WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME X, NO. 3

MARCH, 1935

25 CENTS A COPY
$2.00 PER YEAR

This Issue 8,200 Copies

Snoqualmie Pass Concrete Highway in Washington (Connecting Puget Sound and Eastern Washington) Near Summit of Cascade Mountains.

UNQUESTIONED

¶In building any project from a sidewalk to a skyscraper, the materials entering into it should be of proven performance and unquestioned merit. ¶Engineers and architects deal in constants — not variables. They must *know* to a certainty, just how the materials they specify will act under all conditions. ¶The name GOLDEN GATE has stood for certainty in Portland Cement for over a quarter of a century. Bridges, dams, dry-docks, tunnels, highways and monolithic structures up and down the Coast, are lasting monuments to its permanence. ¶Never once since the first barrel of GOLDEN GATE Portland Cement was produced 32 years ago, has any recognized authority ever questioned its quality or doubted its performance. ¶Today, GOLDEN GATE Portland Cement stands on its own record. In free and open competition it has been selected by the contractors as a product of unquestioned merit, worthy of playing a major part in the construction of both the Golden Gate and San Francisco-Oakland Bay Bridges. ¶When you build any structure, large or small, follow the lead of established engineering practice, use materials of proven merit only.

To make certain of your concrete always specify GOLDEN GATE *True* Portland Cement.

GOLDEN GATE
PORTLAND CEMENT
FOR SOUND CONSTRUCTION

PLANT AT REDWOOD CITY

PACIFIC PORTLAND CEMENT COMPANY
SAN FRANCISCO

When writing to PACIFIC PORTLAND CEMENT CO., *please mention Western Construction News.*

Even if YOUR SHOVEL (regardless of make) had the same engine as used on a NORTHWEST of the same rated capacity the NORTHWEST would still have more cutting force at the Dipper Lip!

Because, in the Northwest Independent Crowd, the hoist cable is dead-ended at the inner end of the dipper sticks instead of at the boom head, it utilizes what on other shovels is dead-end pull, and turns forces to crowding that other shovels waste. This permits the utilization of engine power for hoisting, that on other shovels, must go for crowding.

Your Northwest always has power in excess of other machines for the tough places.

Built in a range of **10 SIZES** *½ yd. capacity and larger*

NORTHWEST ENGINEERING COMPANY

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

1736 Steger Building
28 East Jackson Boulevard
Chicago, Illinois, U. S. A.

NORTHWEST

NORTHWEST ENGINEERING COMPANY
255 Tenth Street, San Francisco, Calif.; 3707 Santa Fe Ave., Los Angeles, Calif.; W. B. JONES, 6206 S. E. 30th Ave., Portland. REPRESENTATIVES—Pacific Hoist & Derrick Co., 3200 4th Ave. S., Seattle; Arnold Block, 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.

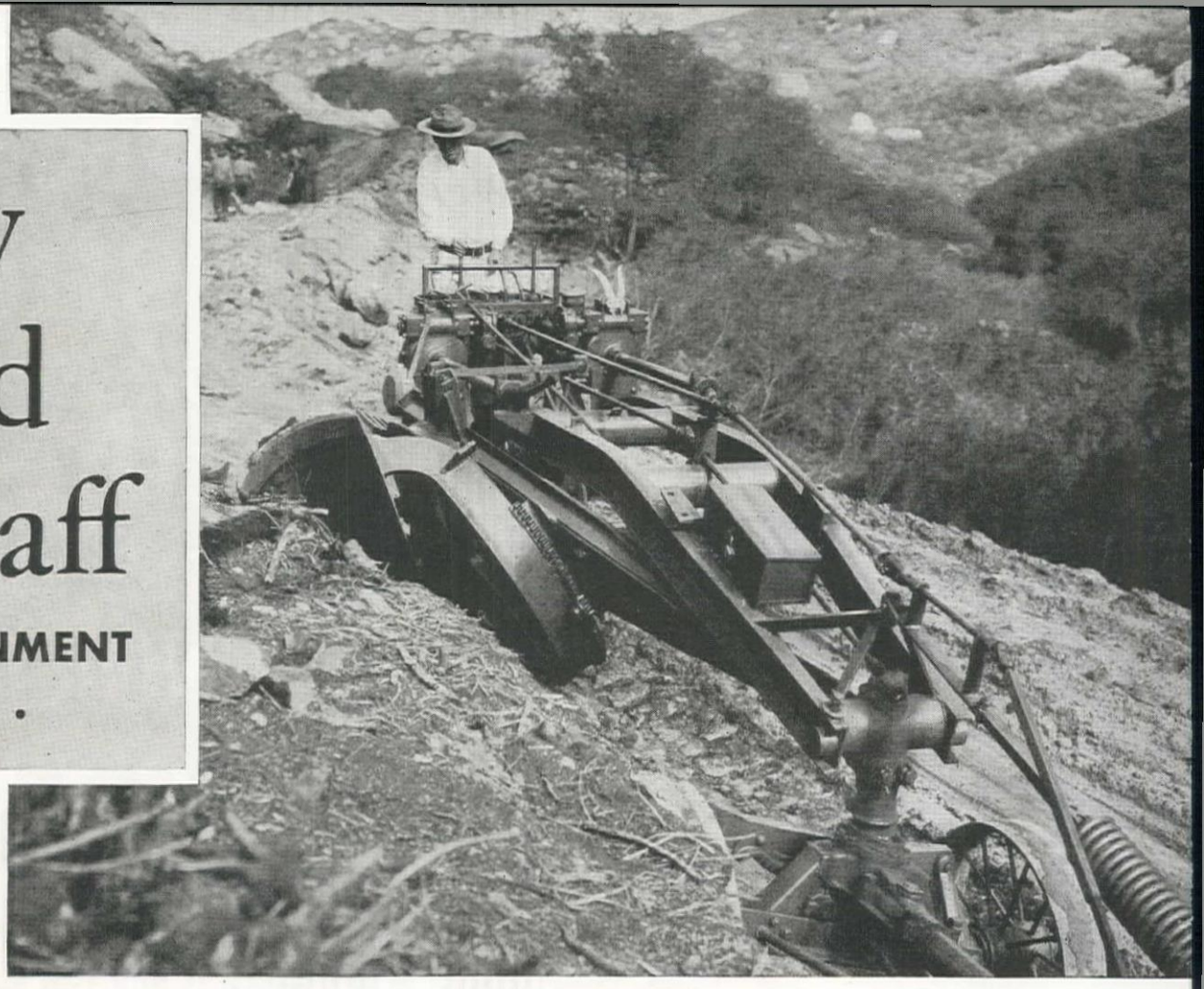
SHOVELS •
CRANES •
DRAGLINES •
PULLSHOVELS •
SKIMMERS •

• • •

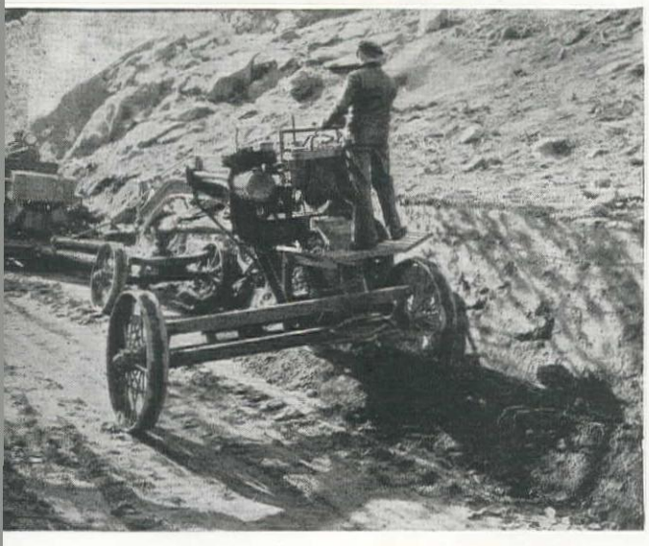
Gasoline •
Oil •
Diesel •
Electric •

They Stand the Gaff

OF GOVERNMENT SERVICE . . .



One of fifteen power-operated graders, ten-foot blade, recently delivered to U. S. Forest Service, California.



Above: U. S. Forest Service machine. Note steep bank cut on mountainside road.

Below: The U. S. Soil Erosion Service has a number of these eight-foot blade machines in operation.

IF THERE is any place in the world where a road grader is punished to the limit, it is in the U. S. Forest Service. Put one of the C.C.C. boys on it — well intentioned but probably inexperienced — and does he "give it the works" — over the hills and through the woods he goes, cutting through roots and saplings and bouncing from one rock to another.

Adams Leaning Wheel Graders are making good under these conditions and they are well represented throughout the country, not only in the U. S. Forest Service but in the National Park Service, U. S. Soil Erosion Service, among the Indian Agencies, etc. The point is — if Adams Graders meet the severe conditions of U. S. Government service, and the wide range of blade adjustments required, they will make good graders for you whether you are highway official or contractor. These graders are available in blade lengths of 6½ to 14 ft., suitable for any power. Larger models available with power-operated controls.

Why not write today for the new Adams Leaning Wheel Grader catalog illustrating and describing various construction and operating advantages of these machines?

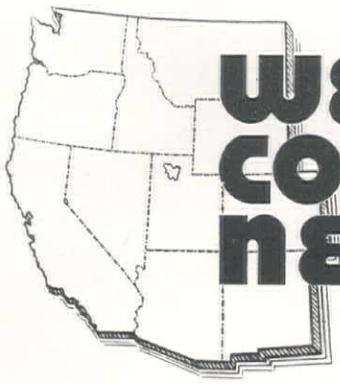
ROAD ADAMS MACHINERY

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.

ADAMS LEANING WHEEL GRADERS



WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

G. E. BJORK, Acting Editor

Contents for March, 1935

Milestones—

During the past year many developments have occurred in the construction industry; and in this same period, keeping step with the industry, progressive changes have occurred in **Western Construction News.** You have noticed improvements in typography, in the front cover, and in strengthening of the editorial coverage. Many new and large projects have entered the construction stage, including Grand Coulee, Fort Peck, All-American Canal, and hundreds of others of lesser magnitude.

Looking Ahead to April

Several of the more interesting operations on these projects will be described in our April issue. At Fort Peck, a novel method is used in driving the four 26-ft. diam. diversion tunnels through Bear Paw shale, a material which, though firm in its native state, slacks rapidly when exposed to air. In driving the pilot tunnel, a special machine for sawing out the shale in large blocks is used. The method of mucking out the excavated material and transporting it to the dump on a large belt conveyor will be of interest also.

One of the most dramatic undertakings of the century is the spanning of San Francisco bay between San Francisco and Oakland. This project which includes the world's largest tunnel, deepest foundations, and largest complete bridge is also unique in that lightweight aggregates (about 100 lb. per cu. ft.) will be used in the upper and lower deck paving. Development and operation of new equipment and methods on this work which is well under way will be described in detail.

Other articles describing methods used in constructing a highway across 40-ft. deep swamps in the Puget Sound lowlands in Washington, the model spillway tests of dams designed by the Bureau of Reclamation, X-raying of metals to detect flaws in welding and riveting, driving of San Jacinto Tunnel under hazardous conditions, and highway maintenance work will be included in the April number.

Northwest Office:
3225 N. E. Davis St., Portland, Ore.
G. E. Bjork, Manager

Chicago Office:
162 East Ohio Street
Stephen H. Babcock, Manager

WESTERN CONSTRUCTION NEWS
Published by
WESTERN CONSTRUCTION PUBLICATIONS, Inc.

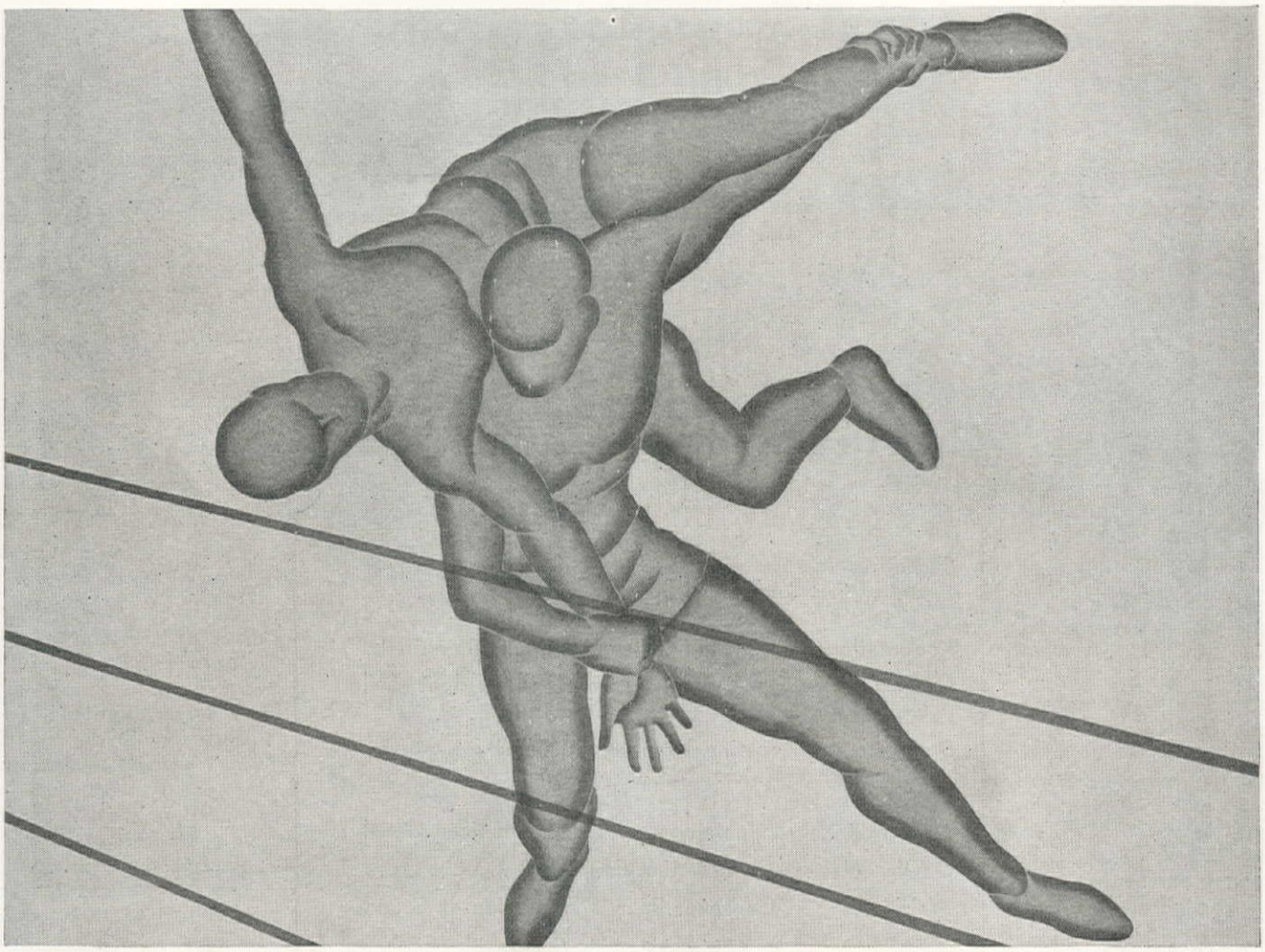
Editorial and Executive Offices: 114 Sansome St., San Francisco
Arthur F. King, President S. H. Wade, Vice-President

Office of Publication: 333 W. Second St., Los Angeles
Newton W. Withers, Manager

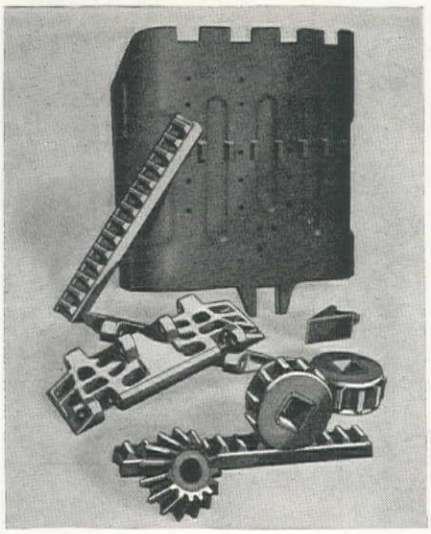
Entered as Second Cass Matter at the Post Office at Los Angeles, California, under the Act of March 3, 1879

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.



IT PAYS TO BE TOUGH!



To provide the necessary stamina for Marion Excavators, alloy steels are used extensively in their construction . . . Crawler shoes and crawler sprockets — dipper fronts and dipper teeth — shipper pinions and dipper handle racking are manganese steel — the toughest and most durable material known for these important parts . . . Axles, shafts and pins, subject to high torques and heavy loads, are chrome, molybdenum, nickel, or vanadium steel alloys to insure maximum strength and stress with minimum weight.

THE MARION STEAM SHOVEL CO. *Marion·Ohio*

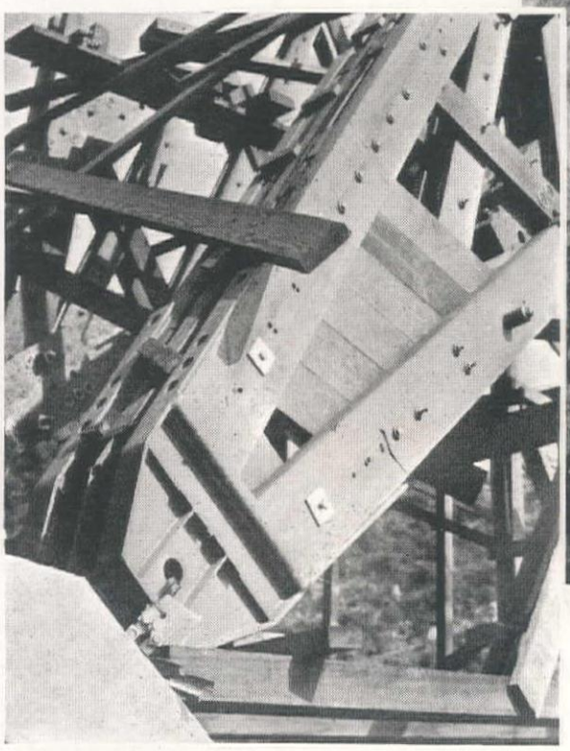
SHOVELS • CLAMSHELLS • DRAGLINES • CRANES • GAS • DIESEL • ELECTRIC • GAS ELECTRIC • DIESEL ELECTRIC • STEAM

AN EXCAVATOR FOR EVERY MATERIAL HANDLING NEED

When writing to MARION STEAM SHOVEL CO., *please mention Western Construction News*

DOLAN CREEK BRIDGE WILL STILL BE SAVING HIGHWAY DOLLARS 40 YEARS FROM NOW

Located on the new San Simeon-Carmel Highway, Dolan Creek Bridge is one of many California Redwood structures entering into the solution of the difficult problems of this notable route. Cost of construction and maintenance, assured strength, long life, and dependable quality governed in the selection of Redwood.



Lower Hinge Detail

The superiority of California Redwood has been proved by use on highways and bridges for more than three-quarters of a century. Hundreds of modern bridges on primary highways are built of this dependable material.

Designed by California Division of Highways
Constructed—1934

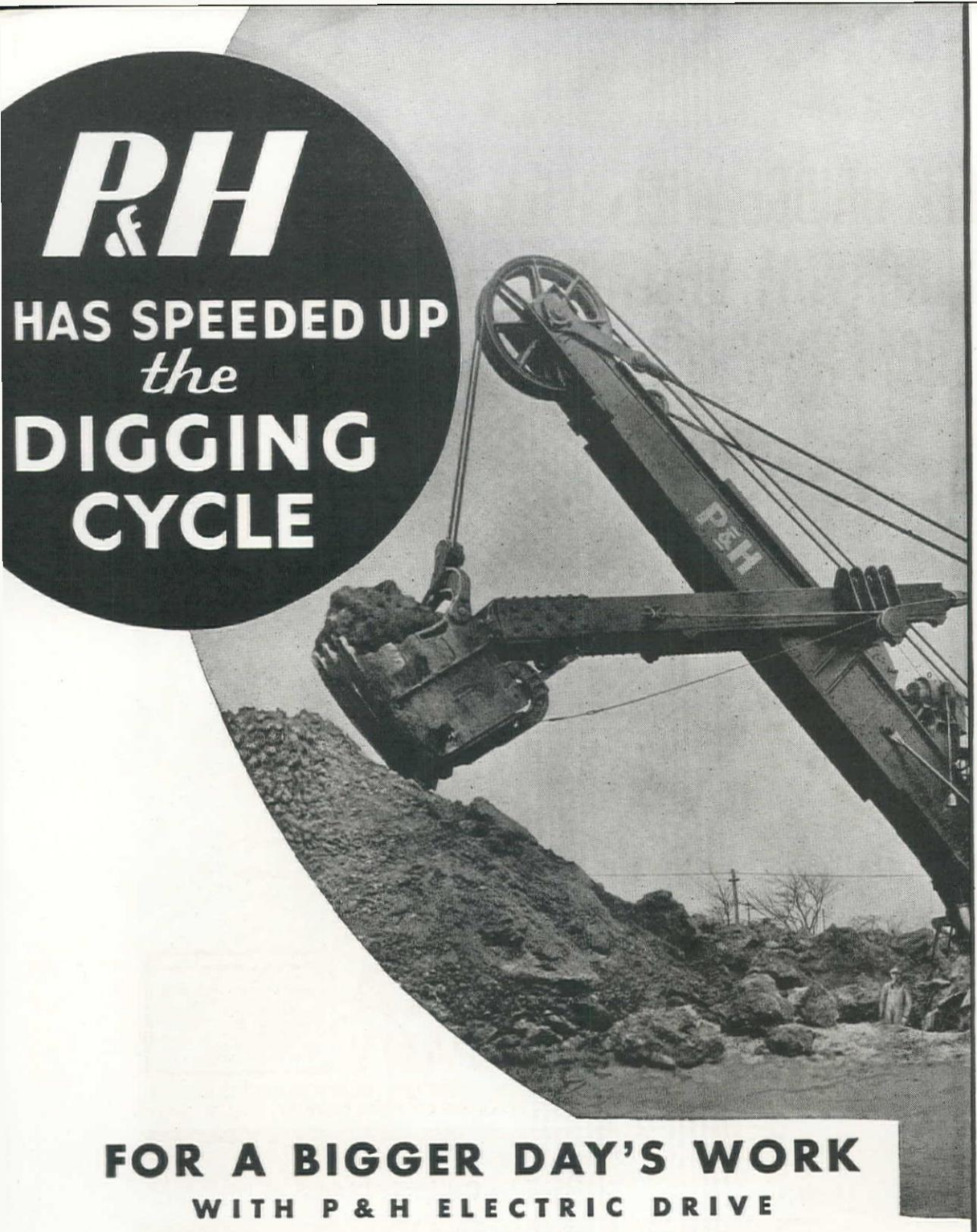
Design Features

Loading—40 ton shovel
Overall Length....514 ft. Roadway Width....24 ft.
Arch Span.....180 ft. Arch Rise.....60 ft.
Approach Spans...38 ft. timber lattice girders and 19 ft. timber bents.
Laced Timber Columns—Maximum Length.....63 ft.
Contains 375,000 board ft. certified Structural Redwood. The Redwood decking was first used for the falsework shown in this illustration....an elimination of waste.

CALIFORNIA REDWOOD ASSOCIATION
405 Montgomery Street San Francisco

NATURALLY DURABLE CALIFORNIA REDWOOD

P&H HAS SPEEDED UP *the* DIGGING CYCLE



FOR A BIGGER DAY'S WORK

WITH P & H ELECTRIC DRIVE

Abundant horsepower . . . faster swinging . . . balanced machinery units on the main working frame . . . less counterweight . . . these are some of the reasons why P&H Ward Leonards are big producers. In speeding up the swing as high as 3½ RPM, P&H engineers have licked the real problem of faster digging.

Remember that the swing absorbs nearly 67% of the digging cycle.

If you've got a big job in dirt or rock, we will present some facts that will interest you. Better investigate these P&H Ward Leonards. Their modern design does things to handling costs.

HARNISCHFEGER CORPORATION
4490 W. NATIONAL AVE. *Established 1884* MILWAUKEE, WIS.
Warehouses and Service Stations
HARNISCHFEGER SALES CORPORATION, 82 Beale St., San Francisco; R. M. Taylor.
WESTERN LOGGERS MACHINERY CO., 302 S. W. Fourth Ave., Portland, Oregon
SEATTLE DALLAS LOS ANGELES SAN FRANCISCO

More Power, Less Weight Speed Up Action of P & H Electric Excavators

The outstanding feature of the P&H Ward Leonard is the faster operating speeds accomplished through high total horsepower and a more advantageous distribution of weight.

The latter refers to the careful grouping of generators, etc., back of the center of rotation to do away with most of the additional counterweight used in conventional designs. Less counterweight means less dead weight to consume motive power and retard action.

100% Electrical Control

Every move the machine makes is electrically controlled from the operator's cab and simplified to a remarkable degree. Steering, too, is accomplished through the use of hydraulic cylinders electrically controlled from the driver's seat. Travel speed runs as high as 1½ miles per hour—extremely fast for a machine of this size.

Main brakes and clutches are also hydraulically operated, eliminating hand levers, manually operated foot pedals, etc.

Hoist Mechanism

The unusually compact hoist mechanism is a sturdy high speed unit. The large hoist motor is connected to the hoist drum through a set of herringbone gears and a set of massive spur gears. The first reduction mechanism is equipped with anti-friction bearings and operates in an oil bath. The large, heavily loaded hoist drum shaft turns in a long, bronze, sleeve bearing.

The hoist drum, of large diameter, with turned grooves, is easy on cable.

Swing is Faster

On the larger models two swing units are employed. Vertical type motors are used, thereby avoiding the use of spur gears. The helical cut gears are longer lived and operate more quietly —the gears operate in an oil bath. All shafting is mounted in anti-friction bearings. The entire mechanism has been given a large factor of safety to withstand, for a long period of years, the heavy service imposed. Starting from rest the speed of the swing motors increases gradually, thereby reaching maximum speed as quickly as possible—yet smoothly and quietly.

P&H WARD LEONARD ELECTRIC EXCAVATORS

How to make Excavator ropes LAST LONGER

In this first of a series of suggestions on the use and care of Excavator Ropes, a few pointers are given regarding new ropes and spares:

1—Take care of your spare ropes—do not allow them to be damaged by exposure and corrosion.

2—When installing a new rope see that it is wound evenly and tightly on the drum.

3—Handle a new rope carefully and do not throw kinks and "dogs legs" into it.

4—Fasten the ends to drums and wedge sockets carefully so that no slack or tight strands develop.

Future advertisements in this series will contain other valuable suggestions on how to secure maximum service from Excavator Ropes. In the meantime our engineers are at your service — to give helpful information on any wire rope application.

There is a

TIGER BRAND
AMERICAN WIRE ROPE
For Every Purpose

Supplied in Excellay (Preformed) or Standard lay, whichever is best suited for the job.

With our own wire rope plant and large stocks of rope wire and wire ropes of all grades and constructions—our own modern testing equipment—all right here on the Pacific Coast, we have a perfect set-up to give you prompt and efficient service.

Tiger Brand ropes are made on the Pacific Coast by the Columbia Steel Company—in the East they are made by the American Steel & Wire Company.

COLUMBIA STEEL COMPANY

Pacific Coast Distributors for
AMERICAN BRIDGE CO.
AMERICAN SHEET & TIN PLATE CO.
AMERICAN STEEL & WIRE CO.
CARNEGIE STEEL CO.
ILLINOIS STEEL CO.
LORAIN STEEL CO.
NATIONAL TUBE CO.
TENNESSEE COAL, IRON & R. R. CO.

SAN FRANCISCO · LOS ANGELES · PORTLAND · SEATTLE · SALT LAKE CITY
MILLS AT SAN FRANCISCO, TORRANCE AND PITTSBURG, CALIFORNIA

United States Steel Corporation Subsidiaries

Export Distributors: United States Steel Products Company, New York

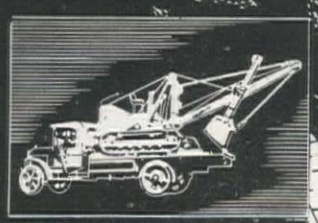
WORTH INVESTIGATING...

300 yards at 3¢ per -

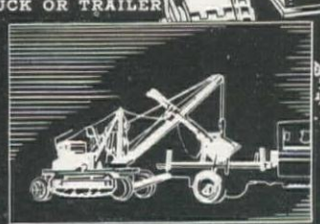
That's an easy day's work for the Bear Cat Jr., even in mighty tough digging. Look at the work it is doing . . . loading heavy chunks of smelted foundry refuse twice the size of the bucket at a price way below estimated cost. If you want to save and make more money on all kinds of excavating jobs...if digging all day long on 9 gallons of gasoline and one quarter pint of oil sounds interesting . . . then investigate the Bear Cat Jr.

Send for Free Illustrated Book "BEAR CAT JUNIOR FACTS."

BEARCAT SHOVEL WORKS BEAR-CAT-JR SHOVEL **RAVENNA, OHIO, U. S. A.**



25 MILES PER HOUR BY TRUCK OR TRAILER



YOU CAN'T BEAT IT FOR PORTABILITY

BEARCAT Jr. SHOVEL CO.
Ravenna, Ohio

Please send me, without obligation, your interesting book entitled "FACTS."

Name .....
Address .....
City ..... State .....

2-B.C.

REPRESENTATIVES IN WESTERN STATES

Edw. R. Bacon Co., San Francisco, Calif. • Garlinghouse Brothers, Los Angeles, Calif. • Balzer Machinery Co., Portland, Ore. • Service Equipment Co., Inc., Seattle, Wash. Connelly Machinery Co., Billings, Mont. • Arnold Machinery Co., Inc., Salt Lake City, Utah • Sprott Tractor & Equipment Co., Grand Jct., Colo. • Rocky Mountain Equipment Co., Denver, Colo. • Sheehan & Company, El Paso, Texas

Complete Road Maintenance

● This Case-powered Wehr Grader is built to do the work better, quicker and cheaper. Constant flow of power at all operating speeds; ease and simplicity of operation; low operating costs; freedom from time-consuming delays for repairs; long life; positive protection from dust; and numerous other important features. Case engines are so well regarded among engineers and highway officials that three times as many selected Case power last year as during 1933. Remember that Case service is always available.

SPECIFY CASE POWER

MODEL "CI"
For Grader Patrols with 6 to 10 foot Blades.

MODEL "LI"
For Larger Graders with 10 to 16 foot Blades.

CASE

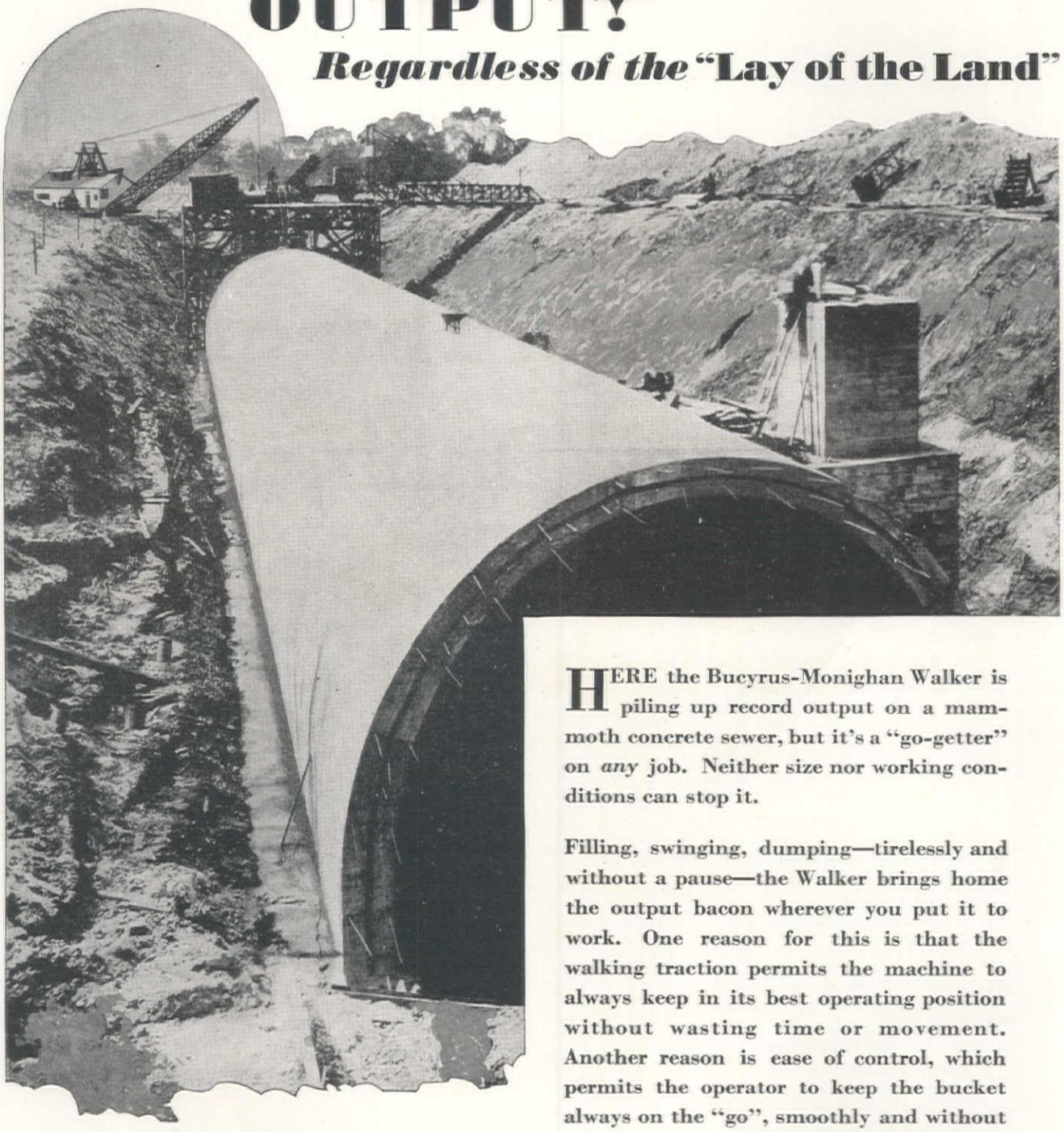
The Modern **POWER** *for Road Maintenance*

J. I. CASE COMPANY, Oakland, Los Angeles, Salt Lake City, Portland, Spokane, Billings

When writing to J. I. CASE COMPANY, *please mention Western Construction News*

OUTPUT!

Regardless of the "Lay of the Land"



HERE the Bucyrus-Monighan Walker is piling up record output on a mammoth concrete sewer, but it's a "go-getter" on *any* job. Neither size nor working conditions can stop it.

Filling, swinging, dumping—tirelessly and without a pause—the Walker brings home the output bacon wherever you put it to work. One reason for this is that the walking traction permits the machine to always keep in its best operating position without wasting time or movement. Another reason is ease of control, which permits the operator to keep the bucket always on the "go", smoothly and without noticeable slow-up during or between cycles.

Investigate the Walker's output records. You'll find them unusually interesting. Bucyrus-Monighan Company, Chicago, Ill.

SAN FRANCISCO OFFICE: 989 Folsom St., Tel. GArfield 8192. CROOK COMPANY, 2900 Santa Fe Ave., Los Angeles, Tel. KImball 5137. CLYDE EQUIPMENT COMPANY, 17th and Thurman Streets, Portland, Ore. Tel. BRoadway 0885. 3410 First Avenue South, Seattle, Wash., Tel. MAin 1235.

BUCYRUS • ERIE CO. • SOUTH MILWAUKEE WISCONSIN

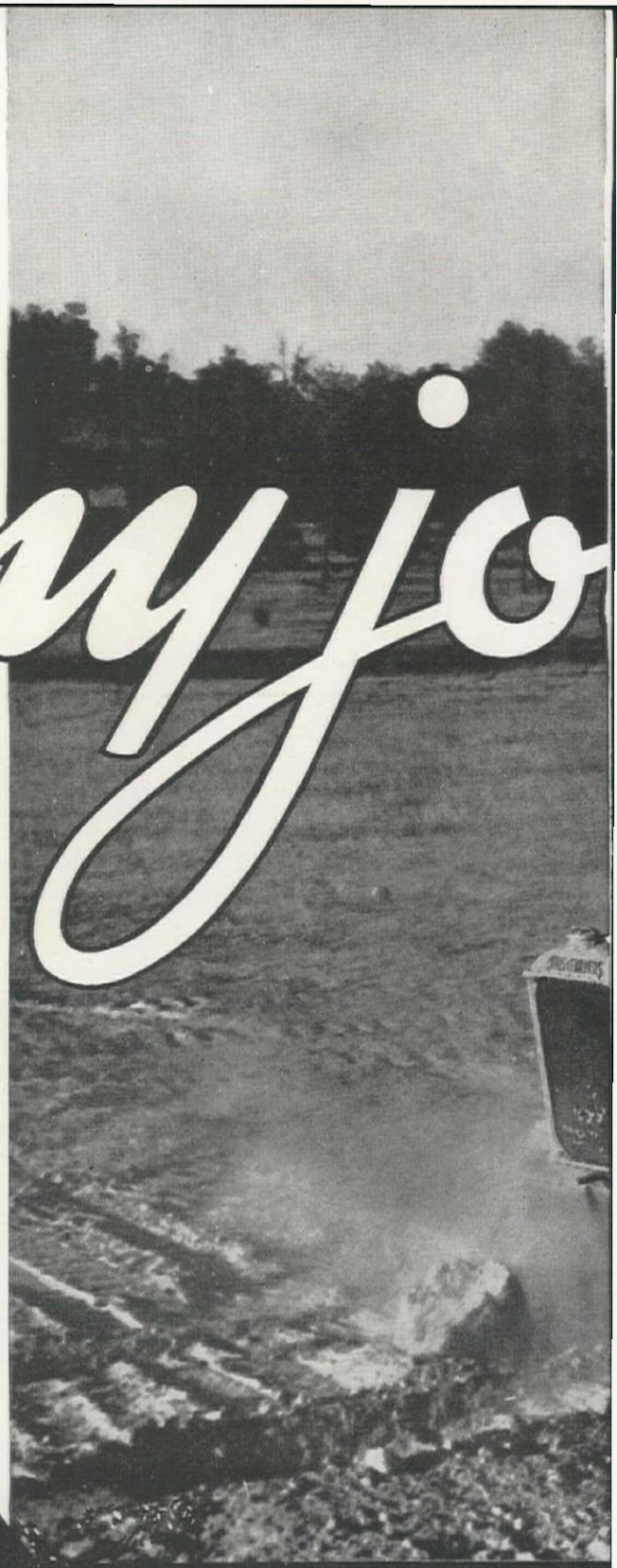
BUCYRUS MONIGHAN

Walking Draglines 1 to 10 cubic yards

B-65

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

ON any jo



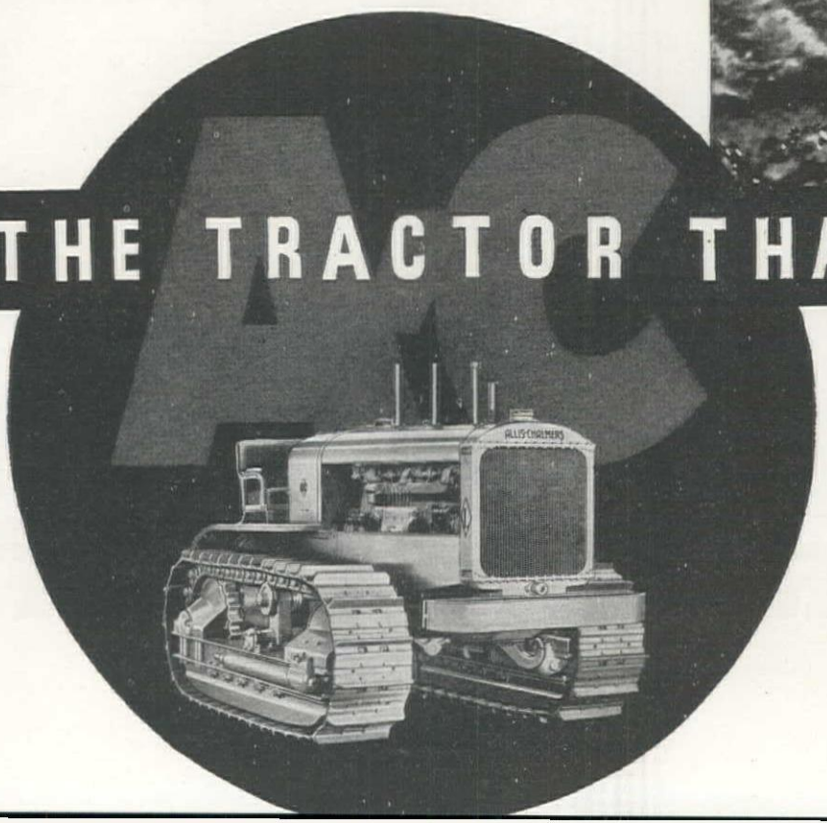
THESE ARE THE COSTS YOU ARE MOST INTERESTED IN:

1 ✓ LOW FUEL COST

2 ✓ LOWER ORIGINAL COST

3 ✓ LOWER MAINTENANCE

4 ✓ LESS DEPRECIATION



BUY THE TRACTOR THAT GIVES Y

10 cents an hour ... 15
... typical fuel costs for
doing the job is what yo
running ... time out co
tractor when the job is
Tractors do the job at th

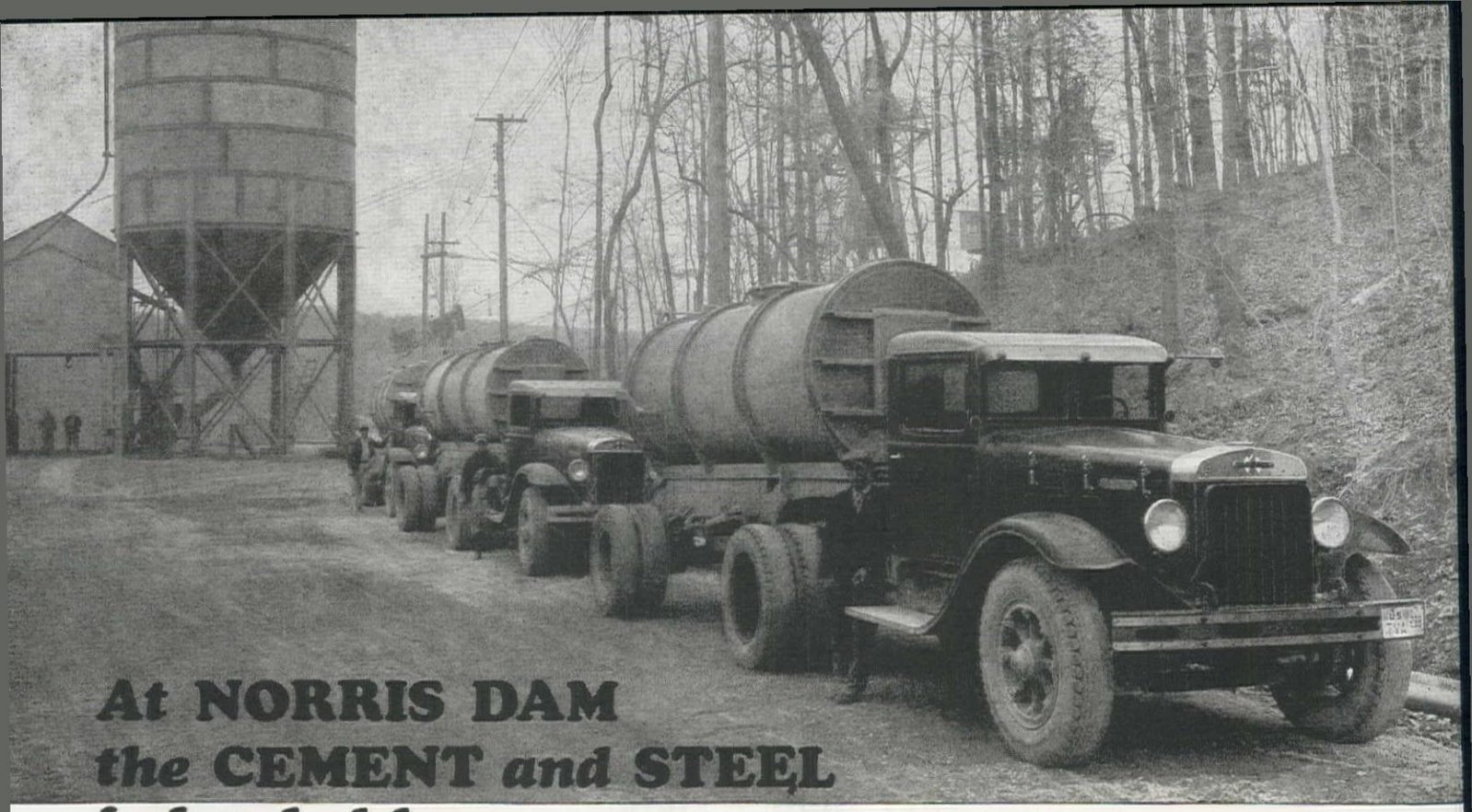
OU THE LOWEST FINAL COST!.

cents an hour ... 24 cents an hour ... $1.96 a day
A-C Oil Tractors. Don't be misled. Final cost of
u want to know ... repair costs to keep the tractor
st when the tractor is down ... condition of the
finished. A-C Oil
e Lowest Final Cost.

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U. S. A.

MODEL "K-O" ... 48 H.P.
MODEL "L-O" ... 76 H.P.

2533 Peralta Street, Oakland, Calif. S. 151 Madison, Spokane, Wash
208 S. E. Belmont, Portland, Ore. 602 First Avenue, Pocatello, Idaho
Billings, Mont.



At NORRIS DAM *the* CEMENT *and* STEEL *is hauled by* INTERNATIONAL TRUCKS

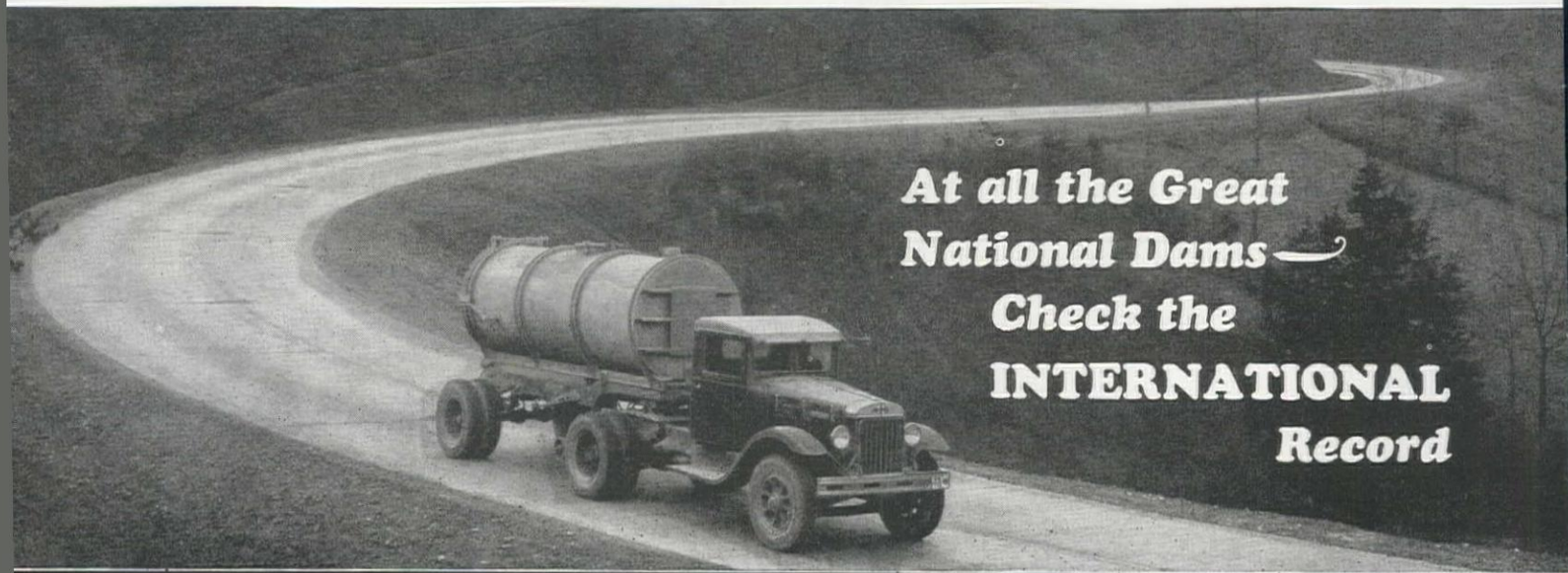
Originally a railroad was planned to get the vast tonnage of cement and reinforcement steel from the railroad siding at Coal Creek, Tenn., up to Norris Dam, but a show-down on efficiency gave the job to trucks—INTERNATIONALS.

A scenic highway 4.8 miles in length was built up the steep grades (eventually it will continue on over the completed dam) and a fleet of International Model A-8 tractor-trucks with semi-trailers got onto the job, to carry on twenty-four hours a day during the many months of dam construction. The aluminum tanks of the trailers hold a capacity of 65 bbl. or 24,440 lb. of cement. Steel and lumber are hauled on other types of trailers.

On the Tennessee Valley projects, as on the most spectacular construction enterprises elsewhere in the country, International Trucks are playing a generous part, consistently dependable, efficient, economical.

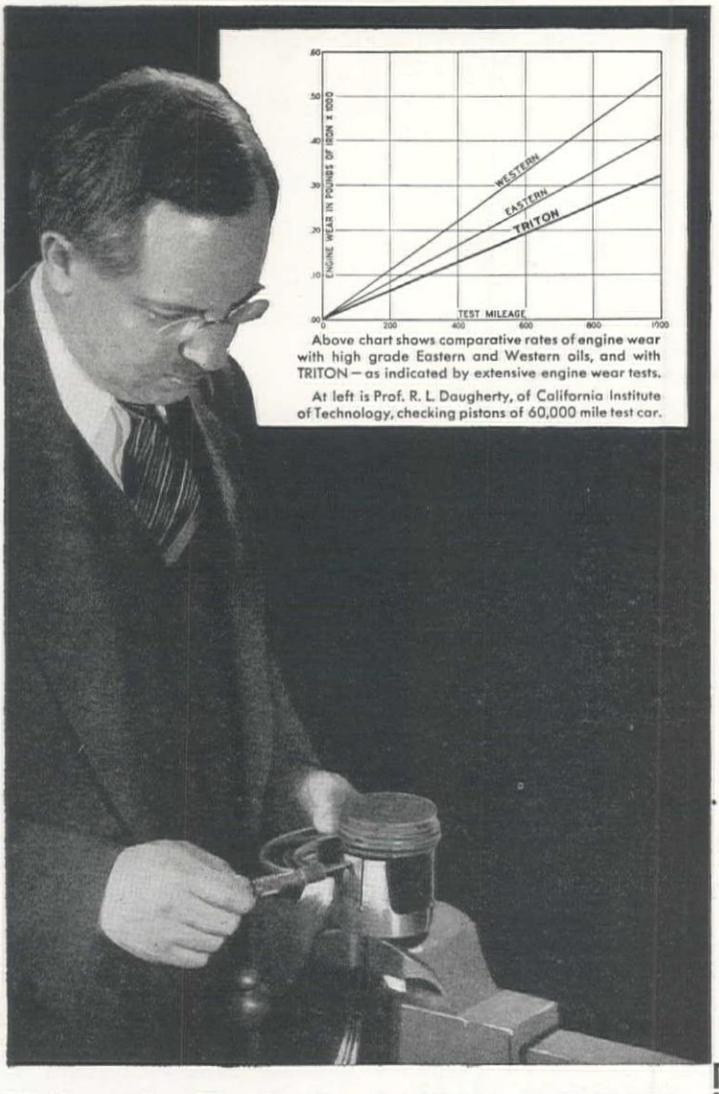
Service through 217 Company-owned branches.

INTERNATIONAL HARVESTER COMPANY OF AMERICA, INC.
606 South Michigan Avenue, Chicago, Ill.



At all the Great National Dams— Check the* INTERNATIONAL *Record

22 to 43% LESS ENGINE WEAR WITH TRITON MOTOR OIL



Above chart shows comparative rates of engine wear with high grade Eastern and Western oils, and with TRITON—as indicated by extensive engine wear tests.

At left is Prof. R. L. Daugherty, of California Institute of Technology, checking pistons of 60,000 mile test car.

Shown by laboratory tests and 60,000-mile, 60-day, stock car road run

UNDER identical conditions an automobile engine was run in a series of 1,000-mile tests with high-grade "Eastern" and "Western" oils, and TRITON.

After each 1,000 mile period, the oil was drained from the crankcase and scientifically analyzed to determine its iron content.

The analyses of the various oils showed that *TRITON reduced engine wear form 22 to 43%!*

These tests were backed up by cylinder measurements of a stock car driven 60,183 miles in 60 days with TRITON. The measurements, made by Prof. R. L. Daugherty, of the California Institute of Technology, *showed less than one-half the normal wear for that distance!*

Other Benefits from Triton!

Over 250,000 miles of stock car road and speedway runs have shown that:

TRITON *outlasts* Eastern or Western oils *...forms less carbon and less sludge...is more stable in service* ... is less affected by temperature.

TRITON is made by the new Propane Solvent Process. *It is the first 100% pure paraffin-base oil refined from California crudes!*

UNION OIL COMPANY

MAIL THIS COUPON NOW!

Valuable Technical Book FREE!

Mail the coupon now and we will send you the valuable 56-page bound volume, "Technical Facts About Motor Oils"—a practical treatise on lubricants. It contains facts of real interest to every operator of trucks, tractors, autos, Diesels, turbines, compressors, etc... Get your copy today.

UNION OIL COMPANY,
Lubricating Oil Dept.,
Los Angeles, Calif.

Please send me your 56-page book—"Technical Facts About Motor Oils"—without cost or obligation to me.

