractor & Equipment Co.,
701 First Ave.
Main 6151
Caterpillar Tractor Co.

San Francisco

Adams, J. D., Co.,
230 Utah St.
UNderhill 5120
Adams, J. D., Co.
International Harvester Co. of America, Inc.

Associated Equipment Co., Ltd.,
355 Fremont St.
KEarny 1181
Thew Shovel Co.

Atlas Powder Co.,
1 Montgomery St.
GArfield 8640

Austin-Western Road Mchy. Co.,
435 Brannan St.
DOuglas 2183

Bacon, Edward R., Co.,
17th and Folsom Sts.
HEmlock 3700
Allis-Chalmers Mfg. Co.
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Mall Tool Company
Page Engineering Co.
United Machinery Co.

Bucyrus-Erie Co.,
989 Folsom St.
GArfield 8192

California Redwood Association,
Financial Center Bldg.
EXbrook 7880

Chicago Bridge & Iron Wks.
116 New Montgomery St.
DOuglas 7376

Chicago Pneumatic Tool Co.,
175 First St.
KEarny 2014

Columbian Iron Works,
1072 Howard St.

Fuller Co.

Fuller, W. P., & Co.,
301 Mission St.
EXbrook 7151
Reilly Tar & Chemical Corp.

Garfield & Co.,
Hearst Bldg.
SUtter 1036
Industrial Brownhoist Corp.
Link-Belt Co.
Plymouth Locomotive Works
Worthington Pump & Machinery Co.

General Electric Co.,
235 Montgomery St.
DOuglas 3740

General Paint Corp.,
2627 Army St.
ATwater 5100

General Petroleum Corporation of California
310 Sansome St.
EXbrook 6411

Great Western Electro-Chemical Co.,
9 Main St.
GArfield 8323

Harnischfeger Sales Corp.,
82 Beale St.
DOuglas 2313

Harron, Rickard & McCone Co.,
2070 Bryant St.
ATwater 2202
Electric Steel Foundry Co.
Harnischfeger Sales Corp.
Koehring Co.
Mall Tool Company
Pioneer Gravel Equipment Manufacturing Co.
Wellman Engineering Co.

International Harvester Co. of America, Inc.,
201 Potrero Ave.
HEmlock 6681

Knapp, J. E., Company,
Balboa Bldg.
GArfield 4783
Ingersoll-Rand Co.,

Kratz & McClelland, Inc.,
522 Bryant St.
SUtter 6807
Electric Tamper & Equipment Co.

Leschen, A., & Sons Rope Co.,
520 Fourth St.
GArfield 8134

Link-Belt Co.,
400 Paul Ave.
DElaware 6400

Neptune Meter Co.,
320 Market St.
GArfield 8144

Northwest Engineering Co.,
255 Tenth St.
HEmlock 5060

Pacific Coast Steel Corp.,
20th and Illinois Sts.
MArket 3200

Pacific Pipe Co.,
207 Folsom St.
EXbrook 6255

Pacific Portland Cement Co.,
111 Sutter St.
GArfield 4100

Pacific States Cast Iron Pipe Co.,
Rialto Bldg.,
KEarny 5075

Portland Cement Association
564 Market St.
SUtter 8159

Robinson Tractor Co.,
1175 Howard St.
MArket 8020
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Thew Shovel Co.,
355 Fremont St.
KEarny 1181

Timken Roller Bearing Service & Sales Co., The
1800 Van Ness Ave.
ORdway 6521

Victor Welding Equipment Co.,
844 Folsom St.
GArfield 5727
General Electric Co.

Wallace & Tiernan Co., Inc.,
171 Second St.
KEarny 5072

Welding Service, Inc.,
954 Howard St.
DOuglas 3292
Harnischfeger Corp.—Welders

Western Machinery Co.,
760 Folsom St.
EXbrook 4167
Ingersoll-Rand Co.,

Western Pipe & Steel Co.,
444 Market St.
GArfield 6788
Toncan Culvert Manufacturers' Association

Wood, H. C., Machinery Works,
514 Bryant
GArfield 0736
Ingersoll-Rand Co.,

Worthington Pump & Machinery Corp.,
543 Howard St.

Young, A. L., Machinery Co.,
26 Fremont St.
SUtter 5736
Lima Locomotive Works, Inc.

Colorado

Denver

American Manganese Steel Co., Inc.,
Fourth and Wazee Sts.
TAbor 8171

Atlas Powder Co.,
401 Midland Savings Bldg.

Bostwick, Frederick H.,
Denver Natl. Bank Bldg.
TAbor 5744
Western Pipe & Steel Co.

Cederberg, C. R.,
5531 East 14th Ave.
YOrk 0604
Wallace & Tiernan Co., Inc.

Clinton & Held Co.,
1637 Wazee St.
TAbor 3291
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Corson, Ray, Machinery Co.,
1646 Wazee St.
KEystone 6632
Bucyrus-Erie Co.
Page Engineerig Co.