*Name*_____

*Firm*_____

*Street*_____

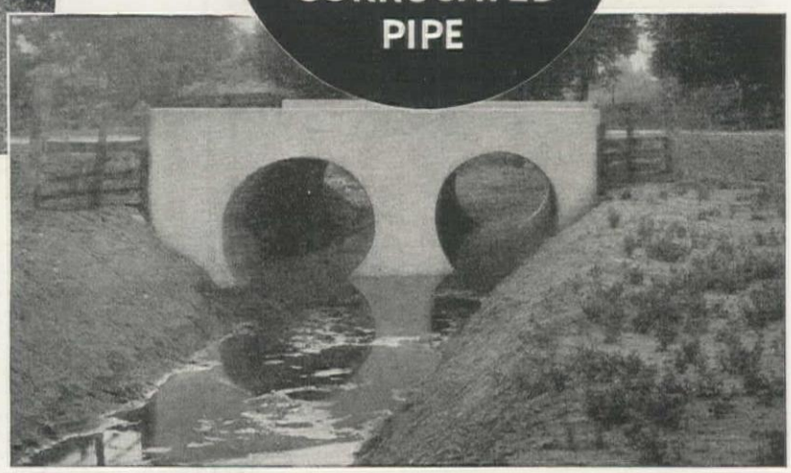
*City*_____ *State*_____

When writing to UNION OIL COMPANY, *please mention Western Construction News.*

Economical

UNDER ALL CONDITIONS

REG U.S. PAT. OFF.
TONCAN
COPPER
MO·LYB·DEN·UM
IRON
CORRUGATED
PIPE



When flood waters washed out a concrete drainage structure under a little-travelled road near Portland, Jay County, Indiana, real consideration was given to the question of the most economical replacement. Toncan Iron Corrugated Pipe with the rough headwalls shown above was installed and now the road may be widened when necessary, new headwalls to match others on the road can be built without disturbing the drainage structure, and years of satisfactory service are assured.

Near Findlay, Ohio, the abutments of an old truss bridge were washed out and immediate replacement was necessary. When soundings were taken and quicksand discovered, it was immediately apparent the cost of replacing the old bridge with another of the same type was prohibitive. Because of its ability to meet foundation conditions encountered, Toncan Iron Corrugated Pipe was used, and the road was quickly put back into service.

For long-lasting drainage structures that are most economical under all conditions, write "Toncan Iron" into your standard specifications. Be sure the corrugated iron pipe you use is made of this modern alloy of open hearth iron, copper and molybdenum that has greater resistance to corrosion than any other ferrous metal, except stainless steel. Write today for your copy of the Toncan Culvert Handbook.

TONCAN CULVERT MANUFACTURERS' ASSOCIATION

REPUBLIC STEEL CORPORATION BUILDING • YOUNGSTOWN, OHIO

BEALL PIPE & TANK CORP., Portland, Ore. - THOMPSON MFG. CO., 30th and Larimer Sts., Denver, Colorado
WM. E. NEWMAN & SONS CO., Ogden, Utah - WESTERN PIPE & STEEL CO., 444 Market St., San Francisco, Cal.

BERGER METAL CULVERT CO. OF N. E., 307 Dorchester Ave., Boston, Mass. - BLUEGRASS PIPE & CULVERT CO., 17th & Arbegust Ave., Louisville, Ky. - CANTON CULVERT CO., Canton, Ohio - THE FIRMAN L. CARSWELL MFG. CO., Kansas City, Kansas - DOMINION METAL & CULVERT CORP., Roanoke, Virginia - EASTERN CULVERT CORP., 16th St. & Washington Ave., Philadelphia, Pa. - A. N. EATON, METAL PRODUCTS, Omaha, Nebraska - A. N. EATON METAL PRODUCTS CO., Billings, Montana - EMPIRE STATE CULVERT CORP., Groton, New York - JENSEN BRIDGE & SUPPLY CO., Sandusky, Michigan - H. V. JOHNSTON CULVERT CO., Minneapolis, Minn. - TRI-STATE CULVERT MFG. CO., Memphis, Tenn. - WYATT METAL & BOILER WORKS, Dallas, Texas

Gentlemen: Please send me the Toncan Iron Corrugated Pipe Handbook.

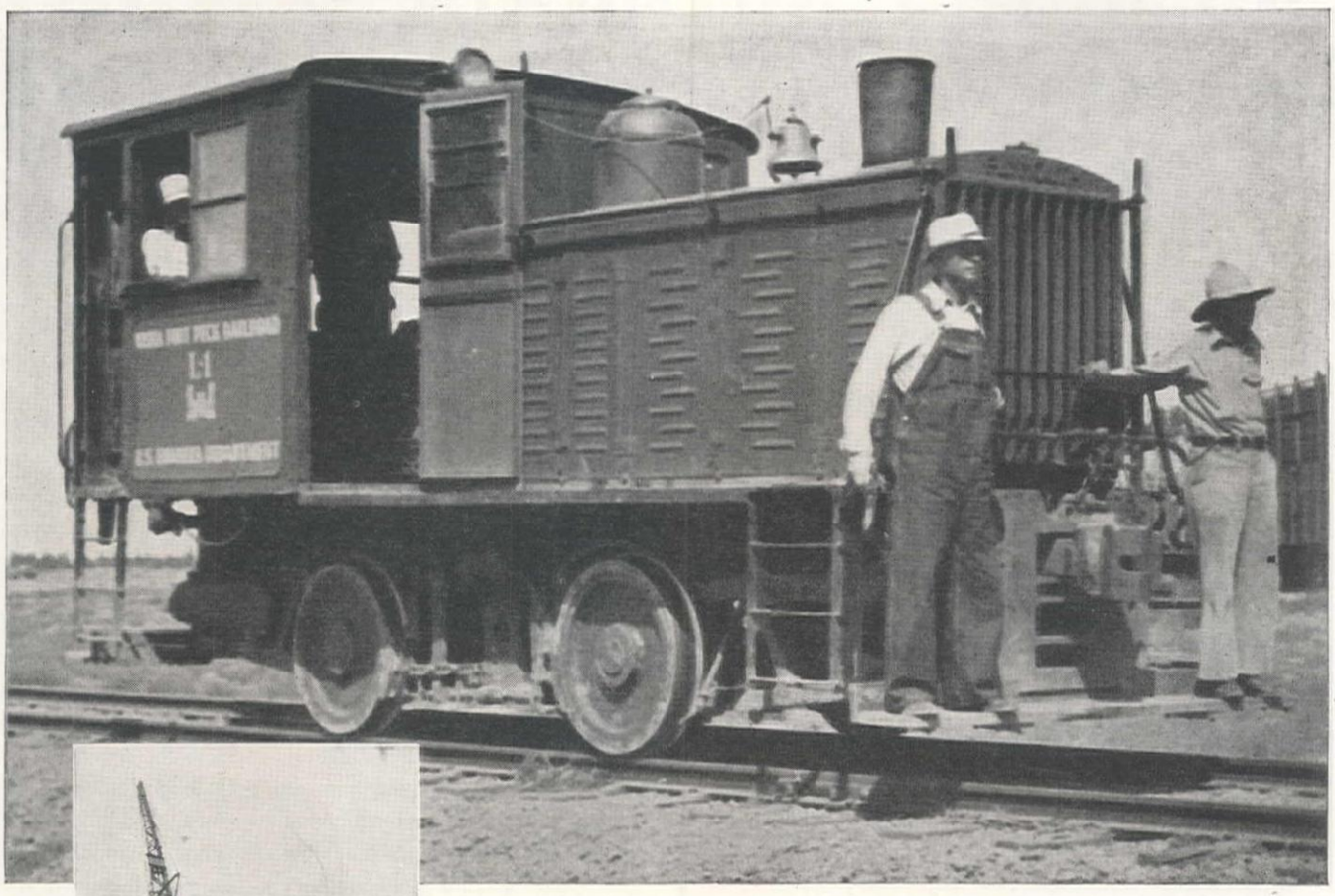
Name .....

Address .....

I am ☐ Engineer ☐ Contractor ☐ Road Official

When writing to TONCAN CULVERT MANUFACTURERS ASSOC., *please mention Western Construction News.*

ON THE FORT PECK PROJECT



It's a PLYMOUTH

This standard gauge Plymouth locomotive is the busiest piece of equipment on the job at Fort Peck, where the U. S. Engineers are building the largest earth fill dam in the world.

Operating over a 12-mile rail line from Wiota to Fort Peck about 6 miles of auxiliary track on the dam site proper, this Plymouth handles the switching of thousands of cars of materials, equipment and supplies to be used in constructing this huge project. Its performance for the U.S. Engineers at Fort Peck is in keeping with the record of hundreds of Plymouths all over the world—economical, trouble-free. That's what makes Plymouth Locomotives so well liked.

On large excavation jobs, Plymouth and dump cars will handle the overhaul most economically. Use Plymouth, too, on breakwaters, dikes and other jobs using large quantities of rock. A size for every job. Ask your dealer.

HARRY C. COLLINS MACHINERY CO.
1919 So. Santa Fe Ave., Los Angeles

A. H. COX & CO., Inc.
1757 First Ave. So.
Seattle

LOGGERS & CONTRACTORS MACHINERY CO.
211 S. E. Madison St., Portland

GARFIELD & CO.
Hearst Building
San Francisco

CONSTRUCTION EQUIPMENT CO.
1118-24 Ide Avenue, Spokane

PLYMOUTH » GASOLINE GAS ELECTRIC » » DIESEL DIESEL ELECTRIC » **LOCOMOTIVES**

PLYMOUTH LOCOMOTIVE WORKS, PLYMOUTH, OHIO, U. S. A.

When writing to PLYMOUTH LOCOMOTIVE WORKS, *please mention Western Construction News*

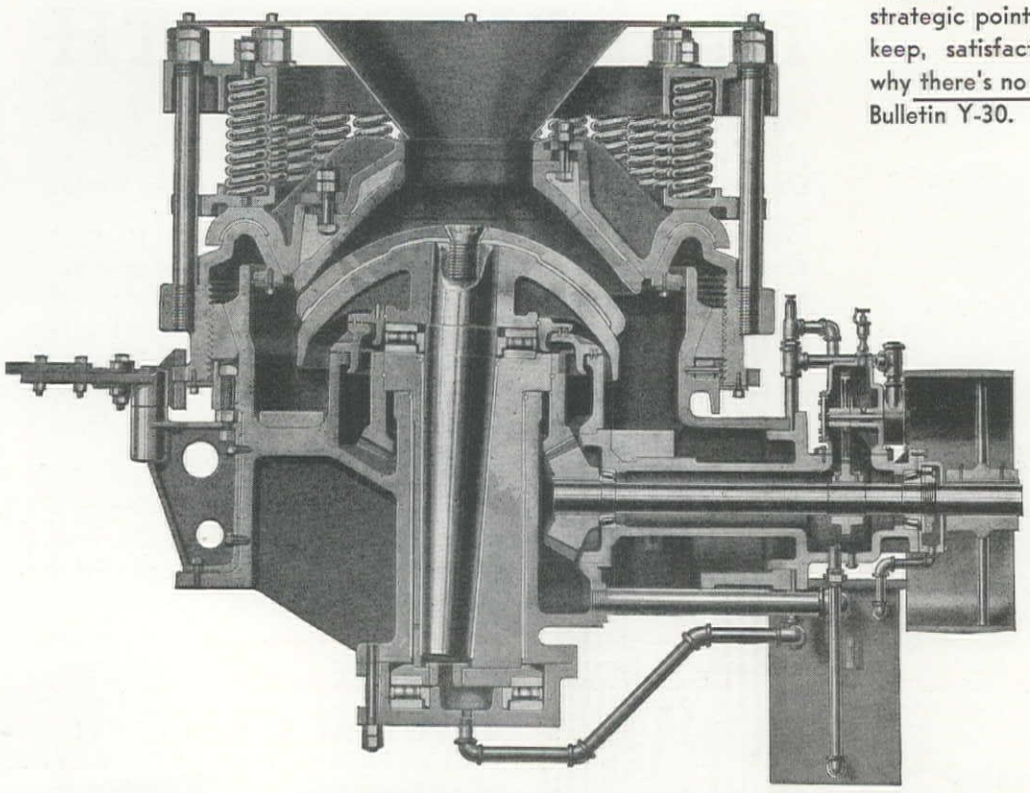
NO SHAFT BREAKAGE IN THE TELSMITH GYRASPHERE

Why?

There are two (2) reasons, so plain and simple as to leave little room for argument or misunderstanding.

(1) Shaft breakages in spring-relief crushers are generally traceable to mis-alignment, caused by uneven wear of the bearings and the resulting shift of stresses to unexpected points on the shaft. Such mis-alignments do not occur in the Telsmith Gyrasphere. The head is supported on the eccentric, with a roller bearing between the two parts. The lower race rotates with the eccentric. The upper race creeps with the head. Between the two races, the rollers are constantly turning at the average speed of the two races. This rotation assures uniform distribution of wear on both rollers and races. The head support is always true—consequently the head and its dependent shaft are always in perfect alignment. That's Reason No. 1 why shaft breakages are most unusual.

(2) The second reason centers in the reduction of radial pressures. In other crushers having a gyratory head movement, a large part of the load is distributed laterally against the eccentric bearings. In a crusher of the spring relief type, such lateral pressures cause the bronze eccentric sleeve to wear more rapidly at the top—to "bell-mouth," we call it. But, in the Telsmith Gyrasphere, the spherical shape of the head greatly reduces the lateral pressures. Most of the crushing load is taken off the bronze eccentric sleeves — diverted downward against the roller thrust bearings — which wear evenly and last indefinitely. To put it briefly, the Gyrasphere takes the heavy load at the strategic point, assuring long life, low upkeep, satisfactory service. And that's why there's no shaft breakage. Write for Bulletin Y-30.



TELSMITH

SMITH ENGINEERING WORKS

4010 North Holton Street

MILWAUKEE

WISCONSIN

•

California Equipment Co.
Los Angeles, Calif.

Jenison Machinery Co.
San Francisco, Calif.

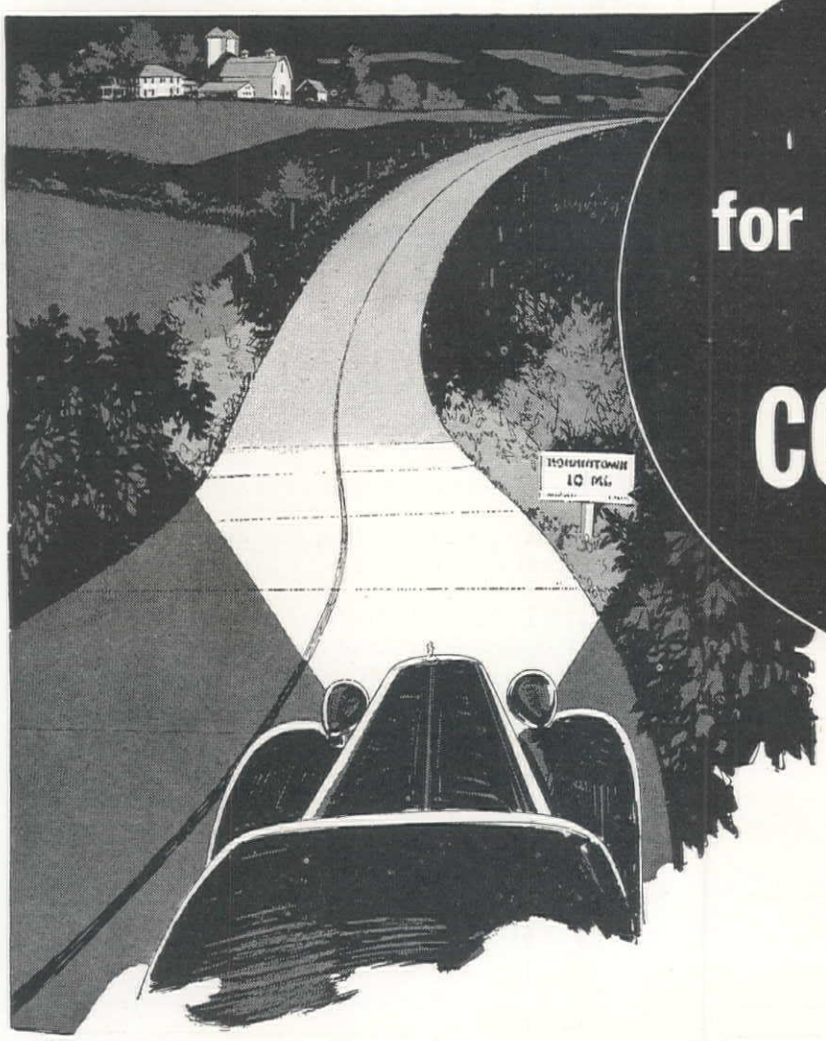
Clyde Equipment Co.
Portland, Oregon

A. H. Cox & Co., Inc.
Seattle, Washington

General Machinery Co.
Spokane, Washington

Hall-Perry Machinery Co.
Butte, Montana

When writing to SMITH ENGINEERING WORKS, *please mention Western Construction News*



for safety's sake
specify
CONCRETE

The reflection factor for portland cement concrete is about 80% while it is around 4% for black pavements *From Highway Lighting Research, by Arthur F. Loewe, Special Representative, General Electric Co., page 244, Proceedings 13th Annual Meeting, Highway Research Board.*

THE rate of death per automobile accident is 43% greater during the hours of darkness than during the hours of light.

Don't make motorists play Blind Man's Buff with death. Give the drivers a break by specifying concrete.

Concrete completely satisfies the principles presented by the American Committee at the International Illumination Congress of 1928, and with the resolution adopted by the Illuminating Engineering Society in 1934.

Concrete takes clear definition under headlights or street lamps; reflects more light but is not glossy; outlines shoulders, ditches and pedestrians in sharp contrast against its light gray background.

This safety is no luxury. Concrete actually saves money. Concrete costs less in the first place than any other pavement of equal load carrying capacity. Maintenance costs are far lower. And compared to inferior surfaces, concrete saves motorists up to 2 cents a mile in car operating expense.

Our free booklet, *"An Open Letter to Henry Ford,"* gives facts on the night safety of concrete. Send the coupon for your copy.

PORTLAND CEMENT ASSOCIATION

Dept. 103	564 Market Street San Francisco, Calif.	816 W. Fifth Street Los Angeles, Calif.	903 Seaboard Bldg. Seattle, Wash.

Please send me *"An Open Letter to Henry Ford."*

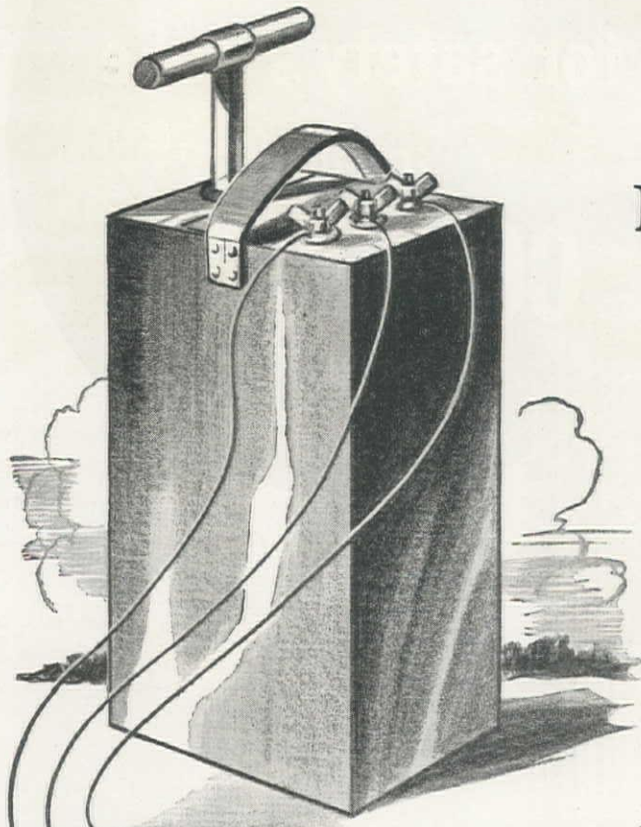
Name.....

Address.....

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

When writing to PORTLAND CEMENT ASSN., *please mention Western Construction News.*

Another ATLAS FIRST



THE NEW ATLAS TWIN FIFTY BLASTING MACHINE

Again Atlas contributes an important advance in the application of the controlled force of explosives.

Used with two leading wires the Twin Fifty Blasting Machine fires a single series of 50 Electric Blasting Caps. Used with *three* it fires a *first* and a *second* series of 50 caps each—with an interval of *only a few thousandths of a second between*—at a single stroke of the rackbar!

The slight interval between the firing of two series increases accuracy in directing the force of explosives, reduces back break, increases fragmentation and lessens pulverization of the burden being moved.

Electric blasting aids materially in confining gases from explosives *behind* the burden, thus utilizing a greater portion of their available energy. Electric Blasting provides the ultimate in control—and the Atlas Twin Fifty is the ultimate in blasting machines of this type.

Atlas 2-B
1-10 Electric Blasting Cap Capacity

Atlas 3-30
1-30 Electric Blasting Cap Capacity

Atlas 3-50
1-50 Electric Blasting Cap Capacity

Holes may be properly located and spaced. They may be right in size and depth. But—the final result may depend on your blasting machine.

The price of a good blasting machine represents only a small fraction of the cost of most blasting operations. Here are pictures of other Atlas Blasting Machines. Each is designed for high capacity, rugged service and ease of operation. Consult the Atlas representative.

ATLAS POWDER COMPANY

THE DANT DIVISION

Everything for Blasting

Seattle, Wash. Portland, Ore. Spokane, Wash.

San Francisco, California
Cable Address—Atpowco
Wilmington, Del.

Los Angeles, Calif. Salt Lake City, Utah Butte, Mont.

Other Offices:

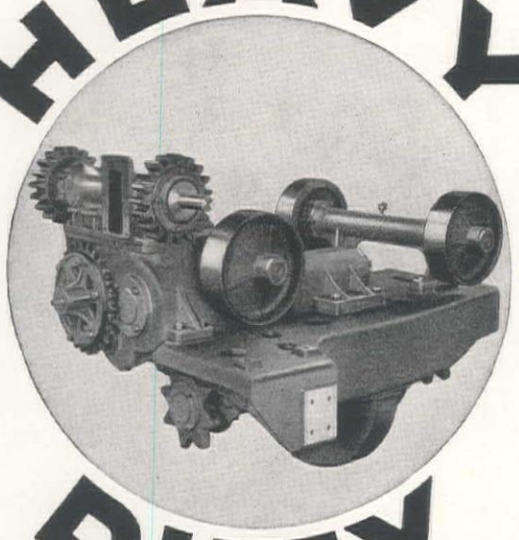
Allentown, Pa.	New York, N. Y.
Boston, Mass.	Philadelphia, Pa.
Denver, Colo.	Picher, Okla.
Houghton, Mich.	Pittsburg, Kansas
Joplin, Mo.	Pittsburgh, Pa.
Kansas City, Mo.	St. Louis, Mo.
Knoxville, Tenn.	Tamaqua, Pa.
Memphis, Tenn.	Wilkes-Barre, Pa.
New Orleans, La.	Wilmington, Del.

ATLAS EXPLOSIVES

ATLAS EXPLOSIVES

KOEHRING

HEAVY DUTY 27-E *autocycle* PAVER



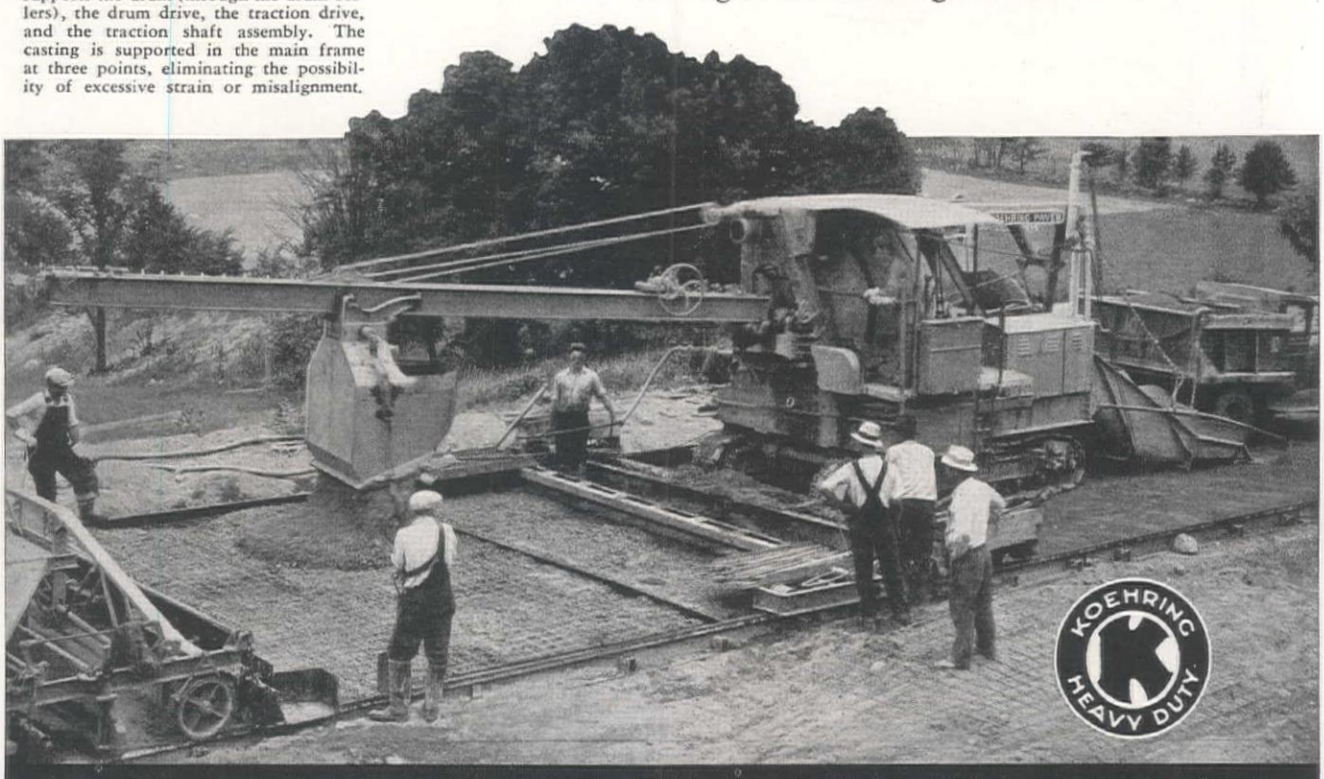
Koehring Heavy Duty construction for long life and dependability is shown in this single steel base-plate casting which supports the drum (through the drum rollers), the drum drive, the traction drive, and the traction shaft assembly. The casting is supported in the main frame at three points, eliminating the possibility of excessive strain or misalignment.

For 1935 you will need a paver having high speed production combined with low maintenance cost. You cannot afford to operate inefficient and obsolete equipment.

The Koehring 27-E Autocycle Paver is fast, efficient and dependable.

Opportunity for profit will depend upon the ability to complete your job at *lower than average* cost. The most efficient and dependable equipment is a vital factor in securing this *lower than average* cost.

Investigate the Koehring 27-E Paver.



KOEHRING COMPANY

MILWAUKEE WISCONSIN

HARRON, RICKARD & McCONE CO., San Francisco, Calif. - Los Angeles, Calif. L. A. SNOW CO., Seattle - Spokane CRAMER MACHINERY CO., Portland

When writing to KOEHRING COMPANY, *please mention Western Construction News*

PROVED ECONOMICAL and DEPENDABLE ON THE NATION'S BIG JOBS

On Boulder Dam, San Gabriel Dam, Bonneville Dam, Grand Coulee Dam, Fort Peck Dam and other great projects of national interest LIMA has established unusual records for big yardage, reliability and economy. They are foremost in the minds of users who hold to high standards of consistent operation and digging ability.

On the Grand Coulee Dam project a type 701 LIMA owned by Goodfellow Brothers, Inc., Wenatchee, Wash., piled up a record for 1 3-4 yard shovels. Working approximately 21 hours a day the type 701 loaded overburden into eight-yard dump trucks at the rate of 300 to 360 yards per hour. To average over 6,000 yards of material in a 21-hour day with a 1 3-4 yard shovel requires power, speed and endurance.

LIMA'S well-balanced design which includes such features as roller bearings at all vital bearing points, helical cut gears throughout, drums with extra-large diameters, square lever shafts, smooth operating clutches that do not run hot, independent motions and scores of other modern advantages, make possible these excess yardages, plus greater fuel economy and longer life.

When you are in the market for a shovel, crane or dragline it will be to your advantage to consider the profitable features offered by LIMA.

LIMA LOCOMOTIVE WORKS, INCORPORATED

SHOVEL AND CRANE DIVISION

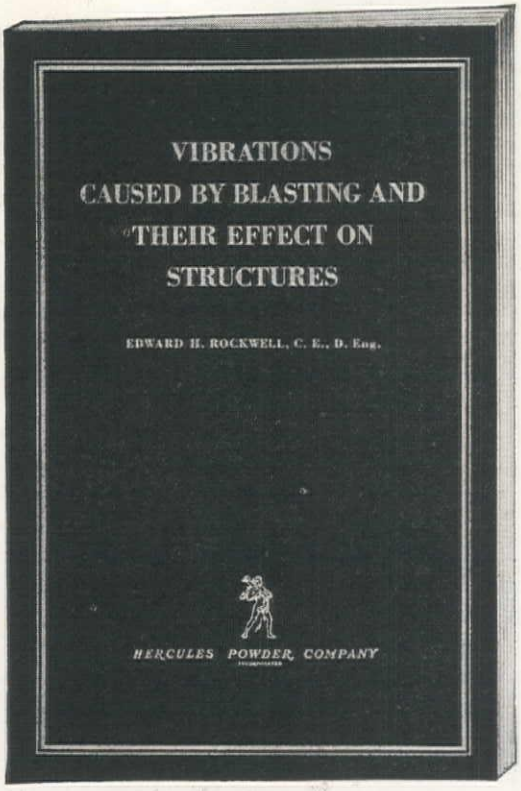
LIMA, OHIO, U. S. A.

DISTRICT OFFICES: Smith-Booth-Usher Co., 2001 Santa Fe Ave., Los Angeles. A. L. Young Machinery Co., 26-28 Fremont St., San Francisco, Calif. H. J. Armstrong Co., 2244 First Avenue S., Seattle, Wash. Western Steel & Equipment Corp., 338 First Ave. S. W., Portland, Oregon. General Machinery Co., East 3500 Block Riverside Ave., Spokane, Wash. C. H. Jones Company, 134 Pierpont Ave., Salt Lake City, Utah.

LIMAS are built in 3/4 YARD CAPACITY and LARGER

Shovels-Cranes-Draglines

NOW READY



FREE TO OFFICIALS

"Vibrations Caused by Blasting" is a technical book, prepared for operating officials, engineers, and consultants. Please use your letterhead when requesting copies.

THE THIRD EDITION OF THIS IMPORTANT STUDY OF EARTH VIBRATIONS CAUSED BY BLASTING

for

QUARRY, CONSTRUCTION, AND MINING EXECUTIVES

HERE is a book for men who direct operations where explosives are used. It is a technical treatise of the forces and possible effect on structures of the vibrations set up in bed rock, by well-drill blasting. It contains a thorough analysis of the mathematics involved and is profusely illustrated with graphs from which basic data were tabulated.

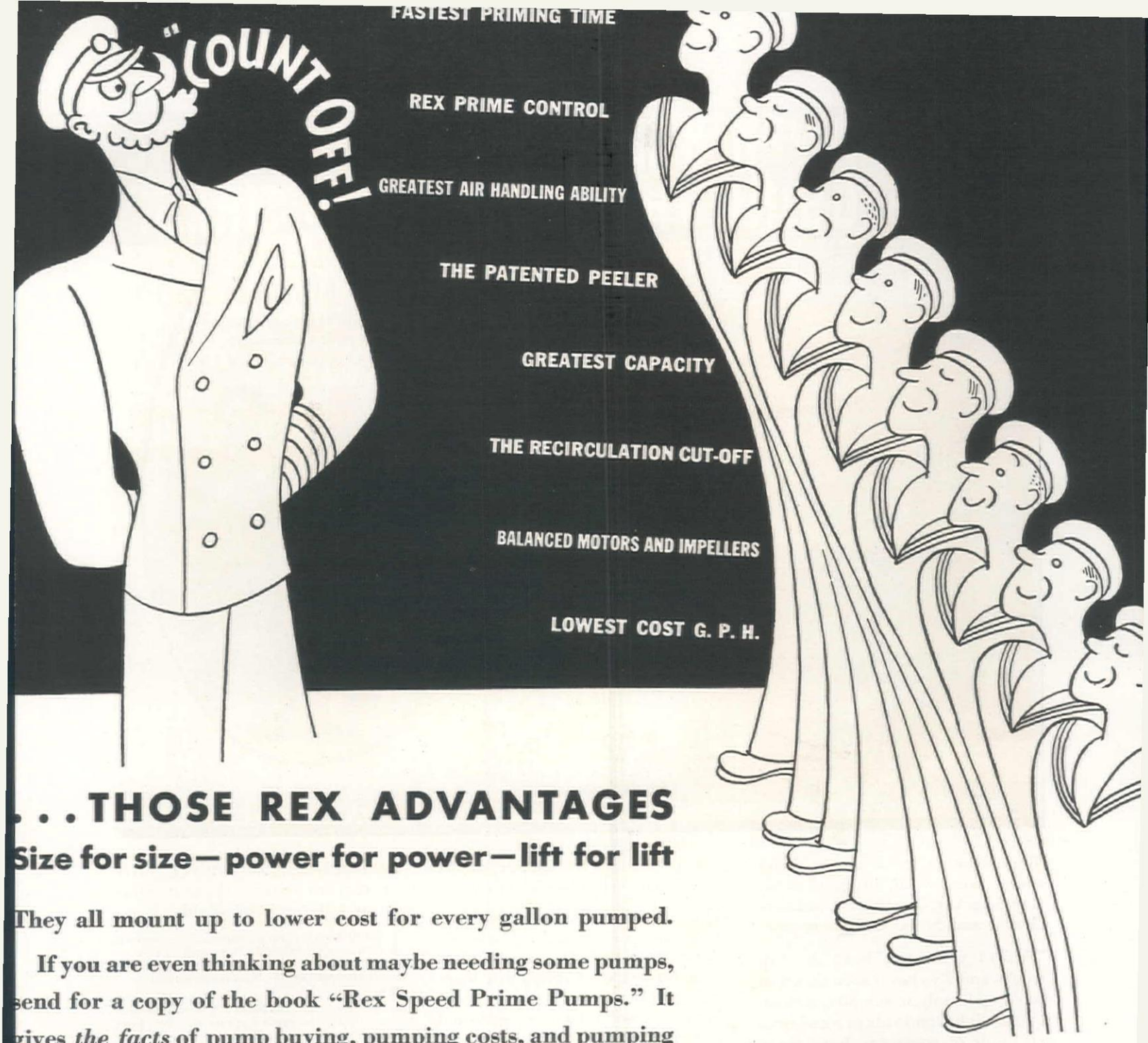
The author, Dean Edward H. Rockwell, is professor of Civil Engineering and director of the Civil Engineering Department at Lafayette College.

This book should be even more valuable to explosives-consuming industries than the first and second editions. It should aid many operators confronted with complaints of blasting damage, for it clearly proves that "ordinarily well-drill blasting, as usually conducted, produces motion and corresponding forces upon objects of so small a magnitude that it is practically certain no damage to buildings in the neighborhood can possibly occur, unless these buildings are within two or three hundred feet of the quarry."

HERCULES POWDER COMPANY
INCORPORATED

Standard Oil Bldg., **San Francisco** Fidelity Bldg., **Los Angeles**
Continental National Bank Bldg., **Salt Lake City, Utah**

A-49



. . . THOSE REX ADVANTAGES

Size for size—power for power—lift for lift

They all mount up to lower cost for every gallon pumped.

If you are even thinking about maybe needing some pumps, send for a copy of the book "Rex Speed Prime Pumps." It gives *the facts* of pump buying, pumping costs, and pumping practice—and gives also valuable information on handling pumping problems in clear, non-technical words and charts. You be the judge—send for the book today and also get the prices. They are the lowest ever offered on Rex Speed Prime Pumps.

CHAIN BELT COMPANY

Home Office—Central and Northwest Divisions:
1615 W. Bruce St., Milwaukee, Wis.
West Coast Division: 909 Harrison St., San Francisco, Calif.

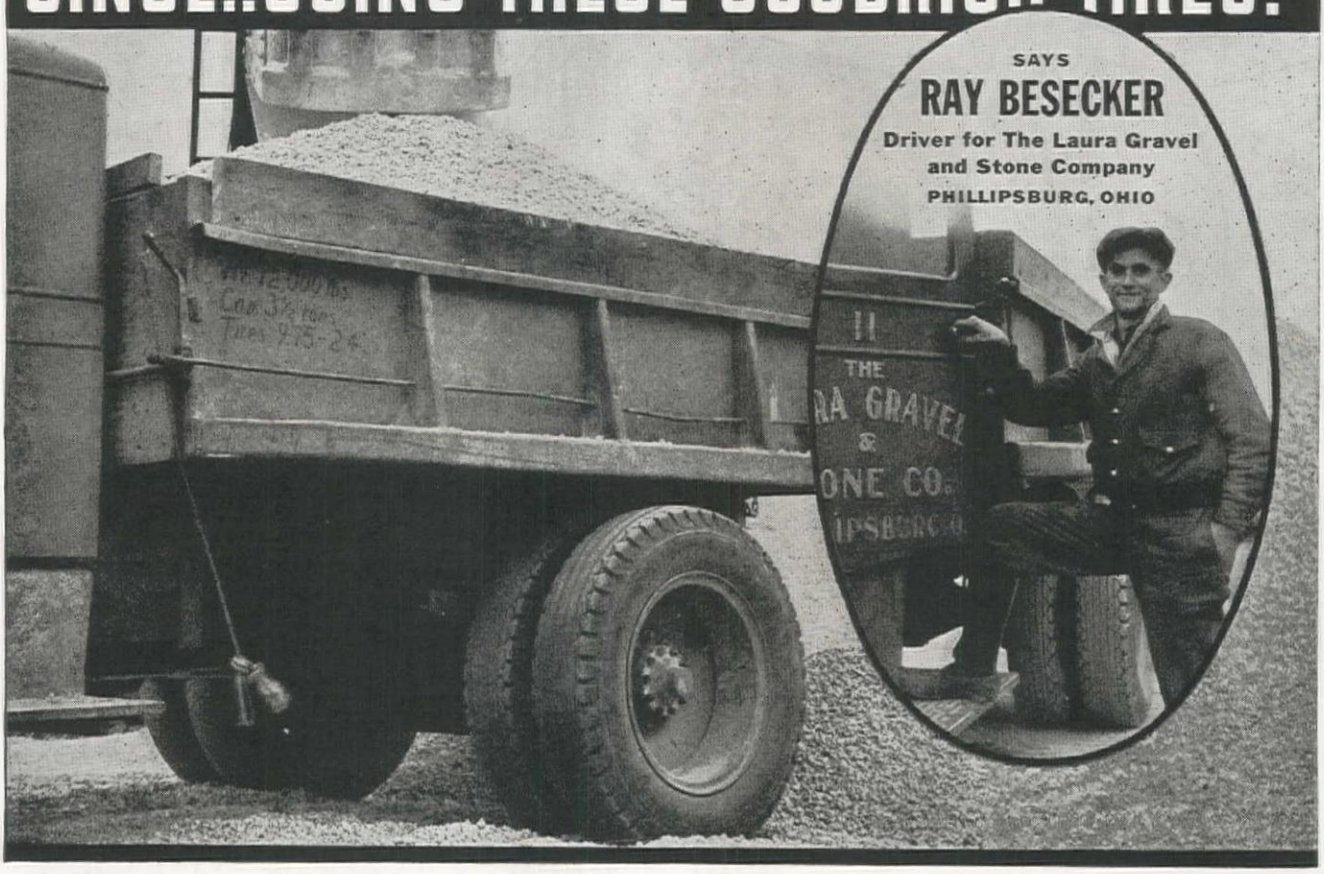
12 MODELS 2" - 6" REX SPEED PRIME PUMPS

Get the New Low Prices

—CARRIED IN STOCK IN 50 CITIES

COST LESS FOR EVERY GALLON PUMPED

"HAVE NEVER HAD A SIDEWALL FAILURE SINCE..USING THESE GOODRICH TIRES."



What does a truck driver think about tires? Well, listen to what Ray Besecker, driver for The Laura Gravel and Stone Company, says:

"For 15 years I've been driving trucks and I've never seen tires that stand up like these new Silvertowns. I haul eight-ton loads of stone over all kinds of roads and have never had a sidewall failure since we have been using these Goodrich Tires. "I hate to make tire changes on the road—that's why I like Silvertowns."

There are no soft jobs at this plant—for men or for tires. Those big trucks bang their way over crushed rock, bounce over rough dirt roads and then hit it up on the highway. Just the sort of job where you would expect plenty of sidewall failures.

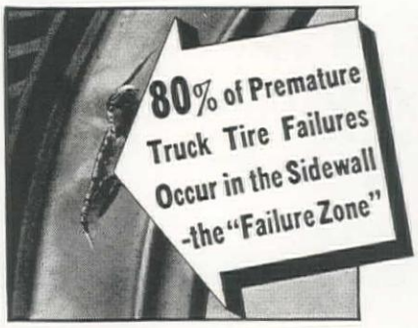
But not with Triple Protected Silvertowns! Every tire has a 3-way safeguard—designed to give positive protection against these money-eating failures. Look at this:

1 PLYFLEX—a *new*, tough, sturdy rubber material with greater resistance to stretch. A layer of Plyflex in the sidewall prevents ply separation—distributes stresses—checks local weakness.

2 PLY-LOCK—the new Goodrich way of *locking* the plies about the bead. Anchoring them in place. Positive protection against the short plies tearing loose above the bead.

3 100% FULL-FLOATING CORD—Each cord is surrounded by rubber. With ordinary cross-woven fabric, when the cords touch each other, they rub—get hot—break. In Silvertowns, there are no cross cords. No friction.

You pay no more to get Triple Protection—the invention that checks 80% of premature failures.



FREE! 44-PAGE HANDBOOK FOR TRUCK OPERATORS

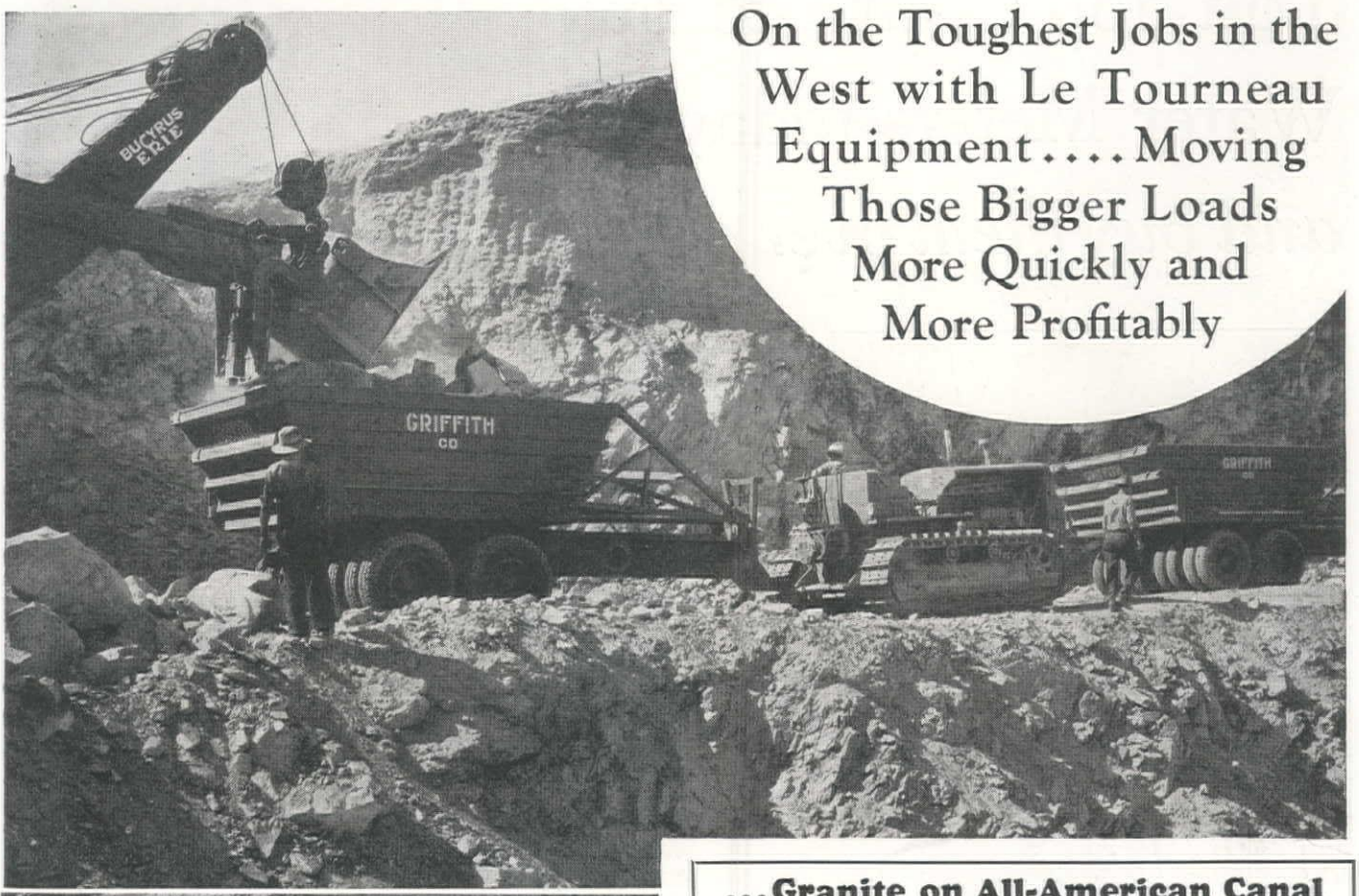
Every truck owner, every driver should have this big 44-page data book. Gives commodity weights, load schedules, inflation schedule, dual spacings and other useful information. No obligation. Write for free copy. Department T-32, The B. F. Goodrich Company, Akron, Ohio.

Goodrich *Triple Protected* Silvertowns

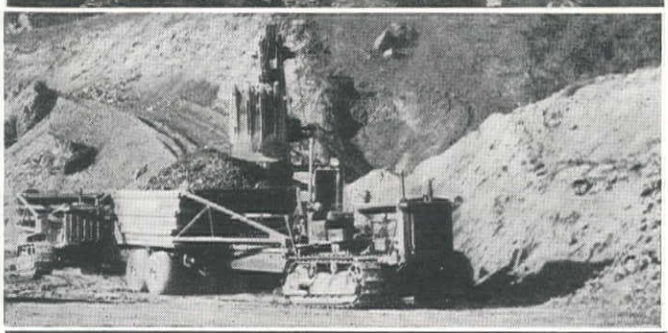
SPECIFY THESE NEW SILVERTOWN TIRES FOR TRUCKS AND BUSES

When writing to B. F. GOODRICH COMPANY, *please mention Western Construction News.*

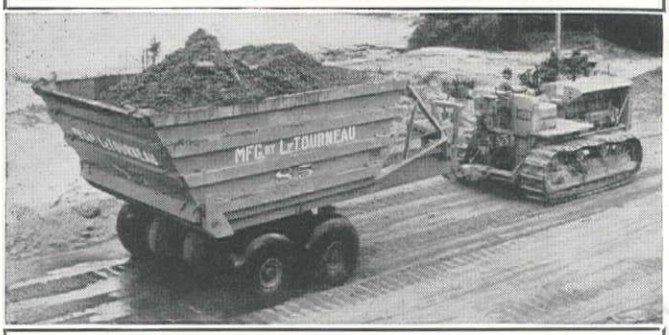
They're Moving Bigger Loads



On the Toughest Jobs in the West with Le Tourneau Equipment.... Moving Those Bigger Loads More Quickly and More Profitably



...Broadway Low Level Tunnel



...One of Eight at Bonneville

...Granite on All-American Canal

On all of the WEST'S biggest and toughest jobs . . . from the Grand Coulee to the All-American Canal you'll find LE TOURNEAU equipment setting dirt moving records, cutting yardage costs.

On the All-American Canal two buggies hauling 25 and 30 yards of granite to the load . . . on the Jack Rabbit Trail 30 Le Tourneau units—six 12-Yard Carryall Scrapers there working tandem, delivering 65 pay yards per tandem unit per hour on a 4,000-foot round trip haul, over grades as steep as 30%, averaging 11½% . . . a Battery of 8 Buggies handling loads of from 20 to 40 cubic yards of saturated gravel over the boggy mud and muck at Bonneville . . . 2 more Buggies placing 100 cubic yards per hour on a 500 ft. round trip haul on the Broadway Low Level Tunnel job.

On all these jobs . . . over rocky grades, thru heavy going, Le Tourneau equipment rolls with ease . . . big pneumatic tires, heavy duty roller bearings make easy pulling for tractors, save on fuel cost and make bigger loads possible.

Ask for DATA SHEET PROOF of Le Tourneau performance. Our Engineering Department is constantly conducting detailed, on-the-job time studies of Le Tourneau-equipped jobs. Write us, describing your dirt-moving problems—we will gladly send you Data Sheets and information telling how Le Tourneau equipment has licked similar jobs for other contractors.

R. G. LE TOURNEAU, INC.

Peoria, Illinois Stockton, California

Cable address: "BOBLETORNO"

LE TOURNEAU

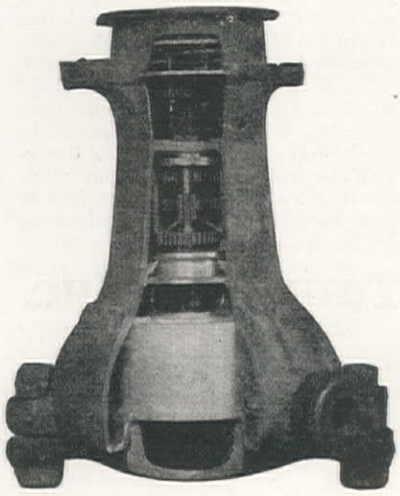
In writing to R. G. LeTourneau, Inc., *please mention Western Construction News.*

Think, man!
You don't want to buy Water Meters today . . .
and buy them over again

a few years from now!

Then why buy Water Meters you may have to scrap a few years hence—not because they're worn out but because some new different design makes the old models obsolete?

YOU BUY *Trident*
and Lambert Meters ONCE and for all

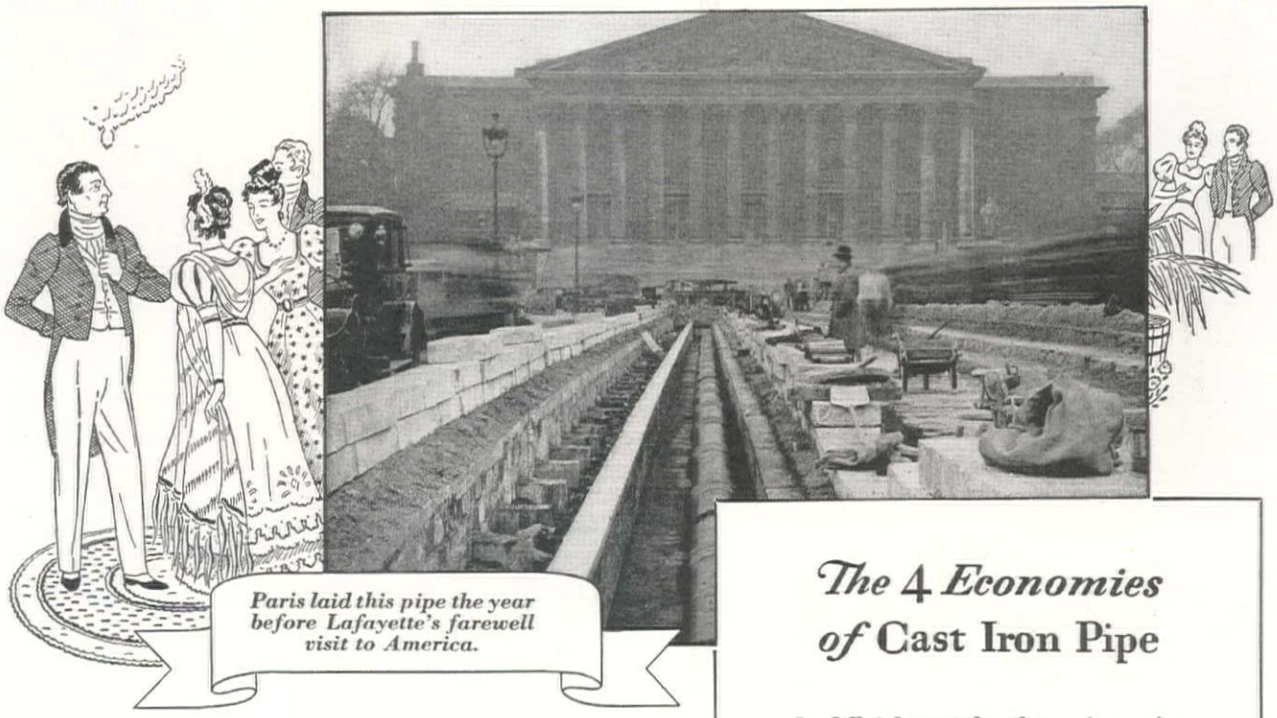


You buy these Water Meters, and a small number of interchangeable parts—and you're set for long years of trouble-free, expense-free, worry-free water revenue service. Should we make further improvements (and we've pioneered in all the basic worthwhile advances in Water Meter design), the new improvements will fit into your "old" meters and the service goes right on. Think! A Water Meter for every type of service. . . . Write for catalogs to the Neptune Meter Company (Thompson Meter Corp.), 50 West 50th Street (Rockefeller Center), New York . . . or Neptune-National Meters, Ltd., Toronto, Canada.

THE SYMBOL OF SUSTAINED ACCURACY

When writing to NEPTUNE METER CO., *please mention Western Construction News.*

106 years underground *then back in service*



Paris laid this pipe the year before Lafayette's farewell visit to America.

ABOVE is shown an unretouched photograph of 106-year-old cast iron pipe, with bell-and-spigot joints, being relaid across the Pont de la Concorde in Paris. Installed in another part of the city about 1825, this section was taken up and relaid in 1931. Each pipe was in such good condition that it could be relaid immediately, and the rest of the original line of which this section was a part is still in service underground. Other cities in Europe and America can point to cast iron pipe, with bell-and-spigot joints, still in use after serving 100 to 200 years and longer.

The four major economies resulting from the long life of cast iron pipe are due to its effective resistance to rust. Cast iron is the one ferrous metal for water and gas mains, and for sewer construction, that will not disintegrate from rust. This characteristic makes cast iron pipe the most practicable for underground mains since rust will not destroy it.