Denver Metal & Machinery Co.,
130 Larimer St.
TAbor 6178
Ingersoll-Rand Co.,

Fair, Elton T., Co.,
1646 Wazee St.
TAbor 1685
Pioneer Gravel Equipment Manufacturing Co.

Fitzgerald, Paul,
U. S. Natl. Bank Bldg.
TAbor 1841
Harnischfeger Corp.—Welders
Plymouth Locomotive Works

General Electric Co.,
650 17th St.
KEystone 7171

General Machinery & Supply Co.,
635 Walnut St.
KEystone 1500
Worthington Pump & Machinery Co.

Hardesty Mfg. Co.,
3063 Blake St.
MAin 4156

Hendrie & Bolthoff Mfg. & Supply Co.
1639 17th St.
KEystone 4111
General Electric Co.

Hercules Powder Co.,
1822 California St.
TAbor 5386

Ingersoll-Rand Company of Colorado,
1637 Blake St.
KEystone 2245

Leschen, A., & Sons Rope Co.,
1554 Wazee St.
MAin 1366

Liberty Trucks & Parts Co., Inc.,
615 East 18th Ave.
MAin 3241
Austin-Western Road Machinery Co.

Link-Belt Co.,
Boston Bldg.
MAin 0231

McKelvy Machinery Co.,
754 South Broadway
Adams, J. D., Co.
Koehring Co.

Mine & Smelter Supply Co.,
1422 17th St.
KEystone 3111
McKiernan-Terry Corp.
Northwest Engineering Co.

Moore Hardware & Iron Co.,
1529 15th St.
TAbor 2251
Harnischfeger Corp.—Welders
International Harvester Co. of America, Inc.

Moore, H. W., Equipment Co.,
Sixth and Acoma Sts.
TAbor 1361
Thew Shovel Co.
Wellman Engineering Co.

Neptune Meter Co.,
1700 15th St.
MAin 3221

Pacific States Cast Iron Pipe Co.,
1921 Blake St.
MAin 0697

Socony-Vacuum Oil Co., Inc.
(Road Oil Sales)
U. S. N. Bank Bldg.
TAbor 2809
General Petroleum Corp.

Stearns-Roger Mfg. Co.,
1720 California
KEystone 3311
Chicago Pneumatic Tool Co.

Steinbarger, Herbert N., Co.,
1711 Market St.
MAin 3460
Lima Locomotive Works, Inc.

Thompson Mfg. Co.,
3001 Larimer
KEystone 8196
Toncan Culvert Manufacturers' Association

Wilson Machinery Company,
1936 Market St.
TAbor 0135
Allis-Chalmers Mfg. Co.

Worthington Pump & Machinery Co.,
512 18th St.

Idaho

Boise

Bunting Tractor Co.,
926 Front St.
2649
Caterpillar Tractor Co.

Feenaughty Machinery Co.
9th and Grove Sts.
1333
Thew Shovel Co.

Fine, Jake
Post Office Box 549
3613J
Adams, J. D., Co.

General Electric Co.,
906 East Bannock St.
368

General Paint Corp.,
2218 W. Fairview Ave.
2861-W

Hardesty Mfg. Co.,
223 South Third St.
3031

Intermountain Equipment Co.,
Broadway and Myrtle St.
171
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
General Electric Co.

Where to Buy in the West

Ingersoll-Rand Company,
420 East Iron St.
2-3903
LeTourneau, R. G., Inc.
Page Engineering Co.
Pioneer Gravel Equipment Manufacturing Co.

Jeter, F. A.
1116 North 18th St.
2612
Austin-Western Road Machinery Co.

Olson Mfg. Co.,
214 South 5th St.
4277
Leschen, A., & Sons Rope Co.

Montana

Billings

Allis-Chalmers Mfg. Co.,
25th and 4th Aves.
5484

Austin-Western Road Mchy. Co.,
2413 First Ave. N.

Connelly Machinery Co.,
2706 Montana Ave.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Leschen, A., & Sons Rope Co.,
LeTourneau, R. G., Inc.
Pioneer Gravel Equipment Manufacturing Co.

Hardie, W. C.,
1121 N. 32nd St.
5548
Adams, J. D., Co.

International Harvester Co. of America, Inc.,
20 South Broadway
4144

Midland Implement Co.,
2300 Montana Ave.
Koehring Co.
Page Engineering Co.

Socony-Vacuum Oil Co., Inc.
Genl. Petroleum Corp.

Butte

Atlas Powder Co.,
412 West Broadway
2-4868

Chicago Pneumatic Tool Co.,
920 South Arizona St.
2-4285

Daugherty, H. H.,
420 South Idaho St.
3884
Bucyrus-Erie Co.

General Electric Co.
20 West Granite St.
5479

Hall-Perry Machinery Co.,
812 East Iron St.
6376
American Cable Co., Inc.,
Page Engineering Co.
Thew Shovel Co.
United Machinery Co.

Montana Hardware Co.,
823 South Montana St.
2-1295
Ingersoll-Rand Co.

Socony-Vacuum Oil Co., Inc.
Genl. Petroleum Corp.