The 4 Economies of Cast Iron Pipe

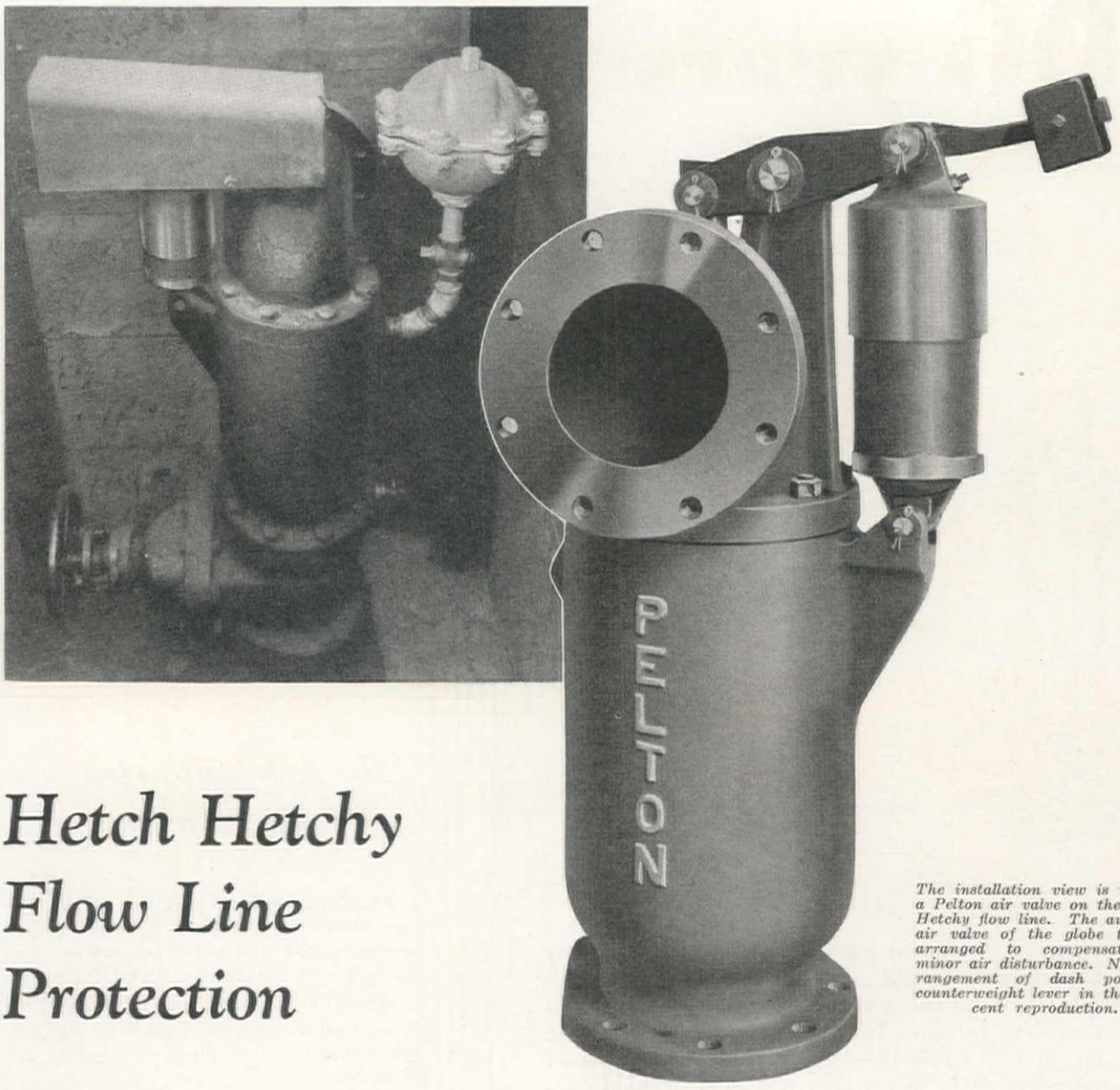
1. Official records of cast iron pipe laid 100 to 200 years ago and still in service, prove that it is *cheapest in the end.*
2. Official reports on file in the office of a prominent technical publication, prove that cast iron pipe is *cheapest to maintain.*
3. Long-lived pipe obviously causes less street-opening for replacements and repairs. Therefore, cast iron pipe *saves money on street-openings.*
4. When replaced by larger pipe, or a main is abandoned or rerouted, cast iron pipe *pays a final dividend in salvage value.*

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

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.



The installation view is that of a Pelton air valve on the Hetch Hetchy flow line. The auxiliary air valve of the globe type is arranged to compensate for minor air disturbance. Note arrangement of dash pot and counterweight lever in the adjacent reproduction.

Hetch Hetchy Flow Line Protection

TO EXHAUST AIR as the line is being filled, or to admit air in case of rupture are the functions of Pelton air valves installed along the Hetch Hetchy flowline where it traverses the coast range foothills. These valves are designed for quick opening to eliminate any possibility of collapse under emergency conditions. The closing movement is slow, being regulated by dashpot control to prevent slamming and excessive pressure rise. Movement in either direction is entirely automatic.

The ruggedness and simplicity of Pelton air valves is characteristic of all other types designed for safeguarding flow lines, feeder lines, distribution laterals and other parts of the water works system. Illustrations and complete parts of the water works system. Illustrations and complete descriptions are given in our bulletin No. 29. Copies will be forwarded promptly on request.

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

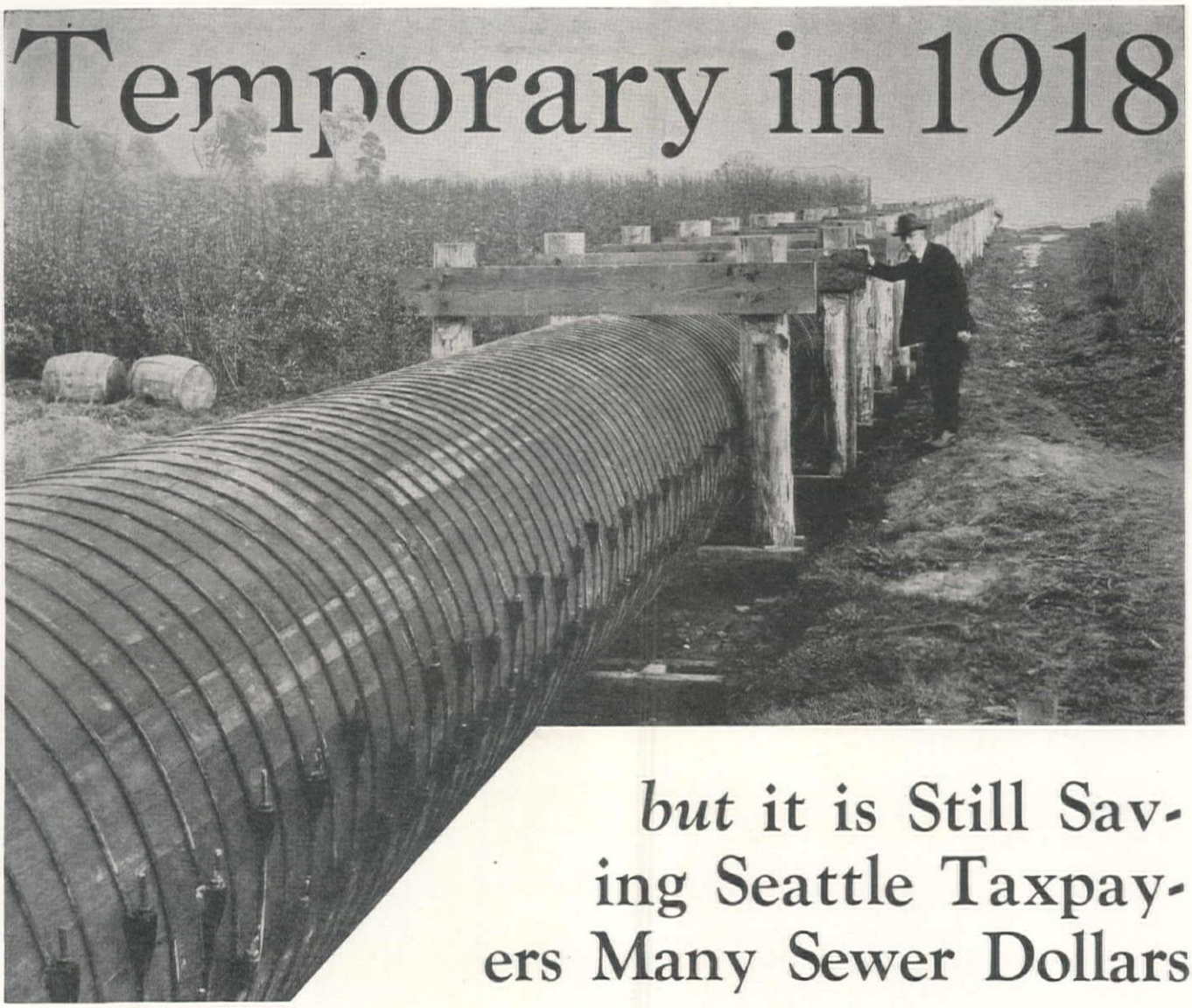
120 Broadway NEW YORK | **2929 Nineteenth St. SAN FRANCISCO** | **Paschall Station PHILADELPHIA**

Pacific Coast Representatives for BALDWIN-SOUTHWARK CORPORATION, DE LA VERGNE ENGINE CO., CRAMP BRASS & IRON FOUNDRIES CO., and LARNER ENGINEERING CO., of Philadelphia, Pa.

PELTON

In writing to THE PELTON WATER WHEEL CO., *please mention Western Construction News.*

Temporary in 1918



but it is Still Saving Seattle Taxpayers Many Sewer Dollars

. . . "As good as new" said the City of Seattle's Sewer Department after inspection of this 72″ Federal Creosoted Wood Pipe which was installed almost 20 years ago. In 1918 this pipe was placed there only for "temporary" service . . . the cost, too, was in keeping with such an installation. But, its excellent service has been convincing enough for Seattle. Replace a pipe with such a record? Never! So, today, this pipe will be lowered into a trench and buried, where it will continue to handle storm water and sanitary sewage for at least another 25 or 30 years.

But, that's Federal's record everywhere it has been given a trial. It has established these—now well known—facts: Not affected by sewer gas; and no reasonable amount of settlement can interrupt its service. In addition, Federal Wood Pipe has saved taxpayers many times the original cost of the installation . . . saved time . . . cut maintenance costs—for this pipe is not affected by corrosion . . . and removes the freezing hazard.

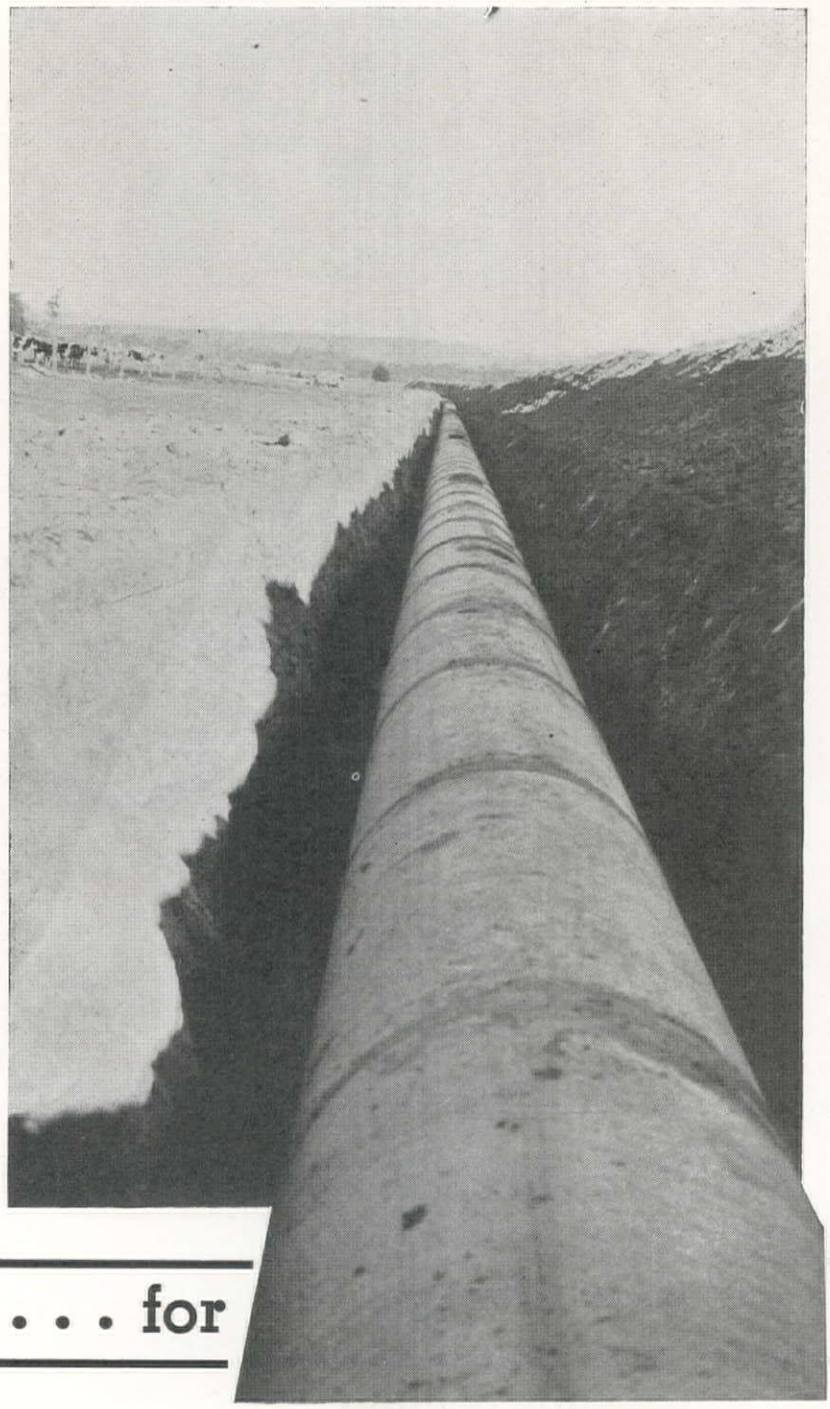
Speaking of freezing brings up this point: Due to Federal Wood Pipe's immunity, trenching in most any climate need be only deep enough to bury the pipe . . . another saving in equipment and labor costs. Its light weight makes transportation no problem at all . . . and in out-of-the-way places, away from the beaten paths, construction is made comparatively easy.

If this is the kind of trouble-free, cost-saving service you are looking for to solve sewage transportation problems, why not give Federal a trial?. Ask for more details. Our engineering department is ready with expert counsel. There is no obligation. FEDERAL PIPE & TANK CO., 5332 24th Avenue, N. W., Seattle, Washington. P. O. Box 5055, Ballard Station, Seattle, Washington.

F. P. & T. CO.

FEDERAL CREOSOTED DOUGLAS FIR PIPE

San Francisco Will Pipe



25,000 feet of San
Crossing Line Ins
Lock-Joint Stee
forced Concrete P
Manufactured
Concrete & S

With
Lock Joint
forced Con

. . . for Permanence,

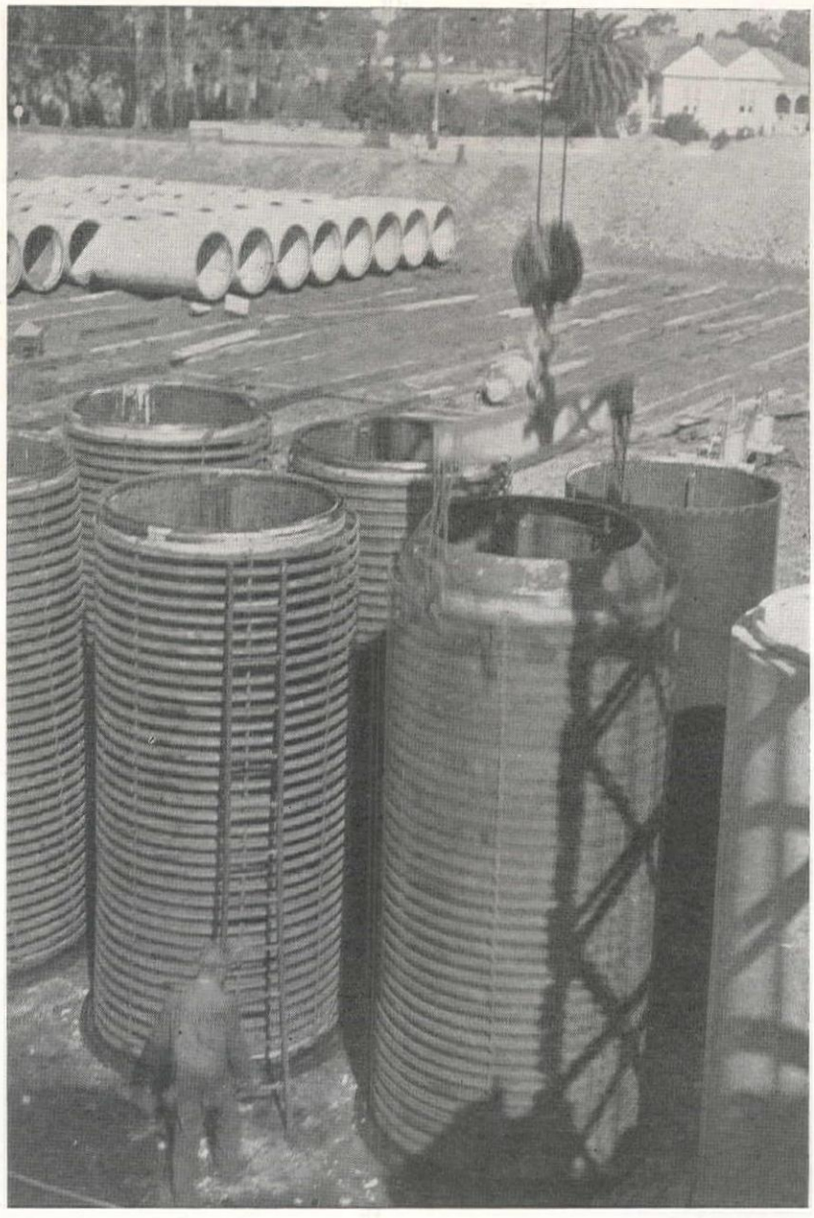
AMERICAN CONCRETE &

Tacoma Oakland

When writing to AMERICAN CONCRETE & STEEL PIPE CO., *please mention Western Construction News.*

Have Permanent Line Construction

Francisco's Bay
alled with 62 in.
Cylinder Rein-
pe. Installed and
by American
eel Pipe Co.



Steel Rein-
crete Pipe

igh Carrying Capacity and Structural Strength

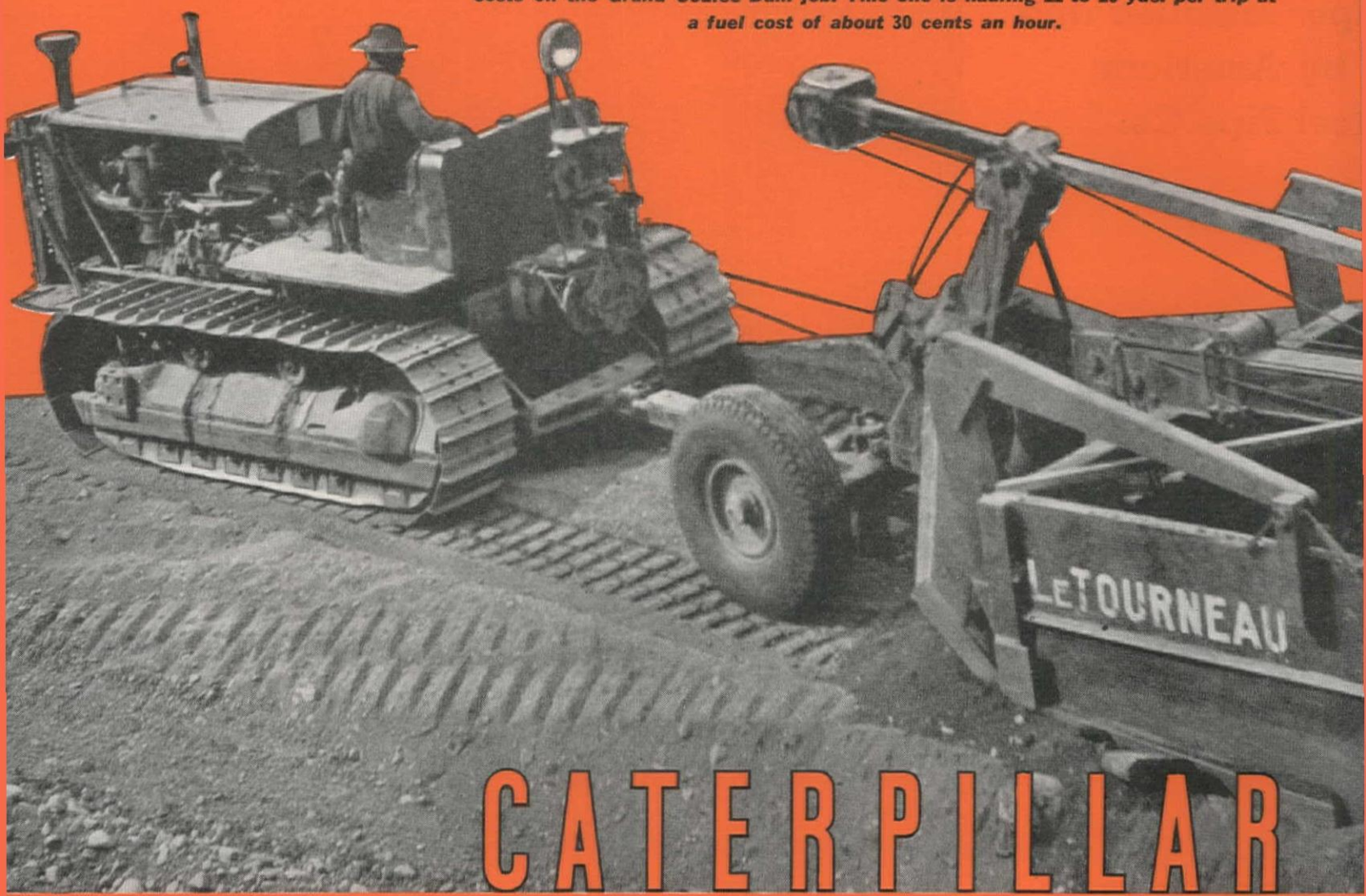
STEEL PIPE COMPANY

Los Angeles San Diego

LET'S HAVE A SHOW-DOWN

The SHOW-DOWN is an opportunity for you to learn for yourself what the "Caterpillar" Diesel Tractor can do for you on your own operations. Check power, easy handling, sure traction. Figure savings in its rock-bottom operating costs—up to 75 and 80% on fuel alone! Call a dealer—he'll arrange a personal SHOW-DOWN for you any time—confirmed by the performance records of over 5000 "Caterpillar" Diesels now at work. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

One of the fleet of 24 "Caterpillar" Diesel Tractors that are cutting earth-moving costs on the Grand Coulee Dam job. This one is hauling 11 to 20 yds. per trip at a fuel cost of about 30 cents an hour.



CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
March, 1935 Vol. 10, No. 3

G. E. BJORK, Acting Editor
H. W. PYERITZ, News Editor
R. P. BRYAN, News Editor

Medical Attention and PWA

IN a previous issue, we discussed a clause in the PWA act that has a definite and negative kickback. We refer to the part of the Federal act which prohibits payroll deductions for any purpose. That the motives which caused this clause to be written into the act were pure, we have no reason to doubt. In practice, however, we observe that the no-deduction clause in certain cases works a serious hardship on the very workmen it was designed to protect.

Take the matter of medical attention and hospital service, for example. There are organizations in the west that make a business of providing on large or isolated projects a type of medical and hospital service that cannot otherwise be created or secured. Employers and employes generally regard such a service as an essential to health and efficiency. Surely a service of this kind, properly conducted, is a definite benefit to workmen who might not otherwise be able to secure intelligent treatment for their ills, common or otherwise. Workmen, especially on the larger projects, are anxious to secure the benefits of such a medical service.

This type of medical service is not to be confused with the care and attention workmen receive under the compensation laws of the various western states in which they work. Quite properly the contractor should pay for the latter type of service, and does pay heavily, under the law. However, beyond the point of caring for, and compensating workmen who are injured, or whose health is impaired in the line of duty, the contractor cannot and should not go. Such outside matters lie beyond his jurisdiction. It is true, nevertheless, that workmen on construction projects, just as industrial workers or farmers or miners, suffer normal ills; and when, as is almost always the case in PWA projects, they are located at a distance from reliable medical facilities or hospitals, it is difficult and expensive to secure proper and intelligent attention.

In the case of many PWA projects, therefore, we have the workmen, on the one hand, definitely needing and wanting the right sort of medical facilities, and willing to pay a reasonable fee for them. On the other hand, we have the contractor, recognizing in such a service the means of creating and maintaining a more efficient and effective force of men, who is willing to act as the agency for the collection of the small fee that is required, setting up such accounting routine as is necessary. The fee frequently runs as low as fifty cents per week, per workman.

But the law says No; and No it has remained during the life of the PWA, thus far. That the law needs to be amended, no one seems to doubt; but the influences necessary for amendment or modification appear strangely indifferent. Can it be that their motives have changed? Is it possible that the workmen, in whose interests the no-deduction clause was designed, are now the forgotten men? We find it difficult to believe that the high-ups in PWA, the President or the Congress can remain indifferent to the hardship and the jeopardy to health which definitely result in the strict interpretation of the no-deduction clause; yet it remains in the act, as silent and solid as ever.

Of course the risk is that when the bars are let down abuses will creep in; but firm and intelligent control will prevent abuses. Meantime, isn't the abuse of jeopardizing the health of workmen serious enough to be considered also? We think it is, and we should like to see the negative effect of the no-deduction clause corrected.

An Engineering Course That Means Business

A FORWARD step in the liberalization of technical training in the field of applied sciences has recently been made by Cornell University, at Ithaca, New York, with the inauguration in the School of Civil Engineering of a four-year course of Administrative Engineering. The course is designed to place predominent emphasis on engineering, but incorporates the necessary fundamentals of administration and management.

An increasing number of civil engineers are being drawn to executive positions in business enterprises during recent years. Within the field of civil engineering itself are to be found growing opportunities for men who are trained in the fundamentals of management as well as engineering. Never before has such emphasis been placed on the national economic importance of all forms of public works, most of which are of such a technical nature as to require engineering training for operation and management.

Engineering training, as conducted in nearly all our colleges, although helpful in the shaping of executives, lacks the quality of application of engineering to business problems and administration, and does not emphasize sufficiently the essentials of business organization and operation. Nowadays the engineer is obliged to obtain, after his graduation, knowledge of accounting and banking methods, labor relations, and other matters pertinent to the field of management.

The new Cornell course, in addition to the usual requirements for a B.S.C.E. degree, includes fifteen courses in such fundamentals as economics, cost accounting, and money and banking. The curriculum provides an unusually strong course in civil engineering, technical studies accounting for 105 of the total 155 credit hours necessary for a degree. Almost half the individual courses during the last three years are devoted to subjects in the field of business and management. Higher entrance requirements (calculus begins in the freshman year), however, make possible a more extended development through hydraulics and mechanics into applied courses.

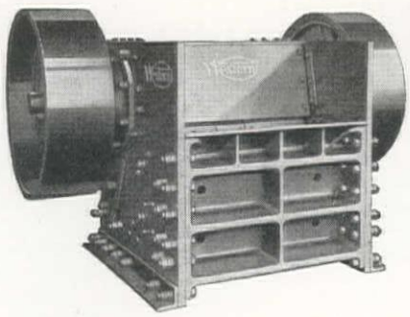
Elementary accounting, for instance, which begins in the sophomore year, emphasizes not so much the training for a position in accounting as the functioning of accounting in business. In the later years it is further developed in statistical methods employed in business thence into cost accounting and valuation engineering.

Such courses in our engineering colleges will create further opportunities in the rapidly expanding fields of administration of public works in utilities, municipalities, states and the nation; in railroad operation and management, in appraisal and valuation work; in industrial relations; and in management of commercial enterprises.

The inauguration of the Cornell course comes at a time when we are at the threshhold of a broad attack upon social and economic problems in the solution of which engineers can, and should, play a vital part. It is to be hoped that our western engineering colleges will not delay the development of similar courses, so that present engineering students may advance from the rank of the 'illiterate teck.'

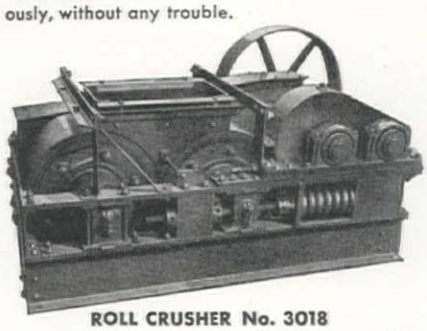
80,000 YARDS IN 70 DAYS

The Key to Austin-Western No. 100's 100-Yards-Per-Hour Performance



PRIMARY BREAKER No. 940

This jaw-type Austin-Western Crusher gives you larger capacity. With roller bearings of the finest type, it operates at full capacity continuously, without any trouble.



ROLL CRUSHER No. 3018

Supplements the No. 940 Crusher in the No. 100 Plant when fine-reduction crushing is done. Roll diameter (with manganese shells) 30 inches, face 18 inches. Speed 60 R. P. M.; horsepower 50.

Users' Confidence in No. 100 Portable Crushing-Screening Plant Backed up by Convincing Operating Records

● Davies & Sons, contractors of Abilene Texas, are thoroughly satisfied operators of an Austin-Western No. 100 Plant. They report: "Over a period of 70 working days the plant has maintained an average of well over 1000 yards per 10 hour day, 40% crushing. Gas and oil $10 per day; repairs negligible."

"Material can be produced much cheaper with the Austin-Western No. 100 Portable Crushing and Screening Plant, than with any other I have known," says Ed. J. Murphy, Kaukauna, Wis., who has been in the gravel and crushed stone business since 1924.

Umatilla County, Oregon, writes: "The No. 100 Plant has crushed a total of 28,078 cubic yards to 1 inch minus from pits averaging about 85% oversize, a total of 330 cubic yards per day for the 85 days the plant has been started. This plant has been moved and set up three different times. It takes an average of one and one-half days to move five or ten miles and start crushing out of a new pit. Enables Umatilla County to produce more yardage for less cost per yard than we were able to do with the non-portable equipment. The savings on moves, set-ups and increased yardage will more than pay for the No. 100 Plant in two seasons."

"1500 yards in 10 hours; $10 labor costs." "Average capacity for 10 hours is 1200 yards, and if crushing does not exceed 25% same can be increased to 1500 yards—and I can assure you material is plenty hard. Three men can operate machine at labor cost of $10 per day," reports Superintendent E. S. Bowden on the No. 100 Portable Plant of the Trinity Farm Gravel Co., Eden, Texas.

Tear out and send the attached coupon today. Safest way to buy a crusher is to ask present users. Easiest way to ask users of the No. 100 is to ask Austin-Western to see their file of users' operating reports and letters. Use the coupon.

The Austin-Western Road Machinery Co.
1, Aurora, Illinois

Please: ☐ Send me complete information on the No. 100 Portable Crushing-Screening Plant. ☐ Have a representative call on me, with users' performance records and reports.

Name.....

Company.....

Address.....State.....458

City.....

ROAD GRADERS · MOTOR GRADERS · ELEVATING GRADERS · DRAGS

ROAD ROLLERS

Austin-Western

DUMP WAGONS

BITUMINOUS DISTRIBUTORS · ROAD-MIX MACHINES · CULVERTS
SCARIFIERS · BULLDOZERS · TRAILERS · SCRAPERS · PLOWS

DUMP CARS

CRUSHING AND WASHING PLANTS · SWEEPERS AND SPRINKLERS · SHOVELS · CRANES · ETC · SNOW PLOWS

BRANCHES AND WAREHOUSES: Los Angles, Calif.; San Francisco, Calif.; Portland, Ore.; Seattle, Wash.; Spokane; Billings, Mont.; Denver, Colo.; Salt Lake City, Utah; Phoenix, Ariz. Los Angeles Warehouse, 4400 District Blvd. (Central Mfg. District), Telephone KImball 4156

When writing to THE AUSTIN-WESTERN ROAD MACHINERY CO., *please mention Western Construction News*

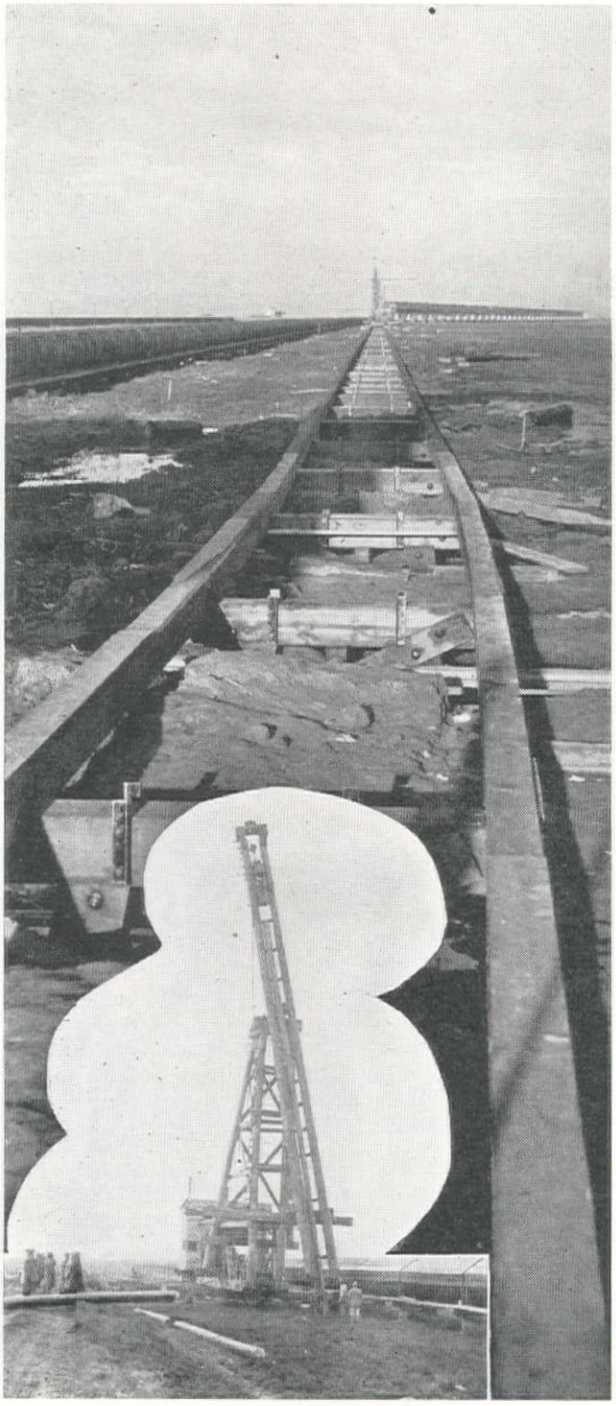
WESTERN CONSTRUCTION NEWS

MARCH, 1935

Second Hetch Hetchy Pipe Line is Laid Across Lower End of San Francisco Bay

By L. B. CHEMINANT

L. B. Cheminant is a native of Alameda, California, and graduated from University of California in 1900 with B. S. degree in mining. From 1901 to 1908 he was with Spring Valley Water Co. as assistant engineer on surveys, design, and construction. For the past 18 years Cheminant has been with the City and County of San Francisco as assistant engineer on design and construction of the sewer system, high pressure fire protection system and Hetch Hetchy Water Supply.—The Editor.



A PWA allotment for San Francisco Water works improvements has made possible the construction of the second Bay crossing pipe line of the Hetch-Hetchy Aqueduct. The capacity of the two Hetch-Hetchy pipe lines will total 114 m.g.d.

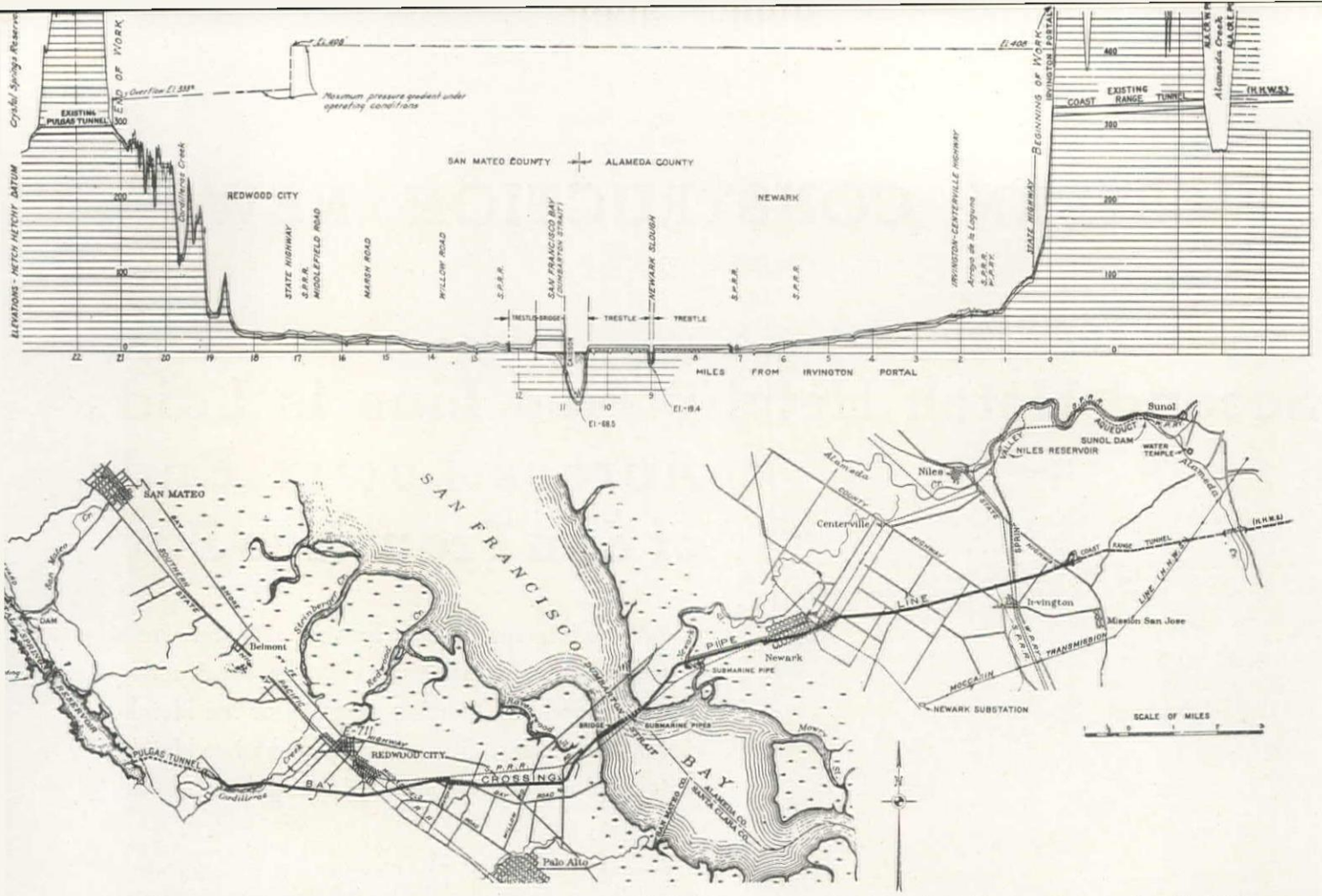
THE City of San Francisco is now laying a second bay crossing pipe line of its Hetch Hetchy aqueduct, extending from Irvington portal, the westerly terminus of the Coast Range tunnel, in Alameda county, to Redwood portal of Pulgas tunnel in San Mateo county, a total distance of 21.25 mi. The navigable channel of San Francisco bay is crossed at Dumbarton strait and a minor branch channel at Newark slough. The entire construction job was undertaken as part of a $12,000,000 program of water works improvement under the National Industrial Recovery Act, which was approved by the voters on Nov. 7 1933. Estimated cost of this pipeline as submitted to the voters was $4,640,000. The work is handled under PWA conditions and financed by bond issue and aided by a 30% grant from the Federal government.

The general plan of the Hetch Hetchy system provides ultimately three 76-in. pipes across the bay but for economic reasons a 60-in. pipe was originally laid and only one 42-in. submarine pipe was installed out of four contemplated, this providing a capacity of about 45 m.g.d. In the meantime the old 36-in. Alameda pipe line acquired from Spring Valley Water Co. has been depended on for a capacity of about 16 m.g.d. This riveted wrought iron pipe was laid in 1888 and in some areas is in an advanced state of deterioration.

Completion of the new bay crossing pipe line will permit abandonment of the old Alameda pipe line and discontinuance of operation of the Belmont pumping station. The capacity of the two Hetch Hetchy pipe lines is 114 m.g.d., which will be delivered by gravity into Crystal Springs reservoir.

The pipe on land is either 66-in, welded steel with appropriate protection, or 62-in. steel cylinder reinforced concrete. On the Dumbarton Strait pipe bridge, 76-in. diam. steel pipe is used, as the bridge was designed for two such pipes, although the first pipe line, which was laid in 1934, is 60-in. dia. Submarine pipes will be 54-in. in diameter.

Redwood Timber Trestle for Supporting Pipe Across Salt Marsh with Existing Pipe Line on Left. Pipe Bridge Over Dumbarton Straits Appears in Background. (Insert) Driving Piles for Supporting Trestle Near Newark.



Bids for construction of the pipe line, exclusive of the submarine section, were received June 12, 1934 by Public Utilities Commission and construction was started shortly after. A contract for constructing section A in which alternative bids were received for 66-in. steel or 62-in. concrete pipe, and section B, for 76-in. and 66-in. steel pipe only, was awarded to Western Pipe and Steel Co. on the steel pipe basis in the estimated amount of $1,732-437. The contract for section C which provides for 62-in. concrete pipe with some short sections of steel pipe, was awarded to American Concrete and Steel Co. in the estimated amount of $638,969.

In section B, extending from Newark to Dumbarton Point, a distance of 16,600 ft. exclusive of the navigable Newark slough, and on the west shore of the bay near Ravenswood for 2,700 ft., the pipe line crosses salt-marsh and is supported on a low superstructure on pile bents. This timber trestle is being built by Barrett & Hilp under a contract amounting to $174,392.

Design

The pipe was designed for a maximum static pressure of 176 lb. per sq.in. Under operating conditions with hydraulic gradient at elev. 408 ft. at Irvington portal and elev. 333 ft. at Redwood portal the maximum pressure will be about 160 lb. Invert elevations are 316.4 ft. at Irvington portal and 290.5 ft. at Redwood portal. Lowest point in the channel of the bay is elev. –68.5. ft. The line consists of the following: 15 mi. of 66-in. welded steel pipe with plate thicknesses of ⅜ and 7/16 in.; 0.7 mi. of 76-in. steel pipe, using ½ in. plate; 4.9 mi. of 62-in. steel cylinder reinforced concrete pipe of which 92% is designed for 400-ft. head, the remainder being lighter; and about 0.6 mi. of double 54-in. submerged pipe under the navigable channel.

The steel plates for pipe are specified to have a tensile strength of not less than 55,000 lb., a yield point not less than one-half the tensile strength but in no case less than 30,000 lb., an elongation in 8 in. of not less than 1,500,000 divided by the ultimate tensile strength, a carbon content not to exceed 0.25% and a manganese content from 0.35 to 0.70% (A.S.T.M. Specification A 89-33 with some modifications). Test specimens of welded joints are required to show an average strength of joint between 52,500 and 55,000 lb. per sq. in. Before applying the protective coating all pipe is subjected to internal hydrostatic pressure of 235 lb. per sq. in. for 66-in. (⅜-in. plate) and 260 lb. for 66-in (7/16-in. plate) and 76-in. pipe. Pipe specials are tested with a pressure to stress the metal to 20,000 lb. per sq. in., the maximum pressure used being 260 lb. per sq. in.

The steel of the cylinder in concrete pipe is required to be not less than 9/64 in. thick. Maximum allowable stress in the cylinder and outer reinforcement must not exceed 12,000 lb. per sq. in. Each cylinder, before being encased in concrete is tested by internal hydrostatic pressure sufficient to cause a stress of not less than 18,000 lb. per sq. in.

Manholes are located on the average about 1,500 ft. apart. Each consists of an 18-in. inside diameter cast steel saddle, welded to the pipe or steel cylinder, and a cast steel cover bolted on. Similar cast steel saddles were used for blow-offs, air valves, and small branch connections

Prior to preparation of specifications a soil survey was made, including both chemical and electrical determinations and a study of the old Alameda pipe line built in 1888. The survey disclosed two areas where more than average protection would be necessary to minimize corrosion of the pipe. These areas are a 2-mi, section extending easterly from the edge of the salt-marsh through the town of Newark and 1.5 mi. section between the Bay Shore highway and Willow road. Concrete pipe was therefore specified for these two sections.

At several locations, more particularly in the adobe soil around Redwood City, the steel pipe is protected by a ¾-in. wrapping of cement mortar similar to that used on portions of the San Joaquin pipe line of the Hetch Hetchy aqueduct. Under bridges and at some road crossings the steel pipe has a mortar jacket 2-in thick. Such short sections of steel pipe as are included in the concrete pipe contract are given a ¾-in gunite covering.

Where the pipe is not in a trench the coating is of the usual asphaltic type with minimum thickness of 3/32-in., applied by vertical dipping of the 30-ft. lengths. Special sections whose shape prevents such dipping are given a priming coat of the composition mixed with gasoline and a final coat undiluted, applied hot with brushes.

Pipe laid in favorable, non-corrosive soil is spirally wrapped with rag felt which has been thoroughly saturated with a high melting point bituminous solution and has received on both sides an application of an asphalt coating containing 25% or more alkali resisting material, and on one side an application of flaked mica. The finished wrapping weighs between 38 and 42 lb. per 100 sq. ft. and has a tensile strength of at least 55 lb. per lin. in.

The city furnishes large gate valves, butterfly valves, Venturi meter and miscellaneous metal work, which are installed by the contractor. The latter furnishes and installs expansion joints, manholes with frames and covers, cast steel saddle nozzles and companion flanges, gate valves up to 8 in., vacuum valves, air release valves, corrugated culverts and miscellaneous cast iron pipe. The contract includes also the construction of a valve house and a meter pit of reinforced concrete.

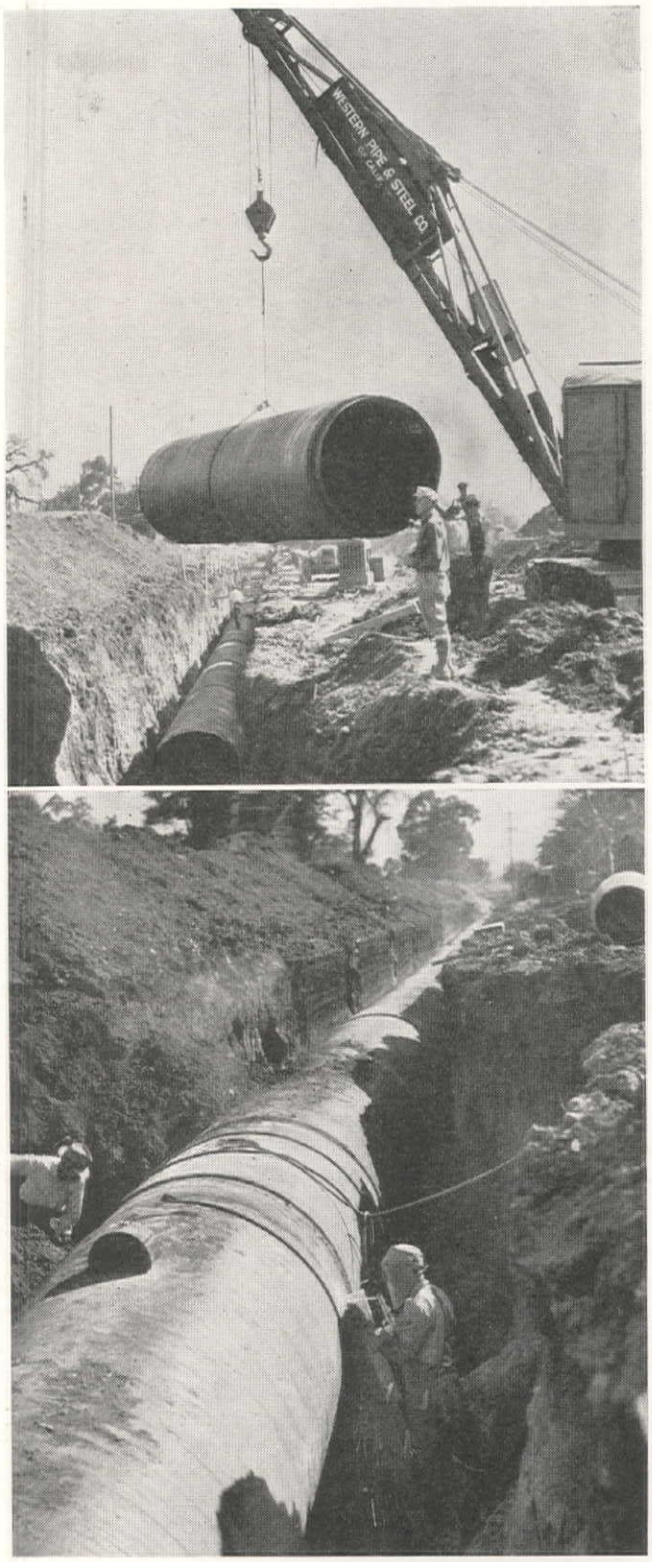
Steel Pipe

The steel pipe is fabricated at the shops of the Western Pipe and Steel Co. at South San Francisco. It is made up in courses 30 ft. long, consisting of two plates rolled semi-circular and joined by longitudinal welds. The edges of the plates to be butt-welded are planed and cleaned and the ends are crimped before rolling. The plates are then rolled to true cylinder form and tack-welded together before being placed in the electric welding machine. After the two longitudinal seams have been welded the 30 ft. cylinder receives a hydrostatic test to either 235 or 260 lb. per sq. in.

During the first part of the test the pressure is maintained at 90% of the above figure and blows are struck alternatively just above and just below the horizontal seams at 1-ft. intervals by steel-headed hammers swinging by gravity through a 90 deg. arc with 48-in radius. The combined weight of hammer and handle is such that the striking power is at least equivalent to that of a 19-lb. hammer with a handle of zero weight. After the hammer test the pressure is brought up to full required amount and maintained until the inspection is completed.

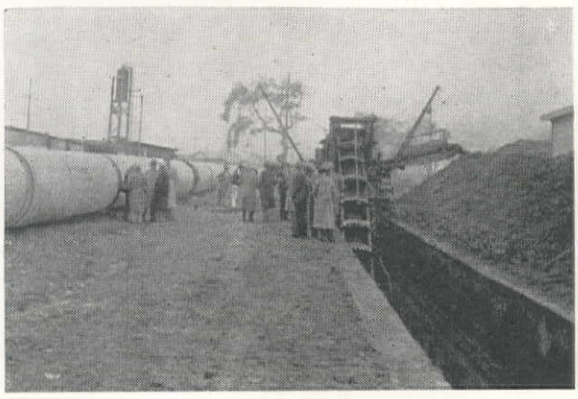
An interesting feature of the fabrication is the forming of the bell for the bell and spigot type of circumferential joint which is used in the field. This is done by a die which is pressed by the hydraulically operated head of the testing machine. The inside diameter of the bell thus formed is 1/32 in. larger than the outside diameter of the pipe. The use of the die and the manner of its application have minimized the splitting of the welded seam.

All curves of short radius, the minimum being specified as 2½ times the diameter of the pipe, must be made of beveled courses cut from straight pipe that has undergone the hydrostatic test. All such curves are made up in the shop. Curves of long radius are made by beveling the ends of straight pipe. All circumferential joints are welded inside and outside. Butt-welding of circumferential joints is permitted in the shop but not in the field.



(Upper) Lowering 60-ft. Pipe Section Into Trench With a No. 700 P&H Crane Equipped With 40-ft. Special Boom. Lower) Electrically Welding 60-ft. Pipe Sections Immediately After Pipe Has Been Lowered Into Position.

Excavating Trench for 66-in. Steel Pipe Near Fair Oaks with Type 'C' Buckeye Trenching Machine. Coated Pipe Ready for Installation Is Shown at Left.



Laying 62-in. Concrete Pipe With a Link-Belt K41 Crane Near Newark.

After testing, the pipe is thoroughly cleaned and then heated in an oven to a temperature slightly below that of the coating bath. It is then hammered to release all scaly matter and is immersed in the coating composition in a vertical dipping tank until it attains the temperature of the bath (about 235 deg. F.). The pipe is then withdrawn from the bath and allowed to cool in a vertical position.

The felt covering is spirally wrapped by machine under tension of 33 lb. per ft. of width. During wrapping a continuous stream of hot asphalt is applied in quantity sufficient to bond the covering completely to the coating and to fill all voids. Consecutive turns of the felt slightly overlap. About 4 in. at each end of the pipe is left bare of coating and felt, and is covered after the pipe is laid and tested.

The 30-ft. sections are next welded together, ready for haul by truck direct to the trench. Extreme care is taken not to injure the pipe or coating during transportation.

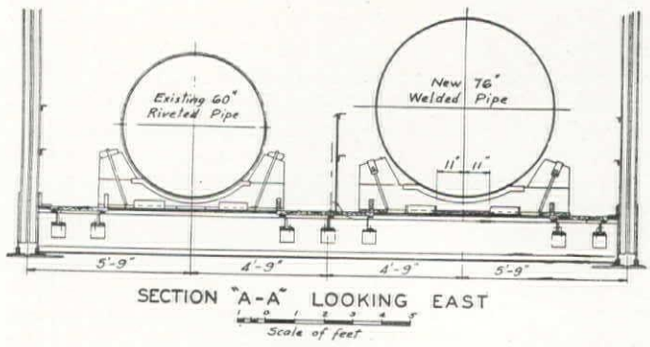
Pipes which are to receive mortar covering are hauled in 30-ft. length, after dipping, to the mortar wrapping plant of W. A. Kraner and S. N. Arnold, which is adjacent to the steel fabrication shop. This plant is practically identical with the plant operated at Modesto during construction of the San Joaquin pipe line of the Hech Hetchy aqueduct, except that the ordinary wrapping here is ¾-in. thick instead of ½-in. As the pipe is rotated, cheesecloth and fine wire mesh are supplied from reels, while cement mortar is fed by a spout onto the cheesecloth so as to envelop the mesh. The pipe is then released from the machine and the cheesecloth is sprayed with an asphaltic mixture. Curing continues for 7 days.

Excavation for the steel pipe has been done by Youdall Construction Co., sub-constractor for Western Pipe and Steel Co., using a model 224 Buckeye trencher in the flat valley land and a 1½-yd. Northwest shovel with a hoe attachment in the hilly sections. In general the trench was excavated to a width 24 in. greater than the outside diameter of the pipe and to a depth sufficient to allow 2 to 3 ft. of cover over the pipe. There are three railroad crossings and numerous road crossings in this contract, none of which presented much difficulty.

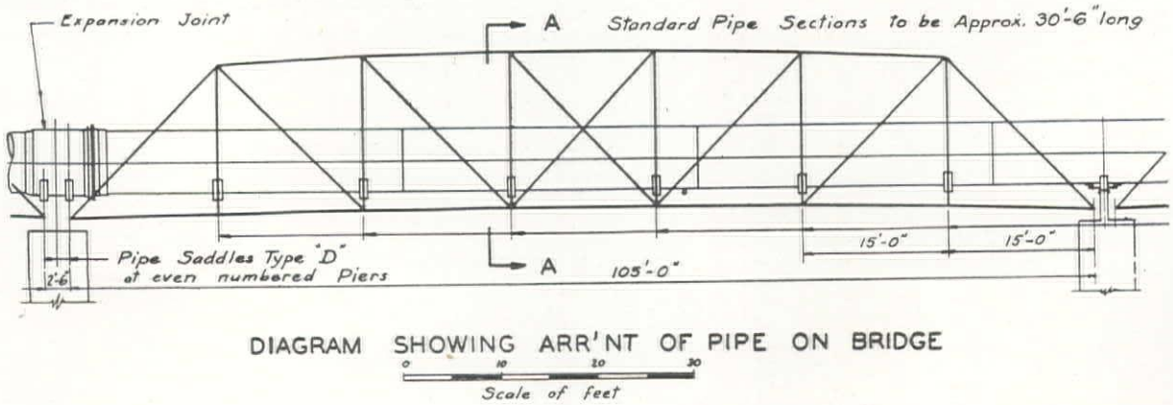
The 60-ft. lengths of pipe which have previously been distributed along the right of way by truck are laid by a No. 700 P&H gas-crane equipped with a 40-ft. special boom after which the circumferential joints are electrically welded. Electric welding aquipment includes one 300-amp. Lincoln stable arc portable welder and one 300-amp. Westinghouse and seven 300-amp. G. E. skid-mounted welders which were drawn by a 35 hp. Allis Chalmers tractor.

Hauling of the pipe was sub-contracted to R. A. Conyes who used five 5-ton Mack trucks and trailers, one Athey truss wheel trailer, and two Caterpillar '60' tractors, one being equipped with a crane boom, for transporting and distributing the 60-ft. pipe sections.

The pipe is then tested under hydrostatic pressure which is gradually increased until equal to 83% of the pressure applied in the shop test. The specified ideal length for testing is 5,000 ft. but variations are allowed to suit specific conditions. Allowable leakage is 550 gal. per mi. per 24 hr. All tests made to date have been very satisfactory, there having been no leakage recorded. Occasionally a sweat has been noted in a circumferential shop seam or in some minor fitting. Pressure has held up

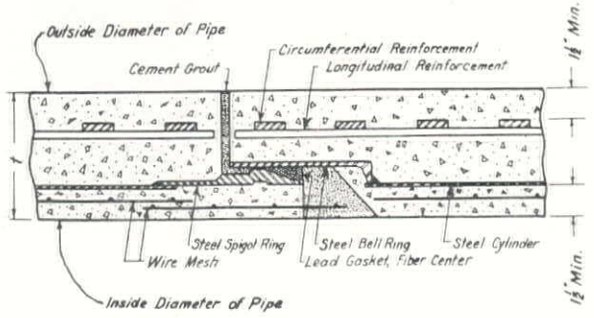


Typical Truss of Bridge Which Supports Pipe Over Water in Dumbarton Strait.



(Left) Pipe Lines No. 1 and 2 Passing Under Western Pacific R. R. Near Irvington. (Right) Unloading 66-in. Steel Pipe Sections Near Redwood City With a Special Crane Mounted on a Caterpillar '60' Tractor.

Typical Section of Concrete Pipe Wall Showing Detail of Joint.



with no diminution for as long as 96 hr. without adding water.

After the field test, protective covering is applied at the joints and the trench is backfilled, using either a Northwest drag-line or an Ateco bulldozer mounted on a Caterpillar '60' tractor. The field staff for Western Pipe & Steel Co. includes: Charles Overton, general superintendent; Charles Anderson, field superintendent; H. Haines, welding foreman; W. Mallon, office manager. K. J. Kennedy is general superintendent and Francis Hodgkins is office manager for Youdall Construction Co. Sherman W. Gibbs is PWA inspector on the steel pipe line.

Concrete Pipe

All concrete pipe for this contract has an inside diameter of 62 in. and is manufactured in 12-ft. sections by American Concrete & Steel Pipe Co. at a yard in Newark. The pipe consists of a steel cylinder of 9/64 in. plate lined with 1½ in. of concrete reinforced with steel wire mesh and jacketed with 4½ in. of concrete with steel bar reinforcement. An 8-sk. per yd. mix is used. Joints are of the bell and spigot type formed of steel plate welded to the cylinder and have a continuous lead gasket for caulking.

The steel cylinder is made up of 3 plates rolled and welded in a manner similar to the two plates of the steel pipe. The bell and spigot pieces are then welded to the cylinder and the section is subjected to internal hydrostatic pressure which with the 400-ft. head pipe is 125 lb. per eq. in. The inside reinforcement is next welded to the cylinder. This consists of steel wire mesh with area of .05 sq. in. per ft. length of pipe for circumferential steel and .02 sq. in. per ft. of circumference for longitudinal steel.

The outer reinforcing cage, consists of flat steel rolled and welded to a true circle and welded to equally spaced longitudinal bars, the size and spacing of both hoops and bars varying with the operating head. Seven 300-amp. motor driven Lincoln, two Schroder, one Westinghouse, and one Federal (butt) welders are used in the fabrication plant.

The steel plate cylinder is set on end and the completed cage is set around it and held by the outside steel concrete form to a position midway between the cylinder and the form. During pouring of the concrete the forms are continuously vibrated. The forms are left in place for 12 hr. and the concrete is cured for 24 hr. in warm water vapor, ranging in temperature from 80 to 120 deg. F., the temperature and humidity being regulated by forcing steam to bubble up through water. After this curing the pipe is kept wet for 7 days and is not placed in the trench until it is at least two weeks old. The strength of the concrete as tested is well in excess of the 4,000 lb. specified.

Steel cages and cylinders are handled in the fabrication plant with a 40-ton American steam railroad crane. The pouring platform is opposite the aggregate bins and mixing plant. Aggregates are elevated to the 30-yd. Heltzel portable steel bunker by a bucket line and are proportioned by a Heltzel batch weigher equipped with Kron beam scales. Concrete is mixed in a 1-yd. Rex mixer and is transported in 39-cu. ft. concrete buckets handled by the railroad crane. After the forms have been stripped and the concrete has cured sufficiently to permit handling the pipe are stored in an area adjacent to the pouring platform. A runway excavated below the storage yard level permits loading of trucks by rolling the pipe directly from the timber sills onto the truck deck.

The trench is excavated by a drag-line and often runs wider than the ideal 8.2-ft. width. There are numerous road crossings and three railroads, none of which present much difficulty except the Bayshore highway, where it may be necessary to resort to a tunnel. In a marshy area near Irvington, concrete piles are used for pipe support.

The finished sections of pipe are distributed along the trench by truck and then laid by a gas crane, while two men with bars shove the sections home in the joints and set them to line and grade. A Link-Belt model K44 dragline, used for excavating the trench, is also used as a crane in laying the pipe and for operating a Morman board for backfilling. The lead gasket is then hand-caulked from the inside and the remainder of the joint seam, both inside and out, is filled with cement grout or mortar, utilizing the ends of the wire mesh reinforcement of the bell end which are straightened out for this purpose after the lead has been caulked. The line is then

backfilled and tested in the same manner as the steel pipe. The pipe is kept filled with water for seven days prior to the test, to allow the concrete to become saturated. Allowable leakage is 1,500 gal. per mi. of pipe.

The field staff for American Concrete & Steel Pipe Co. includes: W. A. Whiting, general superintendent; A. A. Horwege, superintendent; D. H. Rankin, office engieer; J. B. Chambers, office manager. W. B. McMillan is the PWA inspector on the concrete pipe line.

Pipe Trestle

The large salt marsh areas on both sides of the bay near Dumbarton strait necessitated the use of pile trestle for a total distance of 19,300 ft. The ordinary bent of this trestle, which is being constructed under a separate contract by Barrett & Hilp consists of two untreated piles, 14-in. diam. at cut-off, driven to a 1:5 batter, with a 12 by 12 in. by 9 ft. redwood cap. Upon this is a redwood superstructure of 12 by 12 in. posts with 3 by 8 in. sway braces and a 12 by 12 in. by 8 ft.cap with a 12 by 12 in. by 5 ft. saddle with a circular arc recess to hold the pipe.

Bents are generally at 20.5-ft. centers. The substructure caps are about 6-in. below the marsh level and the bottom of pipe about 3-ft. above marsh level. On curves the batter is increased to 1:4. In general, each fifteenth bent, known as a brace bent, consists of 2 vertical piles and 4 batter piles (all of which are treated) with a batter of 1:2 in a plane parallel to the pipe axis.

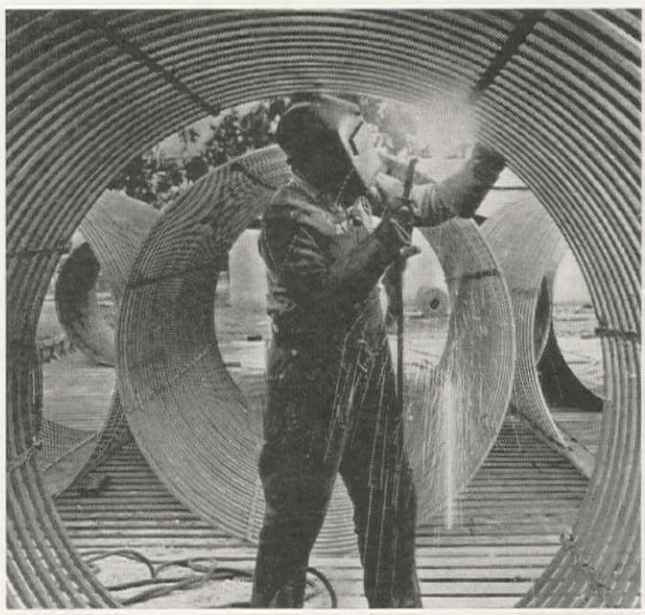
At crossings of sloughs, creosoted piles are used and the cap supporting the pipe saddle rests directly on the piles. Concrete anchors capping nests of piles are used at several locations, as at shore connections for submarine pipe, cross connections, etc. Minimum bearing value of piles is specified as follows: in standard bents, 40,000 lb.; brace bents, 50,000 lb.; vertical piles in anchor blocks, 60,000 lb.; and batter piles in anchor blocks 70,000 lb.

Ben C. Gerwick is piling superintendent, Robert Hoos is superintendent in charge of driving, and J. A. Ginella is in charge of trestle framing for Barrett & Hilp.

Submarine Pipes

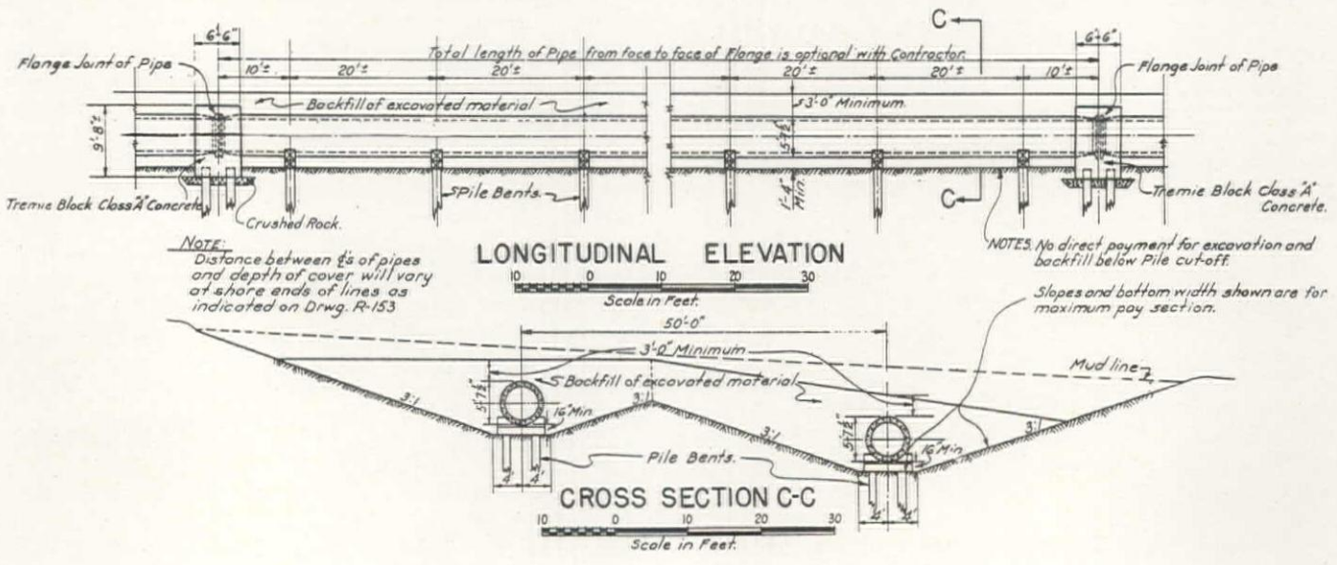
Bids were received on March 6 for constructing submarine pipes which call for a double line of 54-in. pipe approximately 2,800 ft. in length across the navigable channel at Dumbarton strait and a single line of similar pipe, 436 ft. in length, across Newark slough. Low bids were submitted by Pacific Bridge Co. with a price of $698,226 for proposition A (welded steel pipe) and Merritt Chapman & Scott with a price of $928,535 for proposition B (cast iron pipe). These pipes are to be laid parallel to and northerly from the existing 42-in. diameter, flexible joint cast iron pipe. The contract includes also the installation of valves furnished by the city and of fittings furnished by the contractor for shore connections and for additions and alterations in and about the caisson at the junction of the submarine pipes and the pipes on the steel bridge and the removal of portions of the two 16-in. submarine pipe laid across Dumbarton strait in 1888.

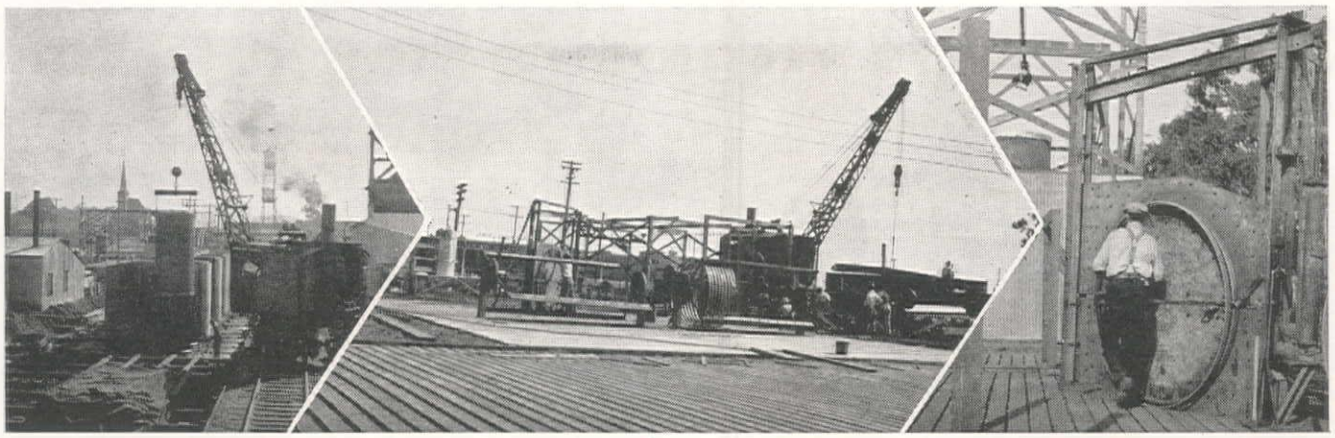
Three alternate types of pipe will be considered. Under proposition A, the installation will consist of welded steel pipe with flanged joints, supported on submarine trestles. This pipe is to be fabricated from ¾-in. plates, coated inside and outside with bituminous enamel and with an outside jacket of reinforced gunite 6-in. thick. The inside lining is to be applied centrifugally. The length of sections to be fabricated and laid is optional with the contractor. Joints will be made of flanges welded to the plate, which are to be bolted together under water and encased in blocks of tremie concrete. The pipe will be laid on a pile trestle with bents at about 20-ft. centers, in



Welding Joints in the Reinforcing Steel Cage for the Concrete Pipe With Lincoln Arc Shield Welder.

A Portion of the Submarine Pipe Showing Method of Supporting on Pile Bents and Encasing of Joints With Tremie Concrete.





(Left) Railroad Crane Setting Steel Forms Around Reinforcing Cage and Steel Cylinder Preparatory to Pouring Concrete. The Pipe Plant of the American Concrete and Steel Pipe Co. Is Located at Newark. (Center) Assemblying Bar Reinforcing Cage for Concrete Pipe Following Fabrication of Hoops. (Right) Testing Hoops to Be Used in Bar Reinforcing Cage for Concrete Pipe. Welds Are Stressed to 18,000 lb. per sq. in.

trenches dredged for the purpose and later backfilled with excavated material.

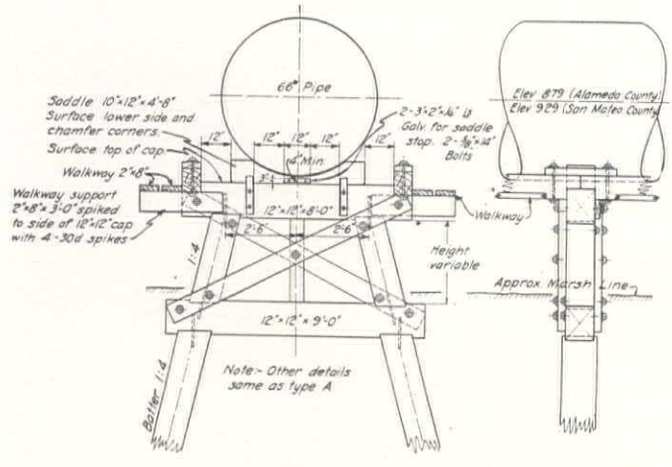
Under proposition B the pipes will be cast iron of the flexible joint type, 2½-in. thick, in 12-ft. lengths, and coated inside and out with bituminous enamel. The pipes will be on a crushed rock fill in dredged trenches that are to be backfilled with excavated material.

Under proposition C, the pipe will be steel cylinder reinforced concrete with flexible joints. The cylinder is to be of ¾-in. plate with an outer coating of bituminous enamel and a 4-in. reinforced concrete jacket and an inside lining of spun concrete 2 in. thick. This pipe is to be laid in 12-ft. lengths. Time of completion under all propositions is set at 240 calendar days.

The principal items of the contract are:

		A	B	C
Excavation	cu.yd.	106,000	125,000	140,000
Rock fill	cu.yd.	530	24,000	26,500
Furnishing treated piles	lin.ft.	52,000	11,500	9,700
Driving piles	each	880	200	170
Tremie Concrete, Cl.A	cu.yd.	1,425	130	125
Tremie Concrete, Cl.B	cu.yd.	25	525	550
Furnish and lay pipe	lin.ft.	6,035	6,035	6,035
Structural steel substructure	lb.	20,000	20,000	20,000

Typical Redwood Timber Bent for Supporting Pipe Across Marsh Lands. Bents Used on Tangents Are Narrower and Piles Are Driven to a 1:5 Batter.



TYPICAL BENT TYPE B
FOR PIPE ON CURVE
To be used for approximately 3600 feet westerly from Newark Slough

Design of the entire pipe line is by San Francisco Water Department, of which N. A. Eckart is general manager and chief engineer, T. W. Espy, engineer of water production and I. E. Flaa, hydraulic engineer. Construction is supervised by the Hetch Hetchy construction department of which L. T. McAfee is chief engineer and manager; L. W. Stocker, chief civil engineer; C. R. Rankin, construction engineer; ad L. A. McAtee, assistant construction engieer.

Reclamation Bureau Studies Transmountain Diversion

A PWA allotment of $150,000 has been made to the Bureau of Reclamation by Administrator Harold L. Ickes for an investigation and report on the proposed northern transmountain diversion from the basin of the Colorado river to the basin of the South Platte river, in Colorado.

The plan to be studied contemplates diversion from tributaries of Colorado river on the western slope of the Rocky mountains divide to supplement the water of South Platte river across the mountains to the east. Preliminary investigations have disclosed the quantity of water from the Colorado river to which the State of Colorado is entitled is in excess of the amount that can be beneficially used on the western slope, while there is a shortage on farms and in some towns within the irrigated area of the South Platte valley. The investigation provided for by the allotment is to include:

1. Engineering and geological surveys and investigations to determine the most feasible location for such transmountain diversion together with the preparation of preliminary plans and estimates.

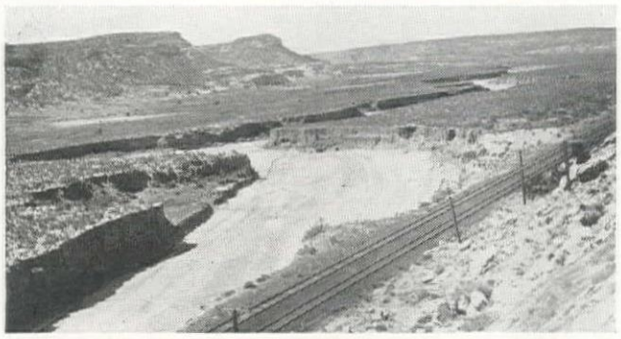
2. A determination of the amounts of water than can practicably be diverted without injury to western slope interests.

3. A determination of the areas to which diverted waters would be furnished and the economic value thereof.

4. A determination of the present and probable future western slope irrigation development in Colorado affected by such prospective transmountain diversion.

5. Survey and investigation of reservoir sites on the western slope of suitable location and capacity to enable replacement of waters that can physically be impounded or diverted for the eastern slope to the extent that such waters are needed for present and prospective irrigation on the western slope in Colorado.

Comprehensive Program is Started to Prevent and Provide Flood



A PWA allotment of $20,000,000 has been made to the Soil Erosion Service to carry out a comprehensive campaign against erosion, the first program of its kind undertaken in this or any other country.

(Upper right) This Gigantic Gully Known as Rio Puerco of the West Has Gashed the New Mexico Range for a Distance of 40 mi. in Three Decades and Has Undermined the Main Line of Santa Fe Railroad at This Point. (Lower) Sheet Erosion Washes 50 Tons of Soil per Acre from This Rolling Fertile Land in the Palouse Wheat Belt in Washington and Is the Forerunner of More Serious Gully Washing.

IN the very beginning, when our forbearers first set foot upon this continent, there developed an illusion that land was limitless and inexhaustible. This mis-guided concept of never-ending land abundance, bred in the people of the United States a careless, reckless attitude toward their basic natural resource, and paved the way for the vicious process of erosion.

Careful estimates, based upon scientific investigation, indicate the tragic fact that more than 35,000,000 ac. of once-fertile land—an area equal to the combined areas of Illinois, Connecticut, and Massachusetts,—has been completely destroyed beyond any hope of reclamation for agricultural purposes. In addition to this permanent and complete destruction, 125,000,000 ac. on which we are still attempting cultivation, has been seriously impoverished by the loss of top-soil.

The annual toll in soil loss is almost incredible. It is estimated that some three billion tons of vital top soil is washed and blown from the fields of the country every year. The mighty Mississippi alone dumps about 400,000,000 tons of rich soil material annually into the Gulf of Mexico. At the present rate of destruction, the end of fifty years will find only about 125,000,000 ac. of land still fit for cultivation in this country—an acreage insufficient to support the population.

It was a recognition of this menace which caused the President, slightly more than a year ago, to create the Soil Erosion Service as a branch of the Department of the Interior. With a PWA allotment of $10,000,000, since increased to $20,000,000, work was immediately started on the organization and prosecution of a comprehensive campaign against erosion,—the first of its kind ever undertaken in this or any other country.

No attempt was made at the outset of the program to control all erosion in the country. The only logical approach was one of education. Accordingly, there was devised a nationwide system of demonstration projects on which the government, with trained technicians and expert knowledge, would show farmers by actual accomplishment that the destruction of their land by erosion can be curbed through the application of simple, practical measures of proper land use. Today, the Soil Erosion Service is carrying out these demonstrations on 30 projects covering an aggregate area of more than 27,000,000 ac., ranging in size from 15,000 to 16,000,000 ac. each.

While the primary purpose of the Soil Erosion Service is to demonstrate methods of preventing soil loss, and land improverishment through run-off and wind erosion, the work now being carried on in each watershed project constitutes a complete demonstration in moisture conservation, which means a general raising of the water table. Moreover, by preventing accelerated run-off and soil washing, the methods employed by the Service likewise serve to effect a material reduction in the silting up of stream channels and reservoirs, with its consequent increase in flood hazards.

The Service is unique in that it is equipped with and is employing every known erosion control weapon that science has developed to date. Where terracing is found necessary, terraces are built; where strip-cropping is required, strip-cropping is employed; where tree planting is needed, trees are planted; and so on, to the end that every acre of every project is treated in accordance with its particular needs and adaptability.

All work is done on a strictly cooperative basis, with the farmers contributing from 30 to 50% of the cost in the way of labor and materials. An agreement is entered into with the owners or operators of all land on which work is done, whereby they agree to manage their lands in accordance with plans worked out for each individual farm and put into operation by experts of the Soil Erosion Service. These agreements of operation and upkeep cover a period of 5 yr. during which time the farmers agree to contribute the necessary labor and materials for the proper maintenance of the work.

Six demonstration projects are now underway in the

Soil Erosion Control

(Left) Building Terraces to Prevent Extensive Sheet Washing on Santa Paula Project Near Ventura in California. An Adams Leaning Wheel Grader No. 83 Is Used in This Work. (Center) General View of Terracing Work Being Done on Santa Paula Project.

Terracing a Hillside on an Experimental CCC Erosion Project in Wasatch Mountains in Utah With a McCormick-Deering T40 Tractractor and a Trail Builder.

eleven western states, including the largest and second largest which have been established. These are the gigantic Navajo Indian Reservation project covering 16,000,000 ac. in New Mexico, Arizona, and Utah, and the Gila River project in New Mexico and Arizona, which embraces 8,200,000 acres along the upper reaches of the stream.

Allotments totaling $2,225,000 have already been made for these projects comprising 24,492,000 ac.

State	Office	Project	Acreage	Allotment
Arizona	Safford	Gila River	8,200,000	$ 500,000
California	Santa Paula	Coralitos Creek	67,000	200,000
California	Santa Paula	Arrojo Las Posas	25,000	175,000
New Mexico	Albuquerque	Navajo	16,000,000	1,000,000
Washington	Pullman	South Palouse River	150,000	250,000
Washington	Pullman	Wildhorse Creek (Oregon)	50,000	100,000

Terrific destruction has been brought to the once-fertile lands of the Navajo by over-grazing. The Oraibi wash, for example, which once was a mild intermittent stream course confined to a narrow channel between shallow, innocent looking banks, has become a sinister, twisting gully for its entire length of 80 mi. varying from 20 to 80 ft. deep. All of its tributaries are in like condition, contributing to the destruction of small farms and helping to carry an enormous load of silt into the Colorado river.

The problem before the Service was not a simple one of gully-plugging. Its solution demanded a combined effort of governmental agencies toward the economic and social rehabilitation of a great Indian nation, involving the right kind of education, the up-building of arts and crafts, and the re-establishment of agriculture and grazing on an enduring basis. The task was to formulate and put into effect, a complete and workable plan for land-restoration and land-management. In order to carry out this program, the Soil Erosion Service has employed a technical staff, established a land-use experiment station at Mexican Springs, on the Reservation, started comprehensive range and soil surveys, and selected a series of demonstration areas, ranging from 5,000 to 40,000 ac., on which the actual work of erosion control has been started.

The first and most important step in the control project is the reduction of livestock to the carrying capacity over a period of three or four years. Already, the Navajo Tribal Council has made an initial cut in sheep and are now in the process of gathering and selling 150,000 goats as the first move toward eliminating the range goat and substituting a much smaller number of the milch variety.

Aside from restoring natural vegetation through range management, it is and will be the aim to revegetate the ranges by such artificial aids as will detain the greatest practicable amount of water where it falls. For this purpose water is being diverted out of gullies, around gully-heads, with the purpose of spreading it over flat and gently-sloping ground to augment the natural growth of grass and other plants, a method to which much of the Navajo country, with its broad alluvial valleys, is admirably suited. Gullies that are too big for such treatment are being planted to quick-growing cottonwoods, willows, and tamarisks and, as rapidly as the stock can be produced, with food-bearing trees such as wild plum, walnut, and honey-locust. Water diverted from gullies is being made available to the Indians, to the greatest possible extent, for flood-irrigation of agricultural land, thereby increasing the production of farm crops for human subsistence and supplemental stock-feeding. Where necessary, check-dams, wire and brush dams, and jetties are being built to collect silt in which plant growth can be established and bank cutting stopped.

Another vast land conservation project involving a completely coordinated program of erosion control, flood prevention, and range management, has been started on an

(Upper) Grading Sides of Deep Gully Preparatory to Planting Controlled Vegetation. (Center) Constructing a Rubble Masonry Check Dam for Gully Control. (Lower) A Diversion Dam Constructed for Erosion and Flood Control on Gila River Project in Graham County, Arizona.

area involving more than 8,000,000 ac. in the upper watershed of the Gila river in Arizona and New Mexico. Parts of Graham and Greenless Counties, Arizona, and Grant, Catron, Sierra, and Hidalgo counties, New Mexico are included within the project area.

Initial work consists mainly in surveys looking to the development of a practical plan for rehabilitating all affected portions of the watershed. An aerial map of the locality is being made; after which, technical experts of the Soil Erosion Service will work out details of a coordinated system of erosion and flood control, forest conservation, and range regulation citing costs and specifications.

Most of the land in the Gila area is federally owned, only 246,000 ac. or 3% being State or privately owned. National forests cover some 3,034,000 ac. or 37% of the total area; Indian reservations, 1,066,000 ac. or 13%, and public domain 3,854,000 ac. or 47%.

Soil erosion in this region is spectacular and acute, having completely destroyed some 19,000 ac. of farm land within the last 15 yr. One gully, ranging from 10 to 40 ft. deep and from 100 to 300 ft. wide, has slashed across the fertile San Simon valley for a distance of 60 mi. and is rapidly spreading lateral arms in all directions. Some gullies within the project area are cutting back into the land at the rate of a half-mile every rainy season.

Over-grazing in the sloping uplands near the headwaters of the Gila has stripped the land of protective vegetation, causing every rain to sweep tons of soil into the stream. Silt, from the upland range, is rapidly filling the San Carlos reservoir at the $5,000,000 Coolidge dam, and silt deposits are causing severe damage to the elaborate irrigation systems which honeycomb the low-land farms.

An adequate system of flood detention structures will minimize the flood hazard which now constitutes a constant menace to the entire area. Through scientific application of erosion control measures, the upland grazing regions, now nearly barren, will be brought back into the rich grass that once flourished there.

The two projects now underway in California, include the rich farm country surrounding Santa Paula, and the valuable citrus fruit region south of San Francisco. The former, covering the watershed of Arroyo Los Pasos in Ventura county, embraces 25,000 ac. of land. The latter covers 67,000 ac. in the watershed of Corralitos creek in Santa Cruz county.

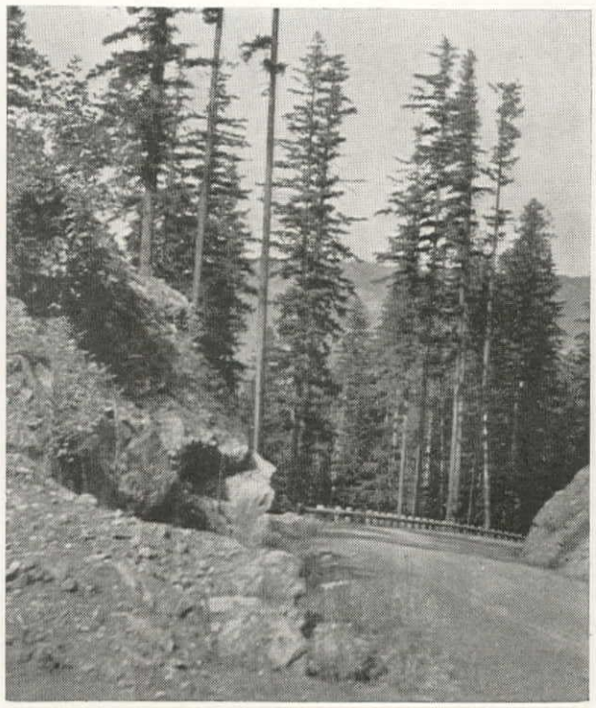
Erosion in the Corralitos watershed, where the work of the Service is just beginning, consists largely of sheet erosion, although gullying is a serious problem in those localities where no effort whatever has been made to control the run-off.

Effective control of erosion can be accomplished in the project area largely through such measures as contour ditches, check dam construction, strip cropping, reforestration, and revegetation of the steeper denuded slopes. Terraces will be employed, but only to a minor extent since the terrain within the area is not always suitable.

Similar treatment is being given two projects underway in the Palouse wheat belt of the northwest. The larger of the two covers 150,000 ac. in the watershed of South Palouse creek in southeastern Washington. The other embraces 50,000 ac. of Wildhorse creek in northern Oregon.

At the head of the Soil Erosion Service, Secretary of the Interior, Harold L. Ickes, appointed Hugh Hammond Bennett, who was then in charge of soil erosion investigations, under the Bureau of Chemistry and Soils.

Regional directors of the various projects are as follows: Gila River—B. P. Fleming; Corralitos Creek and Arroyo Las Posas—Harry Reddick; Navajo—H. G. Calkins; South Palouse River and Wildhorse Creek—W. A. Rockie.



Designing and Locat the Development of

THE subject of this article is frequently referred to as 'roadside beautification,' a term utterly incongruous to the problem, and conveying a regrettable misunderstanding of the fundamental principles of the work. Roadside improvement has been of widespread interest and under discussion for many years and would be much further advanced if enthusiastic supporters of the movement had not made the public apathetic, even distrustful, by their application of the term 'beautify.' This word suggests a desperate, hysterical effort to embellish, to primp and dress up, to labor and bring forth a something startling, artificial, exotic, and foreign to nature. 'Landscaping' is another term that should be used judiciously. A knowledge of landscape design is indispensable in this work, but, to the general public, 'landscaping' is unfortunately synonymous with horticultural activities only.

Roadside improvement is a field for the landscape designer, but a work all its own in the application of the principles of landscape design to the improvement and proper development of natural landscape. A clear definition of the principles of roadside improvement consists of the following:

1. The highway should be a harmonious part of the landscape. Construction scars should be avoided where possible by thorough study of the location. Cuts and fills should be kept at a minimum consistent with modern standard of alignment and grades. Where such scars are unavoidable, cut and fill slopes should be designed as flat as possible to prevent raveling or sloughing of the material through wind or water action, to encourage and promote an early healing, either by natural reproduction, or by suitable seeding or planting. The top of cut slopes as well as the ends of the cuts should be rounded to easy curves to appear as a natural part and continuation of the topography.

2. The area immediately adjacent to and visible from

ing Highways to Facilitate Natural Landscape

(On Left Hand Page) In Finishing This Cut, the end Shown on Left Should be Rounded for a More Natural Appearance. (Above) Puyallup Glacier from West Side Highway, Mt. Rainier National Park. A Location at Points Affording Such a View Demands Adequate Parking Areas.

The growing importance of roadside improvement work is evidenced by the fact that 1% of federal highway allotments to states must be programmed for this work.

By JEAN EWEN
Assistant Highway Engineer, U. S. Bureau of Public Roads

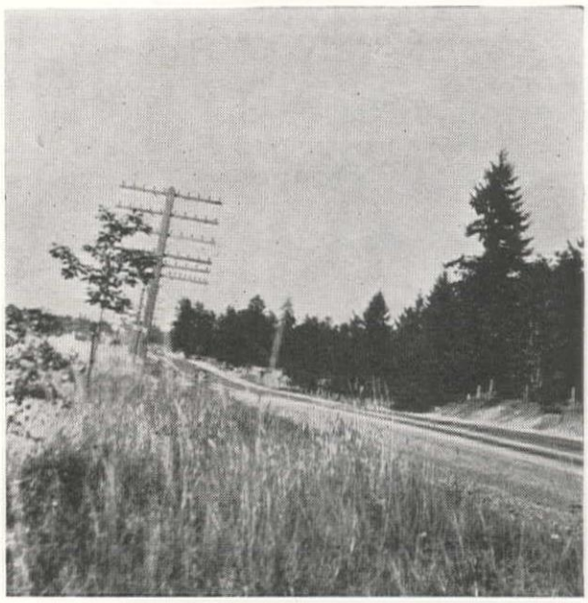
the road should be cleared of all unsightly stumps, litter, refuse, billboards, and all other objectionable encumbrances. The right-of-way should be of sufficient width to prevent encroachment of billboards, unsightly buildings, and other nuisances, and to preserve the natural landscape in the immediate vicinity of the highway.

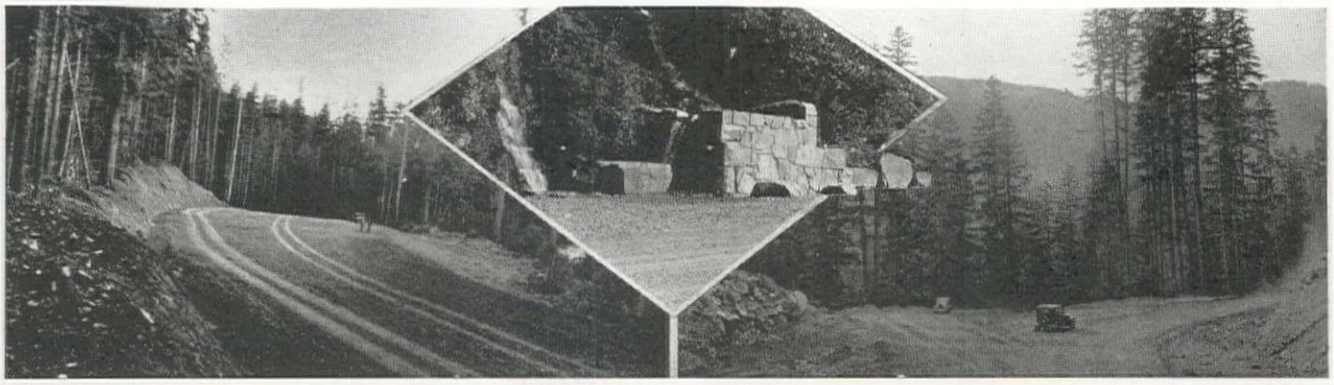
3. All existing trees and plants should be preserved along the right-of-way, but no hesitancy should be shown in removing trees and shrubs to open up views of distant scenery or points of interest, and for the safety of the road users.

4. Planting should be done only as a last resort, using only native material, trees, shrubs, or plants as may be appropriate, at intersections, curves, and prominent drainage structures. Roadside improvement is not ornamentation, nor construction of scenery, but merely what it implies, improvement of existing landscapes. The introduction of promiscuous planting indicates a weakness in the plan, a misapplication of the principles of characteristic landscape design. The entire plan should provide pleasant contrast and varied character. The aim should be for a natural effect of a multiplicity of scenes, each a complete picture in itself, but the whole must be a well proportioned, picturesque composition.

5. The design of all structures should be pleasing, yet unobtrusive. This work presents so many possibilities that it is deserving of the greatest study. Bridges may well be made landscape features in themselves, and the general result of an improvement plan is often made or marred by the design of such structures. Even guard rails may be made attractive if well designed. Bridge rails are commonly terminated abruptly at the abutments and continued as guard fences of entirely different material and design on the approaches. If guard rails are necessary

Planting of Trees Paralleling Road Under Conditions Pictured Below Are Superfluous With the Natural Growth on Far Side and in Conflict With Telegraph Line Along the Tree Row.





(Left) A Section of Highway on Which Planting Should Be Done on the Steep Upper Slope and the More General Glope on the Low Side. (Insert) A Fountain on Route 9 in Rainier National Park Which Blends Harmoniously With the Landscape. (Right) An Intersection Such as This Requires Low Planting to Define the Roadway and Heal Construction Scars.

beyond the bridge span, there is no reason why the same design as used on the bridge cannot be carried beyond as may be necessary.

Retaining walls also present excellent opportunities for the designer, and hand-laid embankments can be developed into more interesting features than merely paved slopes. Structures under modern construction practice are more permanent than any other part of the highway and justify, as permanent highway features, a greater original cost than as purely engineering utilities.

6. Adequate parking areas should be provided at all special points of interest. A highway is a public utility similar to a railroad. A railroad needs, in addition to the main track, suitable passing tracks, side tracks, switching yards, and depots. Where comfort stations cannot be provided in connection with private enterprise, they must be considered as a necessary detail of an improvement plan.

7. Extensive improvements should be undertaken only on permanently located routes. Future widening of the roadbed should be considered in all cases.

8. Highway maintenance organizations should be trained in the proper care and maintenance of roadside improvement as well as in the maintenance of the railroad.

9. Highways are not parkways. However, with the wide distribution of automobiles in this country, with the huge percentage of the population as automobile owners using the highways for recreation, with the tourist traffic recognized as one of the leading industries of the western states in particular, roadside improvement assumes an almost equal importance with the construction of modern roadways in the economic development of the community.

10. Roadside improvement should be recognized as an important function of every highway organization since it is primarily an integral part of highway location, construction, and maintenance.

Every location survey for a new highway should be inspected for possibilities of developing landscape features inherent to the project, so that they may appear to their best advantage. Prospective views and vistas may be brought out by proper location without sacrificing utility or standards of modern highway design. The most important consideration is ample width of right-of-way to assure positive future control of the improvement plan. Plans are also studied for effect of cuts and fills on the landscape picture, all fundamental roadside improvement principles, to be considered before a contract for construction is started.

Maintenance labor ordinarily used in trimming slopes, clearing slides, and cleaning ditches, is considerably reduced by construction under roadside improvement principles. The maintenance staff can, in the spare time made possible by these improvements, further improve the roadside by planting, sodding, seeding slopes where natural reproduction is slow or difficult to establish.

The problem of roadside improvement is somewhat different in the western states than in eastern United States. The panoramas are broader and bolder—entirely different from conditions prevailing in the east, and demand a different scale of landscape values and treatment.

A roadside improvement plan for any particular locality is directly dictated by the local environment and conditions. The improvement must be typical of the country, in keeping with the natural landscape, or it introduces an incongruity, an unwarranted offense against nature. Farming, dairying, horticulture, stock raising, lumbering, mining, industrial and various other communities are advertising their advantages, scenery, points of excellence, the particular individual character of the communities. Then why not design a roadside improvement plan in such communities with as little violence to the existing landscape as possible? An old ramshackle sheepshed may be as appropriate in a picture of the sheep country as a monument in a public park. One of the fundamental principles of design is sincerity and in no other field of design is this principle as important as in roadside improvement.

Under the regulations issued by T. H. MacDonald, chief of the U. S. Bureau of Public Roads, for carrying out the provisions of the National Industrial Recovery Act, approved June 23, 1933, under which act $400,000,000 was appropriated for the construction of public highways and related projects, it was required that 0.5% of the apportionments be expended for appropriate landscaping of parkways or roadsides on a reasonably extensive mileage. Two hundred million dollars were authorized for highway construction under the Hayden-Cartwright Act, approved June 18, 1934, and it is required that 1% of the apportionment to states must be programmed for roadside improvement work.

These regulations indicate the great importance placed upon this work by the Bureau of Public Roads. MacDonald is one of the staunchest supporters of the roadside improvement plan and the bureau has assumed the leadership in formulating a comprehensive policy for the movement. Many states have added roadside improvement departments to their organizations, and as the results of the improvement work undertaken under the federal regulations, the first organized attempt of real significance, will begin to be noted, a greater popular demand for extension of the work may be anticipated.

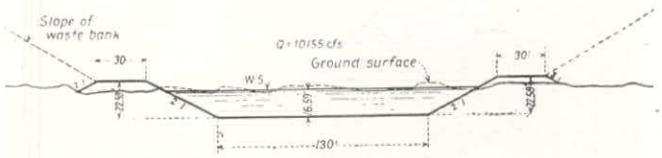
The work presents great opportunities for a distinctive field of highway improvement work. It can almost be classified as a part of highway engineering, for even though proper training in landscape design is prerequisite in the work, still, the application of the principles of landscape design to roadside improvement is as much a problem of common sense and logic as the science of engineering.

Additional Work Contemplated On All-American Canal

PREPARATION of plans and specifications for contract construction of another long stretch of the All-American Canal is nearing completion in the Denver office of the Bureau of Reclamation. It is expected to have these issued during March. Funds for this work are available from a total allotment of $9,000,000 made by the Federal Emergency Administration of Public Works for the All-American canal system, one of the principal features of the Boulder Canyon project.

The All-American Canal System consists of (1) a diversion dam across the Colorado river, about 5 mi. upstream from Laguna dam, (2) a desilting works in connection with this diversion, (3) a main canal about 80 mi. in length generally paralleling the Mexican border for the last 57 mi. of its length but entirely within the United States, and (4) the Coachella Branch canal about 130 mi. long, diverting from the main canal near its midpoint and running in a northwesterly direction to irrigate extreme areas beyond Salton sea. The total estimated cost of the entire system is $38,500,000. Drop structures are planned at various points along the main or All-American canal which may eventually be used for the development of power. Some of the principal concrete structures on this canal are those at the ten washes crossing the canal, three of which will be siphons taking the maximum capacity of the canal under the washes; also several large railroad and highway bridges. Complete development of the canal system will provide irrigation for about 842,500 ac. of lands by gravity and 188,500 by pumping. These lands include those of the Imperial Irrigation District comprising 512,000 ac. of which 425,000 ac. have long been under cultivation.

Construction underway. Present contract construction consists of a 30 mi. reach beginning at a point just west of Laguna dam and extending through the sand hills area. Contracts for this work consisting entirely of excavation were, as a result of bids opened last June, entered into with The W. E. Callahan Construction Company, H. Gunther and J. P. Shirley for about 40,000,000 cu. yd. of common and 30,000 cu. yd. of rock excavation, and with the Griffith Co. for 40,000 cu. yd. of common and 500,000 cu. yd. of rock excavation. On this length of canal the capacity varies from the diversion maximum of 15,155 c.f.s. to 10,155 c.f.s. Near the downstream end of the All-American canal, on a 7-mi. length just west of Calexico, the bureau is conducting the work by force-account to relieve unemployment in that section. (See February issue, Western Construction News.)

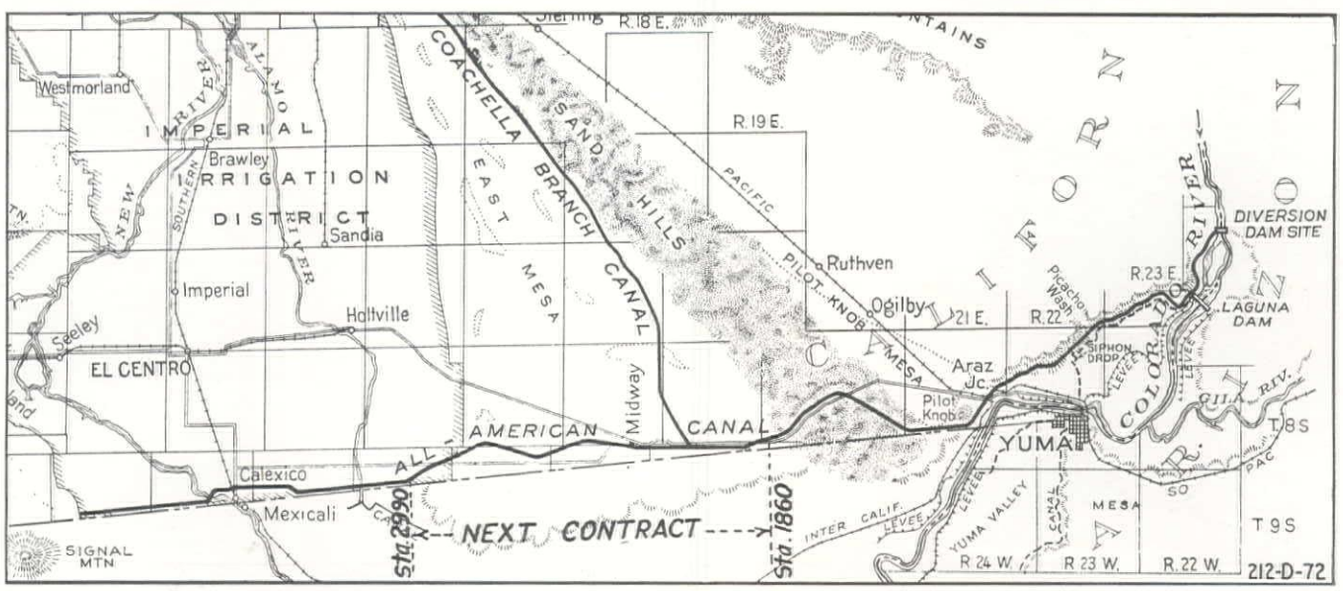


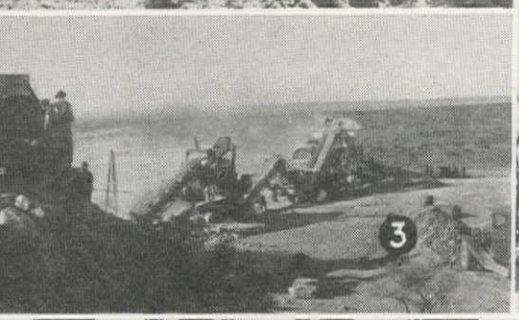
CANAL SECTION AT STA 1860

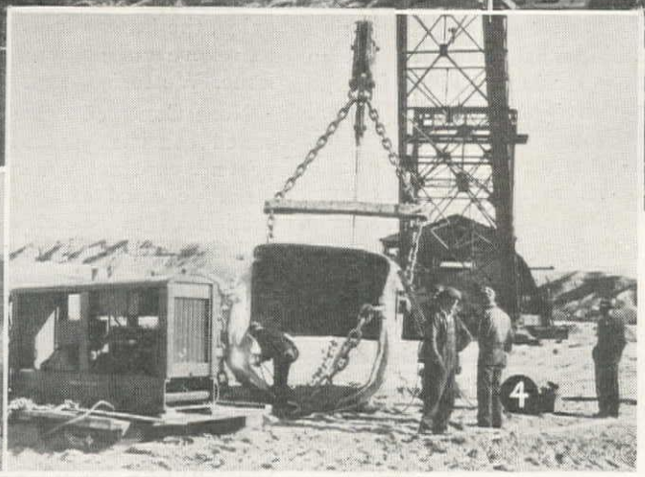
Next Contract. The work for which bids will soon be called consists of a 21-mi. stretch from the end of the present contract work to the intersection with the East Highline canal of the Imperial Irrigation District. This section of the canal will have a capacity varying from 10,155 to about 6,800 c.f.s. The work will consist entirely of common excavation, the advance estimated quantity of which is 12,000,000 cu. yd. The maximum center cut will be about 55 ft. Base widths and inside slopes of the canal section will vary respectively from 130 ft. and 2:1 at the upstream end to 114 ft. and 1-¾:1 at the downstream end of the contract length. Concrete and other structures necessary for completion of this stretch of canal will be left for construction by other contracts.

Future work. It is expected that the stretch of canal between the diversion dam and Laguna dam will be advertised for construction during May of this year. Present plans of the Bureau are to issue specifications and drawings for the three large concrete siphons in June; and probably during July model testing and designs for the proposed Imperial Diversion dam and desilting works will be completed so that a contract construction advertisement may be issued at that time.

Personnal. Design and construction of the All-American canal system, along with numerous other PWA projects, have been delegated to the U. S. Bureau of Reclamation by Federal Public Works Administrator, Harold L. Ickes. The Commissioner of the Bureau is Elwood Mead, with headquarters at Washington, D.C., and R. F. Walter, located at Denver, is chief engineer. R. B. Williams, located at Yuma, Arizona, is construction engineer.







On the Construc

1—Starting work on Griffith Co.'s Colorado River Aqueduct job between San Jacinto and Riverside, Calif. A Lima No. 801 shovel is being used for canal and conduit work.

2—Excavating foundations for Suislaw river bridge at Florence, Ore. This is one of 5 bridges being built along the Oregon coast under a PWA allotment of $5,602,000.

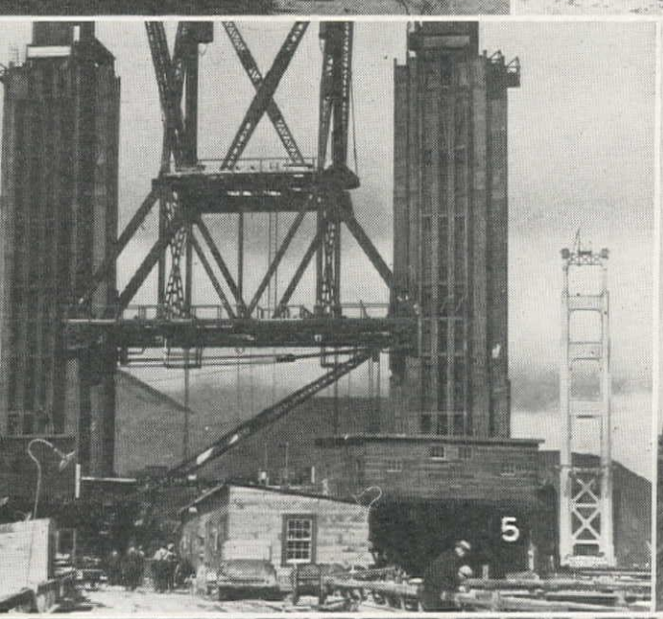
3—Two Cedar Rapids portable crushing plants in tandem on Walter H. Dennison's grading and surfacing job between Carlsbad and Hobbs, N. M., on U. S. Highway No. 62.