Wright, S. P., & Co., Inc.
48 East Broadway
2-3221
Lima Locomotive Works, Inc.

Great Falls

Connelly Machinery Co.,
315 2nd Street S.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Leschen, A., & Sons Rope Co.
LeTourneau, R. G., Inc.

Holdal, Milton
1306 Second Ave. South
3320

International Harvester Co. of America, Inc.,
422 Second St. South
7621

Northwest Equipment Co., Inc.,
Great Northern Tracks
3982
Koehring Co.
Pioneer Gravel Equipment Manufacturing Co.

Socony-Vacuum Oil Co., Inc.
Strain B
6575
General Petroleum Corp.

Fred M. Viles,
1003 Second Ave., N. W.
4755
Allis-Chalmers Mfg. Co.

Missoula

Hardesty Mfg. Co.

Mountain Tractor & Machinery Co.,
618 South Higgins Ave.
4612
Allis-Chalmers Mfg. Co.

Wells, Walker J.
Austin-Western Road Machinery Co.

Westmont Tractor & Equipment Co.,
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Leschen, A., & Sons Rope Co.
LeTourneau, R. G., Inc.
Pioneer Gravel Equipment Manufacturing Co.
Wellman Engineering Co.
Worthington Pump & Machinery Corp.

Nevada

Reno

Bacon, Edward R. Co.,
649 John Fremont Drive
Reno 4043
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Page Engineering Co.
United Machinery Co.

Bell, O. C.,
649 John Fremont Drive
Reno 4043
Adams, J. D., Co.

Collier Tractor & Equipment Co.,
502 East Fourth St.
Reno 6107
Caterpillar Tractor Co.
Harnischfeger Corp.
LeTourneau, R. G., Inc.

Flanigan Warehouse Co.,
408 Eureka St.
Reno 3852
Columbia Steel Co.
Pac. Portland Cement Co.,
Western Pipe & Steel Co.

Scott Motor Co., Ltd.,
S. Va. & Ryland
Reno 4126
Allis-Chalmers Mfg. Co.

Smith, James L.,
1084 S. Virginia
Reno 8139
General Petroleum Corp.

New Mex.

Albuquerque

Harrison, R. L., Co., Inc.,
211 North 4th St.
3300
Bucyrus-Erie Co.
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Wellman Engineering Co.

Magnolia Petroleum Co.,
1101 North First
450
General Petroleum Corp.

McChesney-Rand Equipment Co.,
Adams, J. D., Co.
Thew Shovel Co.

Santa Fe

Magnolia Petroleum Co.,
General Petroleum Corp.

McChesney-Rand Equipment Co.,
Adams, J. D., Co.
Pioneer Gravel Equipment Manufacturing Co.
Thew Shovel Co.

Oregon

Klamath Falls

General Petroleum Corporation of California
Keno Road 473-W
Ingersoll-Rand Co.,

Miller Tractor & Equipment Co.,
719 Market St.
314
Caterpillar Tractor Co.

Portland

Allis-Chalmers Mfg. Co.,
1311 S. E. Union Ave.
EAst 1181

American Manganese Steel Co., Inc.,
Foot of Sheridan St.
ATwater 7425

Atlas Powder Co.,
833 Pacific Bldg.
BEacon 2845

Balzer Machinery Co.,
1636 S. E. Sixth Ave.
EAst 5609
Chicago Pneumatic Tool Co.

Beall Pipe & Tank Corp.,
1945 N. Columbia Blvd.
WAlnut 3171
Tonean Culvert Manufacturers' Association

Clyde Equipment Co.,
1631 N. W. Thurman St.
BRoadway 5561
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Electric Tamper & Equipment Co.
United Machinery Co.

Columbia Steel Co.,
2345 N. W. Nicolai St.
BEacon 7261

Cramer Machinery Co.,
Lewis Bldg.
ATwater 3852
Koehring Co.
United Machinery Co.

Electric Steel Foundry Co.,
2458 N. W. York St.
BEacon 6344

Freenaughty Machinery Co.,
112 S. E. Belmont St.
EAst 2187
LeTourneau, R. G., Inc.
Page Engineering Co.
Thew Shovel Co.
United Machinery Co.

General Electric Co.,
621 S. W. Alder St.
ATwater 0281

General Paint Corp.,
838 S. W. 2nd Ave.
ATwater 5205

General Petroleum Corporation of California
Woodlark Bldg.
BEacon 7101

Haag, A. C., & Co.
931 S. E. Sixth Ave.
EAst 2388
Adams, J. D., Co.
Worthington Pump & Machinery Corp.

Haseltine, J. E., & Co.,
115 S. W. Second Ave.
ATwater 7511
General Electric Co.

Howard-Cooper Corp.,
307 S. E. Hawthorne Ave.
EAst 8188
McKiernan-Terry Corp.
International Harvester Co. of America, Inc.

International Harvester Co. of America, Inc.,
56 S. E. Belmont St.
EAst 6158

Leschen, A., & Sons Rope Co.,
Foot of S. W. Sheridan St.
ATwater 7425

Link-Belt Co.,
1637 N. W. 14th Ave.
ATwater 6481

Loggers & Contractors Machinery Co.,
211 S. E. Madison St.
EAst 4128
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.
Pioneer Gravel Equipment Manufacturing Co.
Plymouth Locomotive Works
Wellman Engineering Co.

Neptune Meter Co.,
1519 N. W. Johnson St.
BRoadway 0100

Pacific Coast Steel Corp.,
American Bank Bldg.
BEacon 7238

Pacific Portland Cement Co.,
701 Lewis Bldg.
ATwater 6656

Pacific States Cast Iron Pipe Co.,
Spaulding Bldg.
ATwater 5465

Pure Iron Culvert & Mfg. Co.,
2321 S. E. Gladstone
SEllwood 2275

Western Loggers Mchy. Co.,
302 S. W. 4th Ave.
ATwater 7491
Harnischfeger Corp.—Welders

Western Steel & Equipment Co.,
734 N. E. 55th Ave.
TAbor 2370
Lima Locomotive Works, Inc.

Woodbury & Co., Inc.,
133 S. W. 2nd
ATwater 6644
Chicago Pneumatic Tool Co.

Texas

El Paso

Car Parts Depot, Inc.,
810 Texas St.
Main 9000
Harnischfeger Corp.—Welders

Chicago Pneumatic Tool Co.,
426 Mills Building
Main 976

General Electric Co.,
109 North Oregon St.
Main 5500

General Engineering & Equipment Co.,
Worthington Pump & Machinery Corp.

Industrial Motor Service Co.,
2227 Texas
MAin 720
Allis-Chalmers Mfg. Co.

Ingersoll-Rand Company,
1015 Texas St.
MAin 1617

International Harvester Co. of America, Inc.,
409 Main St.
MAin 2314

Magnolia Petroleum Co.,
105 Wyoming
Main 1992
General Petroleum Corp.

Mine & Smelter Supply Co.,
410 San Francisco
Main 5720
Worthington Pump & Machinery Corp.

Momsen-Dunnegan-Ryan Co.,
800 East Overland St.
Main 7100
Apache Powder Co.

Tri-State Equipment Co.,
500 East Overland St.
Main 1507
Bucyrus-Erie Co.
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Wellman Engineering Co.

Western Metal Mfg. Co.,
6th and S. St. Vrain
Main 1226

Worthington Pump & Machinery Corp.,
206 San Francisco St.
Main 863

Zork Hardware Co.,
309 North El Paso St.
Main 1040
Leschen, A., & Sons Rope Co.

Utah

Salt Lake City

Ambler & Ritter
Kearns Bldg.
Wasatch 1132
Thew Shovel Co.

Arnold Machinery Co.,
149 West Second South St.
Wasatch 8973
Chain Belt Co.
Northwest Engineering Co.
Page Engineering Co.

Atlas Powder Co.,
822 Continental Natl. Bank Bldg.
Wasatch 4027

Where to Buy in the West

Columbia Steel Co.,
1606 Walker Bank Bldg.
Wasatch 1076

Gallgher Company
228 South West Temple St.
Wasatch 900
General Electric Co.

General Electric Co.,
200 S. Main St.
Wasatch 735

Hardesty Mfg. Co.,
631 South Third West
Wasatch 3141

Harrison & Company
Dooley Block
Fuller Co.

Ingersoll-Rand Company,
51 West South Temple St.
WAsatch 8682

International Harvester Co. of America, Inc.,
435 West Fourth South St.
WAsatch 1617

Jones, C. H., Co.
134 Pierpont Ave.
Wasatch 2580
Allis-Chalmers Mfg. Co.
Lima Locomotive Works, Inc.

Landes Tractor & Equipment Co.,
245 West South Temple St.
Wasatch 4020
Caterpillar Tractor Co.
Harnischfeger Corp.—Welders and Hoists
LeTourneau, R. G., Inc.

Lang Company, The
267 West First South St.
Wasatch 6693
Austin-Western Road Machinery Co.
International Harvester Co. of America, Inc.

Lund Machinery Co.
49 North Second West St.
Wasatch 5581
Adams, J. D., Co.
Koehring Co.

National Equipment Co.
101 West Second South St.
Wasatch 1722
Wellman Engineering Co.

Newman, Wm. E., & Sons Company,
Ogden, Utah
Toncan Culvert Manufacturers' Association

Richmond, F. C., Mach. Co.
322 West Second South St.
Wasatch 742
Chicago Pneumatic Tool

Smoot Machinery Co.,
165 East Fourth South St.
WAsatch 1050
Le Tourneau, R. G., Inc.,
Pioneer Gravel Equipment Manufacturing Co.

Waterworks Equipment Co.
149 West Second South St.
Wasatch 2465
Neptune Meter Co.
Pacific States Cast Iron Pipe Co.

Wilson, S. A.
205 Second Ave.
General Petroleum Corp.