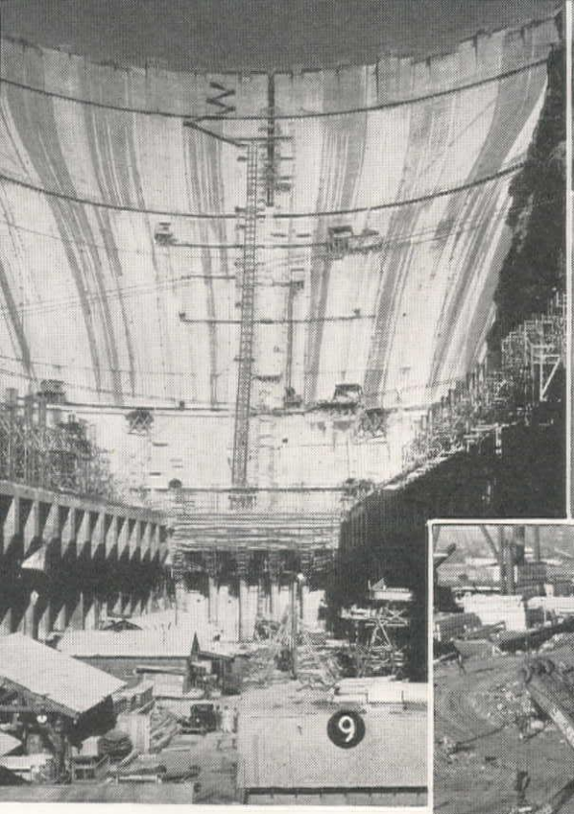
4—A Lincoln "arc shield" electric welder is used for reinforcing the cutting edge of a 12-yd. dragline bucket used on Callahan, Shirley, Gunther & Peterson Co.'s All-American Canal job.

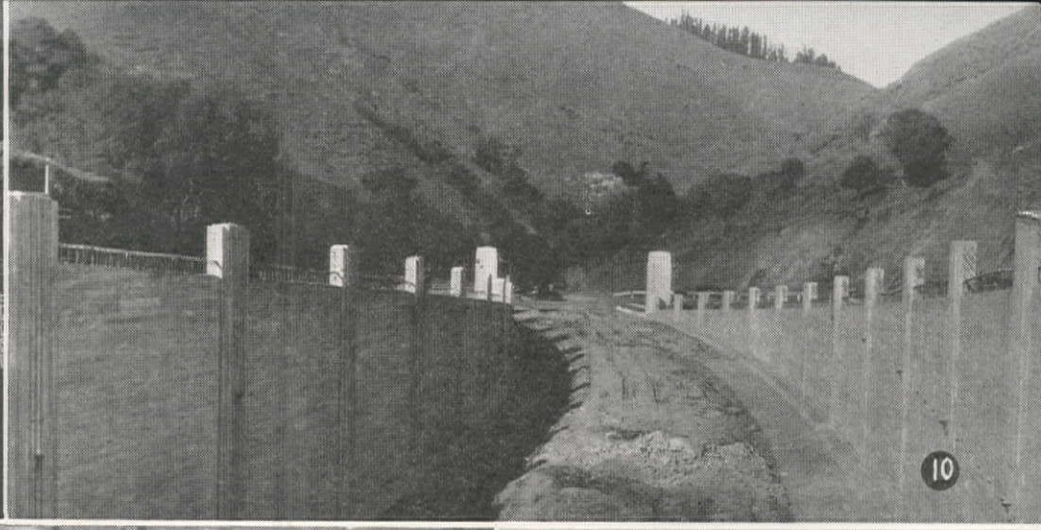
5—Steel goes up on south pier of Golden Gate bridge. On March 4 south tower steel reached a height of 288 ft. above water. Completed Marin tower appears in background across Golden Gate. Photo by Standard Oil Co.

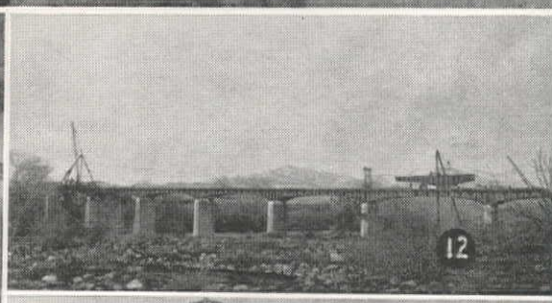
6—A 4½-yd. Bucyrus-Erie dragline (100-B) used on conduit work on Metropolitan River aqueduct near Freda. Barrett & Hilp-Macco Construction Co., contractors.

7—Unloading 84-in. concrete pipe for Orange county storm drain in Santa Ana canyon between Gypsum creek and Corona. Sharp & Fellows, general contractors; Pacific Crane & Rigging Co., sub-contractors for pipe laying.









Western tion Front

8—Building a 12-mi. truck trail for U. S. Forestry Service in San Bernardino mountains. A model 35 Cletrac tractor equipped with a Gar Wood road builder is shown in action.

9—Downstream face of Boulder dam in which nearly all of required concrete has been placed. Powerhouse structure appears in foreground.

10—East portal of Broadway tunnel under construction near Oakland, Calif. This portal serves two 2-lane tunnels.

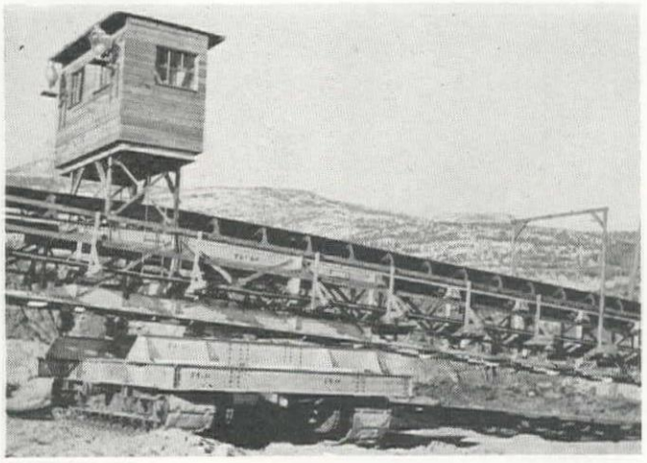
11—A Link-Belt gas shovel loading ballast used for sinking cofferdam cribs for main spillway dam of Bonneville project in Oregon. Columbia Construction Co., contractors.

12—Erecting steel girder bridge over Sacramento river on Pacific highway near Redding, Calif. J. F. Knapp, contractor.

13—Placing reinforcing steel in concrete apron below power house of Bonneville project. Batching and concrete mixing plant is shown on bank above. General-Shea Co., contractors.

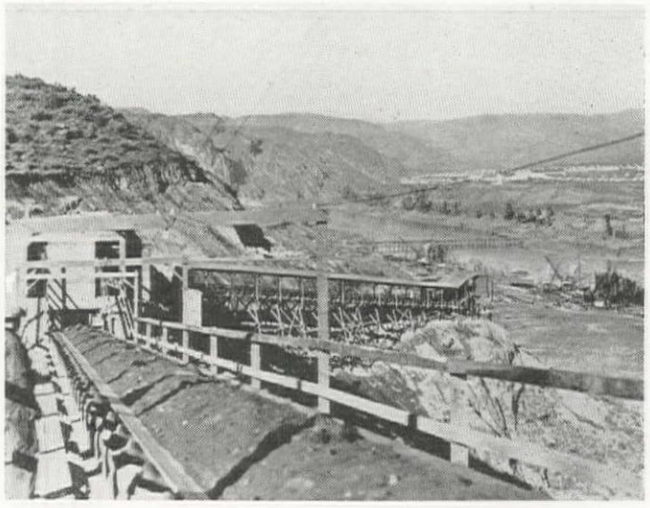
14—A No. 12 Pioneer duplex portable gravel plant equipped with 10-yd. bin which has been set up on Wood and Bevanda's Colorado River Aqueduct job near Rice, Calif.

15—Excavating a trench for a 54-in. steel water main in city of San Francisco.



World's Largest Co Speeds Excavation

(Left) A Section of 60-in. Jeffrey Belt Conveyor Showing Caterpillar Mounting Which Facilitates Movement of Unit.
(Lower) Looking Down From Head End of Conveyor at Rattle Snake Canyon. Steel Sheet Pile Driving Operation Under Way Along River and Mason City Appears in Background.



MORE than two million of the total 14,000,000 cu. yd. of excavation required for construction of the dam and power house of the $63,000,000 Grand Coulee power project has been moved. Grand Coulee dam, being built by the Bureau of Reclamation, is located on Columbia river about 20 mi. northwest of Almira, Wash., and is to be constructed in two principal stages with successive installations of power units. The first unit of the dam, which is under contract to Mason-Walsh-Atkinson-Kier Co. (contract price, $29,339,301) will be a concrete straight gravity dam about 300 ft. high above lowest foundation and will provide for installation of only 3 generating units.

Ultimately the dam, which is a principal unit in the Columbia Basin Project, will be built to elevation 1,085 ft. or 200 ft. higher than the low dam, now under construction, and provides for a 5,000,000 ac. ft. reservoir 150 mi. long and a capacity installation of eighteen 105,000-kw. generating units in the power house.

The Basin project will ultimately irrigate 1,200,000 ac. in central Washington and the development includes: a 310-ft. pumping lift for a maximum 16,000 c.f.s. of water; creation of a 23 mi. long artificial lake within the coulee, and construction of appurtenant dams and hundreds of miles of various size canals. Cost of the combined irrigation and power project is estimated at $394,155,000.

The first actual construction on the Grand Coulee dam project was started approximately one year ago when excavation of the overburden at both abutments was undertaken to relieve employment at the earliest possible moment after the federal allotment had been made. More than 2,700 men are now employed on the project, including 2,400 employees of Mason-Walsh-Atkinson-Kier Co. and the Bureau of Reclamation staff numbering 150.

The major work, preliminary to actual dam construction, which has been completed or is now under construction either by the Bureau or the general contractor, includes: 2,000,000 cu. yd. of overburden excavation; government railroad from Odair (N. P. main line) to the damsite, a distance of 32 mi.; government town site, including streets, water and sewer system, and dwellings; approach highways; transmission lines; contractors' town site (Mason City), including 360 houses, 40 dormitories; 2 large dining rooms, total cost about $1,000,000; construction trestle (first timber trestle ever erected across Columbia river); highway bridge, designed by Washington State Highway Department; and permanent railroad bridge.

Initial excavation at the west side abutment was started in November, 1934, with 2, 3, 4, and 5 yd. electric shovels being employed to load a large fleet of trucks, 12 yd. Athey side-dump crawler wagons and 25-yd. Wooldridge side-pump pneumatic-tired carriers. A small portion of the material being taken out at the west abutment (12,000,000 cu. yd. total required excavation) has been wasted about ¾ mi. down stream and the balance has been moved up stream to Rattle Snake canyon where most of this material will be dumped. Rattle Snake canyon, which connects the river at the damsite with the head of Grand Coulee about 1½ mi. away in a south easterly direction, is several hundred feet deep at the river and is adjacent to the approach highway.

Conveyor System

To transport the excavated material from the dam site to the disposal area, a 60-in. wide belt conveyor is employed. This conveyor is loaded with the Athey and Wooldridge carriers which will be used in the excavation inside of the sheet steel pile cofferdams now being constructed.

The dam will be built in three separate sections, namely the west abutment, the east abutment, and last, the center portion. Sheet steel pile cofferdams will be used for unwatering the east and west sides and the river will be diverted during construction of the center portion through gates in the east abutment and slots left in the west abutment. Sheet steel piling is being driven at present in three locations along the west river shore for a distance of about 3,000 ft.

The conveyor on the west side is the largest ever to be built in the history of the construction world when capacity and length is considered. The huge system has been erected by Jeffrey Mfg. Co. at a cost of approximately $750,000 for its present size for Mason-Walsh, Atkinson-Kier Co., the general contractors. The belt, at present, is about a mile long. To handle the 12,000,000

nstruction Conveyor at Grand Coulee

A 60-in. belt conveyor, more than 1-¾ mi. long, transports excavated material from cofferdam enclosures to waste dump.

A View of the Waste Dump in Rattle Snake Canyon With Stacker Unit Discharging Material Over Slope.

cu. yd. which must be removed for the west shore abutment, it is probable that the stacker which swings in telescope fashion at the end of the line, will continue to move forward until the total length will be approximately 1¾ mi. long with a total lift of 500 ft.

The belt conveyor system consists of 4 steel apron feeders which discharge on 4 feeding belt conveyors. These discharge into one center feeder which evens out the surge and discharges the material on to the main line conveyor. The present main line conveying system consists of 20 separate conveyor units which transports the excavated material to a stacking unit. The capacity of this system is 52,000 cu. yd. per 21-hr. day (2,475 cu. yd. per hr.).

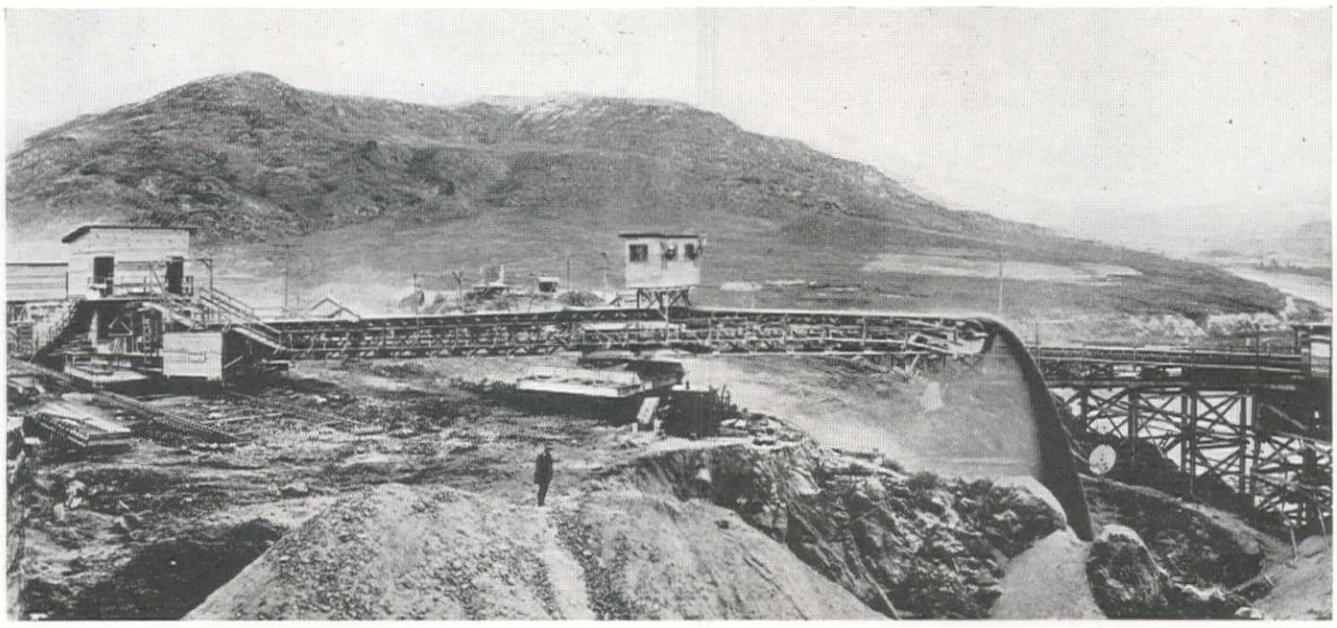
The bain conveyor belt, manufactured by U. S. Rubber Co., is 60-in. 8-ply rubber covered. Each of the 20 units is powered with a 200 hp. slip-ring motor driving headshafts through V-belt drives and a set of open gears. The average length of each individual unit is 250 ft., the rise 33 ft., and the maximum length of any single conveyor unit 420 ft.

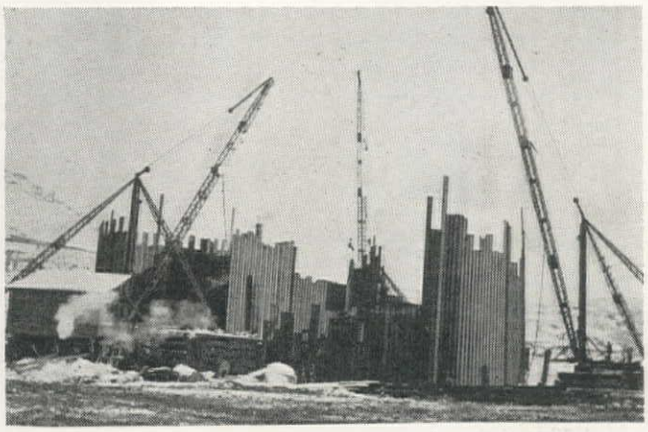
The troughing rolls are 3 pulley type of welded steel with grease-seal protected Timken bearings. There are about 6,800 of these individual unit rollers required for the present length of conveyor. Troughing rolls are spaced at approximately 42 in. centers and the return belt idlers at 7 ft. centers. The apron feeders are of the steel double-headed flight type, each flight being ½-in. thick with reinforced steel H-beams 5 ft. long and mounted on a very heavy type of steel thimble roller chain. The feeder is fitted with high pressure grease fittings throughout. The feeder conveyor is 38 ft. long with a feeder opening of about 16 sq. ft.

The overburden is carried from the various elevations on which the electric shovels are operating to the feeders by means of the large capacity carriers drawn by Caterpillar tractors. Two of the four feeder units operate at the same time permitting the contractor to move the other two and still continue near capacity excavation.

It is necessary to relocate the feeders from time to time as excavation progresses and they are, therefore, self contained and can be moved at the discretion of the contractor to any location during progress of the work. The stacker unit consists of a shuttle belt unit, a telescope unit, and a boom unit which is 150 ft. long. The rear or loading unit is supported on a steel chassis with the front end supported at a point two-thirds distance from the loading end on caterpillar treads, thus permitting a sweep

The Stacker Unit at the End of the 60-in. Conveyor System Dumping Material Into Rattle Snake Canyon.





Sheet Steel Piling Being Driven to Bedrock at Upper End of Cofferdam on West Side of Columbia River.

radially of 180 degs. and a discharge of material over an area 300 ft. wide. The telescope conveyor permits the gradual extension forward of the stacker boom, and when it has traveled forward approximately 50 ft. it is necessary to add a new 50-ft. section of the belt conveyor shuttle unit. The stacker, in addition to its travel forward on the disposal dump, is able to climb on a grade of approximate 7½%, thus increasing the height of the dump while progressing forward. The rise in grade actually amounts to about 5%, however, as the dump settles as the stacker spreads the material. The climbing feature is accomplished through a pivoted universal support of the boom on the caterpillar treads. The turn table on the chassis is pivoted to compensate for the climb when the conveyor swings through its arc of travel.

The entire belt conveyor can be controlled from an operator's house on the discharge boom. A complete telephone system is installed along the route with individual phones at each motor terminal point. The motors are interlocked and operation of the equipment is thus started at consecutive steps from the discharge end. The belt travels at a rate of 620 f.p.m. and at the present time 7 min. is required to transport material from the abutment excavation to the spoil bank at the end of the conveyor. The entire belt conveyor line is housed under timber roofing.

In addition to the main conveyor system, there has also been constructed a cofferdam shuttle conveyor line which permits diversion of excavated material for filling cofferdam cells. This smaller unit consist of 42-in. wide steel apron feeders which discharge on to a inclined 48-in. belt conveyor 260 ft. long, this in turn feeding on to an 860-ft. long travelling shuttle conveyor. At both ends of the shuttle conveyor a 36-in. belt conveyor 200 ft. long is mounted on a structural steel bridge. The head end is supported on a track which runs over the cofferdam cells which permits filling of the entire cofferdam unit with selected excavated material with this one conveyor system. The two boom conveyors are turn-table mounted on the ends of the shuttle conveyor.

In taking out the material for the east abutment, 16 units of 48-in. belt conveyor, each equipped with 125 h.p. motor drives, will be used to transport the material to an upstream location.

Stanley M. Mercier and R. M. Matthew, engineers for Jeffrey Co., supervised the entire installation of the conveyor system.

Personnel. Engineering personnel of the Bureau of Reclamation include: Frank A. Banks, construction engineer; A. F. Darland, field engineer; C. M. Cole, assistant field engineer; and J. A. Miner, office engineer. The executive and field staff of Mason-Walsh-Atkinson-Kier Co. are: Chairman, board of directors—Silas B. Mason; president—T. J. Walsh; Vice-president—Guy F. Atkinson, M. J. Whitson; treasurer—W. J. Hanger; secretary—E. L. Kier; general manager—H. L. Myer; assistant manager—Geo. H. Atkinson; general superintendent—M. H. Slocum; chief engineer—Francis Donaldson; job engineer—C. D. Riddle; office manager—Ray Dycus.

Fort Peck Spillway Structure Bids Called

BIDS will be opened at 11:00 a.m. on April 3 for construction of the spillway gate structure, cut-off structure, and appurtenant works for Fort Peck dam which is under construction by the War Department on Missouri river 25 mi. southeast of Glasgow, Mont. Specifications call for 107 separate items in which are included the following: 667,700 cu. yd. of open-cut and trench excavation; 287,700 cu. yd. of all classes of concrete; 7,564,000 lb. of miscellaneous metal work; and 22,000,000 lb. of reinforcing steel.

The site of the proposed spillway is approximately 3 mi. east of the east end of the dam. The entire spillway consists essentially of an unlined approach channel about 2,000 ft. long leading to a gate structure composed of structural steel gates mounted between concrete piers, a concrete lined channel about 5,000 ft. long, a cut-off structure at the lower end of the lined channel and an unlined outlet channel from the cut-off structure to the river valley.

The above mentioned specifications provide for all work for the approach channel, cut-off structure and spillway structure, including building, roads, grounds, etc. Preliminary excavation for the entire spillway and complete excavation and concrete lining for the channel between the gate structure and the cut-off structure are included in work being done under other contracts.

The entire work shall be completed within 700 calendar days after awarding the contract and the contractor shall pay to the Government as liquidated damages the sum of $500 for each calendar day of delay until the work is placed in a safe and practical operating condition and $35 per day thereafter until the remaining work is completed.

Disposal Plant for Denver

CONSTRUCTION will probably be started within the next few months on Denver's much needed sewage disposal plant. Action has been precipitated by an order issued by the State Board of Health to prevent the City of Denver from dumping sewage into South Platte river under penalty of prosecution and by a pending enjoining suit.

A survey is now being made to determine the type of plant and construction cost. The cost is estimated at $3,030,000, including the site, tentatively chosen at East 52 ave. and Franklin st.

A consultant's report will be made about March 15 in preparation for a vote on the necessary bond issue on May 21. It is hoped that the entire cost or the greater portion of the project can be financed through PWA funds, but it may be necessary to finance a part or all of the work by a bond issue. The acute need for correction of disposal makes it imperative that action be taken very soon.

Montana Adopts Bridges of Built-Up Girder Design

By W. BERTWELL
Chief Draftsman, Bridge Department
Montana State Highway Commission

THE built-up deck girder is being put to good use in Montana's new highway bridges. This type of construction, although its advantages are obvious enough, has been little used in comparison with through construction, or some even more uneconomical design, in an effort to obtain minimum deck thickness for the sake of underclearance. However, for bridges in the range for which they are suited, built-up deck girders have been found to require a deck elevation not more than 3.5 ft. higher than with conventional through construction. This additional height of approaches is of no importance in most locations in Montana and entails a negligible additional cost of approach fills and in many places the higher grade is in fact desirable.

Among structures of this type recently completed or now under contract in Montana are:

1. A 300-ft. cantilever bridge over Tongue river at Miles City; anchor spans, 92.81 ft.; cantilever arms, 20.06 ft.; suspended span, 74.25 ft.; 22-ft. roadway; two 5-ft. sidewalks; girders 5 ft. back to back of angles; floorbeam and stringer deck with concrete slab, sidewalks and handrail; completed in July, 1934.

Quantities and bid prices for Tongue river bridge, Prahl & Sawtell, Inc., Miles City, Mont., contractors: (Contract let in October, 1933)

Item	Quantity	Unit Price	Total
Structural Steel, lb....	363,000	$ .06	$21,780
Cast Steel, lb.....	10,950	.12	1,314
Cl. A Concrete, cu. yd.	498	23.50	11,703
Cl. D Concrete, cu. yd.	240	23.50	5,640
Reinforcing Steel, lb...	60,000	.05	3,000
Concrete Handrail, ft..	603	2.00	1,206
Structure Excv., cu. yd.	820	3.50	2,870
Floor Drains, cu. yd....	26	4.00	104
Total			$47,617

2. A 500-ft. combination of continuous and cantilever spans over Yellowstone river at Livingston; piers on 20-deg. skew; first span consists of 90.5-ft. suspended span and 18.5 ft. cantilever arm; second, third, and fourth spans are continuous and 108, 114, and 108 ft. long respectively; fifth span consists of 18.5-ft. cantilever arm and 42.5-ft. suspended span; completed in July, 1934.

Quantities and bid prices for Yellowstone river bridge, McLaughlin Construction Co., Livingston, Mont., contractors: (Contract let in November, 1933)

Item	Quantity	Unit Price	Total
Structural Steel, lb.....	468,500	$ .056	$26,236
Cast Steel, lb.	15,850	.10	1,585
Cl. A Concrete, cu. yd.	726	20.00	14,520
Cl. D Concrete, cu. yd.	313	20.00	6,260
Reinforcing Steel, lb...	83,830	.055	4,610
Concrete Curb and Rail, ft.	1,015	2.00	2,030
Structure Excv., cu. yd.	1,217	11.00	13,387
Total			$68,628

3. A 500-ft. bridge of five continuous spans over Missouri river at Townsend; 89.5 ft. end spans and three 107-ft. intermediate spans.

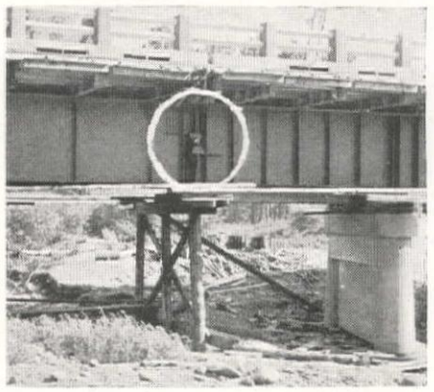
Quantities and bid prices for Missouri river bridge, Rue Bros., Bismark, N. D., contractors: (Contract let in November, 1934)

Item	Quantity	Unit Price	Total
Structural Steel, lb....	398,400	$ .06	$23,904
Cast Steel, lb.....	15,300	.13	1,989
Reinforcing Steel, lb...	82,400	.055	4,532
Cl. A Concrete, cu. yd.	595	23.00	13,685
Cl. D Concrete, cu. yd.	366	23.00	6,438
Structure Excv., cu. yd.	1,100	6.85	7,535
Concrete Curb and Rail, ft.	1,002	3.00	3,006
Untreated Timber Piling, ft.	4,650	.50	2,325
Removal of Existing Structure			1,000
Total			$66,414

Class A concrete is used in the substructure; class D in the slab, handrails, and curbs.

(Left) View of Completed Yellowstone Bridge at Livingston Showing Location of Suspension Point.

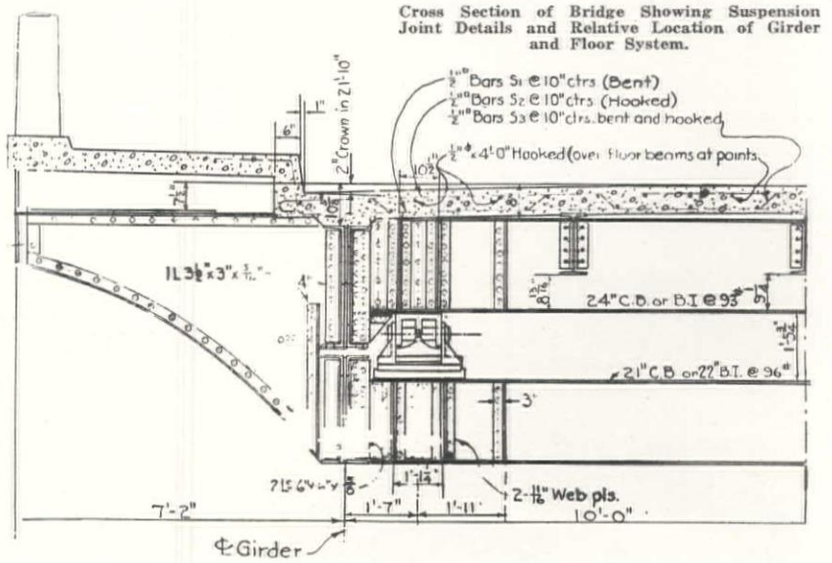
(Lower) Detail of Suspension Point in Girder Showing Overhanging Floor System Above.



Each of these bridges presented a slightly different problem. The structure at Miles City, required as shallow construction as practicable. The crossing at Livingston, except as already noted has superstructure details similar to those of the Townsend bridge, which is under construction at present.

The Livingston and Townsend bridges exemplify better the advantages of the deck girder in light highway bridge construction. They carry 22-ft. concrete roadway slabs and concrete handrails. The girders are 6 ft. back to back of angles and are spaced 13 ft. on centers. Across the top flanges of the girders are 34-lb. floorbeams, (14-in. flanges) spaced 6 ft. on centers, which carry the slab. The slab has a level bottom, thus sim-

Cross Section of Bridge Showing Suspension Joint Details and Relative Location of Girder and Floor System.



plifying form construction, while the 2-in. crown is just sufficient to provide necessary bending strength in the concrete at critical points and to maintain constant spacing and size of reinforcing bars.

The girders themselves are more economically fabricated and erected when compared with trusses. In the erection of the Livingston bridge, very little additional equipment was necessary other than required for the pier construction. The railroad crane unloaded the girders from flat cars and laid them flat on three runways topped with greased railroad rails. A 4-ft. pitch in about 180 ft. on the runways enabled a light tractor to pull the girders down to the falsework trestle, which was composed of three-pile bents on about 20-ft. centers with two 9 by 18-in. stringers placed 6 ft. on centers to match the girder depth. The girders were then run out on rollers and tipped up into final position. The spacing of falsework bents was amply close to permit riveting up the field splices of the continuous spans without stress.

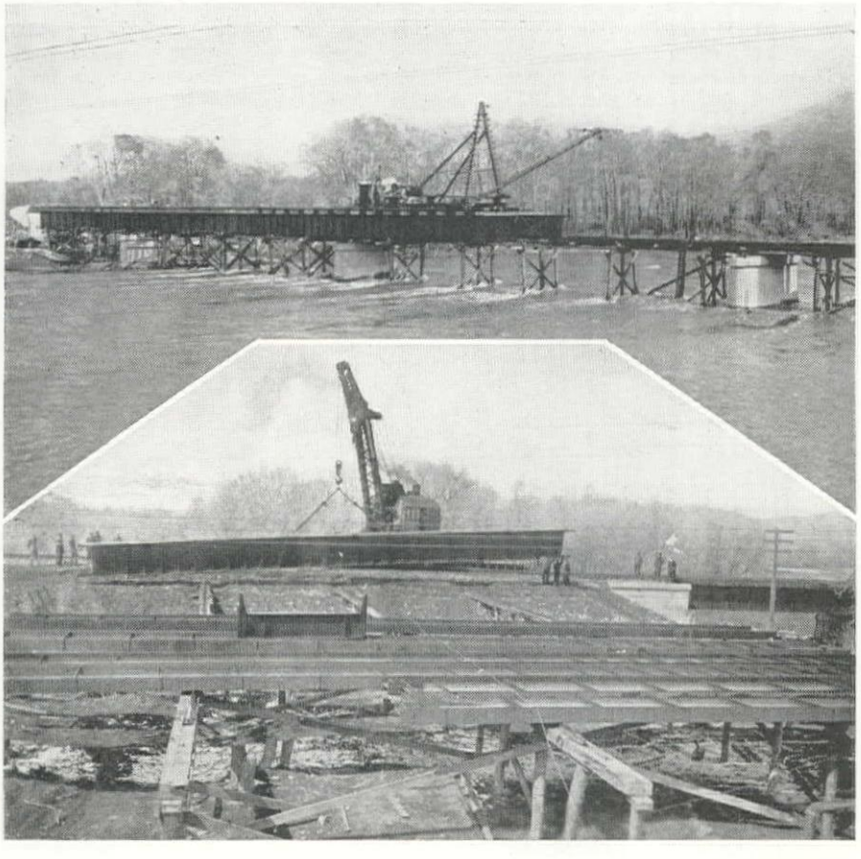
These girders are also better adapted to cantilever or continuous construction than trusses. The continuous construction is preferred where foundation conditions are satisfactory since it eliminates complicated suspension points and provides a more rigid structure. The design usually need not be complex, as with constant depths very little error is introduced by assuming a constant moment of inertia. This may be seen in that girder deflections are compensated for by riveting fillers of proper thicknesses on the top flanges, on which the floorbeams rest. Deflections are calculated using an average moment of inertia, and in construction there is no discernible deviation of the tops of the floorbeams from the calculated elevations.

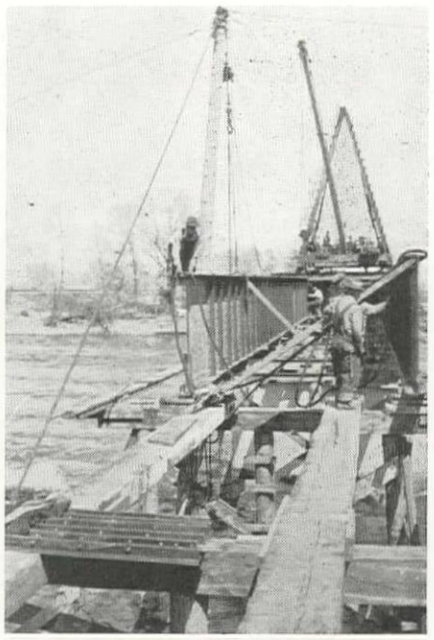
The Livingston bridge also illustrates the simplification possible for skew crossings, in using deck girders rather than trusses. Floorbeams for this bridge were carried normal to the girders over the piers, the only skew details occurring at the two floor joints at the ends of the suspended spans. These suspended spans were introduced because it was decided to reduce the cost of the end bents by founding them at higher elevations than the piers, and therefore on material more likely to settle. But for this arrangement, all floor joints might have been square, as in the Townsend bridge. The bracing of girders is, naturally, much simpler in detail than with trusses.

In general, this type of superstructure provides a wider roadway at the same cost, or the same roadway at less cost, as compared to through structures. Another economy resulting from the use of deck girders is in the substructure. The piers may be made much shorter than for a through bridge, since the girders can be set comparatively close together. In the case of these bridges, which are located over streams that carry ice, the minimum pier shafts were designed for little if any excess strength over that necessary to resist the estimated ice and wind forces. The smaller size of piers required for deck girders indicates the economy of using shorter spans than for through structures, and this in turn tends to increase the range of utility of the deck girder bridge.

R. D. Rader is chief engineer of the Montana Highway Commission and B. J. Ornburn is bridge engineer.

(Upper) Erecting Steel Girders on Timber False Work. Note Overhanging of Beam Over Pier. (Lower) Unloading Girders From Railroad Cars to Timber Runways. Girders Are Picked Up at Lower End and Transported on Rollers to Erection Site.





View of Steel Girder Erection Showing Simple Method of Bracing During Construction.

Work Resumes on Casper-Alcova Project

FOLLOWING suspension of activities several months ago on the PWA Casper-Alcova project in Wyoming construction will proceed under a modified plan which reduces the acreage involved from 66,000 to 35,000. The total cost of the project will be reduced, correspondingly, from $23,700,000 to $20,000,000. The work was temporarily blocked by a suit filed by the State of Nebraska regarding allocation of water from the North Platte river on which Alcova and Seminoe dams are to be built. A definite date for beginning of work has not yet been set since it is necessary to first complete execution of a new repayment contract by the irrigation district.

The project will be built on the basis of 1934 priority water rights instead of the originally planned 1904 priority. In 1904 the U. S. Reclamation Service planned to construct Casper canal as part of a development along North Platte river and filed a permit with the Wyoming state engineer for the necessary appropriation. This application involved irrigation of 25,228 ac. and an appropriation of only 300 c.f.s. The amended application resubmitted in July, 1934, increased the area to be irrigated to 82,000 ac. and the appropriation to 12,000 c.f.s., and was the basis of Nebraska's suit in an effort to protect persons who had perfected water rights on the lower North Platte river in the period since 1904.

The total cost of the revised project remains comparatively high because the cost of Seminoe storage reservoir and power development remains unchanged and the main canal will be made large enough to irrigate the 66,000 ac. as originally planned, providing sufficient water is available. The cost allocated to irrigation amounts to $80 per acre.

Unique Blasting and Grading Methods Used on Arizona Highway

Opening Up a Pioneer Road Around Heavy Rock Cut. Note Wellrig Drilling Blast Holes at Top of Cut Above Shovel.

By A. F. RATH
Resident Engineer, Arizona Highway Department

THE Globe-Showlow division of U. S. Highway No. 60 is now well in its fourth year of construction. Work was started in the late spring of 1931 at Globe county, seat of Gila county, and to date, 45 mi. of the road have been completed. It crosses Crook National forest, San Carlos, and Fort Apache, Indian reservations, and will terminate at Showlow, a town situated in Sitgreaves National forest in Navajo county. When completed, U. S. Highway No. 60 will provide an all-year round route through Arizona from California to New Mexico without a serious snow hazzard such as now encountered along the temporary route.

The portion already completed was let in six different contracts. The first section, beginning at Globe, traversed an easy rolling country but as the work advanced, it met with increasing difficulties. At Salt River canyon, 38 mi. from the beginning, the exceedingly rugged terrain had made road building a very disturbing and difficult task.

The entire route crosses low rolling country between elev. 3,000 and 6,500 ft., and offers many changes in scenery and vegetation. The boundary between desert and mountain is distinguished by an abrupt change in plant life from cactus, greasewood, and mesquite to walnut, oak, and pine trees. In one small isolated section cacti are content to thrive in the shadow of tall pines as though nature became confused while attempting a division, and compromised by permitting both to grow together.

Salt River canyon provides a multicolored series of horizontal rock formations, not unlike Grand Canyon, and offers many inspiring views. In addition to its grandeur it also provided both engineer and contractor with many difficulties during the location and construction of this road as it winds down one canyon wall and up the other side.

Present construction activity is confined to grading a 3.9 mi. section that embraces most of the rougher country at the upper end of this division near Showlow. This section, known as NRH-99G, was awarded by Arizona Highway Department to George W. Orr Contracting Co. last October for $316.938. Of this amount, 87% is applicable to excavation, overbreakage, and haul, while 13% is applied to drainage structures and guard-fence.

The geological formation is chiefly limestone and sandstone with the usual talus slopes commonly found in this region. These slopes cover rock ledges, faults, and fissures and make it almost impossible to determine the nature of material in cuts until they are drilled.

Drilling is done by Ingersoll-Rand S-49 jackhammers and a Bucyrus-Armstrong No. 26 wellrig which provides a new type of drill for this work. The wellrig, which bores either a 6 or 8-in. hole and carries its own powerplant, is mounted on caterpillar tracks, providing a very mobile outfit that can reach its objective with a minimum of pioneer road building.

Where the formation permits, blastholes in cuts are bored about 5 ft. from the shoulder line to a depth slightly below grade. This prevents possible overbreakage and leaves no high places in the bottom of cuts. Where additional slope or ditching shots are required, necessary drilling is done later with jackhammers. Lighter cuts up to 30 ft. deep are all drilled by jackhammer methods, air being supplied by 310-ft. Ingersoll-Rand compressors. The contractor has found it more economical to take out cuts in a single lift to grade than in several layers as done on previous contracts on this project.

These blast-hole shots have been very successful in limestone cuts up to 60 ft. in depth, the heaviest drilling to date. The holes are loaded alternately with powder and tamping and the shots thoroughly shatter the rock from bottom to top. Holes drilled by the wellrig are column-loaded to within about 25 ft. of the top and fired by Cardeau fuses. Jackhammer holes are electrically fired. When shooting and excavating is done simultaneously in deep cuts it is necessary to provide an economical method of landing the rig on lower ground after the cut is drilled and shot. The first cut was drilled from both ends toward the middle in order to shoot against a face and keep the shovel working. In drilling the last group of holes, the rig was perched on high ground surrounded by vertical walls. A temporary road was built and with a cable slacked was let down with little cost.

Excavating equipment consists of a bulldozer and two Bucyrus-Erie shovels —a model GA-3, equipped with a 1¼-yd. dipper and a new 43-B model, equipped with a 2-yd. dipper. To permit the use of shovels in the bottom of deep and narrow cuts, boom lengths were reduced to 22 ft., dipper sticks to 17 ft., and the model 43-B shovel was altered to allow a 360 deg.

Loading 12-yd. Carts With Bucyrus-Erie 43-B Shovel. These Carts, Designed by W. E. Orr, Have 3-ft. Wide Steel Wheels Which Act as Compaction Rollers on Fills.

swing. The width of roadway on tangents is 24 ft. with one foot ditches and ¼ : 1 side slopes.

The direction of haul does not always permit working against a face due to the alignment contouring the mountain side, passing through ridges, or crossing deep narrow gorges. It is often necessary to develop pioneer roads around cuts that are too rugged to pass over on centerline, or perhaps some canyon must be headed to keep equipment in operation. This calls for planning—especially when the access detour is unavoidably routed through some talus slope covered with great slabs of fallen rock or perhaps over a natural road on top of a convenient stratum of limestone, which is a very rare convenience on this job. This work is done entirely with the bulldozer when conditions permit but considerable shooting is required on detours completed to date.

Haulage equipment consists of five 5-yd. White trucks, a McMillan scraper, and two all-steel 12-yd. carts which are drawn by Caterpillar '60' tractors. These carts, designed by W. E. Orr and fabricated at Globe, have 3-ft. wide steel wheels which also act as compaction rollers on fills. The carts are dumped by gravity and a hoist mounted on the tractor facilitates righting the body after dumping.

The material encountered includes about 90% solid rock, therefore no teams or fresnos will be used. This classification did not completely eliminate the use of all livestock, however, since a few burrow are employed to pack powder to places where regular hauling equipment would require extensive pioneer roads. They just about make their own trails and give no concern to their load, although a slip over the hillside may develop a surprise for them on landing.

The quantities for the job run fairly uniform for cuts but vary greatly for the fills. The average roadway excavation amounts to 1,600 cu. yd. per station for the full length of the project and total excavation will amount to 327,000 cu. yd. The largest fill on the job is 285 ft. between grade points and contains 104,000 cu. yd. of embankment. An average of 2,000 cu. yd. of rock per day is being moved.

The work is a National Recovery Highway project with the completion date set for December 31, 1935 but the contractors expect to complete the work in early fall. W. E. Orr and George W. Orr are in active charge of the work for the contractors. R. C. Perkins is district engineer, the writer is resident engineer, and T. S. McConnell is state highway engineer for Arizona Highway Department.

New Stadia Slide Rule Reduces Labor in Reduction of Survey Notes

The reduction board makes possible a saving of 50% in office computation over other methods.

ONE of the most laborious and time-consuming operations confronting topographers and office engineers is the reduction of stadia notes. By the most rapid method heretofore used—the stadia slide rule—the reduction consists of 6 distinct operations, each involving the possible introduction of error, and requiring a definite amount of time, depending upon the dexterity of mechanical manipulation.

A highly improved and ingenious device has been recently developed and perfected by C. J. Terry, and his associates, of the Los Angeles County Surveyor's Department for cutting labor and costs involved in the tedious operations encountered in reduction of stadia notes. Several authorities on stadia work, who have familiarized themselves with this new instrument believe the method for stadia, calculations is about to be revolutionized.

This new stadia reduction board is essentially a slide rule consisting of three slides, the exterior two of which are set on an index indicating the height of instrument (HI) the third or middle slide being set for rod readings. This slide rule operates on a board (as shown on figure 1) which consists of a chart showing horizontal and vertical distances for a given stadia distance at a given angle.

The operation consists of setting up the height of instrument on the slide rule, placing the slide rule to the correct vertical angle in the chart on the board, setting the pointer attached to the rod reading slide to the stadia distance. The true elevation and horizontal distance are read direct.

The portion of the chart lying to the left of line AB (figure 1) is used for determination of vertical corrections, each line of the chart being the curve of the vertical correction for a given stadia distance for any given vertical angle, measured from the line AC as an origin. The portion of the chart lying to the right of the line AB determines the amount to be subtracted from the slope stadia distance to determine the horizontal distance from the instrument to the rod. The vertical angles are set off to the nearest five minutes along the left hand edge of the chart and for all practical purposes can be interpolated to the nearest minute.

The slide rule (figure 1) is composed principally of two elevation slides, D and E, and a rod slide F, slide D being used in case the vertical angle is plus and slide E when a minus vertical angle is encountered. The height of instrument (HI) above initial datum is set off on slides D and E at index marks GG. The slide rule then adds or subtracts the vertical correction from the HI and at a point on the proper elevation slide opposite the rod reading on the rod slide F, the ground elevation at the rod is read directly.

The simplicity of operation in determining elevations can be best illustrated by referring to Figure 2. As an example assume an HI of 1044.6 ft. This (44.6 ft.) is set off on the elevation slides D and E at the index marks GG. It is then desired to reduce the following stadia problem from the above set-up:

Stadia Distance = 66 ft.
Vertical Angle = − 15° 43′.
Rod Reading = 11.0 ft.

1. Move the slide rule along board to a point where index K is set at 15° 43′.
2. Move the rod slide F to a point where index L is set at the 66-ft. curve.
3. On the elevation slide E opposite the 11-ft. rod graduation denoted by M the elevation (16.4 ft.) 1016.4 ft. is read.

Had the vertical angle been +15° 43′ with a rod reading of 11.0 ft., the elevation would have been taken from elevation slide D opposite the 11.0-ft. rod graduation denoted by N and would have been (50.8 ft.) 1050.8 ft.

FIG. 1

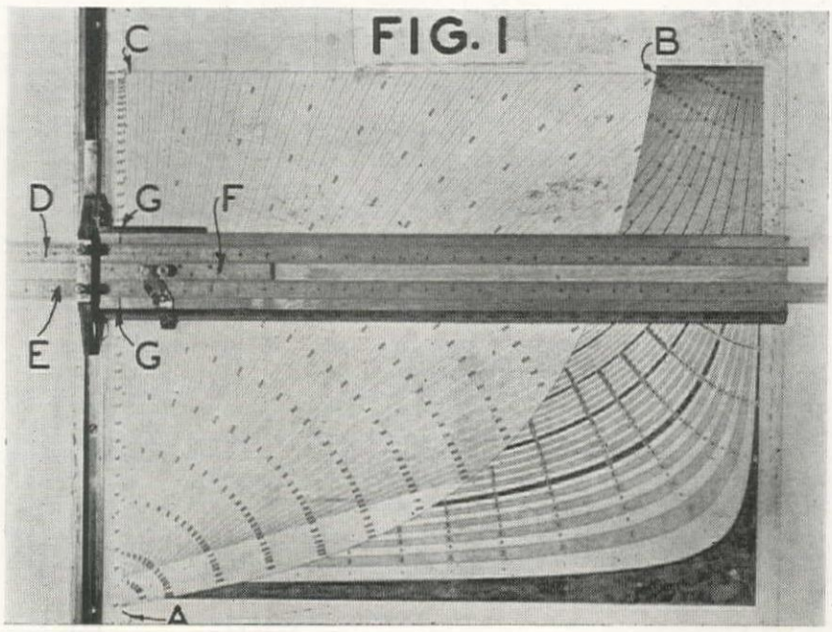
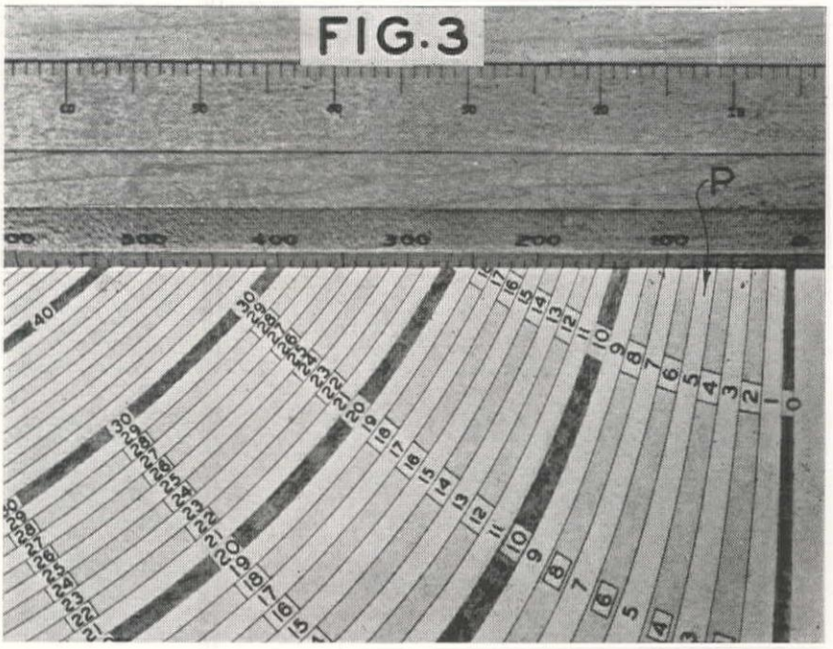


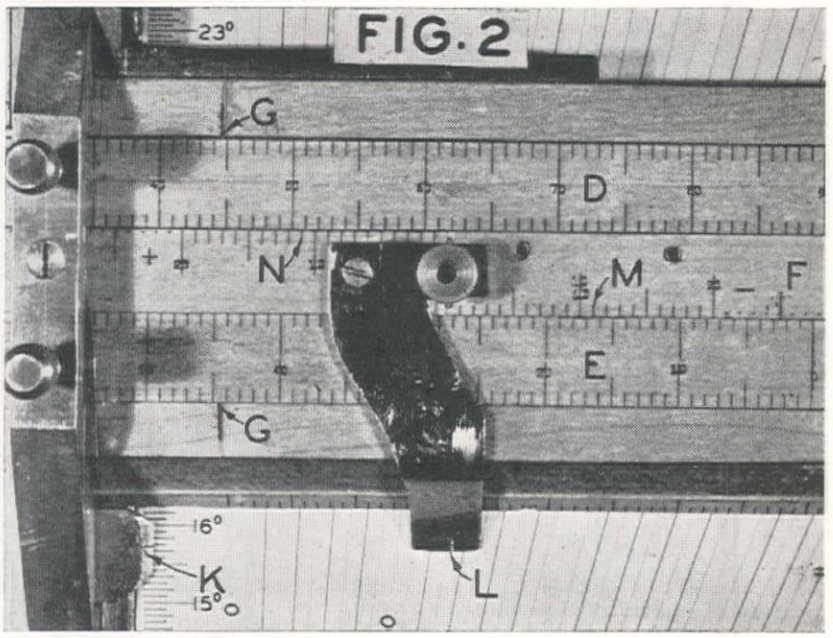
Figure 3 shows a section at the right hand end of the rule at the same setting as used in Figure 2. By reading the band on the chart opposite the stadia distance of 66 ft. at the point P it is found necessary to subtract 5 ft. to arrive at the horizontal distance. This makes the horizontal distance from the instrument to the rod in the above problem 61 ft.

It is a known fact to all engineers who are experienced in stadia calculations, that the major saving of any consequence through the use of the stadia slide rule and other modern devices of similar nature, is in the actual calculation of (1) the vertical distance between the telescope axis and the point on the rod intersected by the center horizontal hair and (2) the horizontal distance between the instrument and the point occupied by the rod. Example (1) is expressed mathematically as follows:

V = stadia distance × (½ sine 2a)
where
V = vertical distance
a = angle of elevation.

To obtain the required ground elevation at the rod by this method, V must





be added to, or subtracted from, the HI and the rod reading subtracted from the result thus obtained. These last two operations must be made by actual computation, the value of the slide rule having expended itself in the determination of V.

The Terry device in one operation calculates the elevation of the point (at the rod) on the ground above the initial datum, thus eliminating the actual computation and personal error involved in the last two operations mentioned above. Expressed mathematically the following computation is accomplished by the new device:

E = HI ± (stadia distance × ½ sine 2a) − R
where
E = ground elevation above the initial datum at point occupied by rod
HI = the height of instrument above initial datum
a = angle of elevation
R = rod reading

The new instrument, as previously illustrated, reduces the slope stadia distance to horizontal with the same setting required in determining the elevation of a point. The added feature involves some saving in time over the old slide rule method.

The Los Angeles County Surveyor's Office is engaged in considerable mountain highway location involving topographic surveys by the transit-stadia method. Office reduction of stadia notes are continually in progress. Previous to this recent development this type of work has been done through the use of 24-in. stadia slide rules. During a thorough test of the Terry instrument, covering a period of several months, a saving of 50% in office computations of this kind has been made over the slide rule method. This amounts to a monetary saving of approximately $1,200 per year per instrument on office computations alone. When used by the recorder on a plane table an even greater saving is realized.

Speed and accuracy when used in the latter capacity exceed considerably that obtained by the use of the Beaman stadia arc, especially at stations where numerous side shots are taken from the same HI.

No arrangement has yet been made to manufacture and distribute the Terry stadia reduction board.

Pipe Line Completed for Colorado Springs

WITH completion scheduled for February for the second pipe-line unit of the North Slope Diversion on Pike's Peak, the city of Colorado Springs will begin using its new $715,000 pipe line system immediately. This new pipe line, with a total length of 10.25 mi. is complete between Manitou, a suburb at the base of Pike's Peak and Crystal dam which is now under construction. This dam, which is 90 ft. high, will be a gravel-fill with an electrically-welded steel face. E. H. Honnen has a $293,235 contract for constructing the gravel fill and the steel face will be erected by American Bridge Co. at a price of $65,000.