Z. C. M. I.
351 Z. C. M. I. Ave.
Wasatch 1010
Leschen, A., & Sons Rope Co.

Washington

Seattle

American Manganese Steel Co., Inc.,
4785 First Ave. South
GLendale 3100

Armstrong, H. J., Co.
2244 First Ave. So.
ELliott 5940
Leschen, A., & Sons Rope Co.
Lima Locomotive Works, Inc.
(Shovel and Crane Division)
Page Engineering Co.

Atlas Powder Co.
1320 Jos. Vance Bldg.
MAin 5110

Chicago Pneumatic Tool Co.
1928 First Avenue South

Clyde Equipment Co.
3410 First Ave. South
MAin 1235
Bucyrus-Erie Co.
Electric Tamper & Equipment Co.
United Machinery Co.

Columbia Steel Company
1054 Fourth Avenue South
MAin 1972

Cox, A. H., & Co., Inc.
1757 First Ave. South
MAin 1121
Austin-Western Road Machinery Co.
Link-Belt Co.
Plymouth Locomotive Works
Wellman Engineering Co.

Electric Steel Foundry Co.
2724 First Ave. South
ELliott 1084

Federal Pipe & Tank Co.
5332 24th Ave. N.W.
SUnset 5878

Feenaughty Machinery Co.
1028 Sixth Ave. South
ELliott 7808
LeTourneau, R. G., Inc.
Page Engineering Co.
Thew Shovel Co.
United Machinery Co.

General Chemical Company
2203 First Avenue South
ELliott 0350

General Electric Co.
821 Second Ave.
MAin 9790

General Paint Corp.
1406 Dearborn St.
PRospect 7600

General Petroleum Corporation of California
1519 Railroad Ave. South
MAin 3765

Harnischfeger Sales Corp.
2911 First Ave. South
MAin 5576

Haseltine, J. E., & Co.
440 Holgate St.
SEneca 0626
General Electric Co.

Howard-Cooper Corp.
1520 Fourth Ave. South
ELliott 0740
McKiernan-Terry Corp.
International Harvester Co. of America, Inc.

Ingersoll-Rand Company,
526 First Ave. South
MAin 2436

International Harvester Co. of America, Inc.,
916 Maynard Ave.
MAin 7337

Lima Locomotive Works, Inc.
(Shovel and Crane Division)
2244 First Ave. South
ELliott 5940

Link-Belt Co.
820 First Ave. South
ELliott 5554

Mall Tool Company,
202 Office Appliance Bldg.

Pacific Coast Steel Corp.
28th Ave. S.W. and W. Andover St.
WEst 1131

Pacific Hoist & Derrick Co.
3200 Fourth Ave. South
ELliott 1860
Northwest Engineering Co.
Pioneer Gravel Equipment Manufacturing Co.

Pacific Portland Cement Co.
1871 16th Ave. S.W.
ELliott 4033

Portland Cement Association
903 Seaboard Bldg.
SEneca 0916

Purcell, Hugh G., Co.
Colman Bldg.
MAin 6835
Industrial Brownhoist Corp.

Reilly Tar & Chemical Corp.
Central Bldg.
SEneca 1191

Rental Machinery Company,
1531 Utah
MAin 1123
Ingersoll-Rand Co.,

Smith, R. G.
3223 61st Avenue S.W.
WEst 2416
Adams, J. D., Co.

Snow, L. A., Co.
1032 Sixth Ave. South
ELliott 4188
Koehring Co.

Star Machinery Co., Inc.
1741 First Avenue South
ELliott 0760

Timken Roller Bearing Service & Sales Co., The
321 East Pine St.
ELliot 0067

Wallace & Tiernan Co., Inc.
917 Terminal Sales Bldg.
MAin 0201

Washington Corrugated Culvert Co.
4327 Roosevelt Way
EVergreen 0660

Western Tractor & Equipment Co.
2230 First Ave. South
MAin 5180
Caterpillar Tractor Co.

Worthington Pump & Machinery Corp.
922 First Avenue South
MAin 4220

Spokane

Adams, J. D., Co.
E. 14 Main St.
Main 3995

Allis-Chalmers Mfg. Co.,
S. 151 Madison St.
MAin 4226

Atlas Powder Co.
1131 Old Natl. Bank Bldg.
Main 4733

Austin-Western Road Mchy. Co.
N. 1405 Ash St.
Broadway 1294

Bucyrus-Erie Co.
1805 Ninth Ave.

Construction Equipment Co.
1118 Ide
Broadway 5076
Plymouth Locomotive Works
Wellman Engineering Co.

Chicago Pneumatic Tool Co.
715 Division St.
Broadway 5606

Columbia Steel Company
W. 914 Ninth Avenue
Riverside 3695

Feenaughty Machinery Co.
N. 715 Division St.
Broadway 5606
Thew Shovel Co.
United Machinery Co.

General Electric Co.
421 Riverside Ave.
Main 5201

General Machinery Co.
E. 3501 Riverside Ave.
Lakeview 1134
Lima Locomotive Works
Worthington Pump & Machinery Corp.

General Paint Corp.
713 First Avenue
Main 2166

General Petroleum Corporation of California
Havana & Sprague
Lakeview 1074

Harnischfeger Sales Corp.
S. 1314 Bernard St.
Main 6805

Howard-Cooper Corp.
134 Spokane International Rt. of Way
Main 1812
International Harvester Co. of America, Inc.
McKiernan-Terry Corp.

Hoflus-Ferris Equipment Co.
728 Mallon Ave.
Broadway 1954
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Hughes & Co.
S. 119 Howard St.
Main 4277
Neptune Meter Co.

International Harvester Co. of America, Inc.,
South 121 Monroe St.
MAin 1271

Lundy, A. L.
Culmstock Arms Apt. Hotel
Riverside 7181
Columbia Steel Company

Nott-Atwater Co.
S. 157 Monroe St.
Main 4377
Leschen, A., & Sons Rope Co.

Snow, L. A., Co.
S. 151 Madison St.
Main 4226
Allis-Chalmers Mfg. Co.
Koehring Co.

Washington Corrugated Culvert Co.
N. End Division Bridge
Broadway 3537

Washington Mchy. & Supply Co.
9 Cataldo St.
Broadway 0390
Ingersoll-Rand Co.,

Tacoma

General Electric Co.
1019 Pacific Ave.
Main 2882

General Petroleum Corporation of California
520 East D
Broadway 4256

International Harvester Co. of America, Inc.,
102 Puyallup Ave.
BRoadway 2423

Wyoming

Cheyenne

Allied Equipment Co.,
608 West 18th St.
Allis-Chalmers Mfg. Co.

International Harvester Co. of America, Inc.,
701 West Seventeenth St.
3343

Moss, Glenn
423 West 19th
Austin-Western Road Machinery Co.

Socony-Vacuum Corp.
General Petroleum Corp.

Wortham Machinery Co.
410 West 19th St.
4649
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

OPPORTUNITY SECTION

OPPORTUNITY SECTION

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

Seminoe Dam and Power Plant

Washington, D. C., October 23, 1935. Sealed bids (Specifications No. 630, Readvertisement) will be received at the office of the United States Bureau of Reclamation, Casper, Wyoming, until 10 o'clock a. m., Mountain standard time, November 26, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the construction of the Seminoe dam and power plant, Casper-Alcova project, Wyoming. The work is located on the North Platte river about 37 miles northeast of Parco, Wyoming. The principal items of work and the estimated quantities involved are as follows: 606,000 cubic yards of all classes of open-cut excavation; 22,000 cubic yards of tunnel excavation; 700 cubic yards of gravel road surfacing; 3,000 cubic yards of back fill; 1,000 cubic yards of riprap; 400 cubic yards of rubble masonry; 189,680 cubic yards of concrete; 90 cubic yards of porous concrete; 34,600 cubic feet of pressure grouting; drilling 30,400 linear feet of grout, drainage, weep, and anchor bar holes; placing 2,550,000 pounds of reinforcement bars and fabric; constructing 260 linear feet of 4-inch to 6-inch diameter sewer pipe drains; constructing 800 linear feet of 4-inch diameter split sewer pipe drains; manufacturing and placing 7,000 linear feet of porous concrete drain tile; installing 397,000 pounds of metal pipe, tubing, and fittings; installing 365,000 pounds of power penstocks and outlet pipes; installing 1,535,000 pounds of needle valves and miscellaneous metalwork; installing 1,002,000 pounds of gates and appurtenances; installing 180,000 pounds of structural bridge steel; installing 13 M ft. b. m. of bridge timbers; installing 11,600 linear feet of metal sealing strips; installing 8,400 square feet of asphalt-saturated-felt roofing; installing 25,700 linear feet of electrical conduit; installing 10,000 linear feet of electrical cable for testing apparatus; furnishing, installing, and operating a concrete cooling plant; and transporting 30,000 hundredweight of freight for the Government. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor, and those furnished by the Government are described in the specifications which will be a part of the contract. The work shall be commenced within thirty (30) calendar days after date of receipt of notice to proceed and shall be completed within one thousand one hundred and fifty (1,150) calendar days from the date of receipt of such notice. Liquidated damages for delay will be two hundred and fifty dolars ($250) per day. Bid security 10 per cent and performance bond 50 per cent will be required. The charge for copies of the specifications and drawings is $5.00 per copy, not returnable. For particulars, address the Bureau of Reclamation, Casper, Wyoming; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD,
Commissioner.