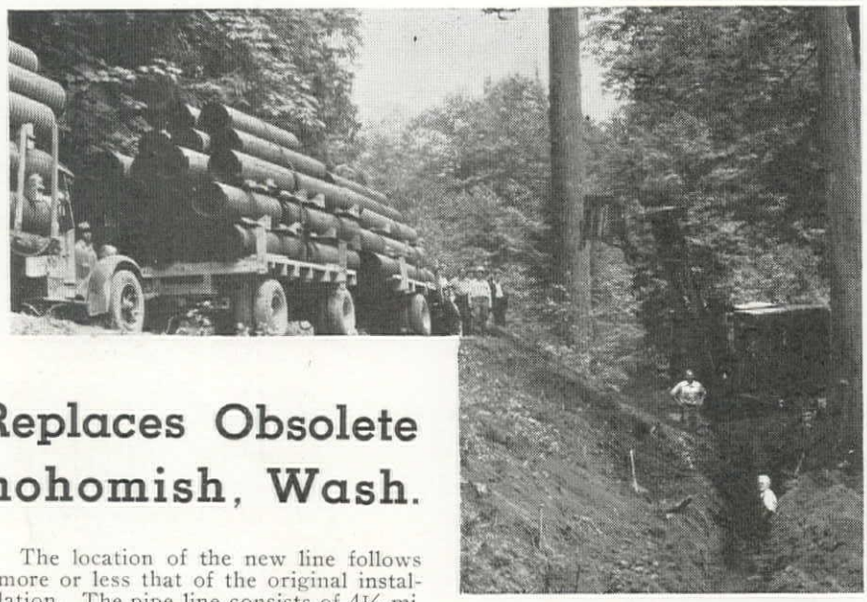
Following completion of Crystal Creek dam the final unit in the $1,500,000 water development program of Colorado Springs will be started. This will be a dam of similar construction to be known as Catamount dam, the site being about one mile above the Crystal Creek location. Plans and specifications are now being prepared for Catamount dam, which will provide 800 million gal.

New Tunnel for Twin Lakes Diversion

Bids on the second unit in the Twin Lakes Water Diversion project in Colorado may be called within the next two months. An original appropriation of $2,000,000 was made by the RFC to the Twin Lakes Reservoir and Canal Co. for driving of two tunnels and constructing collection canals to facilitate bringing water from the west side of the Continental Divide to Twin Lakes on the east side. The water will be used

An original allotment of $1,125,000 was used to finance the driving of a 3.8-mi. long tunnel under the Continental Divide at Independence Pass. This work was under contract to Platt Rogers, Inc., of Pueblo and on February 4 this tunnel was holed through.

The new tunnel will be about 2 mi. long with a diameter of about 7 ft. inside the concrete lining. When bids were opened on the original unit, Rogers submitted a bid for the second unit of the work at that time. He may be awarded the new work under his original bid in which case no bids will be requested.



Wood Stave Pipe Replaces Obsolete Supply Line for Snohomish, Wash.

THE City of Snohomish, Wash., recently completed reconstruction and enlargement of its 15-mi. gravity water supply line from its source on the Pilchuck river to the reservoir at the city limits. The original 12 and 14-in. Douglas Fir wire-wound wood stave pipe line installed in 1911, was designed to deliver 1.2 m. g. d., which, at that time seemed to be ample—even for future development. However, the demand increased beyond expectations, and for several years past, water has been pumped from wells near the city limits during the summer season to augment the gravity supply. This arrangement proved expensive and unsatisfactory since the pumping cost could not be gracefully accepted in view of the fact that the Pilchuck river water right provided for more water than the city could use. The new line will deliver 3.168 m. g. d. which is considered sufficient for present and estimated future demands. Although the water is of exceptional purity, it is chlorinated as a safety measure.

The location of the new line follows more or less that of the original installation. The pipe line consists of 4½ mi. of 18 in., 7 mi. of 16 in. and 3½ mi. of 14 in., a portion of the line operating under a pressure of about 85 lb. per sq. in. Because more than one half of the line operates under a light pressure, staves for all of the low-pressure pipe were preserved by a pressure creosote treatment, 8 lb. being applied per cubic foot of wood. Double-seal metal collar couplings were used on all of the pipe. These couplings consist of an inner and an outer welded steel ring, the inner ring being ⅛ in. thick and the outer one 3/16 in. thick. A portion of the line parallels an access road and pipe was distributed directly to the trench from trucks, but in some places a Caterpillar tractor and sled were used. Pipe was laid in a trench which provided a cover over the pipe of about 18 in.

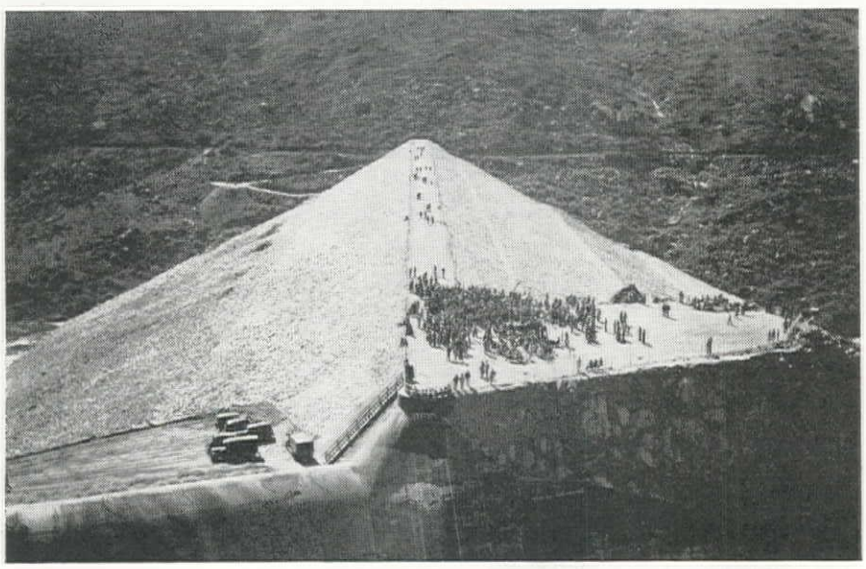
Acme Construction Co., contractors for the pipe installation, used two Speeder hoe type gasoline shovels for trench excavation. To comply with the Federal 30 hr. week requirement, crews worked two, and sometimes three, 5-hr. shifts per day. The contractor made excellent progress although swampy conditions and excessive ground water in some places made it difficult to excavate and lay pipe. Before backfilling, the pipe was tested in sections about a mile long and leakage was practically negligible. A large part of the backfilling was done with a tractor and bulldozer.

Pipe was furnished by Federal Pipe and Tank Co., Seattle, under a $93,644 contract and the installation contract involved $48,741. The project was financed by a 20% grant from the State of Washington, a 30% PWA grant, and bonds for the balance which were sold to the Public Works Administration. Clarence Hickey, now Snohomish county engineer, was consulting engineer for the project.

Dedication Held for El Capitan Dam

BEFORE a crowd of 1,500 people, El Capitan dam, the recently completed hydraulic fill-rock fill embankment type dam for the City of San Diego, was formerly dedicated on February 22. Tribute was paid by several speakers to Hiram N. Savage and Fred D. Pyle, hydraulic engineers who supervised design and construction of the 217-ft. high dam which provides a reservoir capacity of 38 billion gallons.

Savage died on June 24, 1934, during active work on the project. He first entered the service of the City of San Diego in 1917. In recognition of his outstanding services in furthering the City's water and construction program, Lower Otay dam, a part of the system, was named 'Savage Dam' in his honor on July 9, 1934.



Appropriately enough, T. B. Cosgrove, who in 1914 dictated the opinion upholding the City's rights to the waters of the San Diego river, unveiled the dedicatory plaque. Hydraulic engineer Pyle gave a brief summary of the work yet to be done on the project and mentioned several men who played an important part in the construction of the dam. These included: D. W. Albert, hydraulic fill engineer; Harold Wood, former resident engineer; H. W. Rohl and T. E. Connolly, dam contractors; M. H. Golden and A. Bodenhamer, contractors on appurtenant work; J. B. Lippincott and Louis C. Hill, consulting engineers; Paul Beerman; O. C. Steves, and Allan Rowe.

The dam is located 8 miles easterly of Lakeside, Calif. It contains 2,700,000 cu. yd. of materials and is the second highest dam of this type in the world (Cobble Mountain dam in Massachusetts is highest). The contract price of the dam was $2,332,860. (For detailed articles see December, 1933, March 25, 1932, October 25, 1932, issues of Western Construction News.)

Bids Open for Taylor Park Dam in Colorado

BIDS for construction of Taylor Park dam, a part of the Uncompahgre irrigation project in western Colorado, were opened by the Bureau of Reclamation in Gunnison, Colo., on February 18. Alternate low bids were submitted by the joint firm of Utah Construction Co., W. A. Bechtel Co., Morrison-Knudsen Co., and Henry J. Kaiser Co., (all Six Companies, Inc., members), who bid $783,742 for the concrete arch dam and $798,078 for the earth and rock-fill dam. The second low bidder on the concrete arch dam was W. S. Broderick, Hinman Bros. Construction Co., Floyd Shafner, and J. M. Gordan, at $974,682, and J. A. Terteling & Sons was second low on the earth and rock-fill dam at $819,517.

The Uncompahgre project has an irrigable area of 75,000 ac. and is one of the Bureau's oldest units. Necessary additional storage, due to recent severe shortages, will be made possible by construction of Taylor Park dam. The concrete arch dam will have a maximum height of 200 ft., a crest length of 850 ft., and will provide a reservoir of 160,000 ac. ft. capacity. The earth and rock-fill dam will be 168 ft. high above the river bed. The main feature of the outlet works will be a concrete-lined tunnel, 1,100 ft. long, which will be used for diversion during construction.

A. A. Whitmore is construction engineer for the Bureau at Gunnison. (For detailed articles see September, 1934, and January, 1935, issues, Western Construction News.)

●

Moffat Tunnel Work Starts

WITH formal ceremonies at West Portal, work was started on the contract for enlarging and lining the pioneer Moffat tunnel, a part of the Frasier River project for supplying additional water to the City of Denver. The tunnel work is being done by Utah-Bechtel-Morrison, Inc., of Ogden, Utah, at a price of $972,576. The engineer's estimate was $1,206,722.

The work is financed by a $3,500,000 PWA loan and grant and the project will bring 54,000 ac. ft. per year from Frasier river and its tributaries through the Moffat pioneer bore from the west side of the Rockies (see December, 1934, issue, Western Construction News).

●

THE Tenth Annual Meeting of the Montana Section of American Water Works Association will be held at Helena, April 12 and 13. The program for the two days meeting includes reports of the [illegible] and members who have re[illegible] Montana section at y[illegible] taliks and perti[illegible] informed sp[illegible] an inspecti[illegible] system [illegible]

Association Notes . . . .

Chas. W. Carle, 3rd
Vice-President, San Francisco Builders Exchange

Architects Hold Biennial Exhibit

The biennial exhibit of the Northern California Division of the American Institute of Architects will be held in connection with the annual building exposition and convention to be held May 4 to 12 inclusive in San Francisco Civic Auditorium. The exhibit, to occupy 4,000 sq. ft., will consist of models, drawings, paintings, and photographs of fine examples of architecture in northern California as well as building materials and equipment used in the building industries.

William H. George is president of the builders exchange and Frederic Weddleton is exposition manager.

●

At the February meeting of Colorado Association of Highway Contractors, Williard T. Chevalier, vice-president of McGraw-Hill Publishing Co., gave a talk on 'The Construction Industry Today and Tomorrow.' G. W. Hamilton, president, and James B. Kenney, secretary, presented a report of the National A. G. C. meeting which they attended in Washington, D. C.

●

R. B. Cozzens, of Watsonville, was recently appointed assistant to Regional Director Harry E. Reddick for the [illegible]ralitos soil erosion project in Santa [illegible]county, Calif. Cozzens was asso[illegible]ith Granite Construction Co.

AT THE annual meeting of the Portland Chapter of the Associated General Contractors of America, the following officers were re-elected for the coming year: President—C. A. Schram; first vice-president in charge of public works division—J. A. Lyons; second vice-president in charge of building division—Ross B. Hammond; and secretary-treasurer—W. T. Jacobsen.

The executive board elected for 1935, in addition to C. A. Schram, P. L. Crookes, and W. T. Jacobsen, the latest three past presidents is as follows: J. C. Compton, M. J. Lynch, G. E. Kibbe, H. A. Dick, Theodore Shoemaker, Frank Penepacker, W. H. Feigenson, J. A. Lyons, Ross B. Hammond, Natt McDougall, and J. S. Seed, serving in an honorary advising capacity.

The meeting was featured by a talk by R. H. Baldock, Oregon State Highway Engineer, who spoke to the members on the effect of the public works bill now pending before congress and the benefits that would accrue thereby for the State of Oregon. Baldock brought out the point that the State of Oregon has made provisions to match state funds with the $2,000,000 federal funds authorized by the last congress in connection with federal aid highway work.

C. A. Schram brought out the great need for expending the work relief funds now under consideration at Washington through the contract method which has been proven more economical than the day labor system.

●

The February meeting of the Seattle Section, Am. Soc. C. E. was featured by a talk by O. A. Piper, Assistant City Engineer, and Clark Eldridge, bridge engineer on the design and construction of the railroad avenue seawall now under construction in Seattle.

●

At the February meeting of Colorado Society of Engineers several speakers discussed the new public works program. These included: Irving J. McGary and Robert K. Fuller; consultant, State Planning Commission; George Bull, state PWA engineer; W. B. Freeman, engineer in state PWA office; Charles A. Davis, sanitary engineer, Denver; and Allen S. Peck, Forestry Service.

●

Quinton, Code & Hill—Leeds & Barnard, Engineers, have moved their offices from the Standard Oil Building to Suite 905 Edison Building, Los Angeles.

●

O. H. Ammann, chief engineer of the Port of New York Authority was married on March 2 to Mrs. Fred A. Noetzli, widow of F. A. Noetzli, well known consulting engineer on dams who died more than a year ago.

●

Personally Speaking . . . . . .

C. E. Arnold was recently appointed chief deputy surveyor for Los Angeles Co. by Alfred Jones, county surveyor. Arnold is a graduate of civil engineering from University of California in the class of 1909.

Arnold's first work was with Sacramento Valley Irrigation Co. at Willows and consisted of surveying and constructing irrigation and drainage lines. From 1912 to 1921 he was connected with several irrigation and civic projects in Northern California. These include Sacramento Valley Sugar Co., Yolo County, City of Woodland, and Montana Land Co., at Los Alamitos. This work consisted of surveys, sub-division, irrigation, drainage, and levee construction work. He was assistant superintendent, handling about 10,000 ac. of farm land for Montana Land Co.

From 1921 to 1924 Arnold was connected with surveying, subdivision, and sewer construction work in Los Angeles. In 1924 he became associated with Los Angeles county and from that time up to the present, nearly $15,000,000 worth of work has been built under his supervision. During this same period Arnold had charge of construction of more than 730 mi. of sanitary sewers, the work embracing construction of sewers in all classes of work from rock to quick sand.

During the past two years Arnold has been in charge of CWA and FERA projects during which time more than 100 mi. of sanitary sewers and storm drains have been constructed.

●

C. W. Scott, Redwood City, has been appointed San Mateo county engineer. Scott has been connected with the county engineer's office for the past 4 years working under J. S. James, former engineer.

●

W. P. Whitsett, chairman of the Metropolitan Water District board of directors since the inception of the organization in 1928, was re-elected for another 2-year term of office.

●

James L. Chase has been appointed consulting engineer on formation of Costa Mesa Sanitary District, California.

●

B. A. Etcheverry, professor of irrigation of drainage, University of California, Berkeley, has been appointed consulting engineer on Orange County Flood Control projects. He succeeds George A. Elliott who died on December 23, 1934. Etcheverry is a member of American Society of Civil Engineers.

●

John W. Blackman was appointed director of public service and city engineer of Long Beach, Calif. He succeeds Edward H. Harnett, who died recently. Blackman was city engineer of New Westminster, B. C., for 8 yrs, and

Alameda's New Manager

Walter P. Koetitz was appointed City Manager for Alameda, California, on February 16 succeeding Ralph M. Bryant who recently resigned. He is a native of Ohio and is a civil engineering graduate from Ohio State University. His first work in the west was construction of the Utah hotel in Salt Lake City and in 1912 Koetitz came to Oakland as general superintendent for Tibbetts —Pacific Co., general contractors. In 1914 he was made vice-president and general manager, which post he held until 1927 at which time he became senior member of Koetitz & Koetitz, construction engineers.

During the past 21 years he has constructed and supervised the following Projects: Dallas concrete dam for Modesto—Turlock Irrigation District; concrete highway between Visalia and Porterville for Tulare County; Parr Terminal and General Petroleum Wharf Co. of Oakland outer harbor; Santa Fe car ferry slip at Port Richmond; Embarcadero subway at the foot of Market St., in San Francisco; Bascule bridge

Walter P. Koetitz

across San Joaquin river near Tracy; north side tidal flush sewer for Alameda; pile and concrete foundation for 6,000,000-cu. ft. gas container for Pacific Gas and Electric Company. Koetitz has long been active in civic enterprises in Alameda.

●

Robert E. L. Knapp, former Skagit county engineer, has been re-appointed to the same position. He will succeed L. J. Wright.

Obituaries . . . .

Stephen Allen Roake, supervising bridge designing engineer on the San Francisco-Oakland Bay bridge project died on February 3 at his home in San Mateo following a long illness. He was born in 1874 at Peekshill, N. Y. He began his engineering work as a rodman for the city of New York in 1892. Between 1895 and 1915, Roake served as draftsman and designer for several large eastern structural firms. The following two years he was concrete designer for the Celluloid Company, Newark, N. J. From 1917 to 1928 Roake was with Southern Pacific Co. advancing from chief draftsman to assistant consulting engineer in the New York office, after which he became chief designing engineer on the Suisun bridge. Upon completion of the Suisun bridge in December, 1931, he began his work on the San Francisco-Oakland Bay Bridge and continued until ill health caused him to take a leave of absence in August, 1934. He is survived by his widow, two sons, and two daughters. He is a member, Am. Soc. C.E.

●

Charles Voetsch, 57, widely known mechanical and electrical engineer with the Bureau of Reclamation, Denver, died in Denver cn February 7 of a heart attack and rheumatism. He was born in Waldenbuch, Germany, and attended the technical universities of Stuttgart and Darmstadt. Following several years' work in Europe and with priv[illegible] firms in this country, Voetsch be[illegible] associated with the U. S. F[illegible] working on Boulder (Hoover), Norris, and Grand Coulee dams. He was a member of Am. Soc. C. E. and American Society of Military Engineers, and is survived by three children.

●

John G. McMillan, 84, surveyor for Santa Clara county, Calif., between 1890 and 1914, died at his home at San Jose on February 14. He was engineer in charge of ground plans for Stanford University in 1886. He was surveyor for Sutter County in 1876, later entering railroad construction work. During this period he was assistant construction engineer for the old Market Street Cable Lines in San Francisco. He is reputed to have built the first concrete bridge in California in 1890. This bridge was constructed across Penitencia creek near Alum Rock park.

Other outstanding structures built by McMillan in the early days of engineering include: the stone arch bridge at Long Bridge above Saratoga on the California Redwood Park (Big Basin) approach road and the rubble masonry arch across Los Gatos creek at Los Gatos. He was a native of Rhode Island and is survived by his widow, daughter, and two sons. He was a life member, Am. Soc. C.E.

●

Joh[illegible]n, 50, for the past 2 y[illegible]lbuquerque branch [illegible] Denver, died [illegible]short illness. [illegible]in Colorado [illegible] until it

operators school
will be held at Helena on April 10 and 11 under the direction of Dean Cobleigh of Montana State College engineering school and Eric Therkelsen.

for 16 years
general superi
bridge work. Fe
has been mainte
on 40 mi. of highw
tional Park.

..., in 1927.

...erred to Mad-
..., as senior elec-
...completion of this
...came affiliated with
...clamation in Denver,

Sanderson was a ...
ing from University of Michigan ...
member of Am. Soc. C. E. He is survived by his mother, wife, two sons, a sister and brother.

UNIT BID SUMMARY

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

IRRIGATION and RECLAMATION

GUNNISON, COLORADO—GOVT.—TAYLOR PARK DAM

Utah Const. Co., W. A. Bechtel Co., Morrison-Knudsen Co., and Henry J. Kaiser Co., 1st National Bank Bldg., Ogden, Utah, $784,742 on SCHED. 1 (CONCR. ARCH DAM) low to Bureau of Reclamation, Gunnison, Colo., for const. of the Taylor Park Dam, Uncompahgre Project, located near Gunnison, Colo., under Spec. No. 594. Bids received from:

(1) Utah Const. Co., W. A. Bechtel Co., Morrison-Knudsen Co., and Henry J. Kaiser Co., S. F. and Ogden $784,742
(2) W. S. Broderick, Hinman Bros., F. Shofner and J. M. Gordan $974,682
(3) Waterways Const. Co. and Al Johnson Const. Co., Minneapolis ..... $ 975,493
(4) Winston Bros. Co., L. A. $1,061,168
(5) L. E. Dixon, Bent Bros., Inc., and Johnson Inc., L. A. $1,081,045

	(1)	(2)	(3)	(4)	(5)
Lump sum, diversion and care of river	$25,000.00	$10,000.00	$33,833.00	$11,000.00	$5,500.00
8,000 cu.yd. exc. strip sand and gravel deposits	.20	.25	.25	.40	.20
70,000 cu.yd. comm. excav. for foundation	.50	.59	1.10	.73	1.25
30,000 cu.yd. rock excav. for foundation	2.00	3.45	3.00	2.40	2.75
1,000 cu.yd. backfill about dam	.40	:62	.30	.55	.50
30 cu.yd. comm. excav. for road structures	1.00	1.50	3.00	1.20	2.00
5 cu.yd. rock excav. for road structures	3.00	2.00	10.00	3.80	3.00
16,000 cu.yd. comm. excav. for roads	.30	.50	.80	.68	1.25
14,000 cu.yd. rock excav. for roads	.90	1.00	1.75	1.25	1.25
200 lin. ft. lay 15" corr. metal pipe	.40	.75	.32	.60	.25
50 cu.yd. rubble masonry	10.00	10.00	14.00	15.00	10.00
30 sq.yd. dry rock paving	2.00	6.00	.83	2.00	5.00
680 cu.yd. gravel surf. on roads	1.00	1.75	1.25	.95	2.00
100 lin. ft. construct timber guardrail	.90	1.00	.31	.35	1.00
2,000 lin. ft. drill grout holes, 0' to 25' deep	1.00	1.00	1.50	1.00	.40
5,000 lin. ft. drill grout holes, 25' to 50' deep	1.50	2.00	2.50	1.90	1.75
10,000 lin. ft. drill grout holes 50' to 125' deep	2.50	3.00	2.75	1.90	2.50
13,000 cu.ft. pressure grout foundations	1.25	1.10	1.28	1.00	1.00
2,000 lin. ft. drill drain holes 0' to 30' deep	1.50	3.00	1.50	2.75	2.50
7,500 lin.ft. porous concr. drain tile	.50	.50	.17	.38	.40
100,000 cu.yd. concrete in dam	5.50	6.91	6.48	8.11	7.75
100 cu.yd. concrete in parapets	20.00	24.60	13.17	19.00	35.00
80 cu.yd. concrete (trash rack struc)	25.00	18.60	13.75	19.00	30.00
410 cu.yd. concrete (valve house)	22.50	18.00	8.35	16.00	25.00
700 sq.yd. spec. finish of concr. surface	.75	1.00	.55	.58	.75
65,000 lb. place reinf. bars and rails	.02	.025	.014	.02	.02
29,000 lb. inst. construction jt. grout pipe	.10	.06	.065	.11	.04
9,400 lin. ft. inst. seal strips in contr. joints	.25	.25	.16	.35	.35
50,000 lb. install trash rack metal work	.025	.03	.015	.02	.02
210,000 lb. install ring-follower gates, etc.	.02	.03	.015	.02	.015
1,200 lb. install control apparatus R-F gates	.10	.12	.115	.13	.05
75,000 lb. install inter. differen. needle valves	.025	.04	.02	.02	.015
71,000 lb. install met. tubing, pipe fittings and valves	.08	.05	.054	.04	.05
15,000 lb. install crane and crane rails	.02	.04	.015	.02	.02
Lump sum, install met. panels, door and windows	200.00	200.00	69.00	260.00	100.00
19,000 lb. install misc. metal work	.10	.10	.025	.06	.05
5,000 lin.ft. inst. thermoms. jt. and strain meters	.0725	.20	.11	.12	.06
1,000 lin.ft. inst. electric conduit	.20	.10	.12	.26	.20

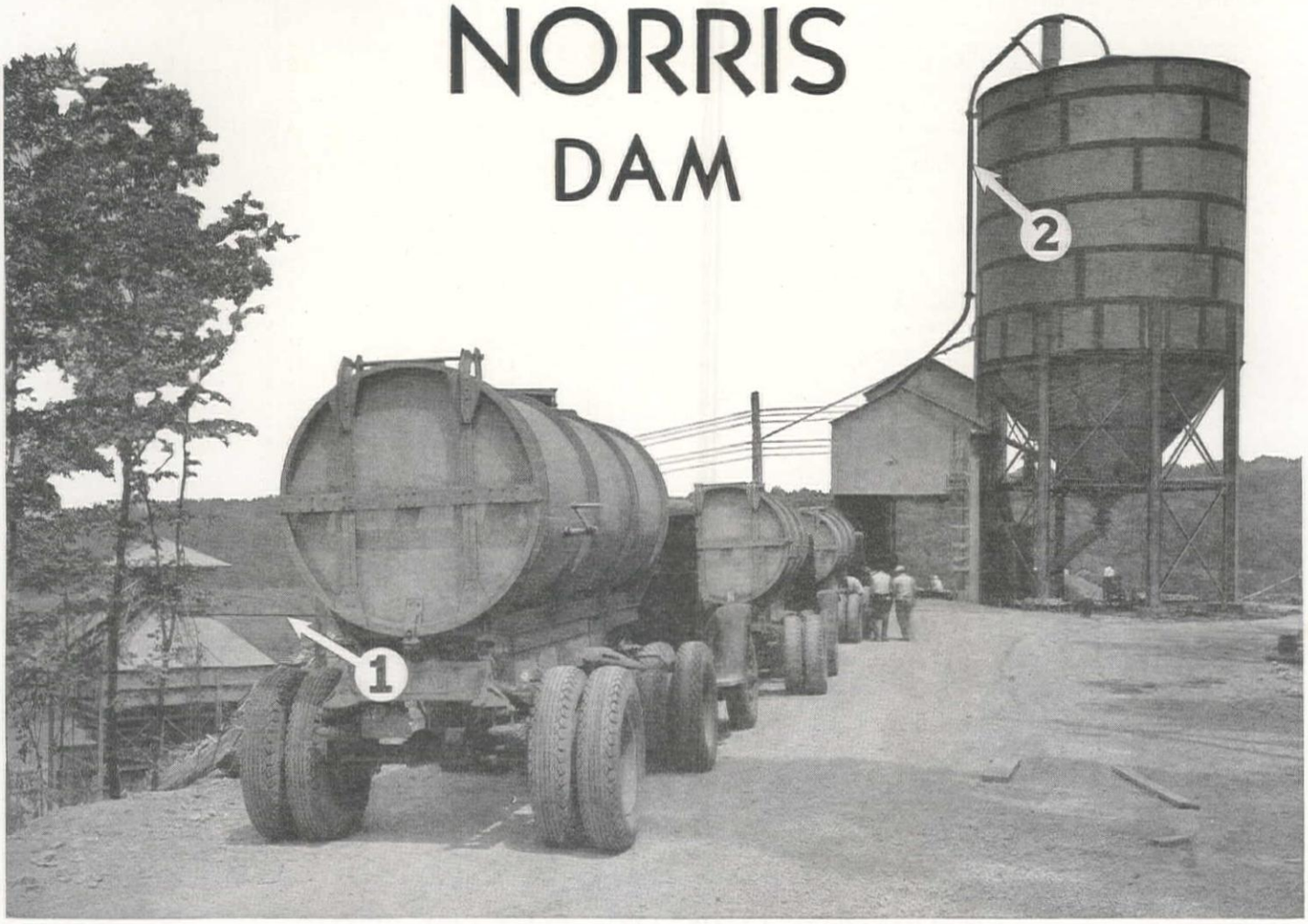
SCHEDULE 2—(EARTH AND ROCK FILL DAM)

(1) Utah-Bechtel-Morrison-Knudsen-H. J. Kaiser Co. (low) $798,078.00
(2) J. A. Terteling & Sons, Boise 819,517.00
(3) Winston Bros. Co., Los Angeles 928.415.00
(4) S. S. Magoffin Co., Inc. 993,557.00
(5) W. S. Broderick, Hinman Bros, F. Shofner and J. N. Gordan $1,020,305.00
(6) L. E. Dixon Co., Bent Bros. Inc. & Johnson, Inc., Los Angeles 1,153,180.00
(7) Bates & Rogers Const. Co. 1,364,363.00

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump Sum diversion & care of river	$5,000.00	$3,000.00	$9,500.00	$1,500.00	$5,000.00	$5,550.00	$19,655.00
350 cu.yd. exc. strip sand & gr. dep.	.40	.50	.20	.50	.40	.50	.48
110,350 cu.yd. exc. strip embankment	.35	.50	.34	.65	.59	.75	.71
32,550 cu.yd. exc. strip borrow pits	.15	.30	.20	.50	.25	.60	.41
15,100 cu.yd. com. exc. tunn. intake & outlet	.40	.40	.35	1.00	1.00	1.00	.55
4,300 cu.yd. rock exc. tunn. intk. & outlet	1.50	1.10	1.00	2.00	1.50	2.00	1.07
7,100 cu.yd. tunnel excavation	9.00	8.00	16.50	16.00	10.00	11.00	11.80
20,000 cu.yd. comm. exc. spillway	.40	.40	.25	.60	1.00	1.00	.72
61,400 cu.yd. rock exc. spillway	1.50	1.00	1.10	1.25	1.25	2.25	1.30
3,750 cu.yd. comm. exc. drain & trench	.60	.60	.35	.60	1.00	.50	1.30
30 cu.yd. rock exc. drain & trench	5.00	2.00	1.25	5.00	8.00	8.00	10.00
600 cu.yd. rock exc. wall footings	7.00	10.00	4.10	8.00	20.00	8.00	10.00
300 cu.yd. comm. exc. in stopes	6.00	1.50	3.75	4.00	10.00	5.00	6.55
50 cu.yd. rock exc. in stopes	10.00	10.00	6.50	10.00	15.00	15.00	13.10
875,000 cu.yd. comm. exc. bor. pits to embkm.	.26	.30	.30	.31	.35	.42	.464
2,000 cu.yd. rock exc. bor. pits to embkm.	1.00	1.00	.80	1.00	1.00	2.00	1.25
550 cu.yd. backfill about struc.	.50	.50	.50	.50	.90	1.00	1.50
10 cu.yd. comm. exc. road struc.	1.00	.75	1.25	1.00	1.50	2.00	1.95
10 cu.yd. rock exc. road struc.	3.00	1.50	2.25	4.00	2.00	3.00	3.30
12,400 cu.yd. comm. exc. roads	.30	.35	.30	.40	.50	1.25	.60

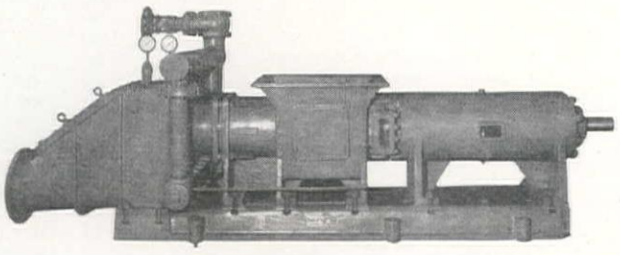
(Continued on Next Page)

HANDLING THE CEMENT FOR NORRIS DAM



Two portable and two stationary Fuller-Kinyon Pumps are handling the cement for Norris Dam. At the railroad siding, the portable pumps unload boxcars and deliver the cement to a truck-loading bin, the arrangement providing for the discharge of four cars without shifting. Special trucks carry the cement a distance of five miles to the mixing plant where the loads are dumped into a hopper above two stationary pumps, of the type shown below. One pump is for stand-by service. From the hopper the cement is pumped either directly to the mixing plant through a pipe-line (1) suspended from a cable, or to storage in the bin illustrated, through branch line (2). Stored cement is spouted to the same hopper.

Our bulletin shows how advantage has been taken of the flexibility in layout of Fuller-Kinyon Systems in all classes of mixing and batching plants. Write for a copy.



The stationary Type "H" Fuller-Kinyon Pump is the most economical and convenient conveyor for transporting cement from hopper-bottom cars, truck hoppers and storage bins. It will convey and elevate cement far beyond the practical limits of mechanical systems. Fuller-Kinyon Pumps are standard conveying practice in the cement industry.

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

Pacific Coast Representative:
WILLIAM S. WEAVER

1041 S. Olive St.
Los Angeles

742 Phelan Bldg.
San Francisco

STATIONARY and PORTABLE FULLER-KINYON CONVEYING SYSTEMS

When writing to above advertisers, please mention Western Construction News.

23,000 cu.yd. rock exc. roads	.90	.90	.80	1.10	1.00	1.25	1.25
130 lin. ft. lay 15" cor. met. pipe	.30	.75	.55	.50	.75	.25	.60
770 cu.yd. rubble masonry	8.00	8.00	11.00	10.00	10.00	10.00	12.00
30 sq.yd. dry rock paving	2.00	1.50	2.00	2.00	6.00	5.00	1.50
700 cu.yd. gravel surf. roads	1.00	.75	1.25	1.00	1.75	2.00	2.00
760 lin. ft. const. timb. guardrail	.50	.60	.35	.50	1.00	1.00	.25
833,000 cu. yd. earthfill (dam embankment)	.09	.10	.13	.09	.12	.09	.257
129,500 cu.yd. rock fill (downstr. slope)	.25	.20	.25	.40	.30	.50	.85
26,000 cu.yd. riprap (upstream slope)	.50	.30	.35	1.00	.60	.50	1.50
250 lin. ft. 24" sewer pipe dr. in gravel	1.20	1.50	1.65	1.50	2.50	2.00	1.25
2,100 lin. ft. 15" sewer pipe dr. (por. conc.)	1.50	1.25	.95	1.00	2.75	1.50	2.25
325 lin. ft. 12" sewer pipe dr. (gravel)	.70	1.00	.50	.75	2.00	1.25	1.25
1,050 lin. ft. 8" sewer pipe dr (gravel)	.60	.75	.30	.60	1.00	.50	.65
4,400 lin. ft. 4" sewer pipe dr. (por. conc.)	.75	.50	.50	1.00	.60	.40	1.00
35 lin. ft. 4" cast ir. pipe drains	1.00	.50	.60	1.00	2.00	1.00	1.00
3,350 lin. ft. drill gr. holes 0' to 25'	.75	1.00	1.00	1.00	1.00	.40	1.25
6,400 lin. ft. drill gr. holes 25' to 50'	1.50	2.00	1.90	1.50	2.00	1.75	1.50
8,700 lb. inst. grout pipe & fittings	.10	.15	.10	.20	.15	.05	.12
6,500 cu.ft. pressure grouting	1.25	1.00	1.00	1.00	1.10	1.00	2.25
170 cu. yd. porous concrete	8.00	10.00	7.70	8.00	11.00	11.00	8.00
300 lin. ft. drill weep holes (tunnel)	1.00	1.00	1.00	1.00	1.00	.60	1.00
300 lin. ft. weep holes (outside tunn.)	1.00	1.00	1.00	1.00	1.00	.60	1.00
9,500 lin. ft. drill holes (anch & gr. bars)	.90	.50	.55	1.00	1.00	.75	.50
1,200 cu.yd. concr. (cutoff walls)	11.50	11.00	18.00	14.60	15.00	16.00	15.45
300 cu.yd. concr. (fault cut-offs)	8.00	11.00	12.50	8.20	12.00	9.00	11.25
100 cu.yd. concr. (trash rack str. etc.)	18.00	12.50	20.00	20.00	18.00	27.50	15.60
2,030 cu.yd. concrete in tunnel	13.00	11.00	20.00	13.60	16.00	16.00	16.95
430 cu.yd. concrete (gate chamber)	15.00	15.00	21.00	15.00	19.00	25.00	16.00
400 cu.yd. concr. (valve struc. & house)	21.00	20.00	21.00	27.50	18.00	25.00	19.35
4,300 cu.yd. concr. in spillway	11.00	14.00	15.00	12.35	16.00	11.00	12.40
250 cu.yd. concr. (parapet & curb walls)	10.00	10.00	25.00	16.00	17.00	16.00	22.35
25 cu.yd. concr. (toe drain well)	20.00	20.00	25.00	27.50	50.00	22.00	28.00
437,000 lb. place reinf. bars	.0175	.015	.0175	.02	.02	.02	.02
37,300 lb. fur. & inst. stl. tunn. liner plates	.08	.10	.10	.08	.10	.08	.09
Lump sum, const. needle valve house	600.00	600.00	500.00	600.00	1,000.00	750.00	875.00
40 cu.yd. rubble concrete paving	8.00	5.00	4.35	8.00	10.00	5.00	12.00
23,000 lb. inst. trash rack metal work	.025	.02	.015	.03	.03	.02	.026
189,000 lb. inst. gates & conduit lining	.025	.03	.0275	.03	.03	.03	.04
8,800 lb. inst. control apparatus	.07	.05	.05	.06	.10	.05	.20
332,000 lb. inst. outlet pipes	.025	.03	.02	.025	.02	.02	.04
118,800 lb. inst. balanced needle valves	.025	.04	.04	.05	.04	.02	.063
21,100 lb. inst. metal walkway & stairway	.07	.03	.04	.07	.05	.05	.026
2,950 lb. inst. pipe handrailing	.10	.05	.10	.07	.10	.10	.10
37,800 lb. inst. structural steel (bridge)	.025	.03	.015	.025	.04	.02	.022
9,050 lb. inst. misc. metal work	.10	.10	.04	.10	.10	.07	.12
1,500 lin. ft. inst. elec. metal conduit	.20	.20	.25	.20	.25	.20	.55
Lump sum, inst. elec. apparatus & conductors	700.00	500.00	500.00	550.00	1,000.00	750.00	1,910.00

WATER SUPPLY SYSTEMS

SAN FRANCISCO, CALIF.—CITY—SUBMARINE PIPELINE

Contract awarded to Pacific Bridge Co., Room 1011 Balfour Bldg., San Francisco, $698,226 ALT. "A" (STEEL PIPE) to Public Utilities Comm., City Hall, San Francisco, for constructing a 2800 lin. ft. double 54" submarine pipeline across the southerly arm of San Francisco Bay end of S. F. Water Dept's Bridge, 7 mi. easterly from Redwood City; and for a 435-ft. single 54" line across Newark Slough, about 2 mi. westerly from Newark under S. F. W. D. Contract No. 53. Bids received from on PROP. "A"—STEEL PLATE PIPE.

(1) Pacific Bridge Co., San Francisco $698,226
(2) Merritt Chapman & Scott Corp. 717,795
(3) Healy Tibbitts Const. Co. 822,177
(4) Geo. Pollock Co., Sacramento $864,550
(5) MacDonald & Kahn Co., Ltd. 944,909
(6) Case Const. Co., Alhambra 987,324

	(1)	(2)	(3)	(4)	(5)	(6)
100,000 cu. yd. exc. at Dumbarton Strait	1.00	.33	.50	1.20	1.04	.47
6,000 cu. yd. exc. at Newark Slough	1.00	.75	.50	1.20	1.04	.47
100 cu. yd. exc. on land	1.00	3.00	2.00	3.00	4.00	1.50
530 cu. yd. rock fill	3.50	9.00	3.00	10.00	10.00	6.40
800 lin. ft. furn. untr. piles	.30	.50	.25	.20	,30	.40
52,000 lin. ft. furn. treated piles	.60	.60	.48	.62	1.00	1.25
880 ea. driving piles	20.00	45.00	50.00	150.00	90.00	72.00
10 M. ft. BM furn & inst. untr. timber	60.00	250.00	65.00	75.00	105.00	82.50
70 M. ft. BM furn & inst. tr. timber	110.00	550.00	200.00	400.00	525.00	200.00
1,425 cu. yd. A tremie concrete	40.00	40.00	20.00	50.00	50.00	25.00
25 cu. yd. B tremie concrete	38.00	40.00	17.00	50.00	45.00	20.00
125 bbl. extra cement	2.25	5.00	2.00	4.00	6.00	3.00
2,600 lin. ft. rem. 16" sub. pipes, St. 5 & 17	2.50	2.50	1.50	5.00	3.50	3.00
12,000 lin. ft. rem. 16" sub. pipes (Dumb. Strt.)	2.00	1.10	1.00	1.00	1.00	3.00
5,600 lin. ft. furn. & lay 54" fl. jt. stl. pipe	65.00	73.00	91.50	65.00	81.25	109.50
435 lin. ft. furn. & lay 54" flanged jt. stl. pipe (in Newark Slough)	70.00	73.00	91.50	70.00	80.00	109.50
28 ea. const. angles in 54" pipe	150.00	120.00	200.00	150.00	225.00	180.00
20,000 lb. struc. steel sub-struc.	.20	.14	.15	.125	.20	.16
Lump sum, furn. & inst. steel pipe, tapers, etc.	$14,000	$12,085	$25,000	$14,000	$25,000	$15,250
Lump sum, inst. City gate valves, etc.	$2,000	$2,000	$11,000	$2,000	$3,000	$3,300
Lump sum, furn. & inst. valv., fittings and piping for motors & ejector	$9,000	$9,000	$14,000	$9,000	$14,000	$7,775
Lump sum, power plant and electric installation	$2,050	$2,000	$2,500	$2,100	$3,000	$2,000
Lump sum, construct super-structure	$10,000	$7,500	$18,000	$8,000	$15,404	$7,550
Lump sum, furn. & inst. crane and hoist	$1,800	$1,500	$2,500	$1,350	$2,000	$1,250
1,600 sq. ft. steel floor grating	1.25	1.50	2.00	1.25	1.25	1.60
Lump sum, furn. & inst. stairway and railings	$700.00	$1,500	$1,500	$1,000	$1,000	$1,400

When writing to above advertisers, please mention Western Construction News.

TACOMA, WASH.—CITY—GREEN RIVER PIPELINE REPLACEMENT

Contracts awarded to American Concrete Pipe Co. of Washington, 459 E. 15th St., Tacoma, Wn., $526,224.00 PROP 7 (Section 'M') and to Puget Sound Machinery Depot, 322 1st Avenue, South, Seattle, Wn., $124,597.00. PROP. 1 (Section 'N' with Type 'A' Coating) by Board of Contracts & Awards, City Hall, Tacoma, Wn. for furnishing and installing the Green River Gravity Pipeline Replacement, P.W.A. Project No. 1135.

PROP. 7—Section 'M' (CONCRETE PIPE)—only bid by American Concr. Pipe Co. $526,224.00.

Lump sum clear and grub road	$21,525.00
40,000 lin.ft. fencing	.05
52 ea. gates	16.40
33,950 lin.ft. exc. and backfill	1.16
600 cu.yd. sand and gravel	1.25
33,911 lin.ft. 54" lock jt. conc. pipe	13.10
180 l. ft. 54x⅜" stl. pipe	12.80
3 ea. A.V. chambers	152.40
8 ea. B.O. chambers	117.70
12 ea. AV&MH chambers	164.80
6 ea. BO&MH chambers	126.95
Lump sum concrete supports	1,511.00
100 lin.ft. 12" culverts	1.84
120 lin.ft. 18" culverts	2.42
100 lin.ft. 20" culverts	3.57

PROP. 1—Section 'N' Bids from:

(1) Puget Sd. Mchy. Depot	$124,597.00
(2) Felix Arcorace (paint coat)	$116,395.00
(3) Amer. Concr. Pipe Co. ('A')	$120,361.00

L. S. 42" culv. Sta. 146-M	667.80
L. S. 42" culv. Sta. 338-M	658.70
L. S. 60" culv. Sta. 422-M	$1,573.10
L. S. 60" culv. Sta. 359-M	1,612.90
1,900 l.ft. wooden gutters	.22
670 l.ft. wooden flume	.36
67 2" service connections	14.42
6 ea. 4" service connections	13.60
1,900 cu.yd. exc. & backfill (hand)	.75
1,900 cu.yd. exc. & backfill (machine)	.30
CONCR. CHAMBERS—CHANGE HEIGHT	
12 ft.ht. AV,BO or MH	8.00
6 ft.ht. comb. AV&MH	10.00
6 ft.ht. comb. BO&MH	9.00
5 ft.ht. end Piers	17.80
20 ft.ht. middle Piers	9.15
(4) L. Coluccio & Co. (paint coat)	$129,936.00
(5) Reese & Moore, Seattle ('A' coat)	154,897.00
(6) Paine-Gallucci, Inc. ('A' coat)	162,080.00
(7) Queen City Const. (paint coat)	155,928.00

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lump sum, clear and grub road	$200.00	$3,000.00	$525.00	$4,000.00	$2,750.00	$1,000.00	$4,500.00
10,770 lin.ft. exc. and backfill—42"	.95	1.00	1.58	1.50	2.46	2.55	1.50
1,800 cu.yd. bank run sand and gravel	1.00	1.00	1.00	1.25	1.25	1.00	2.00
10,775 lin.ft. 42"x5/16" steel pipe	7.35	8.15	7.80	8.80	7.65	8.55	10.00
L. S. 42"x5/16" pipe and specials	1,550.00	800.00	2,000.00	750.00	2,000.00	1,565.00	2,000.00
3 std. AV chambers	110.00	125.00	147.00	85.00	90.00	125.00	200.00
1 ea. std BO chambers	150.00	125.00	110.00	100.00	100.00	75.00	200.00
2 ea. std. MH chambers	150.00	125.00	94.50	100.00	100.00	75.00	200.00
2 ea. AV & MH chambers	200.00	200.00	152.40	125.00	125.00	150.00	350.00
5 ea. BO & MH chambers	160.00	150.00	115.50	120.00	90.00	75.00	300.00
L. S. anchor Sta. O-04N	800.00	500.00	929.25	650.00	200.00	1,000.00	750.00
L. S. chamber Sta. 0-17N	260.00	150.00	249.10	300.00	150.00	250.00	500.00
L. S. chamber Sta. 53-44N	260.00	150.00	150.15	175.00	150.00	250.00	200.00
3 ea encasement RR crossing	375.00	450.00	157.60	525.00	260.00	500.00	500.00
40 lin.ft. 18" culvert	3.00	2.00	2.42	2.20	2.50	3.00	3.50
12 ea. 2" service connections	11.00	15.00	13.45	10.00	13.00	11.30	10.00
600 cu.yd. exc. and backfill (hand)	1.50	1.00	1.00	1.50	.75	.50	1.50
600 cu.yd. exc. and backf. (machine)	.30	.50	.40	.50	.82	.40	.75
CONCRETE CHAMBERS-HEIGHT CHANGE							
6 ft. height AV, BO or MH	8.00	8.00	8.00	8.00	8.00	8.00	8.00
6 ft. height COMB. AV-MH	10.00	10.00	10.00	10.00	10.00	10.00	10.00
6 ft. height COMB. BO-MH	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Type 'A' coating (10,770 ft.)	2.40				3.27	3.07	
Paint coating (10,770 ft.)	.86	.65	.97	.60	.97	.98	1.30

SEWER CONSTRUCTION

BURLINGAME, CALIF.—CITY—INTERCEPTING SEWERS & DISPOSAL PLANT

Contracts awarded to Fredrickson & Watson Const. Co., 873 81st Ave., Oakland, $78,250.00 SCHED. 4, less $5,000.00 on chlorination equipment and gas engine generator unit; H. E. Conner, 1222 Whipple Ave., Redwood City, $38,941.00. SCHED. 2, and C. W. Caletti & Co., P. O. Box 243, San Rafael, $14,200.00 SCHED. 3 lowest combination of bids totaling $131,391.00 to City Clerk, City Hall, Burlingame, for construction of intercepting sewers, sewage pumping plant, and digestion tank, for complete sewage disposal system for City.

SCHEDULE 2—SEWERS ONLY—Bids from:

(1) H. E. Conner, Redwood City (low)	$38,941.00
(2) W. J. Tobin, Oakland	$43,954.00
(3) Bayshore Const. Co., S.F.	$49,086.00

	(1)	(2)	(3)
40 l.ft. 4" vitr. sewer	.50	.50	1.00
60 l.ft. 6" vitr. sewer	.50	.60	1.00
2,520 l.ft. 8" vitr. sewer	.74	1.00	1.10
1,934 l.ft. 12" vitr. sewer	1.29	1.48	1.50
690 l.ft. 15" vitr. sewer	1.73	2.39	2.10
24 l.ft. 21" vitr. sewer	2.64	3.50	4.00
997 l.ft. 24" vitr. sewer	3.76	4.24	4.20
4,105 l.ft. 27" vitr. sewer	5.15	6.00	6.85
44 l.ft. 36" vitr. sewer	7.52	9.51	10.50
38 8"x4" Y branches	1.50	.75	2.00
288 cu.yd. 'C' concr.	8.00	8.00	8.00
7 std. sh. brick manh.	65.00	50.00	80.00
4 S.B.manh. 6 to 8'	72.00	70.00	100.00
6 S.B. manh. 8 to 10'	100.00	85.00	120.00
14 S.B. manh. 10 to 12'	114.00	110.00	140.00
2 spec manholes	150.00	100.00	150.00
1 screen manhole	150.00	125.00	200.00
1 drop manhole	160.00	150.00	200.00
1 relift station	2,000.00	2,000.00	2,100.00

SCHEDULE 3—FILL—Bids from:

(1) C. W. Caletti & Co. (low)	$14,200.00
(2) H. E. Casey Co., San Mateo	$14,830.00
(3) Bayshore Const. Co., S.F.	$27,880.00

	(1)	(2)	(3)
28,000 cy. fill matl.	.45	.485	.755
2,000 cy. loose rk. ripr.	.80	.625	3.37

SCHED. 4—SEWAGE PUMPING PLANT AND TREATMENT WORKS, ETC.

(1) Frederickson & Watson (low)	$83,250.00
(2) MacDonald & Kahn Co., Ltd.	$91,677.00

	(1)	(2)
1 sewage pumping plant	$11,500.00	$11,380.00
1 20" C. I. force main	12,500.00	15,259.00
1 sewage treatm. works	48,000.00	54,900.00
1 digester gas and htg. eqp.	2,500.00	2,425.00
1 chlorination equipment	2,000.00	1,725.00
1 gas holder	3,750.00	3,000.00
1 gas eng. generator unit	3,000.00	2,988.00
Per cy. 'A' extra concr.	22.00	14.00
Per cy. 'B' extra concr.	21.00	13.50
Per cy. 'C' extra concr.	14.00	13.00

DAM CONSTRUCTION

SALT LAKE CITY, UTAH—MOON LAKE DAM

T. E. Connolly, 461 Market St., San Francisco, $547,221 low to Bureau of Reclamation, Salt Lake City, Utah, for const. the Moon Lake Dam, Moon Lake Project, Utah, under Spec. No. 605. Bids from:

(1) T. E. Connolly, San Francisco $547,221
(2) Winston Bros., Los Angeles 579,922
(3) W. W. Clyde & Co., Springville 585,419
(4) J. A. Terteling & Son, Boise $657,141
(5) Utah Const. Co., and Morrison-Knudsen Co., Ogden, Utah 691,596

	(1)	(2)	(3)	(4)	(5)
L. S. diversion and care of river	$500.00	$2,150	$3,000	$4,000	$10,000
34,000 cu. yd. excav. strip borrow pits	.30	.22	.32	.465	.45
43,500 cu. yd. excav. strip embankments	.50	.27	.40	.60	.60
2,800 cu. yd. common excav. open cut for intake	1.00	.40	.40	.60	.58
1,050 cu. yd. rock excav. open cut for intake	1.00	1.50	1.00	.60	1.32
12,400 cu. yd. excavation in tunnels and shafts	8.00	7.70	11.30	7.00	11.50
24,000 cu. yd. common excav. embankment toe dr. etc.	.50	.27	.40	.70	.46
550 cu. yd. rock excavation embankment toe dr. etc.	1.00	1.50	1.25	4.00	2.30
240 cu. yd. common excavation cutoff wall	6.00	3.00	6.50	5.00	5.75
700 cu. yd. common excavation cutoff wall (stoping)	6.00	3.00	7.00	10.00	9.20
110 cu. yd. rock excavation cutoff wall	8.00	4.00	8.00	20.00	11.50
12,700 cu. yd. common excavation open cut spillway intake	.40	.40	.44	.60	.42
15,400 cu. yd. rock excavation open cut spillway intake	1.00	.85	.90	.60	1.15
115 cu. yd. common excavation concrete cutoff wall	1.00	1.00	1.30	.75	1.15
40 cu. yd. common excavation control house	1.00	1.00	1.50	.75	1.15
400,000 cu. yd. common excavation borrow pits	.36	.27	.325	.465	.33
32,500 cu. yd. rock excavation borrow pits	.60	1.00	.80	.465	.46
8,400 sq. yd. coat surfaces of shale excavation	.10	.15	.10	.15	.115
6,000 cu. yd. backfill about structures	.30	.40	.35	.60	.46
413,000 cu. yd. earthfill in embankment	.10	.12	.09	.10	.115
77,000 cu. yd. rock fill on downstream slope	.40	.35	.325	.30	.57
29,200 cu. yd. riprap on upstream slopes	.30	.42	.35	.50	.63
740 lin. ft. const. 12" sewer pipe drain	.70	.60	.90	1.00	.69
260 lin. ft. const. 8" sewer pipe drain	.70	.50	.65	1.00	.58
350 lin. ft. const. 8" sewer pipe drain (por. conc.)	1.00	.50	1.50	1.50	.92
150 lin. ft. const. 6" sewer pipe drain (por. conc.)	1.00	1.40	1.50	1.50	.74
150 cu. yd. porous concrete under spillway int. str.	5.00	8.00	6.00	16.50	9.20
30 cu. yd. screen. grav. spillway struc. drain.	1.00	3.50	2.00	2.00	3.45
800 lin. ft. drill grout holes	.50	.60	1.00	1.50	1.15
640 lb. install grout pipe and fittings	.10	.20	.15	.10	.20
1,000 cu. ft. pressure grouting	1.00	1.00	1.30	1.25	1.15
300 cu. yd. concrete embankment cutoff wall	8.00	18.00	10.00	16.50	11.50
960 cu. yd. concrete cutoff wall in stopes	5.00	12.00	7.50	16.50	10.35
205 cu. yd. concrete trash rack structure and transit	14.00	24.00	13.00	20.50	20.70
2,480 cu. yd. concrete tunnels and shafts	10.00	18.00	15.00	16.50	13.80
1,300 cu. yd. concrete in gate chamber, etc.	16.00	20.00	11.00	16.50	20.70
360 cu. yd. concrete at outlet portal of tunnel	10.00	17.00	11.00	18.50	11.50
2,950 cu. yd. concrete spillway intake structure	10.00	16.00	10.40	16.50	20.70
40 cu. yd. concrete in control house	25.00	30.00	23.00	25.00	28.75
390 cu. yd. concrete parapet and curb walls	8.00	26.00	10.50	5.00	11.50
110 cu. yd. concrete in cutoff wall	8.00	13.00	7.50	16.50	9.20
870,000 lb. place reinforcing bars	.015	.02	.018	.02	.0175
90,000 lb. furn. and inst. steel tunnel liner plates	.08	.10	.12	.10	.092
1,500 sq. yd. spec. finish concrete surfacing	.20	.60	.50	.25	.69
Lump sum, construct control house except concrete	500.00	330.00	300.00	500.00	575.00
210 cu. yd. rubble concrete paving	5.00	5.00	6.00	6.00	6.40
120 cu. yd. dumped riprap (outlet of spillway tunnel)	2.00	1.30	1.50	1.50	2.30
44,000 lb. install trash rack metal work	.02	.02	.015	.03	.025
90,000 lb. install slide gates and metal cond. lining	.03	.035	.025	.04	.025
13,000 lb. install control apparatus for gates	.03	.06	.05	.05	.09
16,000 lb. install metal spiral stairway	.03	.05	.02	.04	.055
6,000 lb. install pipe handrailing	.03	.10	.02	.04	.12
4,800 lb. install ventilating duct. and dr. ejector	.03	.06	.05	.10	.08
1,100 lb. install miscellaneous metal work	.10	.07	.05	.10	.12
780 lin. ft. install elec. metal conduit	.10	.25	.10	.20	.23
Lump sum, inst. elec. conductor and apparatus	500.00	500.00	300.00	600.00	575.00

STREET and ROAD WORK

LOS ANGELES, CALIF.—STATE—GRAD. & SURF.—IMPERIAL COUNTY

Contract awarded to Oswald Bros., 366 E. 58th St., Los Angeles, $45,547, to Calif. Div. of Highways, State Bldg., Los Angeles, for 21 mi. shoulders to be graded and bitum. tr. screen. gravel or stone borders between East Highline Canal and Sand Hill in IMPERIAL COUNTY, Calif. Bids from:

(1) Oswald Bros., Los Angeles $45,547
(2) Griffith Co., Los Angeles 45,742
(3) Dimmitt & Taylor, Los Angeles $49,796
(4) V. R. Dennis Const. Co. 58,668

	(1)	(2)	(3)	(4)
21 mi. shoulder embankment	110.00	200.00	220.00	500.00
221,800 lin. ft. rem. exist. side forms	.015	.015	.02	.01
14,200 tons screen. grav. or stone (bitum. tr. borders)	2.00	1.80	2.00	2.10
640 tons cutback asphalt	17.00	16.00	16.00	17.00
21 miles finish roadway	30.00	115.00	100.00	250.00

PROFESSIONAL DIRECTORY

PHOENIX, ARIZ.—STATE—GRADING—GILA COUNTY

Contract awarded to Lee Moor Contracting Co., 807 Bassett Tower, El Paso, Texas, $185,075.00 to Arizona State Highway Comm., Phoenix, for 4½ miles grading and draining, beginning about 56½ miles northeast of Globe and extending northeasterly on the Globe-Sholow Highway, GILA COUNTY, NRH 99-I. Bids from:

		Alternate
(1)	Lee Moor Contr. Co.,	$185,075.00 / $185,075.00
(2)	Hodgman & MacVicar, San M..	211,148.00 / 211,148.00
(3)	Geo. W. Orr, Globe, Ariz.	243,246.00 / 243,246.00
(4)	Morrison-Kundsen Co.	$262,234.00 / $263,324.00
(5)	Vinson, Pringle & Daley	278,867.00 / 278,867.00
(6)	Pearson & Dickerson	296,091.00 / 296,091.00

Bids received on:	(1)	(2)	(3)	(4)	(5)	(6)
274,979 cu.yd. roadway excav. uncl.	$.40	$.48	$.60	$.61	$.67	$.75
2,533 cu.yd. drain. excav. uncl.	.50	.30	.60	1.00	1.00	.63
15,000 cu.yd. slides & overbreakage	.30	.36	.45	.4575	.5025	.5625
1,965 cu.yd. struc. excav. uncl.	1.25	.90	1.50	1.00	2.00	1.40
3,284 cu.yd. borrow excav. uncl.	.35	.45	.60	.50	.50	.60
70,163 sta.yd earthwork overh.	.025	.03	.015	.015	.02	.03
3,887 cu.yd.mi. earthwork haul	.30	.30	.50	.25	.25	.40
435 cu.yd. 'A' conc.	25.00	28.00	24.00	35.00	35.00	29.50
45,107 lb. reinf. steel	.05	.06	.055	.07	.0525	.06
1,382 lin. ft. 24" corr. met. pipe	3.00	2.50	3.00	3.00	3.00	3.00
224 lin.ft. 24" corr. met. pipe, 12 ga.	4.00	3.50	4.00	4.20	3.90	4.00
236 lin.ft. 30" same	3.75	3.20	4.00	4.00	3.75	4.00
654 lin.ft. 36" same	5.50	5.20	5.50	6.20	5.70	6.00
160 lin.ft. 36" same, 10 ga.	6.50	6.40	6.50	7.50	7.00	7.50
64 lin.ft. 42" same	6.50	6.10	6.50	7.40	7.25	7.00
270 lin.ft. 48" same, 8 ga.	10.50	10.30	10.50	12.00	12.00	12.00
2 ea. cattle guard	475.00	450,00	500.00	400.00	500.00	500.00
10,940 lin.ft. cable road guard	.85	.90	.80	.90	.80	.90
605 lin.ft. std. line fence	.15	.10	.20	.10	.15	.14
20 cu.yd. plain riprap	2.50	2.50	4.00	2.50	3.00	3.00
70 ea. right-of-way markers	2.50	2.00	2.50	3.00	3.00	3.00
106 ea. guide posts	1.50	1.50	1.50	3.00	2.00	2.00
STRUCTURES OVER 20' CLEAR SPAN						
770 cu.yd. drainage excav.	.50	.30	.60	1.00	1.00	.63
797 cu.yd. struct. excav.	1.25	.90	1.50	1.00	2.00	1.40
794 cu.yd. 'A' concrete	25.00	28.00	24.00	35.00	35.00	29.50
77,820 lb. reinf. steel	.05	.06	.055	.07	.0525	.06
ALTERNATE, IN LIEU OF CABLE ROAD GUARD						
10,940 lin.ft. steel plate road guard	.85	.90	.80	1.00	.80	.90

BRIDGES and CULVERTS

OLYMPIA, WASH.—TIMBER & STEEL—SNOHOMISH COUNTY

Contract awarded to West Coast Const. Co., 1022 Lloyd Bldg., Seattle, Wn., $306,128.00 to the Director of Highways, Olympia, Wn., for constructing bridge over Ebey Slough between Everett and Cavalero's on State Road No. 15, consisting of 6,282 lin. ft. tr. pile and timber trestle, 240' steel span with 210' concr. approaches and paving with concr. and asph. concr. on the Cavalero's Corner intersection in SNOHOMISH COUNTY, Wn. Bids from:

(1)	West Coast Const. Co.	$306.128.00	
(2)	Puget Sound Bridge & Dredging Co.	309,688.00	
(3)	General Const. Co., Seattle	310,492.00	
(4)	Sheble Const. Co., Seattle	312.922.00	
(5)	C. L. Creelman, Seattle	313,204.00	
(6)	The Hart Const. Co., Inc.	320,354.00	
(7)	Teuffel & Carlson, Seattle	$321,195.00	
(8)	D. Nygren & Co., Seattle	329,272.00	
(9)	Northwest Roads Co., Portland	341,411.00	
(10)	Puget Sound Const. Co.	345,057.00	
(11)	MacRae Bros., Seattle	347,466.00	
(12)	Parker Schram Co., Portland	352,119.00	

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
2,320 cu. yd. struc. excav.	5.25	8.00	9.00	10.00	7.50	10.00	4.83	7.00	5.00	10.00	6.00	6.00
3,940 cu. yd. conc., Class A	17.50	16.00	17.00	17.00	15.00	16.00	16.65	18.00	21.00	17.00	17.70	21.75
300 cu. yd. 'B' concrete	17.00	14.00	15.00	17.00	15.00	13.00	14.25	18.00	15.00	20.00	17.70	15.50
250 cu. yd. 'D' concrete	23.00	14.00	15.00	17.00	16.00	14.00	14.25	18.00	17.50	20.00	17.70	19.25
270 cu. yd. 'D' concrete	23.00	10.00	13.00	17.00	17.00	13.00	10.35	18.00	15.50	20.00	17.70	14.00
684,000 lb. steel reinf. bars	.04	.04	.04	.04	.04	.04	.0448	.04	.043	.05	.045	.045
455,000 lb. structural steel	.058	.06	.06	.045	.069	.06	.058	.06	.065	.06	.0696	.068
3,700 lb. cast steel	.12	.15	.12	.12	.12	.15	.13	.10	.13	.20	.12	.15
12 ea. steel drain. cast	20.00	25.00	30.00	20.00	30.00	16.00	26.50	25.00	25.00	25.00	30.00	28.00
12,062 lin. ft. handrailing stl.	1.14	1.00	1.00	1.00	1.00	1.00	1.30	1.50	1.20	1.00	1.75	1.15
360 lb. bronze exp. plates	.53	.50	.60	.50	.60	.54	.575	.50	.50	.50	.60	.70
183 M ft. BM timber and plank (untr.)	40.00	35.00	38.00	35.00	38.00	46.00	44.50	50.00	32.00	50.00	45.00	47.50
38 M. ft. BM timber and plank (zinc chl. tr.)	52.00	60.00	64.00	50.00	48.00	76.00	59.50	50.00	65.50	70.00	60.00	78.00
1,071 M. ft. BM timber and plank (creosoted)	57.50	64.00	60.00	60 00	55.00	62.00	67.00	60.00	65.00	75.00	64.00	66.00
72,450 lineal ft. furn. piling (untreated)	.18	.11	.13	.12	.15	.135	.14	.12	.11	.15	.14	.15
28,075 lineal ft. furn. piling (creosoted)	.50	.60	.54	.60	.54	.65	.625	.60	.62	.70	.61	.67
6,700 lineal ft. furn. piling (mineral. cell)	.35	.35	.38	.36	.40	.41	.4025	.40	.42	.40	.50	.43
1,667 ea. driving piles	5.50	9.00	9.00	10.00	12.00	11.00	9.50	10.00	11.00	7.50	8.00	7.70
1,276 ea. pile splices	9.50	10.00	10.00	10.00	11.50	8.50	7.65	10.00	10.00	7.50	12.00	8.00
10 ea. test piles	$100	50.00	35.00	50.00	50.00	50.00	57.50	$100	12.00	50.00	$100	12.60
L. S., signs and reflectors	55.00	75.00	$100	70.00	$150	85.00	69.00	$100	$100	$100	$100	$140
150 cu. yd. gravel backfill.	3.00	2.50	4.00	3.00	3.00	3.00	3.45	3.00	3.00	3.00	3.00	1.60
L. S., remove existing struc.	3,000	5,000	2,500	1,000	5,500	4,575	6,900	3,000	7,500	4,000	7,755	5,000
50 sq. yd. remove exist. pavement	5.00	1.00	1.00	1.00	1.50	1.00	1.00	.50	.75	1.00	1.00	1.25
L. S., roadway approaches	$13,216	$11,780	$10,996	$16,025	$14,033	$12,214	$13,779	$16,215	$14,134	$11,188	$17,037	$19,013

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

SANTA ANA, CALIF.—Flood control and conservation work for Orange County Flood Control Dist. Est. cost, $3,000,000.

LOS ANGELES, CALIF.—White Point Outfall Sewer (34,817 lin. ft. long) for L. A. County Sanitation Dist. Est. cost, $2,900,000.

CALL FOR BIDS

SAN JOSE, CALIF.—Guadalupe Dam and spillway (earth fill) for Santa Valley Water Conservation Dist. Bids to March 13th. Est. cost, $305,000.

BIDS RECEIVED

GUNNISON, COLO.—Taylor Park Dam for Bureau of Reclamation, Gunnison, Colo., Utah Const. Co., W. A. Bechtel Co., Morrison-Knudsen Co. and Henry J. Kaiser Co., Ogden, Utah, $784,742, Sched 1, CONCRETE ARCH, and $798,078, Sched 2, EARTH AND ROCK FILL, low.

SALT LAKE CITY, UTAH—Moon Lake Dam for Bureau of Reclamation, Salt Lake City, Utah, T. E. Connolly, San Francisco, $547,221, low.

SAN FRANCISCO, CALIF.—2800 lin. ft. 54" submarine pipeline for Public Utilities Comm., San Francisco, low bid from Pacific Bridge Co., S. F., $698,226, Prop. A, Steel Plate Pipe.

CONTRACTS AWARDED

OLYMPIA, WN.—Timber and Steel bridge over Bay Slough for Director of Highways to West Coast Const. Co., Seattle, Wn., $306,128.

TACOMA, WN.—Green River Gravity Pipeline Replacement for City of Tacoma to American Concrete Pipe Co. of Wn., $526,224, on Prop. 7, and to Puget Sound Machinery Depot, Seattle, Wn., $124,597 on Prop. 1.

STREET and ROAD WORK

CALL FOR BIDS

PHOENIX, ARIZ.—Bids to 10 a.m., March 21, by Bureau of Public Roads, Phoenix, Ariz., for 3.776 mi. grading Section A of Federal Lands Highway Project No. 6, the Globe-Showlow Highway, NAVAJO COUNTY, Arizona, involving: 149,200 cu. yd. excavation, 2,480 cu. yd. excav. for struc., 6,000 cu. yd. excav. for borrow, 110,000 sta. yd. overhaul, 1,900 cu. yd. mi. borrow haul, 3.776 mi. finishing, 674 cu. yd. 'A' concrete, 75,150 lb. reinf. steel, 305 cu. yd. cement rubble masonry, 2,420 lin. ft. corr. met. pipe, 1,400 lin. ft. rem. existing fence, 3,738 lin. ft. new fence, 10,312 lin. ft. Type I protec. ditch. 3-1

PHOENIX, ARIZ.—Bids to 10 a.m., March 26, by Bureau of Public Roads, Phoenix, Ariz., for 4.527 mi. grading on Section A of Route 30, the Globe-Showlow National Forest Highway, Sitgreaves Natl. Forest, NAVAJO COUNTY, Arizona, involving: 33,100 cu. yd. excav., 47,650 cu. yd. excav. for borrow, 955 cu. yd. excav. for struc., 550 sta. yd. overhaul, 8,500 cu. yd. mi. borrow haul, 1,458 lin. ft. corr. metal pipe, 307 cu. yd. cement rubble masonry, 207 cu. yd. concrete, 19,750 lb. reinf. steel, 19,300 lin. ft. Type I protec. ditch, 3,940 lin. ft. remove existing fence, 20,891 lin. ft. new fence. 2-28

SACRAMENTO, CALIF.—Bids to 2 p.m., March 20, by the Calif. Div. of Highways, Sacramento, for: (1) TEHAMA COUNTY—1 mi. grading and bitum. tr. cr. grav. or stone surf. (road mix) on creek run gravel base, involving: 10,500 cu. yd. roadway excav., 87,700 cu. yd. overhaul, 3,600 cu. yd. imported borrow, 1,200 cu. yd. creek run grav. base, 13 tons liq. asphalt SC 2 (prime coat), 1,700 sq. yd. paint binder, 1,550 cu. yd. cr. grav. or st. (bit. surf.), 109 tons liq. asph. ROMC-3, 4 or 5 (bit. tr. surf.), 84 lin. ft. 12" corr. metal pipe, 182 lin. ft. 18" corr. metal pipe. (2) SOLANO COUNTY—0.7 mi. grad. and bitum. tr. cr. grav. or stone surf. (plant mix) through Fairfield, involving: 700 cu. yd. roadway excav., 850 cu. yd. selected material, 550 cu. yd. struc. excav., 65 cu. yd. A conc. (sidew., curb and gut.), 30 cu. yd. A conc. (struc.), 326 lin. ft. 12" corr. metal pipe, 524 lin. ft. 15" corr. metal pipe, 19 steel covers, type A (culv. inlets), 21 steel covers, type B, 7 steel grates, type A1, 12 steel grates, type A2, 7 steel grates, type B1, 14 steel grates, type B2, 160 tons cr. run base, 3,000 tons bitum. tr. surf., 21,400 sq. yd. pt. binder (emuls. asph.), 21,500 sq. yd. seal coat (emuls. asph.). 2-26

SACRAMENTO, CALIF.—Bids to 2 p.m., March 20, by the Calif. Div. of Highways, Sacramento, for: (1) KERN COUNTY—1 mi. grad. and asph. concr. OR concr. pav. and const. reinf. concr. underpass abutments betw. 1 mi. S. of Delano and Delano, involving: 36,000 cu. yd. roadway excav., 102,000 sta. yd. overhaul, 1,000 cu. yd. struc. excav., 55 cu. yd. 'A' concrete (struc.), 212 cu. yd. A conc. (curbs and sidew.), 650 cu. yd. A conc. (slope paving),1,000 cu. yd. B concrete, 59,000 lb. reinf. steel, 1,890 lb. cast steel, 3,200 lin. ft. 8" perf. met. pipe underdr., 1,090 lin. ft. 12" corr. metal pipe, 1,120 lin. ft. 12" plain concr. pipe, 420 tons cr. grav. or stone (oil tr. surfacing). ALTERNATE 'A'—20 cu. yd. remove pavement, 17,800 sq. yd. prepare subgrade pavement, 700 sq. yd. asph. paint binder, 7,840 tons asph concr. ALTERNATE 'B'—150 cu. yd. remove pavement, 18,600 sq. yd. prepare subgrade pavement, 3,715 cu. yd. A concr. pavement, 9,400 lb. reinf. steel, 5,500 pavement dowels. (2) SACRAMENTO COUNTY—0.3 mi. riprap slope protection to be constructed betw. Rio Vista Bridge and Sweetwood, involving: 3,500 cu. yd. local borrow, 8,500 tons riprap (based on weight of 150. lb. per solid dry cu. ft.). 2-26

SAN FRANCISCO, CALIF.—Bids to 2 p.m., March 26, by Bureau of Public Roads, San Francisco, for 2.155 miles grading Section A2 of Rt. 3, the Big Oak Flat Road, Yosemite National Park, MARIPOSA COUNTY, Calif. Work involves: 107,400 cu. yd. excav., 6,200 cu. yd. excav. for borrow, 1,020 cu. yd. excav. for struc., 45,600 st. yd. overhaul, 8,500 cu. yd. mi. borrow haul, 1,952 lin. ft. cor. met. pipe (asph. dip), 108 cu. yd. concrete, 12,000 lb. reinf. steel, 170 cu. yd. masonry, 2,600 cu. yd. handlaid rock embankment, 2,800 lin. ft. protection ditch. 3-2

NEWS SUMMARY

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

SAN FRANCISCO, CALIF.—Bids to 2 p.m., March 28, by Bureau of Public Roads, San Francisco, for 19.662 mi. bitum. treatment (light surf. application) of Secs. A, B, C, D and E of Rt. 5, the Douglas City-Peanut National Forest Highway, Trinity National Forest, TRINITY COUNTY, Calif. Work involves: 590 tons liquid asph. road matl. SC-2. 2-21

SAN FRANCISCO, CALIF.—Bids ot 2 p.m., May 9th, by Bureau of Public Roads, San Francisco, for 16,208 mi. bitum. treatment (light surface application) of Secs. A, B, C, D and E of Rt. 21, the Deer Creek Meadows Natl. Forest Highway, Lassen National Forest, TEHAMA COUNTY, Calif. Work involves 470 tons liq. asph. road matl. SC-2. 2-21

BOISE, IDAHO—Bids to 2 p.m., March 15, by Comm. of Public Works, Boise, Ida., for 1.828 mi. const. roadbed, drain. struc. and cr. rock surf. on the Moscow-Pullman Road and on Line St. in Moscow, LATAH COUNTY, Idaho. NRS 184, involving: 27,160 cu. yd. excav., 8,600 tons cr. rock surf., 906 lin. ft. corr. metal pipe. 3-2

BOISE, IDAHO—Bids to 2 p.m., March 15, by Commissioner of Public Works, Boise, Idaho, for: (1) LEMHI COUNTY (NRH 5-A, 1935)—5.180 mi. const. roadbed, drainage struc. and cr. rock surf. on the Sawtooth Park Highway south from Salmon City, involving: 8,800 cu. yd. solid rock excav., 58,000 cu. yd. common excav., 15,700 tons cr. rock surf. (2) PAYETTE COUNTY (NRH 54-A, NRM 54-C, and NRS 191-A)—0.838 mi. const. roadbed, drain. struc. and cr. gravel surf. on Old Oregon Trail from Payette south, NRH 54-A and NRM 54-C; and on 3.177 mi. of the Payette-Emmett Highway east of Payette, known as Proj. NRS 191-A, involving: 53,800 cu. yd. excav., 3,100 tons cr. grav. surf., 10,000 tons cr. grav. surf. (NRS 191A). 2-28

PORTLAND, ORE.—Bids to 10 a.m., March 15, by Bureau of Public Roads, Portland, Oregon, for constructing or improving the Mt. Adams Highway Reconstruction Grading and Subgrade Reinforcement project FHEC 17-A1, Natl. Forest Road Project, located in the Columbia Natl. Forest, KLICKITAT COUNTY, Washington. Work involves: 28,960 cu. yd. excav., 5,000 cu. yd. cr. or screen. rock or grav. (top course), 6,000 cu. yd. subgrade reinforcement, and other items. 3-2

BIDS RECEIVED

PHOENIX, ARIZ.—Bids received as follows by the Arizona State Highway Commission, Phoenix, Ariz., for: (1) COCONINO COUNTY (NRH 95-J)—Hodgman & MacVicar, 714 Plymouth Road, San Marino, $35,004, low for 5 mi. grad., draining and placing select material and aggregate base course approx. 38⅔ mi. north of Flagstaff and extending northerly on the Flagstaff-Fredonia Highway. (2) GILA COUNTY (NRH 99-I)—Lee Moor Contr. Co., El Paso, $185,075. (ALT. same price) low to above for 4½ mi. grad. and draining, beginning about 56½ mi. northeast of Globe and extending northeasterly on the Globe-Sholow Highway. 2-21

PHOENIX, ARIZ.—Bids received as follows by the Arizona State Highway Comm., Phoenix, Ariz., for: (1) MARICOPA COUNTY (NRH 33)—Phoenix Tempe Stone Co., Phoenix, $68,785 low for 6 mi. widening of roadway and lengthening of drainage struc. at Six Pts. in Phoenix on Phoenix-Prescott Highw. (2) MARICOPA COUNTY (NRM 8-A and NRH 8-A)—Norman Nursery, $2,744 low for 2 mi. furn. haul and plant trees, shrubs, furn. haul and pl. selec. matl. and top soil, pl. rock border and remov. some trees from corner of 11th St. and Mill Ave. in Tempe on the Tempe-Mesa Highway. (3) MARICOPA CO. (NRH 97-F)—Phoenix Tempe Stone Co., Phoenix, $12,080 for 2½ mi. grad., drain and oil processing, located S. of Mesa at intersection of Mesa-Chandler Highway and base line road, on Mesa-Casa Grande Ruins Highway. 2-28

FULLERTON, CALIF.—George R. Curtis, 2440 E. 26th St., Los Angeles, submitted low bid to City Council, City Hall, Fullerton, for paving the highway from North Spadra to Harvard St., Fullerton. 2-21

LOS ANGELES, CALIF.—T. E. Shafer, 405 N. Rampart Blvd., L. A., $2,921 low to Board of Public Works, L. A., for grading and paving Allesandro St. at Riverside Drive (southwest corner) under Cash Contract. 2-7

LOS ANGELES, CALIF.—Koopman Wright Co., 4735 E. 52nd Drive, Los Angeles, who bid $776, low to City Clerk, Los Angeles, for improving alley south of 12th St. near Pacific Blvd., San Pedro. 2-21

LOS ANGELES, CALIF.—Oswald Bros., 366 E. 58th St., Los Angeles, $45,547, low to Calif. Div. of Highways, State Bldg., Los Angeles, for 21 mi. shoulders to be graded and bitum. tr. screen. gravel or stone borders betw. East Highline Canal and Sand Hill in IMPERIAL COUNTY, Calif. 2-28

LOS ANGELES, CALIF.—B. G. Carroll, 4396 Maryland St., San Diego, $64,148, low to Calif. Div. of Highways, State Bldg., Los Angeles, for 2 mi. grad. and concr. paving betw. Riverside Ave. and Colton in SAN BERNARDINO COUNTY. 2-28

LOS ANGELES, CALIF.—L. A. Paving Co., 3200 E. Vernon Ave., L. A., $111,222 low to Calif. Div. of Highways, State Bldg., L. A., for 3.4 mi. grad. and concr. pav. betw. Winter Canyon and Las Flores Canyon, LOS ANGELES COUNTY, Calif. 2-28

SACRAMENTO, CALIF.—Tiffany Const. Co., 535 North 7th St., San Jose, $14,203 low to Calif. Div. of Highways, Sacramento, for 0.7 mi. grad., select matl. surf. and bitum. tr. applied betw. ¾ mi. south of northerly boundary and northerly boundary in INYO COUNTY. 2-27

SACRAMENTO, CALIF.—Tiffany Construction Co., 535 North 7th St., San Jose, $53,084, low to Calif. Div. of Highways, Sacramento, for 10 mi., of which 0.6 mi. is to be grad. and surf. with cr. run base and bitum. tr. cr. grav. or stone and remainder widened and borders of cr. run base constructed betw. 3 mi. north of Willows and Orland in GLENN COUNTY. 2-27

VALLEJO, CALIF.—Independent Const. Co., Ltd., 46th Avenue and Clement St., Oakland, $19,567, low to City Clerk, Vallejo, for asph. concr. paving on Napa Road betw. Tennessee St. and the northerly boundary of the City. 2-28

PORTLAND, ORE.—All bids submitted to the Bureau of Public Roads, Portland, Ore., have been rejected and recommendation for bids to be readvertised has been made for 25.919 mi. constructing or improving the Glacier National Park, Transmountain Highway-East Side, and Babb-Many Glaciers Oiling Projects, PEC-1-D1, D2, E1, E2, and Glacier Natl. Park, GLACIER COUNTY, Montana. 2-12

PORTLAND, ORE.—Bids received as follows by Oregon State Highway Comm., Portland, Oregon, for: (1) MARION COUNTY (NRS 243)—J. C. Compton, McMinnville, Ore., $33,609, low for 0.27 mi. oil mat surf. tr. and 1.64 mi. surf. and penetr. type bitum. macad. wr. surf.; also furn. cr. rock or cr. grav. in stockpiles on Salem-Pringle Creek Section of Morningside Secondary Highway. (2) POLK COUNTY (NRS 249)—Oregon Contracting Co., Portland, $9,190, low for 0.22 mi. pavement widening and resurf. and 0.19 mi. grad., surf. and penetr. type bitum. macad. wr. surf. on Rockreal Creek-Coast Junction Unit, Dallas Sec. or Salem-Dallas Highway. (3) WASCO COUNTY (NRH 36A and 36C)—Edlefsen-Wygandt Co., Peninsular Ave. and Columbia Blvd., Portland, $61,458 low for 1.23 mi. grad., surf. and penetr. type bitum. macad. wr. surf. and 432 lin. ft. pavement widening and resurf. on West Entrance of The Dalles Section of Columbia River Highway. 3-2

BELLINGHAM, WASH.—All bids submitted to County Comm., Bellingham, Wn., for 3 mi. grading and surfacing on Glen Slater Road, have been rejected. 2-14

CONTRACTS AWARDED

EL CENTRO, CALIF.—To Miracle Co., 4751 Monroe St., San Diego, $4,243 to City Clerk, City Hall, El Centro, for improving Imperial Ave. 2-8

LOS ANGELES, CALIF.—To C. O. Sparks, 2309 E. 9th St., L. A., $2.40 per ton to County Board of Supervisors, Hall of Records, Los Angeles, for 8500 tons asph. concr. medium wearing surface for improving Alexander Ave. from Holt Ave. to Cucamonga Ave. in cities of Pomona and Claremont, a distance of 1.88 miles. 2-5

LOS ANGELES, CALIF.—To Matich Bros., Elsinore, $139,804, by Calif. Div. of Highways, Los Angeles, for 16.8 mi. grade and portions paved with concr. and portion tr. with oil tr. cr. grav. or stone (plant mix), betw. 1 mi. east of Beaumont and Whitewater, in RIVERSIDE COUNTY, Calif. 2-8

LOS ANGELES, CALIF.—To Sully Miller Contr. Co., 1500 W. 7th St., L. A., $107,081 ALT. 'A' (ASPH. CONCR.) by Calif. Div. of Highways, L. A., for 3.7 mi. grad. and asph. concr. paving betw. State St. and Los Angeles St. on Rt. 163, LOS ANGELES COUNTY, Calif. 2-8

LOS ANGELES, CALIF.—To Osborn Co., 1570 San Pasqual, Pasadena, $41,580 to County Board of Supervisors, Los Angeles, for improving Foothill Blvd. from its intersection with Greenwood Ave. and Walnut St., easterly to Santa Anita Ave. in City of Pasadena, a distance of .70 mi., under Cash Contract No. 465. 2-14

LOS ANGELES, CALIF.—To J. E. Haddock, 357 N. Chester Avenue, Pasadena, $56,750, to County Board of Supervisors, Los Angeles, for improving Santa Fe Avenue from boundary of City of Long Beach, between Arlington Street and Park Road south to Willow Street, a distance of 1.2 mi., under Cash Contract No. 472. 2-14

LOS ANGELES, CALIF.—To T. E. Shafer, 405 N. Rampart Blvd., Los Angeles, $2921 to Board of Public Works, City Hall, Los Angeles, for grading and paving Allesandro St., at Riverside Drive (southwest corner) under Cash Contract. 2-16

LOS ANGELES, CALIF.—To A. E. Pearson, 1152 Van Buren Ave., Venice, $9,444 to Board of Public Works, City Hall, Los Angeles, for improving Barrington Ave. and Crescenda St. Improvement District, under 1911 Act. 2-16

LOS ANGELES, CALIF.—To J. L. McClain, 5850 Brynhurst Ave., Los Angeles, $48,389, to Calif. Div. of Highways, Los Angeles, for 0.8 mi. grad. and concr. paving betw. Pier Ave. and Sepulveda Blvd., Rt. 175, in Redondo Beach, Manhattan Beach, and Hermosa Beach, LOS ANGELES COUNTY, Calif. 2-20

LOS ANGELES, CALIF.—To J. E. Haddock, Ltd., 357 N. Chester Ave., Pasadena, $123,729 to California Division of Highways, Los Angeles, for 1.1 mi. grading and concrete paving betw. Cypress St. and South city limits in Laguna Beach, ORANGE COUNTY, Calif. 2-20

LOS ANGELES, CALIF.—To Bennett & Taylor, 1041 W. Venice Blvd., Los Angeles, $79,476 to the Metropolitan Water District, Los Angeles, for constructing 16.3 mi. patrol road and 1.4 mi. of stub roads adjacent thereto, along proposed route of the 230 KV transmission line for the Colorado River Aqueduct, located in SAN BERNARDINO COUNTY, Calif. 2-26

LOS ANGELES, CALIF.—To Chas. Booth, 5922½ Estrella Ave., L. A., $3949 to Board of Public Works, L. A., for improving Canyon Drive from Bronson Ave. to Foothill Blvd., under Cash Contract. 2-28

LOS ANGELES, CALIF.—To Southwest Paving Co., Inc., 712 Lankershim Blvd., Los Angeles, $11,105 to Calif. Div. of Highways, Los Angeles, for 1.1 mi. surf. with bitum. tr. cr. grav. or stone on Hill St., betw. Wisconsin Ave. and 8th Street, in Oceanside, SAN DIEGO COUNTY, Calif. 2-28

MARYSVILLE, CALIF.—To Hemstreet & Bell, 501 11th St., Marysville, $2,295 to Dist. Engineer, Calif. Div. of Highways, Marysville, for 0.5 mi. const. borders betw. west city limits and State Highway Rt. 3 in Yuba City, SUTTER COUNTY, Calif. 2-19

MARYSVILLE, CALIF.—To Hemstreet & Bell, 501 11th St., Marysville, $5.063 to Dist. Engineer, Calif. Div. of Highways, Marysville, Calif., for 0.2 of a mi. surf. with cr. run base and bitum. tr. cr. grav. or stone betw. Buchanan St. in City of Marysville and a point 0.04 mi. north of the northerly city limits in YUBA COUNTY, Calif. 2-19

SACRAMENTO, CALIF.—Awards as follow by the Calif. Div. of Highways, Sacramento, for: (1) SHASTA COUNTY—To T. M. Morgan Paving Co., 472 N. Barrington Ave., Los Angeles, $92,485 on ALT "B"—CONCRETE, for 0.9 mi. grading and asph. concr. OR concrete paving at north entrance to City of Redding. (2) MADERA COUNTY—To Union Paving Co., Call Bldg., San Francisco, $61,735 for 1.5 mi. grading and asph. concr. paving in City of Madera. 2-4

SACRAMENTO, CALIF.—To Mittry Bros., 5531 Downey Road, Los Angeles, $123,144 by Calif. Div. of Highways, Public Works Bldg., Sacramento, for 3.7 mi. grading betw. Coarse Gold and Hawkins School in MADERA COUNTY, Calif. 2-8

SACRAMENTO, CALIF.—To Tiffany Const. Co., 535 N. 7th St., San Jose, $13,911 by Calif. Div. of Highways, Sacramento, for 0.9 mi. grad., surf. with salv. surf. matl and a bitum. applied betw. 1.8 mi. and 0.9 mi. S. of Fish Springs School, INYO COUNTY, Calif. 2-27

SAN BERNARDINO, CALIF.—To George Herz & Co., Platt Bldg., San Bernardino, $2231 to Dist. Engineer, Calif. Div. of Highways, San Bernardino, for 3.8 mi. bitum. surf. treatment to be applied to existing oiled shoulders, betw. Sierra Ave. and Riverside Ave. in SAN BERNARDINO COUNTY, Calif. 2-28

SAN FRANCISCO, CALIF.—To Chas. Kuppinger, Box 356, Lakeport, $3971 by Dist. Engineer, Calif. Div. of Highways, S. F., for 139.2 mi. apply Diesel oil to roadside vegetation at var. locations in SONOMA, MARIN, NAPA, and SOLANO COUNTIES, Calif. 2-8

SAN FRANCISCO, CALIF.—To Hayward Bldg. Matl. Co., Hayward, $2000 by Dist. Engineer, Calif. Div. of Highways, S. F., for 75.5 mi. applying Diesel oil to roadside vegetation at var. locations in ALAMEDA, CONTRA COSTA and SANTA CLARA COUNTIES, Calif. 2-8

SAN FRANCISCO, CALIF.—To R. S. Silverberg, 405 Montgomery St., San Francisco, $1567, by Dept. of Pub. Works, S. F., for improving Kramer Place betw. Greenwich St. and south terminal of Kramer Place and Pardee Alley betw. Kramer Place and Grant Ave. 3-1

SAN FRANCISCO, CALIF.—To S. F. Paving Co., 6565 3rd St., S. F., $744, by Dept. of Pub. Works, City Hall, S. F., for moving 700 cu. yd. earth slide on easterly side of Bayshore Blvd., San Francisco. 3-1

SAN FRANCISCO, CALIF.—To Pacific States Const. Co., 708 Call Bldg., S. F., $35,437, by Bureau of Pub. Roads, San Francisco, for 8.606 mi. surf. with cr. gravel base course on Sections A and B or Route 51, the Hoopa Natl. Forest Highway, Trinity Natl. Forest, HUMBOLDT COUNTY, CALIF. 2-13

SAN MARINO, CALIF.—To Geo. R. Curtis Paving Co., 2440 E. 26th St., Vernon, $9480 (USING 7" ASPH. CONCR. PAVEM.), to City Clerk, San Marino, for improving San Gabriel Blvd. betw. Duarte Road and S. Gainsborough Drive. 2-15

STOCKTON, CALIF.—To Sheldon Oil Co., Suisun, Calif., $3257, by Dist. Engineer, Calif. Div. of Highways, Stockton, for 199.7 mi. applying Diesel oil to roadside vegetation at var. locations in SAN JOAQUIN, STANISLAUS, CALAVERAS, AMADOR, TUOLUMNE and MARIPOSA COUNTIES, Calif. 2-8

STOCKTON, CALIF.—To Lee J. Immel, 1031 Evelyn Ave., Berkeley, $2459, by Dist. Engineer, Calif. Div. of Highways, Stockton, for 129.9 mi. applying Diesel oil to roadside vegetation at var. locations in SOLANO and SAN JOAQUIN COUNTIES, Calif. 2-8

STOCKTON, CALIF.—To Tiffany Const. Co., 535 N. 7th St., San Jose, $2,517, to Dist. Engineer, Calif. Div. of Highways, Stockton, for 147.6 mi. applying Diesel oil to roadside vegetation at var. locations in MERCED, MARIPOSA and STANISLAUS COUNTIES, Calif. 2-20

STOCKTON, CALIF.—To Sheldon Oil Co., Suisun, Calif., $2851, by Dist. Engineer, Calif. Div. of Highways, Stockton, for 189.9 mi. applying Diesel oil to roadside vegetation at var. locations in AMADOR, CALAVERAS, STANISLAUS and TUOLUMNE COUNTIES, Calif. 2-20

DENVER, COLO.—Award recommended to J. L. McLaughlin, 3003 3rd Ave. N., Great Falls, Mont., $46,977, by Bureau of Pub. Roads, Denver, Colo., for 3.701 mi. fine grad. and surf. (cr. run) on Grand Loop Highway, Yellowstone Natl. Park, NR-1-J-2, H-4, Wyoming. 2-11

DENVER, COLO.—To Owen-Baab & Thorkildsen, 1375 Monaco Blvd., Denver, Colo., $89,130, by State Highway Dept., Denver, Colo., for 4.185 mi. gravel surfacing betw. Delta and Olathe on State Highway No. 6, NRH 23-F and NRH 23-A, No. 1, in DELTA and MONTROSE COUNTIES, Colo. 2-13

DENVER, COLO.—To Monaghan & Kenney, 332 S. Race St., Denver, Colo., $131,509, by State Highway Engineer, Denver, Colo., for 9.292 mi. grav. surf. betw. Peyton and Calhan on St. Highw. No. 4, NRH 55 (1935) and NRH 79-H (1935), in EL PASO COUNTY, Colo. 3-1

DENVER, COLO.—To J. B. Bertrand, Inc., 301 Union Station, Denver, Colo., $58,137, by State Highway Engineer, Denver, Colo., for 2.003 mi. gravel surfacing on Colorado Blvd. in the City of Denver, on State Highway No. 81 (NRM 285-B, Const. Div. No. 1), DENVER COUNTY, Colo. 2-23

DENVER, COLO.—Awards as follow by State Highway Engineer, Denver, Colo., for: (1) FREMONT COUNTY (FLHP 2-D)—To M. E. Carlson, 4483 Newton St., Denver, $68,614, for 1.967 mi. grav. surf. betw. Texas Creek and Parkdale on St. Highway No. 6. (2) MOFFAT COUNTY (NRH 150-D Const. Div. 2)—To Northwestern Eng. Co., Rapid City, South Dakota, $52,368, for 10.243 mi. road mix oil processing betw. Massadona and Elk Springs on State Highway No. 2. (3) SAGAUCHE COUNTY (NRS 389-No. 2)—To C. Ryan & Son, 4880 Julian St., Denver, Colo., $9204, for 1.081 mi. gravel surfacing betw. Sagauche and Parlin on State Highway No. 114. 2-23

MILES CITY, MONTANA—To Northwest Roads Co., P. O. Box 5072, Portland, Ore., $143,618, by City Clerk, Miles City, Mont., for excav., graveling and oiling of streets in Miles City, Spec. Improv. Dists. 98, 99 and 100. Oiling to be plant mix process with comb. curb and gutter with alternate bid for straight curbing. 2-4

PORTLAND, ORE.—To Edlefsen-Wygandt Co., Peninsular Ave. and Columbia Blvd., Portland, Ore., $31,465, by Oregon State Highway Comm., Portland, Ore., for 0.38 mi. grad. and pav. on Newberg-Chehalem Creek Section of West Side Pacific Highway in YAMHILL COUNTY, Oregon, (NRH 52A and NRH 52B). 3-2

PORTLAND, ORE.—To United Contr. Co., 311 Stock Exch. Bldg., Portland, $22,191, by Oregon State Highw. Dept., Portland, for 0.63 mi. pav. resurf. on 10th St.-Powder River Unit, Baker Sec. of Oregon Trail in BAKER COUNTY, Ore. (NRM 154-E). 3-2

PORTLAND, ORE.—To Itschner & Rigdon, Barlow, Ore., $28,722, to the Oregon State Highway Comm., Portland, Ore., for 1.32 mi. grading and surfacing, 0.32 mi. oil mat surf. tr. and 1.0 mi. penetr. type bitum. macadam, also including grading 0.7 mi. railway roadbed on State Hospital-Ash Street Unit, Pendleton Section of Old Oregon Trail in UMATILLA COUNTY, NRM 40-C (1935). 2-12

PORTLAND, ORE.—To Parker-Schram Co., Couch Bldg., Portland, $61,860, by U. S. Engr. Office, Portland, for const. permanent road system and landscaping at Bonneville, Ore., under Spec. No. 35-426. 2-28

PORTLAND, ORE.—Awards as follow by the Oregon State Highway Comm., Portland, Oregon, for: (1) BAKER and UNION COUNTIES (State Proj.)—To Quinn-Robbins Co., Inc., 319 Noble Bldg., Boise, Ida., $12,750, for furn. approx. 6000 cu. yd. cr. rock in stockpiles on North Powder-Haines Rock Production Proj. on Old Oregon Trail. (2) CLATSOP COUNTY (NRM 194-B)—To Edlefsen-Wygandt Co., Peninsular Ave. and Columbia Blvd., Portland, $29,680, for 0.89 mi. grad. and pav. and pavement widening and resurf. on Florence Ave.-Eric Ave. Unit, Astoria Section of Oregon Coast Highway. (3) JACKSON COUNTY (NRM 131-G)—To Mt. States Const. Co., Eugene, Ore., $21,386, for 0.45 mi. grad., pav. and pavement widen. and resurf. on Gold Hill Sec. of Pacific Highway. (4) TILLAMOOK COUNTY (NRH 180-D)—To Chas. H. Leonard, Albany, Ore., $27,504 for 0.71 mi. grad. on Necarney Creek Sec. of Oregon Coast Highway. (5) LANE COUNTY (NRS 247)—To Northwest Rds. Co., P. O. Box 5072, Portland, $20,369 (USING TAR) for 3.3 mi. surf. and oil mat surf. tr. on Elmira Sec. of Territorial Secondary Highway, also furnish cr. matl. on stockpiles. (6) LANE COUNTY (NRM 105-B)—To Edlefsen-Wygandt Co., Peninsular Ave. and Columbia Blvd., Portland, $22,775 for 0.53 mi. pavem. widen. on 15th St.-6th St. Unit, Junction City Section. 3-2

SALT LAKE CITY, UTAH—To Reynolds-Ely Const. Co., Springville, Utah, $36,398, by State Road Comm. of Utah, for 4.313 mi. gravel surfacing road betw. Logan and the Little Bear River Bridge on State Road No. 69, IN CACHE COUNTY, Utah NRS 154-A and NRS 154-B. 2-9

OLYMPIA, WN.—Awards as follow by the Director of Highways, Olympia, Wn., for: (1) GRAYS HARBOR COUNTY (NRM 54-E)—To Macrie & Steffenson, 511 21st Ave., North, Seattle, Wn., $33,973 for 0.6 mi. concr. paving and retopping existing pavement with asph. concr. on State Road No. 9, Pioneer Avenue from Sylvia to Seventh Sts. in City of Montesano, Wn. (2) ISLAND COUNTY (NRS 218-A)—To H. P. Dorsey & Co., 2006 State St., Bellingham, Wn., $27,614 for 4.9 mi. grading, surf. with cr. stone, const. bitum. surf. by road mix method and applying a dust palliative on county road, Stanwood to Utsalady. 2-7

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) WHATCOM COUNTY (NRM 17-D (1935)—To J. H. Lick, 1601 Broadway, Bellingham, Wn., $19,030 for 0.3 of a mi. cement concr. paving and retopping existing pavement with asph. concr. on State Road No. 1, Mill Avenue North Revision in City of Bellingham. (2) WHITMAN COUNTY (NRS 213-A)—To G. D. Lyon & Co., 503 W. 14th Ave., Spokane, Wn., $63,386 for 1.9 mi. grading and surf. and const. tr. timber trestle 51' long and a tr. pile and timb. overcrossing with 60' steel span, both with concr. deck on the Inland Empire Highway-Eastern Route, Oakesdale South. 2-21

BRIDGES and CULVERTS

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 a.m., March 20, by Board of Public Works, Los Angeles, for construction of the Gaffey Street bridges, including two structures; one a concrete girder bridge on Gaffey Street over Summerland Ave. and the other a reinf. concr. arch bridge on Elberon Ave. over Gaffey St. 2-27

LOS ANGELES, CALIF.—Bids to 10 a.m., March 20, by the Board of Pub. Works, Los Angeles, for widening existing reinf. concr. girder bridge on San Fernando Road at Southern Pacific Co.'s new tunnel station, under Cash Contract. 2-27

LOS ANGELES, CALIF.—Bids to 2 p.m., March 21, by the Calif. Div. of Highways, State Bldg., Los Angeles, for: (1) IMPERIAL COUNTY—Const. 2 bridges and 0.2 mi. grade and surf. with road mix bitum. tr. material roadway 1½ mi. north of Calexico, involving: 4,200 cu. yd. imported borrow, 1,200 cu. yd. selected material, 26 tons cutback asphalt, 2,400 sq. yd. prep., mix and shape roadbed, 21 tons fuel oil, 225 M gallons water, 155 cu. yd. 'A' concrete, 30,000 lb. reinforcing steel, 2,240 lin. ft. furn. creos. Doug. Fir piles, 7 M ft. BM Creos. Doug. Fir timb., 266 lin. ft. timber railing. (2) RIVERSIDE COUNTL—Const. bridge across San Jacinto River, 1¾ mi. east of Elsinore, consisting of 19 14' concrete slab spans on creosoted pile bents, involving: 1,050 cu. yd. roadway excav., 60 cu. yd. struc. excav., 16 tons fuel oil, 80 tons cr. grav. or stone, 3,150 lin. ft. furn. creos. Doug. Fir piles and test piles, 390 cu. yd. 'A' concrete, 77,400 lb. reinforcing steel. 2-26

BOISE, IDAHO—Bids to 2 p.m., March 15, by the Comm. of Pub. Works, Boise, Idaho, for the following projects: (1) VALLEY COUNTY (NRH 130-G)—Const. a 151.2' concr. overhead struc. over the McCall Branch of the Oregon Short Line Railroad, and grading and surf. the approaches on 0.450 mi. of the Payette Highway north of Cascade, involv.: 3,000 cu. yd. solid rock excav., 12,000 cu. yd. common excav., 444 cu. yd. 'A' concrete, 84,000 lb. metal reinforcement, 3,200 lb. struc. steel. (2) SHOSHONE COUNTY (NRH 73-A)—Const. a 125.3' concr. bridge across the Coeur d'Alene River Channel Change and grading and surf. the approaches on 0.474 mi. of the Coeur d'Alene-Yellowstone Trail betw. Kellogg and Wallace, involv.: 15,000 cu. yd. excav., 480 cu. yd. 'A' concrete, 48,000 lb. metal reinforcement, 68,400 lb. structural steel. 2-28

BIDS RECEIVED

DOUGLAS, ARIZ.—Ed. Powell, Douglass, Ariz., $3,775 on Item 1 and $3,000 on Item 2, only bid submitted to the Treasury Dept., Procurement Div., Pub. Works Branch, Washington, D. C., for constructing a concr. bridge and approaches at the U. S. Inspection Station, Douglas, Arizona. 3-2

LOS ANGELES, CALIF.—Jacobson Bros., 4963 Genevieve Ave., Los Angeles, $3,172, low to County Bd. of Supervisors, L. A., for constructing a culvert on Emerald Ave. at Emerald Wash, north of La Verne, betw. Foothill Blvd. and Baseline Road. 2-26

PORTLAND, ORE.—Kern & Kibbe, 42 E. Salmon St., Portland, Ore., $9,563, low to Oregon State Highway Comm., Portland, Ore., for const. concrete bridge over Mill Creek on the Columbia River Highway in City of The Dalles, WASCO COUNTY, Oregon (NRM 36-C). 3-2

BELLINGHAM, WN.—All bids submitted to the County Comm., Bellingham, Wn., for repairing and reconst. the Marietta Bridge by redecking and const. new approaches, have been rejected. 2-14

CONTRACTS AWARDED

FRESNO, CALIF.—To Rexroth & Rexroth, 2110-C, Station A, Bakersfield, Calif., $5,488, to Dist. Engineer, Calif. Div. of Highways, Fresno, for removing and disposing of an existing bridge and constructing a new bridge consisting of four 10-ft. timber stringer spans about 1.6 mi. S. of the westerly county boundary in FRESNO COUNTY, Calif. 2-16

LAKEPORT, CALIF.—To C. S. Good, Lakeport, Calif., $2,133.68, to Lake County Board of Supervisors, Lakeport, for the repair of the Rodman Bridge located on the Lucern Cutoff. 2-18

LOS ANGELES, CALIF.—To R. R. Bishop, 5017 E. Broadway, Long Beach, $25,270, to Calif. Div. of Highways, Los Angeles, for widening reinf. concr. bridge across Malibu Creek approximately 10 mi. N.W. of Santa Monica, consisting of 17 31'6" spans on concr. bents and abutments, in LOS ANGELES COUNTY, Calif. 2-28

OAKLAND, CALIF.—To MacDonald & Kahn Co., Ltd., Financial Center Bldg., S. F., $17,225, by County Clerk, Oakland, for furn. and installing sheet steel piling surrounding the under-water pits at each end of the Park Street Bridge. 3-1

SACRAMENTO, CALIF.—To Thos. J. Doyle, 1527 17th Ave., S. F., and Theo. Johanns, 2020 15th St., S. F., $23,737, to Calif. Div. of Highways, Sacramento, for const. a reinf. concr. bridge across Malpaso Creek, 9 mi. S. of Monterey, consisting of one 117' open spandrel arch span and six 13' 10" approach spans, in MONTEREY COUNTY, Calif. 2-19

DENVER, COLO.—To Construction Service, Inc., Tramway Bldg., Denver, Colo., $44,688, by Mgr. Dept. of Improvements and Parks, Denver, for const. two bridges over Cherry Creek, at Stout St. and at Champa St. 2-

DENVER, COLO.—To W. O. Allison Co., 207 Electrical Bldg., Durango Colo., $32,708, by State Highway Engineer, Denver, Colo., for consti a 2-span steel truss bridge across the Colorado River west of Granby on State Highway No. 2 in GRAND COUNTY, Colo., Proj. NRH 151-D, Const. Div. No. 2. 2-23

PORTLAND, ORE.—To Joplin & Eldon, North Columbia Blvd. and Peninsular Way, Portland, Ore., $54,355, by Bureau of Public Roads, Portland, Ore., for const. a 3-span continuous reinf. concr. bridge over Laughing Water Creek, Mt. Rainier Natl. Park, East Side Highway, Proj. NR-5A, located in the Mt. Rainier Natl. Park, LEWIS COUNTY, Wn. 2-15

PORTLAND, ORE.—Awards as follow by the Oregon State Highway Comm., Portland, Ore., for: (1) WASHINGTON COUNTY (NRH 73)—To J. F. Johnston, Newberg, Ore., $4,464 for const. 2 culverts over Cedar Creek on the Votaw Unit of the West Side Pacific Highway approx. 5 mi. east from Newberg. (2) YAMHILL COUNTY (NRH 52-A)—To C. J. Montag & Son, 201 Worcester Bldg., Portland, Ore., $43,600 for const. composite pile trestle over Chehalem Cr. on West Side Pacific Highway near the south city limits of Newberg. (3) CLACKAMAS COUNTY (NRS 242)—To Averill & Philpott, Rt. 10, Portland, $18,701 for const. concr. bridge over Milk Cr. on the Cascade Secondary Highway at Mulino. (4) UMATILLA COUNTY (NRM 38-C)—To C. J. Montag & Son, 201 Worcester Bldg., Portland, $42,080 for const. concr. bridge over Umatilla River on Old Oregon Trail in Pendleton. 3-2

OGDEN, UTAH—Award recommended to Interstate Engineering & Construction Co., Newport, Wash., $42,698 by Bureau of Public Roads, Ogden, Utah, for constructing or improving the Lewis and Clark Highway, Kooskia Bridge, Natl. Forest Road Proj., FHEC 16-A5, Unit No. 1, located in Selway Natl. Forest, Idaho, IDAHO COUNTY, including 0.098 miles approaches. 2-7

OLYMPIA, WN.—To West Coast Const. Co., 1022 Lloyd Bldg., Seattle, $306,128, by Director of Highways, Olympia, Wn., for bridge over Ebey Slough betw. Everett and Cavalero's on St. Rd. No. 15, consisting of 6,232 lin. ft. tr. pile and timb. trestle, 240' steel span with 210' concr. approaches and paving with concr. and asph. concr. on the Cavalero's Corner intersection in SNOHOMISH COUNTY, Wn. (See Unit Bid Summary.) 2-21

SEATTLE, WN.—To Henriksen-Alstrom Const. Co., 1710 Textile Tower, Seattle, Wn., $9,100, by Port of Seattle Comm., Seattle, Wn., for constructing a reinf. concr. viaduct at the west end of Lenora St. 2-23

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

PHOENIX, ARIZ.—Plans are now being prepared for the second unit of the city water system extension project and bids will be called for within the next few weeks, by City Commissioner, Phoenix. Est. cost $100,000. Work involves installation of lateral mains and connecting lines. 2-20

LONG BEACH, CALIF.—Board of Water Comm., Long Beach, has instructed General Manager to present plans and specifications to Board for approval for grading and constructing 6 steel storage tanks on Alamitos Hill at Loma Ave. and State St. Tanks will be 35' high and 420' in circumference. Est. cost $266,000. 2-23

LOS ANGELES, CALIF.—A special election will be held April 6 to establish the Howard County Water District, in an area west of Vermont Avenue and south of 94th St., in LOS ANGELES COUNTY. At the same time election will be held to vote $120,000 in bonds to finance the project. 2-6