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Reclamation

Construction of Earthwork, All-American Canal

Washington, D. C., October 22, 1935. Sealed bids (Specifications No. 647 will be received at the office of the Bureau of Reclamation, Federal Building, Yuma, Arizona, until 10 o'clock a. m., mountain standard time, November 23, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the construction of earthwork, All-American Canal, Boulder Canyon project, Arizona, California-Nevada. The work is located on the Colorado River from 10 to 14 miles northeast of Yuma, Arizona. The principal items of work and the estimated quantities involved are as follows: 1,072,000 cubic yards of common excavation for canal; 542,000 cubic yards of rock excavation for canal; 97,000 cubic yards of stripping for embankments; 25,200 cubic yards of excavation of cut-off and toe trenches; 691,000 cubic yards of compacted embankment; 8,000,000 station cubic yards of hauling and placing rock fill on outside slope of canal embankment; 17,400 cubic yards of gravel blankets on inside slopes of canal embankments; and fabricating and driving 1,440 M. ft. b. m. of timber sheet-piling. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor, and those furnished by the Government are described in the specifications which will be a part of the contract. The work shall be commenced within 30 calendar days after date of receipt of notice to proceed. Schedule 1 must be completed within 780 days and schedule 2 within 600 calendar days from date of receipt of such notice. Bid security in an amount not less than 10 per cent and performance bond not less than 50 per cent will be required. Liquidated damages for delay will be two hundred dollars ($200) per day for each uncompleted schedule. No charge to prospective bidders for copies of the specifications and drawings; to others, $1.00 per copy, not returnable. For particulars, address the Bureau of Reclamation, Yuma, Arizona; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD,
Commissioner.

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office of the East Bay Municipal Utility District, 512 Sixteenth Street, Oakland, California, until 8 p. m., Wednesday, November 13, 1935, and will at that hour be opened for the construction of the Crockett Hill Tunnel, approximately 1,380 feet long.

The general prevailing rate of per diem wages in the locality in which the work is to be performed, for laborers and each craft or type of workman and mechanic needed to execute the contract, and the general prevailing rate for legal holiday and overtime work specifically set forth in the plans and specifications on file with the Secretary of the District, are referred to and incorporated herein.

Specifications (No. LS 159) may be obtained upon application at Room 405 of the office of the District.

JOHN H. KIMBALL,
Secretary.

Oakland, California,
October 24, 1935.

POSITIONS WANTED

CIVIL ENGINEER—15 years in California. Irrigation, Highway, and Municipal work. Will go any place. Address: Box 456, WESTERN CONSTRUCTION NEWS, 114 Sansome Street, San Francisco.

Construction Superintendent, 23 years with large New York firms, desires connection with small young organization in view for future, first-class references, Box 450, *Western Construction News,* 114 Sansome Street, San Francisco, Calif.

OPPORTUNITY SECTION

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Construction of Wash Siphon Structures, All-American Canal

Washington, D. C., October 21, 1935. Sealed bids (Specifications No. 645) will be received at the office of the United States Bureau of Reclamation, Federal Building, Yuma, Arizona, until 10 o'clock a. m., Mountain standard time, November 25, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the **construction of Wash Siphon Structures** at 120 Wash, 424 Wash, Unnamed Wash, and Picacho Wash, All-American Canal System, Boulder Canyon Project, Arizona-California-Nevada. The work is located between 5 and 12 miles northeast of Yuma, Arizona. The principal items of work and estimated quantities involved are as follows: 370,000 cubic yards of all classes of excavation; 4,700 cubic yards of compacted embankment; 6,850 cubic yards of back fill; 32,380 cubic yards of concrete; 2,200 square yards of dry-rock paving; 14,000 cubic yards of riprap; placing 6,482,000 pounds of reinforcement bars; installing 116,400 pounds of metal and rubber in side-wall expansion joints; manufacturing and driving 270 23-foot reinforced concrete piles; driving 341,100 pounds of steel sheet-piling; constructing 820 linear feet of timber railing; installing 53,400 pounds of metal handrails; and installing 16,800 pounds of miscellaneous metalwork. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be made part of the contract. The work shall be commenced within thirty (30) calendar days after date of receipt of notice to proceed and shall be completed within six hundred (600) calendar days from the date of receipt of such notice. Bid security in an amount not less than 10 per cent and performance bond not less than 50 per cent will be required. Liquidated damages for delay will be two hundred ($200) per day for each uncompleted schedule. No charge to prospective bidders for copies of the specifications and drawings; to others $2.50 per copy, not returnable. For particulars, address the Bureau of Reclamation, Yuma, Arizona; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD,
Commissioner.

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Construction of Tunnels 3, 4, 5 and 6, Casper-Alcova Project

Washington, D. C., October 23, 1935. Sealed bids (Specifications No. 649) will be received at the office of the United States Bureau of Reclamation, Casper, Wyoming, until 10 a. m., Mountain standard time, November 25, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the **construction of Tunnels Nos. 3, 4, 5 and 6**, Casper Canal, Casper-Alcova project, Wyoming. The work is located from 13 to 36 miles southwest of Casper. The principal items and estimated quantities of work involved are as follows: 166,000 cubic yards of all classes of open-cut excavation; 81,500 cubic yards of tunnel excavation; 900 cubic yards of back fill; 1,096 cubic yards of concrete in portal structures and transitions; 17,750 cubic yards of concrete in tunnels; 3,400 cubic feet of pressure grouting; 800 cubic yards of dry-rock paving; furnishing and installing 390,000 pounds of steel tunnel supports; furnishing and installing 132 M ft. b. m. of timber lagging and sills for steel tunnel supports; furnishing and installing 415,000 pounds of steel tunnel liner plates; constructing 11,000 linear feet of 6- to 10-inch diameter tunnel drains; placing 116,000 pounds of reinforcement bars; drilling 1,600 linear feet of grout holes; and installing 2,300 pounds of metalwork. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be part of the contract. The work shall be commenced within thirty (30) calendar days after date of receipt of notice to proceed and shall be completed within seven hundred and fifty (750) calendar days from the date of receipt of such notice. Bid security in an amount not less than 10 per cent and performance bond not less than 50 per cent will be required. Liquidated damages for delay will be fifty dollars ($50) per day for each uncompleted schedule. No charge to prospective bidders for copies of the specifications and drawings; to others $1.00, not returnable. For particulars, address the Bureau of Reclamation, Casper, Wyoming; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD,
Commissioner

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Cement for All-American Canal

Washington, D. C., October 22, 1935. Sealed bids (Specifications No. 648) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 2 p. m., November 22, 1935, and will at that hour be opened, for furnishing and delivering f. o. b. cars at the shipping point approximately 300,000 barrels of modified portland cement and 40,000 barrels of sulphate-resistant portland cement, in cloth sacks, for the All-American Canal System, Boulder Canyon Project, Arizona-California-Nevada. No charge for specifications to prospective bona fide bidders; to others, $0.25, not returnable. For particulars, address the Bureau of Reclamation, Denver, Colorado, or Washington, D. C.

ELWOOD MEAD,
Commissioner.

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

Imperial Dam and Desilting Works—Boulder Project

Washington, D. C., October 15, 1935. Sealed bids (Specifications No. 644) will be received at the office of the U. S. Bureau of Reclamation, Yuma, Arizona, until 10 o'clock a. m., mountain standard time, November 21, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the **construction of the Imperial Dam and desilting works**, All-American Canal System, Boulder Canyon project, Arizona-California-Nevada. The work is located on the Colorado River about 18 miles northeast of Yuma, Arizona. The principal items of work and the estimated quantities involved are as follows: 572,000 cubic yards of all classes of excavation for dam; 791,000 cubic yards of all classes of excavation for desilting works; 16,000 cubic yards of all classes of excavation for roads; 1,079,300 cubic yards of excavation from borrow pits; 91,500 square yards of preparing earth foundations for concrete; 60,000 cubic yards of back fill; 1,065,000 cubic yards of compacting embankments; 182,550 square yards of dry-rock paving; 45,900 cubic yards of riprap; 38,000 cubic yards of gravel fills and blankets; 47,300 cubic yards of rock fills on canal embankment; 10,000 cubic yards of concrete in concrete piles; 65,200 cubic yards of concrete in dam; 55,100 cubic yards of concrete in aprons and paving; 34,700 cubic yards of concrete in desilting works; 400 cubic feet of pressure grouting; fabricating and driving 1,710 M. ft. b. m. of untreated timber sheet-piling; driving 950 M. ft. b. m. of treated timber sheet-piling; driving 5,203,000 pounds of steel sheet-piling; placing 182,500 pounds of steel sheet-piling in concrete in trenches; driving 13,300 linear feet of timber foundation piles; driving 113,400 linear feet of concrete piles; drilling 1,600 linear feet of grout holes; placing 18,255,000 pounds of reinforcement bars; placing 419,300 pounds of jet pipe in concrete piles; installing 19,300 linear feet of flexible joint-seals; installing 6,600 linear feet of metal water stops; placing 10,900 linear feet of mastic filler at tops of sheet-piling; laying 2,300 linear feet of 4-inch and 12-inch clay sewer pipe; installing 4,650 linear feet of timber crests on effluent weirs; installing 2,450 square feet of roofing on building; erecting 379,000 pounds of structural steel in bridges; installing 1,184,000 pounds of roller gates and hoists; installing 1,169,700 pounds of radial gates and hoists; installing 813,000 pounds of trash-rack metalwork; installing 200,000 pounds of metal handrails; installing 2,054,000 pounds of revolving scrapers and drives; installing 353,000 pounds of metal lining in slots of effluent weirs; installing 1,400,000 pounds of metal pipe, fittings, and valves; installing 94,500 pounds of miscellaneous metalwork; installing 1,400 square feet of metal doors and windows; installing 71,300 linear feet of electrical metal conduit; laying 13,500 linear feet of 4-way and 6-way multiple-duct conduit; laying 10,000 linear feet of parkway cable; and installing electrical conductors, and apparatus. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be a part of the contract. The work shall be commenced within thirty (30) calendar days after date of receipt of notice to proceed and shall be completed within eight hundred (800) calendar days from the date of receipt of such notice. Liquidated damages for delay will be $500 per day. Bid security 10 per cent, performance bond not less than 50 per cent and payment bond (Act of August 24, 1935, 49 Stat. 793) will be required. The charge for the specifications and drawings is $5.00 per copy not returnable. For particulars, address the Bureau of Reclamation, Yuma, Arizona; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD,
Commissioner.

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