NEWPORT BEACH, CALIF.—City Council, City Hall, Newport Beach, has rescinded steps for holding special election on Feb. 26 to vote $120,000 in bonds to finance a 93-acre or 34-acre tract, installation of new water system, including pumps, equipment, aeration plant, pipe lines and buildings. The project will be discussed within 30 days by the Council, at which time reports will be made on possibilities of P.W.A. assistance and also on a plan to install a temporary system (to be paid out of the city's general fund) at cost of $43,000. 2-14

NORTH SACRAMENTO, CALIF.—The P.W.A. has made a loan and grant of $132,000 to North Sacramento, Calif., for construction of a complete new waterworks system. Surveys are now being made by S.E.R.A. labor. 2-23

VENTURA, CALIF.—Bonds were defeated at a special election held by the City of Ventura to vote on proposed construction of a storage dam on Coyote Creek at the Hoffman Site, just below the junction of Santa Ana Creek, at an estimated cost of const. of $700,000 and $450,000 for reservoir lands. 2-7

VICTORVILLE, CALIF.—Chas. Foulke, 455 4th St., San Bernardino, Consulting Engineer, has completed preliminary plans for construction of a waterworks system for the Victorville County Water District involving surface reservoir, distribution system, well, and pumping plant, as follows: Reinforced concrete reservoir, $3,500; distribution system, $27,750; 25,500 ft. 4" and 11,600 ft. 6" CI pipe; 32 4" and 10 6" gate valves; 30 hydr. well, 16", 280 ft. deep, $7,300. Also pumps, piping, sand traps, etc. 2-21

BAINVILLE, MONT.—Plans and specifications are being completed by Engineer Roy N. Stewart, 602 W. Babcock St., Bozeman, Montana, and call for bids will be issued shortly by City Clerk, Bainville, Mont., for improvements to water works system. Est. cost $34,000. 2-7

CHINOOK, MONT.—Plans and spec. are being completed by City Engineer, F. E. Brandis, and call for bids will be issued shortly by City Clerk, Chinook, Mont., for improv. to water works system. . Est. cost is $24,000. 2-7

GLASGOW, MONT.—Plans and specifications are being completed by engineer, M. A. Walker, Glasgow, Mont., and call for bids will be issued shortly by City Clerk, Glasgow, Mont., for water works improvements. Estimated cost $32,000. 2-7

HELENA, MONT.—Plans and specifications are being completed by J. S. James, State Engineer, Helena, Mont., and call for bids will be issued about April 1st by R. R. Purcell, Secretary, Water Conservation Board, Helena, Mont., for improvements at Rock Creek, CARBON COUNTY, Montana. Estim. cost, $826,000. 2-7

EMPIRE, ORE.—P.W.A. has made a loan and grant of $10,000 to City of Empire, COOS CO., for replacem. of supply main and distrib. system, install. of chlorinator and meters. 2-21

COQUILLE, ORE.—P.W.A. has made a loan and grant of $35,000 to City of Coquille, COOS CO., Ore., for replacement of 4 miles of wood and steel pipe with cast iron pipe in the existing water distribution system. Labor and material is $34,000. 2-21

LONG PRAIRIE, ORE.—P.W.A. has made a loan and grant of $18,600 to the Long Prairie Water District in Tillamook County, Oregon, for replacements and extensions to the water distribution system of the Long Prairie Water Co., a private corporation which will be succeeded by the Long Prairie Water District. 2-21

TILLAMOOK, ORE.—P.W.A. has made a loan and grant of $59,000 to City of Tillamook, TILLAMOOK COUNTY, Ore., for replacement of 32,000 ft. of existing steel watermains with cast iron pipe, installing gate valves and additional hydrants. 2-21

WALLOWA, WASH.—P.W.A. has made a loan and grant of $62,000 to City of Wallowa, WALLOWA COUNTY, for improvements to waterworks system consisting of replacement of supply main, construction of 400,000-gallon surf. reservoir, construction of chlorinator and extensions to distribution system. 2-21

CALL FOR BIDS

SAN FRANCISCO, CALIF.—Bids to 3 p.m., March 20th, by Public Utilities Commission, San Francisco, for laying 12 and 16" feeder mains in southwest section of San Francisco, under S.F.W.D. Contract No. 56, involving **Excavation and backfill** (a) 7,160 lin. ft. for 12" C.I. pipe, trench, 24" wide x 44" deep; (b) 22,080 lin. ft. for 16" C.I. pipe, trench, 30" wide x 48" deep. 2-26

SAN FRANCISCO, CALIF.—Bids to 3 p.m., March 20th, by Public Utilities Comm., San Francisco, for laying 12 and 16" feeder mains in the easterly section of San Francisco, under S.F.W.D. Contract No. 57, involving: **Excavation and backfill** (a) 12,930 lin. ft. for 12" C.I. pipe, trench, 24" x 44" deep; (b) 9,220 lin. ft. for 16" C.I. pipe, trench, 30" wide by 48" deep. 2-26

SAN FRANCISCO, CALIF.—Bids to 3 p.m., March 20th, by Public Utilities Comm., San Francisco, for laying 6 and 8" cast iron mains from 26th to 48th Avenues and from Fulton to El Camino, under S.F.W.D. Contract No. 76, involving: 34,790 lin. ft. excavation and backfill for 6" and 8" pipe, trench, 17" wide by 36" deep. 2-26

SAN FRANCISCO, CALIF.—Bids to 3 p.m., March 20th, by Public Utilities Comm., San Francisco, for constructing 6 and 8" cast iron mains in area from Funston Avenue to 35th Avenue and from Quintara to Wawona, under S.F.W.D. Contract No. 77, involving: 30,640 lin. ft. excav. and backfill for 6 and 8" pipe, trench, 17" wide by 36" deep, 480 cu. yd. additional excavation and backfill, 1,190 sq. ft. addtl. pavement removal and replace. 2-26

LUALUALEI, T. H.—Bids to 10 a.m., March 20th, by Bureau of Yards & Docks, Navy Dept., Pearl Harbor, T. H., for constructing a pipeline at Lualualei, under Spec. No. 7645. Estimated cost of work is $2,000. 2-21

TREMONTON, UTAH—Bids to 10 a.m., March 19th (tentative date) by City Clerk, City Hall, Tremonton, Utah, for development of a new spring, replacement of 8,350 ft. wood pipe with cast iron pipe; reconditioning overflow and intake of reservoir and install 260 water meters. Est. cost, $35,000. 3-2

BIDS RECEIVED

OAKLAND, CALIF.—Albertson-McCormick Sprinkler Co., Ltd., 865 Mission St., San Francisco, $5,200, low to East Bay Municipal Utility District, Oakland, for furnishing and installing a fire sprinkling system for Office Building at 512 16th St., Oakland, under Spec. No. L. S. 139. 2-28

SAN JOSE, CALIF.—Byron Jackson Co., 6th and Carlton St., Berkeley, $5580, low to Secretary of Santa Clara Valley Water Conservation Dist., Rm. 62, Grant Bldg., San Jose, for constructing two pumping plant replacements at the Lester and Doetch Wells, involving 3 deep well type turbine pumps. 2-19

CONTRACTS AWARDED

BEVERLY HILLS, CALIF.—To Fred Weber, 8442 California Ave., South Gate, $6,600 (not including resurfacing) to City Council, Beverly Hills, for furn. and installing 6000 ft. 6" and 8" cast iron pipelines in the West Hollywood system of the Beverly Hills waterworks. 2-28

BRAWLEY, CALIF.—To Marko Matick, 1269 Colorado Blvd., Los Angeles, $71,970, to City Council, Brawley, Calif., for construction of sedimentation basins, filtration plant and changes in and around the pump house, P.W.A. Project No. 5771, Unit B. 2-5

OAKLAND, CALIF.—To Pacific Bridge Co., Box 87, Presidio Station, San Francisco, $12,697, by East Bay Municipal Utility District, Latham Square Bldg., Oakland, for installing submarine pipe across Oakland Inner Harbor, under L. S. 136. 2-5

CHEYENNE WELLS, COLO.—To J. E. Schwartz & Sons, Everhart Bldg., Colorado Springs, Colo., $8218, by Town Clerk, Cheyenne Wells, Colo., for construction of water works extensions and improvements. 2-20

EKA LAKA, MONT.—To Boespflug & Manning, Miles City, Mont., $27,807, to the Town Clerk, Ekalaka, Mont., for const., of a complete water system for the town of Eklalaka, Mont. 3-1

CARSON CITY, NEVADA—Awards as follow by Nevada State Highway Commission, Heroes Memorial Bldg., Carson City, Nevada, for: (1) To Silver States Const. Co., Fallon, Nev., $7,946, for constructing a pipeline and tree pits a distance of 1.64 mi. on Rt. 6, Sec. C2. (2) To Joe Evans, Las Vegas, $2,404, for drilling a water well complete with casing ready for pump installation for irrigation purposes, 1.7 miles south of Las Vegas, Rt. 6, Sec. C2. 2-7

CHEHALIS, WN.—To Felix Arcorace, 8423 48th Ave., South, Seattle, Wn., $24,171, to City Clerk, Chehalis, for furnishing and installing 2¼ miles 16" creosoted wood pipe and appurtenances. 2-16

SEATTLE, WN.—To A. Del Guzzo, 3702 Ida St., Seattle, Wn., $11,350, to the Secretary of Water District No. 20, J. C. Colburn, 12,207 22nd Ave., South, Seattle, Wn., for construction of watermains in L.I.D. No. 2 of said Water District. 2-23

TACOMA, WN.—To American Concrete Pipe Co. of Washington, 459 E. 15th St., Tacoma, Wn., $526,224 PROP 7 (Section 'M") and to Puget Sound Machinery Depot, 322 1st Ave., South, Seattle, Wn., $124,597, PROP. 1 (Section 'N" with Type 'A' Coating) by Board of Contracts and Awards, City Hall, Tacoma, Wn., for furnishing and installing the Green River Gravity Pipeline Replacement, P.W.A. Project No. 1135. (See Unit Bid Summary) 2-12

SEWER CONSTRUCTION

WORK CONTEMPLATED

COSTA MESA, CALIF.—James Lyle Chase, Consulting Engineer for the Costa Mesa Sanitary District, has made cost estimates for construction of sanitary sewers and a sewage disposal plant for Costa Mesa. Est. cost, $70,000. 2-14

LONG BEACH, CALIF.—Protests to 11 a.m., March 26th, by City Council, City Hall, Long Beach, for construction of a reinforced concrete pumping station and sanitary sewer in Daisy Ave. and adjacent alleys. 2-28

LOS ANGELES, CALIF.—Plans completed by City Engineer, City Hall, Los Angeles, for construction of a sewer in Mt. View Avenue and Venice Blvd. Sewer District. Work involves: Lump sum, sewer, 146 lin. ft. house connec. sewers, 185 vertical ft., chimney pipe, 1,109 sq ft. 'A' resurfacing, 26,200 sq. ft. 'AA' resurfacing. Est. cost, $23,750. 3-2

LOS ANGELES, CALIF.—Protests to 10 a.m., March 27th, by City Council, City Hall, Los Angeles, for Cypress Ave. and Macon St. Sewer District. Work involves: 547 ft. 8" cem. or vitrified pipe, 1,187 sq. ft. 'A' resurfacing. Est. cost, $1703. 2-21

LOS ANGELES, CALIF.—Call for bids will be issued in April by County Sanitation Districts, 139 N. Broadway, Los Angeles, for construction of the White Point Outfall Sewer, in accordance with plans and specifications prepared by A. K. Warren, engineer for the district. The sewer line will extend from the sewage treatment plant at Figueroa and Lomita Blvd. to White's Point via the Palos Verdes Hills, a length of 34,817 feet, and will involve concrete-lined tunnel. The P.W.A. has made a grant of $872,000 and total est. cost is $2,960,000. 2-16

SANTA MONICA, CALIF.—City Council, City Hall, Santa Monica, has authorized the City Engineer to prepare plans and specifications for const. of the Colorado Ave. trunk sewer. Application will be made to P.W.A. for funds. Est. cost of materials $200,000. 2-18

SEAL BEACH, CALIF.—A special bond election will be held March 29th by the City of Seal Beach, on a $132,000 bond issue, which involves Sewage plant, water system and breakwater. Sewage plant specifications call for an expenditure of $52,000, $12,000 of which is to be in the form of a grant from the Federal Government. Breakwater to be constructed at the west entrance to Anaheim Bay, is to be for $62,000. Total work will cost $82,000 with the remainder of the cost being made up by a Federal Grant. Water system is to be installed at a cost of $30,000, with an expected appropriatilon from the Government. 2-25

SUNSET BEACH, CALIF.—Sunset Beach Sanitary District has voted $45,000 in bonds to finance the construction of a sewer system and disposal plant. 2-18

BURNS, ORE.—P.W.A. has made a loan and grant of $22,000 to City of Burns, HARNEY COUNTY, Oregon, for additions to existing sewage treatment plant, consisting of a primary settling basin and aeration plant, final settling basin and sludge digestion tank. 2-21

LAKEVIEW, ORE.—P.W.A. has made a loan and grant of $36,000 to the town of Lakeview, LAKE COUNTY, Ore., for construction of a sewage disposal plant consisting of primary and secondary clarifiers, trickling filters, sludge digestion chamber, sludge drying beds and pumping unit. 2-21

SALEM, ORE.—The P.W.A. has made a loan and grant of $360,000 to Salem, Oregon, for constructing intercepting sewers, alterations to laterals, pumping facilities and a sewage disposal plant. 2-23

CONTRACTS AWARDED

PHOENIX, ARIZ.—To Torson Const. Co., Cincinnati, $270,461 to City Commission, Phoenix, for construction of approx. 15 miles of concrete storm drains, from 54" to 8-in. 2-28

BURLINGAME, CALIF.—Contracts officially awarded as follows (with P.W.A. approval) by City Clerk, City Hall, Burlingame, for construction of intercepting sewers, sewage pumping plant, and digestion tank, for complete sewage disposal system for city: (1) To H. E. Conner, 1222 Whipple Ave., Redwood City, $38,941, on SCHED. 2, sewers; (2) To C. W. Caletti & Co., P. O. Box 243, San Rafael, $14,200, on SCHED. 3, fill; (3) To Fredrickson & Watson Const. Co., 873 81st Ave., Oakland, $78,250, on SCHED. 4, sewage pumping plant and treatment works, etc. (See Unit Bid Summary) 2-23

LOS ANGELES, CALIF.—To J. L. Kruly, 1759 N. Eastern Ave., L. A., $1238, by Bd. of Pub. Works, L. A., for const. of a sanitary sewer, 791 ft. long in Durango Ave. near Natl. Blvd. 2-26

LOS ANGELES, CALIF.—To V. C. K. Const. Co., 5629 Via Corona, Los Angeles, $1283, by Board of Public Works, Los Angeles, for construction of sewers in 'G' Street between Frigate Avenue and Figueroa Street. 2-16

ONTARIO, CALIF.—To H. A. Teget, 133 Princeton St., Ontario, $34,770, to City Council, Ontario, for completion of sewage disposal plant. P.W.A. approved contract. 2-13

PASADENA, CALIF.—To John Grancich, 117 N. Gage St., Los Angeles, $873, to City Clerk, Pasadena, for construction of a sanitary sewer in Millicent Way between El Nido St., and a point 447 ft. east. 2-20

SAN FRANCISCO, CALIF.—To Bayshore Const. Co., 255 Bayshore Blvd., S. F., $1365, by Dept. of Public Works, City Hall, S. F., for reconst. sewer on 22nd St. betw. Potrero and San Bruno Ave. 2-13

SAN FRANCISCO, CALIF.—To Bayshore Const. Co., 255 Bayshore Blvd., San Francisco, $9,462, by Dept. of Public Works, City Hall, S. F., for constructing Golden Gate Heights Sewer. 2-15

RIVER and HARBOR WORK

WORK CONTEMPLATED

LOS ANGELES, CALIF.—City of San Buenaventura, Calif., has asked for War Department permit to construct two composite type groins each to extend 150 ft. seaward and a composite type breakwater shore end to extend 400 ft. seaward from the mean high tide line at Ventura, Harbor, Calif. 2-27

LOS ANGELES, CALIF.—Caroline C. Spalding has asked for War Department permit to extend 18 ft. seaward and widen 8 ft. a lateral pier, located on State Tideland Lease No. 93, near Elwood, Santa Barbara County. 2-27

MONTECITO, CALIF.—Application has been made to U. S. Engineer Office, 751 S. Figueroa, L. A., by A. C. Postal for permit to construct a rubble groin to extend about 170 ft. seaward from the line of mean high water at Montecito in SANTA BARBARA CO. 2-4

REDONDO BEACH, CALIF.—Special election will be held April 8th by City of Redondo Beach, to vote on a proposed bond issue of $27,000, for an extension to the city pier and other beach front improvements, and for purchase of materials for same. 2-8

SANTA MONICA, CALIF.—The City of Santa Monica will ask the P.W.A. for funds to finance purchase of 90,000 tons of rock to repair the damage done to breakwater by recent storm. 2-5

BIDS RECEIVED

SAN DIEGO, CALIF.—M. H. Golden, 404 California Bank Bldg., San Diego, $24,289, low to the 11th Naval District, San Diego, for alterations to floating dry dock ARD-1 at Naval Operating Base (Destroyer Base), San Diego, under Spec. No. 7887. 2-8

SAN DIEGO, CALIF.—Chas. & F. W. Steffgen, 2015 Bay Front St., San Diego, $7,657, low to 11th Naval District, Foot of Broadway, San Diego, for fender piles and chocks for Station Pier at the Naval Operating Base (Air Station), San Diego, under Spec. No. 7896. 3-1

CONTRACTS AWARDED

OAKLAND, CALIF.—To Pacific Bridge Co., Box 87, Presidio Station, San Francisco, $2800, to Port of Oakland, for clamshell dredging adjacent to Market Street Pier. 2-5

OAKLAND, CALIF.—To Ben C. Gerwick, Inc., 112 Market St., San Francisco, $42,317, by Howard Terminal Co., 1st and Market Sts., Oakland, for reconstruction of west apron of Pier No. 1 at Oakland Harbor. 2-27

SAN DIEGO, CALIF.—To Sparks & McClellan, 23rd and Central, Newport Beach, $3.96 per day for mechanical equipment and maximum of $.155 per cu. yd. (Proposition 'B', using SERA labor) to Harbor Commissioners, San Diego, for dredging an area in the vicinity of 28th Street Recreation Pier in the Bay of San Diego. 2-23

SAN FRANCISCO, CALIF.—To Dutton Dredge Co., Ltd., Mills Bldg., San Francisco, $.11 per cu. yd., total of $770 to Public Utilities Comm., S. F., for 7000 cu. yd. dredging channel for levee at Municipal Airport, under Airport Contract No. 35. 2-14

PORTLAND, ORE.—To Wm. C. Schmitt, foot of Knott St., Portland, Oregon, $5250, to U. S. Engineer Office, Portland, Ore., for removal of the existing miter sills and lock gates and the const. and installation of new miter sills and lock gates at Yamhill Lock on Yamhill River, near Lafayette, Ore., under Spec. No. 35-409. 2-4

Irrigation and Reclamation

WORK CONTEMPLATED

PASADENA, CALIF.—The City of Pasadena, and Irrigation Companies of La Verne, San Dimas, and Claremont, have made application to the P.W.A. for $850,000 to finance a project to bring reclaimed sewer water to Pomona from Pasadena to provide irrigation water for 10,000 acres between Glendora and Claremont. Project would include conduit construction, pumping equipment, etc., to provide an average flow of 600 miners inches. 2-14

DENVER, COLO.—The P.W.A. has made an allotment of $150,000 to the Bureau of Reclamation, Customhouse, Denver, to finance an investigation and report on the proposed Northern Transmountain Diversion from the basin of the Colorado River to the basin of the South Platte River in Colorado. 2-12

EMBLEM, WYOMING—The P.W.A. has made a loan and grant of $1,108,000 to the Greybull Valley Irrigation District, Emblem, Wyoming, for construction of a concrete diversion dam across Greybull River, a supply canal and a 50,000 ac. ft. storage reservoir. Approximately 1,400, 000 cu. yd. earth is involved in dam and canal is to be about 8½ miles long. 2-23

LOVEL, WYO.—The P.W.A. has made a loan of $2,500 to the Hunt Canal Co., Lovell, Wyoming, for replacement of 138 lin. ft. flume with metal flume supported by frame timber bent on creosoted pile and concrete foundation. 2-23

BIDS RECEIVED

GUNNISON, COLO.—Utah Const. Co., W. A. Bechtel Co., Morrison-Knudsen Co., and Henry J. Kaiser Co., 1st National Bank Bldg., Ogden, Utah, $784,742, on SCHED. 1 (CONCR. ARCH DAM) low to Bureau of Reclamation, Gunnison, Colo., for const. of the Taylor Park Dam, Uncompahgre Project, located near Gunnison, Colo., under Spec. No. 594. (See Unit Bid Summary) 2-20

FAIRFIELD, MONT.—T. G. Rowland, 1558 Yale Ave., Salt Lake City, Utah, $50,420, low to Bureau of Reclamation, Fairfield, Mont., for const. earthwork and struc. for open drains, Greenfields Div., Sun River Proj., Montana, under Spec. No. 611. 2-28

SALT LAKE CITY, UTAH—T. E. Connelly Co., 461 Market St., San Francisco, $547,221, low to Bureau of Reclamation, Salt Lake City, Utah, for const. the Moon Lake Dam, Moon Lake Project, Utah, under Spec. No. 605. (See Unit Bid Summary) 2-4

ONTARIO, ORE.—To Geo. B. Henly, Nyssa, Ore., $21,502, by Bur. of Reclamation, Ontario, Ore., for const. earthwork and struc. North Canal, Laterals, Mitchell Butte Division, Owyhee Proj., Oregon-Idaho, under Spec. No. 644-D. 2-4

HYRUM, UTAH—To Knowlton & Rupert, Layton, Utah, $26,997, to Bureau of Reclamation, Hyrum, Utah, for construction of a pumping plant, structures, and canal lining on the Hyrum-Menden, Hyrum Feeder, and Wellsville Canals, Hyrum Project, Utah, under Specification No. 606. 2-6

TUNNEL CONSTRUCTION

CONTRACTS AWARDED

OAKLAND, CALIF.—Sub-contract awarded to Ariss-Knapp Co., 961 41st Street, Oakland, by Six Companies of Calif., 155 Sansome St., San Francisco, for 30,000 cu. yd. East Portal structure excavation in connection with construction of the Broadway Low Level Tunnel and Highway. 2-25

SAN FRANCISCO, CALIF.—Award recommended to Peninsula Paving Co., 9 Main St., San Francisco, $16,800, by Bureau of Public Roads, San Francisco, for constructing a gunite lining in the unlined portions of the Wawona Tunnel, Sec. A5 of Rt. 2, the Wawona Road, Yosemite Natl. Park, MARIPOSA COUNTY, Calif. 2-21

FLOOD CONTROL WORK

WORK CONTEMPLATED

SANTA ANA, CALIF.—Tentative plans are being prepared by the Orange County Flood Control Dept., for flood conservation and control work along the Santa Ana River, including construction of sloping cement dikes on both sides of the river, widening river channel to 1200 ft. and const. of cement walls; dikes to be 18' high on one side, and 15' on the other. Est. cost, $3,000,000. 2-16

DENVER, COLO.—Plans and specifications are being completed by City Engineer and call for bids will be issued in about one month by Mgr. of Improvements and Parks, City-County Bldg., Denver, for constructing the Cherry Creek Retarding Dam, to be located near Sullivan, Colo., 5 mi. southeast of Denver. Est. cost, $734,000. 2-9

CONTRACTS AWARDED

NOGALES, ARIZ.—To Harry J. Karns, $21,424, by International Boundary Comm., 1st Natl. Bank Bldg., El Paso, Texas., for construction of Unit No. 2, Nogales Flood Control Project. 2-19

SACRAMENTO, CALIF.—Award recommended (subject to P.W.A. approval) to J. R. Reeves, R. D. No. 3, Box 100, Sacramento, $2,704, to American River Flood Control Dist., State Bldg., Sacramento, for excavation of drainage ditches, A, B and C, near North Sacramento. 2-21

DAM CONSTRUCTION

CALL FOR BIDS

SAN JOSE, CALIF.—Bids to 10 a.m., March 13th, by Santa Clara Valley Water Conservation District, San Jose, for constructing the Guadalupe Dam and Spillway on the Guadalupe Creek about 12 miles from San Jose, under Contract No. 6 (PWA Project 6051). Work involves: 50,000 cu. yd. stripping, 515,000 cu. yd. embankment in dam, 140,000 sq. ft. conc. facing on dam. Est. cost, $305,390. 2-26

POWER DEVELOPMENT

WORK CONTEMPLATED

EL CENTRO, CALIF.—A loan of $12,000 will be asked from the P.W.A. by the Imperial Irrigation District of El Centro, to finance the construction of a power generation and distribution system to be developed with the All-American Canal. 2-5

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Commercial Electric Co., 616 W. 9th St., Los Angeles, who bid $1,920, to the U. S. Indian Irrigation Service, 751 S. Figueroa St., Los Angeles, for construction of a 4.4 mi. transmission line (6900 volt) at San Xavier Indian Reservation, under Bid No. 122. 2-8

LIGHTING SYSTEMS

CONTRACTS AWARDED

SAN DIEGO, CALIF.—To W. H. Rumble, 6507 Haas Ave., Los Angeles, who bid $44,970, to City Clerk, City Hall, San Diego, for installing 184 Union Metal lighting standards on Atlantic St., and other streets in San Diego. 2-16

MISCELLANEOUS

WORK CONTEMPLATED

COSTA MESA, CALIF.—Petitions have been circulated in Costa Mesa and will be forwarded to Orange County Supervisors for approval of the formation of a fire district which will finance the construction of a $45,000 fire system. 2-14

LUALUALEI, T. H.—E. E. Black, Ltd., Honolulu, T. H., $14,442, low to Bureau of Yards & Docks, Navy Dept., Washington, D. C., for installing a cooling water system at Lualualei, T. H., under Spec. No. 7817. 2-25

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Southern Pacific Co., Los Angeles, Pacific Electric Co., L. A., and Salt Lake Railroad Co., $292,734.80, to Metropolitan Water District, L. A., for transporting 718,000 bbl. cement for one year, over 100 miles of the Colorado River Aqueduct, from West Portal of Coxcomb tunnel to East Portal of San Jacinto Tunnel, under Specification No. 83.

MARE ISLAND, CALIF.—To Star Iron & Steel Co., 435 E. 11th St., Tacoma, Wash., $76,900, to Bureau of Yards & Docks, Navy Dept., Washington, D. C., for furnishing a 40-ton outdoor electric Gantry crane and runway at the Navy Yard, Mare Island, Calif., under Spec. No. 7855. 3-2

SAN DIEGO, CALIF.—To J. A. Hunt, P. O. Box 146, E. San Diego, $9281, by 11th Naval Dist., San Diego, for concr. floors in landplane hangars at Naval Operating Base, under Spec. No. 7885. 2-8

PEARL HARBOR, T. H.—To City Welding Shop, Honolulu, $4950, by Pub. Wks. Officer, Navy Yard, Pearl Harbor, T. H., for improv. of elevators at the Pearl Harbor Navy Yard, under Spec. No. 7784. 2-8

MT. VERNON, WN.—To L. Coluccio & Co., 103 Securities Bldg., Seattle, Wn., $4,868, to County Commissioners, Mt. Vernon, Wn., for constructing a new fill at the proposed location of the new Swinomish Channel Bridge on the Mt. Vernon-Anacortes Highway, SKAGIT COUNTY, Wn. 2-8

SEATTLE, WN.—To Puget Sound Bridge & Dredging Co., 2929 16th Ave.,SW., Seattle, $5450, by Bd. of Pub. Works, Seattle, Wn., for const. earth dikes on Airport Way, betw. Roxbury St. and south city limits, under Ordinance No. 65105. 3-1

MACHINERY and SUPPLIES

CALL FOR BIDS

DENVER, COLO.—Bids to 2 p.m., March 21st, by Bureau of Reclamation, Denver, Colo., for furnishing and delivering FOB cars at factory shipping point or at Almira, Wn., the following, under Spec. No. 667-D; 35—30-gal. elec. storage water heaters, 1—120-gal. same, 30 3,000-watt, sidearm, circulation-type, elec. water heaters for installation at residences at Govt. Camp, Grand Coulee Dam, Columbia Basin Project, Wn. 3-1

DENVER, COLO.—Bids to 2 p.m., March 20th, by Bureau of Reclamation, Denver, Colo., for furnishing the following FOB cars at factory shipping point or at Boulder City, Nevada, under Spec. No. 666-D: 1 elec. water heater with tank and motor-driven circulating pump, 2 30-gal. elec. storage water heater, 1 120-gal. elec. storage water heater, 7 elec. water coolers (3 gal. per hr. capacity), 4 elec. water coolers (6.5 gal. per hr. capacity). Above for installation in the Boulder Power Plant, Boulder Canyon Project, Arizona-California-Nevada. 3-1

BUYERS'

Advertisers index on Page 72

Acetylene Generators
Air Reduction Sales Co.

Air Compressors
Gardner-Denver Co.
Ingersoll-Rand Co.
Western Machinery Co.
Worthington Pump&Mach. Corp.

Air Hoists
Ingersoll-Rand Co.

Ammonia
Great West. Electro-Chemical Co.

Asphalt
Asphalt Institute, The
Seaside Oil Co.
Union Oil Co.

Asphalt Plants & Equipment
Barber-Greene Co.
Link-Belt Co.
Standard Steel Works

Backfillers
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co., The

Backfillers, Hydraulic
Wooldridge Co., Mack

Beams, Channels and Angles
Columbia Steel Co.
Pacific Coast Steel Corp.

Bearings, Ball
Angelica Bearing Co.

Bearings, Roller
Angelica Bearing Co.
The Timken Roller Bearing Co.

Belting
Goodrich Rubber Co., B. F.

Bins, Storage and Hopper
Bacon, Edward R.
Blaw-Knox & Western Pipe Corp
Chicago Bridge & Iron Works
Link Belt Co.
Smith Engineering Works
Standard Steel Works

Bits, Rock Drilling
Ingersoll-Rand Co.
The Timken Roller Bearing Co.

Blades—Fresno, Grader, and Scraper
Adams Co., J. D.
Allis-Chalmers Mfg. Co.
Bacon Co., Edward R.
Caterpillar Tractor Co.

Blasting Supplies
Apache Powder Co.
Giant Powder Co., Const., The
Hercules Powder Co., Inc.
Trojan Powder Co.

Buckets, Clamshell
Bacon Co., Edward R.
Blaw-Knox & Western Pipe Corp.
Harnischfeger Sales Corp.
Link-Belt Co.
Northwest Engineering Co.
Owen Bucket Co., Ltd.
Wellman Engineering Co., The

Buckets, Dragline
Bacon Co., Edward R.
Blaw-Knox & Western Pipe Corp.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Owen Bucket Co., Ltd.
Wellman Engineering Co., The

Bulldozers, Hydraulic
American Tractor Equip. Co.
Austin Western Road Machy. Co.
Le Tourneau, Inc., R. G.
Wooldridge Co., Mack.

Cableways
American Steel & Wire Co.
Columbia Steel Co.
Leschen & Sons Rope Co., A.
Roebling's Sons Co., John A.

Carbide Lights
Air Reduction Sales Co.

Carbide Torches
Air Reduction Sales Co.

Cars, Industrial
Austin Western Road Machy. Co.
Bacon Co., Edward R.
Western Wheeled Scraper Co.

Cement
Pacific Portland Cement Co.
Portland Cement Association

Cement—Tan
Pacific Portland Cement Co.

Chemicals
Great West. Electro-Chemical Co.

Chlorinators
Wallace & Tiernan
Water Works Supply Co.

Chlorine
Great West. Electro-Chemical Co.

Clarifiers, Water
Hardinge-Western Co.
Wallace & Tiernan Co.

Commissaries
Threlkeld Commissaries, Inc.

Concrete Forms
Blaw-Knox & Western Pipe Corp.

Concrete Roads
Portland Cement Association

Concrete Vibrators
Electric Tamper & Equip. Co.
Munsell Concrete Vibrators

Conveyors, Elevating and Conveying
Austin-Western Road Mchy. Co.
Bacon Co., Edward R.
The Jeffrey Mfg. Co.
Galion Iron Works & Mfg. Co.
Link-Belt Co.
Pioneer Gravel Equip. Mfg. Co.

Cranes, Electric, Gasoline Locomotive
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Koehring Co.
Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Lima Locomotive Works, Inc.
Thew Shovel Co., The
Whitcomb Locomotive Co.

Cranes, Tractor
Harnischfeger Sales Corp.
Northwest Engineering Co.

Cranes, Traveling
Harnischfeger Sales Corp.
Northwest Engineering Co.
Thew Shovel Co., The

Creosoting Cylinders
Chicago Bridge & Iron Works

Creosoted Piling and Lumber
Baxter Co., J. H.
McCormick Lumber Co., Chas. R.

Crushers
Alloy Steel & Metals Co.
Austin-Western Road Mchy Co.
Bacon Co., Edward R.
California Equipment Co.
Pioneer Gravel Equip. Mfg. Co.
Smith Engineering Works

GUIDE

Advertisers index on Page 72

Culverts, Concrete
Portland Cement Association

Culverts, Metal
California Corrugated Culvert Co.
Western Pipe & Steel Co.

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

Diesel Tractors
Adams Co., J. D.
Caterpillar Tractor Co.

Diffuser Mediums
Carborundum Co., The

Digesters
Chicago Bridge & Iron Works

Ditch Machinery
Bucyrus-Erie Co.
Byers Machine Co.
Harnischfeger Sales Corp.
Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Lima Locomotive Works, Inc.
Thew Shovel Co., The

Draglines
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Lima Locomotive Works, Inc.
Thew Shovel Co., The
Wellman Engineering Co., The

Drills, Rock
Gardner-Denver Co.
Western Machinery Co.
Worthington Pump&Mach. Corp.

Dump Wagons
Austin Western Road Machy. Co.
Western Wheeled Scraper Co.

Engines—Diesel, Gasoline and Steam
Bacon Co., Edward R.
Case Co., J. I.
Caterpillar Tractor Co.
Ingersoll-Rand Co.
International Harvester Co.
Worthington Pump & Mach. Corp.

Excavating Machinery
American Tractor Equip. Co.
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Cleveland Tractor Co.
General Excavator Co., The
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Koehring Co.
LeTourneau, Inc., R. G.
Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Lima Locomotive Works, Inc.
Thew Shovel Co., The

Expansion Joints
Aquatite Co.
U. S. Pipe & Fdy. Co.

Explosives
Atlas Powder Co.
Apache Powder Co.
Giant Powder Co., Cons., The
Herules Powder Co.
Trojan Powder Co.

Ferric Chloride
Great West. Electro-Chemical Co.

Fire Hydrants
Columbian Iron Works

Flumes, Metal
California Corrugated Culvert Co.
Chicago Bridge & Iron Works

Forms, Steel
Blaw-Knox & Western Pipe Corp.

Furnaces, Drill Steel
Ingersoll-Rand Co.
Sullivan Machinery Co.
Western Machinery Co.

Gas Holders
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Gasoline
Union Oil Co.—"76"

Gates, Cast Iron or Radial
California Corrugated Culvert Co.

Gates, Sheet Metal
California Corrugated Culvert Co.

Governors, Turbine
Pelton Water Wheel Co., The

Graders, Elevating, Motor Road
Adams Co., J. D.
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.
Galion Iron Wks. & Mfg. Co.

Gravel Plant Equipment
Austin-Western Road Mchy Co.
Bacon Co., Edward R.
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Iowa Mfg. Corp.
Link-Belt Co.
Northwest Engineering Co.
Smith Engineering Works

Grinders, for Detachable Bits
Ingersoll-Rand Co.

Hoists, Hand and Power
Alloy Steel & Metals Co.
American Hoist & Derrick Co.
Bacon Co., Edward R.
Harnischfeger Sales Corp.
Harron, Rickard & McCone Co.
Jenison Machinery Co.
Link-Belt Co.

Hoppers, Steel
Bacon Co., Edward R.
Blaw-Knox & Western Pipe Corp.
Chicago Bridge & Iron Works
Link-Belt Co.
Standard Steel Works

Hospitals
National Hospital Association

Kilns, Rotary
Blaw-Knox & Western Pipe Corp.
Chicago Bridge & Iron Works

Loaders, Power, Truck and Wagon
Austin-Western Road Mchy. Co.
Bevis Machinery Co.
Galion Iron Works & Mfg. Co.
Link-Belt Co.
Spears-Wells Mchy. Co.

Locomotives, Electric, Gas and Steam
Bacon Co., Edward R.
Garfield & Co.
Plymouth Locomotive Works
Smith Booth Usher Co.
Whitcomb Locomotive Co.

Lubricating Oil
Union Oil Co.

Lumber
Baxter Co., J. H.
McCormick Lumber Co., Chas. P.

Lumber, Preserved
Reilly Tar & Chem. Corp.

Meters, Water
Neptune Meter Co.
Smith Co., The T. L.

Mixers, Retread
Adams Co., J. D.
Austin-Western Road Machy. Co.

THE BUYERS' GUIDE

Motors, Electric
Lincoln Electric Co.

Motors, Gasoline
J. D. Adams Co. (McCormick-Deering)
Allis-Chalmers Mfg. Co.
Case Co., J. I.
Caterpillar Tractor Co.

Paints, Acid Resisting
Columbia Wood and Metal Preservative Co.

Paints, Metal Protective
Columbia Wood and Metal Preservative Co.
Wailes Dove-Hermiston Corp.

Paints, Technical
Columbia Wood and Metal Preservative Co.

Paints, Waterproofing
Columbia Wood and Metal Preservative Co.

Paving Breakers
Ingersoll-Rand Co.
Western Machinery Co.
Worthington Pump—Mach. Corp.

Penstocks
Chicago Bridge & Iron Works
Water Works Supply Co.
Western Pipe & Steel Co.

Pile Drivers
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
Northwest Engineering Co.
Thew Shovel Co., The

Piling, Pipe
National Tube Co.

Piling, Steel
Columbia Steel Co.
Pacific Coast Steel Corp.

Piling, Wood
Baxter Co., J. H.

Pipe, Cast-Iron
Pacific States Cast Iron Pipe Co.
U. S. Pipe & Foundry Co.

Pipe, Concrete
American Conc. & Steel Pipe Co.
Portland Cement Association

Pipe, Culvert
California Corrugated Culvert Co.
Western Pipe & Steel Co.

Pipe Fittings
Pacific Pipe Co.
Pacific States Cast Iron Pipe Co.

Pipe, Hume Concrete
American Conc. & Steel Pipe Co.

Pipe, Lock-Bar
Western Pipe &Steel Co.

Pipe, Lock Joint Steel
American Conc. & Steel Pipe Co.

Pipe, Preservative
Columbia Wood & Metal Preservative Co.

Pipe, Riveted Steel
Chicago Bridge & Iron Workss
Western Pipe & Steel Co.

Pipe, Standard
Columbia Steel Co.
Federal Pipe & Tank Co.
National Tube Co.
Pacific Pipe Co.

Pipe, Welded Steel
California Corrugated Culvert Co.
Chicago Bridge & Iron Works
Columbia Steel Co.
Western Pipe & Steel Co.

Pipe, Wood
Federal Pipe & Tank Co.

Plows, Road or Rooter
Adams Co., J. D.
Austin-Western Road Mchy. Co.

Pneumatic Tools
Hackley Equip. Co., P. B.
Gardner-Denver Co.
Western Machinery Co.
Worthington Pump & Mach. Corp.

Powder
Apache Powder Co.
Giant Powder Co., Cons., The
Hercules Powder Co., Inc.
Trojan Powder Co.

Power Units
Allis-Chamlers Mfg. Co.
Case Co., J. L.
Caterpillar Tractor Co.
International Harvester Co.

Preservative, Wood, Metal, etc.
Columbia Wood and Metal Preservative Co.
Reilly Tar & Chem. Corp.

Pumps, Centrifugal
Chain Belt Co.
Pelton Water Wheel Co., The
Worthington Pump & Mach. Corp.

Pumps, Deep Well
Layne & Bowler Corp.
Pelton Water Wheel Co., The
Pomona Pump Co.

Pumps, Power
Gardner-Denver Co.
Layne & Bowler Corp.
Worthington Pump & Mach. Corp.

Pumps, Water Works
Layne & Bowler Corp.
Pelton Water Wheel Co., The
Pomona Pump Co.

Rails
Columbia Steel Co.
United Commercial Co., In.

Reinforcing Bars
Columbia Steel Co.
Pacific Coast Steel Corp.

Reinforcing Wire Fabric
American Steel & Wire Co.
Columbia Steel Co.

Repairing Equipment
Sam Bates Co.

Reservoirs, Steel
Chicago Bridge & Iron Works

Road Finishers
Bacon Co., Edward R.
Blaw-Knox & Western Pipe Corp.

Road Forms
Bacon Co., Edward R.
Blaw-Knox & Western Pipe Corp.

Road Graders and Scrapers
Adams Co., J. D.
Allis-Chalmers Mfg. Co.
American Tractor Equipment Co.
Austin-Western Road Mchy. Co.
Bacon Co., Edward R.
Bevis Machinery Co.
Case Co., J. L.
Caterpillar Tractor Co.
Galion Iron Wks. & Mfg. Co., The
Robinson Tractor Co.
Spears-Wells Machinery Co.

Road Joint Machines
Flexible Road Joint Mach. Co.

Road Oil
Seaside Oil Co.
Union Oil Co.

Road Rippers
Adams Co., J. D.
Le Tourneau, Inc., R. G.
Mack Wooldridge Co.
McCaffrey, M. P.

Road Rollers
American Tractor Equip. Co.
Austin-Western Road Mchy. Co.
Galion Iron Wks. & Mfg. Co., The

Rubber Goods—Accessories
Goodrich Rubber Co., B. F.

Rubber Goods—Mechanical
Goodrich Rubber Co., B. F.

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

Scarifiers
Adams Co., J. D.
Austin-Western Road Mchy. Co.
American Tractor Equipment Co.
Caterpillar Tractor Co.
Le Tourneau, Inc., R. G.
Spears-Wells Machinery Co.

THE BUYERS' GUIDE

Scrapers, Drag, Fresno, Wheeled
Adams Co., J. D.
Austin Western Road Machy. Co.
American Tractor Equipment Co.
Bacon Co., Edward R.
Le Tourneau, Inc., R. G.
Mack Wooldridge Co.
Western Wheeled Scraper Co.

Screens, Sand and Gravel
Link-Belt Co.
National Wire Cloth Co.
Roeblings' Sons Co., John A.
Smith Engineering Co.

Screens, Sewage
Link-Belt Co.

Second-Hand Equipment
Bates Co., Sam
California Equipment Co.
Contractors Machinery Exchange
Hackley Equipment Co., P. B.
Western Machinery Co.

Sewage Disposal Apparatus
Carborundum Co., The
Link-Belt Co.
Wallace & Tiernan
Water Works Supply Co.

Sharpeners, Drill
Ingersoll-Rand Co.
Sullivan Machinery Co.

Sheet Piling
Columbia Steel Co.
Pacific Coast Steel Corp.

Shovels, Electric, Gasoline, Steam
Austin Western Road Machy. Co.
Bucyrus-Erie Co.
Concrete Mchy. & Supply Co.
Hackley Equip. Co., P. B.
Harnischfeger Sales Corp.
Koehring Co.
Link-Belt Co.
Marion Steam Shovel Co., The
Northwest Engineering Co.
Lima Locomotive Works, Inc.
Osgood Co., The
Thew Shovel Co., The

Sluice Gates
Calif. Corrugated Culvert Co.
Columbian Iron Works
Water Works Supply Co.
Western Pipe & Steel Co.

Smoke Stacks
Chicago Bridge & Iron Works

Stand Pipes
Chicago Bridge & Iron Works

Steel Plate Construction
Chicago Bridge & Iron Works
Western Pipe & Steel Co.

Surge Tanks
Chicago Bridge & Iron Works

Tamping Rollers
American Tractor Equip. Co.
Le Tourneau, Inc., R. G.

Tanks, Corrugated
Calif. Corrugated Culvert Co.

Tanks, Elevated Steel
Chicago Bridge & Iron Works
Montague Pipe & Steel Co.

Tanks, Storage
Chicago Bridge & Iron Works
Federal Pipe & Tank Co.

Tapes, Measuring, Steel and Fabric
Lufkin Rule Co., The

Tires, Truck and Automobile
Goodrich Rubber Co., B. F.

Towers, Transmission
Blaw-Knox & Western Pipe Corp.
Columbia Steel Co.
Pacific Coast Steel Corp.
Water Works Supply Co.

Track-Laying Wheels
Allis-Chalmers Mfg. Co.
Austin Western Road Machy. Co.

Tractors
Adams Co., J. D.
Allis-Chalmers Mfg. Co.
Bacon Co., Edward R.
Case Co., J. I.
Caterpillar Tractor Co.
International Harvester Co.

Trail Builders
Mack Wooldridge Co.

Trailers (Track-Laying)
Allis-Chalmers Mfg. Co.

Tramways, Aerial
American Steel & Wire Co.
Bacon Co., Edward R.
Columbia Steel Co.
Leschen & Sons Rope Co., A.
Roebling's Sons Co., John A.

Transmission Machinery Power
Link-Belt Co.

Trench Excavators
Cleveland Trencher Co., The
Garfield & Co.
Harnishfeger Sales Corp.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co., The

Truck Mixers
Blaw-Knox & Western Pipe Corp
Chain Belt Ct.

Trucks
Chrysler Motors—Dodge Div.
International Harvester Co.
Marmon-Herrington

Truck Tires
Goodrich Rubber Co., B. F.

Tunnel Shovels
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
St. Louis Power Shovel Co.

Turbines, Hydraulic
Pelton Water Wheel Co., The
Water Works Supply Co.

Unloaders, Car and Wagon
Link-Belt Co.

Valves
California Corrugated Culvert Co
Columbian Iron Works
Pacific Pipe Co.
Renssalaer Valve Co.

Valves, Gate
California Corrugated Culvert Co
Pelton Water Wheel Co., The
Water Works Spply Co.

Valves, Hydraulic
California Corrugated Culvert Co
Pelton Water Wheel Co., The

Wagons (Track Laying)
Adams Co., J. D.
Allis-Chalmers Mfg. Co.
American Tractor Equipment Co
Austin Western Road Machy. Co.
Western Wheeled Scraper Co.

Waterproof Cement
Pacific Portland Cement Co.

Waterproofing Materials
Aquatite Co.

Water Wheels
Pelton Water Wheel Co., The
Water Works Supply Co.

Welders, Acetylene
Air Reduction Sales Co.

Welders, Electric Arc
Adams Co., J. D.
Harnischfeger Sales Corp.
Lincoln Electric Co.

Welding Apparatus
Air Reduction Sales Co.
Lincoln Electric Co.

Welding, Wire
Adams Co., J. D.
Air Reduction Sales Co.
Columbia Steel Co.
Lincoln Electric Co.
Roebling's Sons Co., John A.

Wire Cloth
National Wire Cloth Co.

Wire Rope
American Cable Co., Inc.
Columbia Steel Co.
Leschen & Sons Co., A.
Roebling's Sons Co., John A.

OPPORTUNITY SECTION

RATES: SITUATIONS WANTED—5c per word; HELP WANTED—No charge to subscribers; OFFICIAL BIDS—20c per line; ALL OTHERS—$2.50 per column inch.

OPPORTUNITY SECTION

EXTRA SPECIAL

USED EQUIPMENT FOR SALE

We have been appointed exclusive agents to dispose of the entire construction equipment of the Middle Rio Grande Conservancy District. This equipment is all high-grade, has been given the best of care and maintenance during use, and is in excellent condition now. It is not to be compared with the ordinary used equipment which comes on the market, and it is available only because the Conservancy District has completed its construction work and will use only maintenance equipment in the future. It consists in part of:

DRAGLINES

5 Bucyrus Erie 50-B Draglines with 50 ft. boom and 10 ft. extension, powered by 4-cylinder Atlas 9 x 12, 350 r.p.m. full Diesel engine, mounted on "Caterpillars", equipped with Model E Kohler Light Plant. Purchaser may have choice of one 1-½ or 2 cu. yd. bucket. Majority of buckets, Page Class C; a few Esco Manganese. Practically all equipped with manganese drag chains.

1 Same as above but equipped with shovel attachment with 1-½ cu. yd. dipper. Shovel attachment can be purchased separately.

3 P & H Draglines, Model 775, equipped with 50 ft. boom, 6-cylinder Atlas 7-½ x 8, 600 r.p.m., full Diesel Engine, mounted on "Caterpillars", equipped with Model E Kohler Light Plant, choice of 1- or 1-¼ cu. yd. bucket.

1 P & H Dragline, Model 750, equipped with 50 ft. boom, 4-cylinder Atlas 7-½ x 12, 600 r.p.m., full Diesel engine, mounted on "Caterpillars", equipped with Model E Kohler Light Plant, one 1-¼ cu. yd. bucket.

1 P & H Dragline, Model 700, with 50 ft. boom, 6-cylinder Atlas 7-½ x 8, full Diesel Engine, mounted on "Caterpillars", equipped with Model E Kohler Light Plant, choice of 1- or 1-¼ cu. yd. bucket.

1 No. 105 Northwest Shovel, Twin-City Power, 1-¼ yd. dipper.

TRACTORS

3 "Caterpillar" Model Thirty-five Tractors, equipped with La Plant Choate Hydraulic Bulldozers.

2 "Caterpillar" Model Thirty Tractors.

1 "Caterpillar" Model Twenty-five Tractor.

1 "Caterpillar" Model Twenty Tractor.

2 "Caterpillar" Model Sixty Tractors.

TRACTOR EQUIPMENT

1 Willamette Hyster Double Drum for "Caterpillar" Twenty Tractor.

1 La Plant Choate Rotary Scraper, Type RO-30, with hydraulic pump to fit "Caterpillar" Thirty or Thirty-five.

1 Russell 9 ft. Super Special Grader.

WELL POINT EQUIPMENT

2 Moretrench 6" Combination Pumping Unit, portable type, gasoline motor driven.

1 Moretrench No. 12 High Pressure Jetting Pump, portable type, gasoline motor driven.

200 ft. 2" Rubber Hose.

120 Moretrench Well Points, 20 ft. long, with swing connections, valves, etc.

600 ft. Moretrench 6" Header Pipe, with necessary connections and pipe clamp couplings.

200 ft. Moretrench 6" Discharge Pipe with patented clamp couplings.

PILE DRIVING EQUIPMENT AND MATERIALS

6 All Steel Drop Hammer Pile Driving Outfits, complete with swinging leads, stiff legs, etc., suitable for use with either Bucyrus Erie 50-B or P & H 700, 750 775 Draglines, or could be easily made into drop hammer outfit for operation with tractor or engine driven hoist. Hammer Weight 2800 lbs.; Follow Block 700 lbs.

1 Length 30 ft. Carnegie Arch Webb, 16" Steel sheet piling for corners.

71 Lengths 30 ft. Carnegie Arch Webb, 16" Steel sheet piling.

18 Lengths 12 ft. Carnegie Arch Webb, 16" sheet piling.

2 Lengths 30 ft. Carnegie Arch Webb, 16" Steel sheet piling.

1 McKiernan-Terry No. 0 Air Hammer.

CONCRETING EQUIPMENT

7 3-½ Concrete Mixers; 5 Wonder, 2 Boss.

1 7L2S Jaeger Concrete Mixer.

4 14 S Concrete Mixers; 2 Rex, 2 Knickerbocker.

9 K & J Concrete Cards, 6 cu. ft. capacity.

1 Insley Mast Hoist Concrete Placing Outfit, with 55 ft. steel mast, 7 cu. ft. bucket, head frame, hopper, and two 20 ft. sections of chute.

2 Gunite Machines, Type N-1.

1 Rigid-Vibor Pneumatic Vibrator Concrete Tamper, Model G, 3" Element.

3 Houck No. 352 Concrete Heaters.

SAND AND GRAVEL EQUIPMENT

1 Cedar Rapids Gravel Plant with Model 5000-G "Caterpillar" Power Unit. Two independent portable conveyors 50 ft. long and 14" wide, with Le Roi Engine, Type VP, 14 HP. One 3-compartment, size 8 x 10 bin.

1 Telsmith Sand Washer, No. 5.

1 Cedar Rapids Traction Type Loader.

1 Haas 20 ft. Portable Conveyor, 16" belt, 4-cylinder Continental Engine, 15 HP.

1 Pioneer Screening Plant, with 5 cu. yd. steel bin with 2-½ cu. yd. auxiliary hopper, double shaker screen, 55' x 18" feed conveyor with trap feeder.

LIGHTING EQUIPMENT

1 37 KW, 2200 AC, 60 cycle, lighting plant, with 4-cylinder, direct connected Atlas full Diesel engine; includes complete switch equipment, panel boards, and eight 3 KVA transformers, three 5 KVA transformers, three 7½ KVA transformers, all 2200 volt to 110 volt.

SHOP EQUIPMENT

1 C.H. & E. Portable Saw Rig with 15 HP. Le Roi Engine, with jointer and boring attachment.

1 Skilshaw 8" Portable Electric Saw, 110 volt, AC, 60 cycle.

1 Waugh Turbo Air Drill.

1 Ingersoll-Rand Oil Furnace.

1 Ingersoll-Rand Shank Grinder.

1 Ingersoll-Rand Drill Sharpener No. 34.

1 Oxweld Carbic Welder Outfit, complete with generator, torches, etc.

1 Cincinnati Lathe, 16 x 10", 3-step, cone type, with countershaft.

1 Manley hydraulic Press No. 28A, 40 tons capacity.

1 Curtis Pipe Threading and Bolt Machine, capacity ¼" to 2", complete with rests, etc.

COMPRESSED AIR EQUIPMENT DRILLS AND DRIFTERS

1 Schramm Gasoline Engine Driven, Type 60, Air Compressor.

2 Ingersoll-Rand Diesel Engine Drive, direct connected, Air Compressor, Type POC—2-stage, 603 cu. ft.

1 Fluor Cooling Tower, 7' 6" x 15' 10" x 13'.

1 Air Receiver, sizs 42" x 10' 0".

1 Air Receiver, size 54" x 14' 0".

1 Ingersoll-Rand R-39 Blower Type Jackhammer, ⅞" chuck.

2 Ingersoll-Rand Type S-49 Wet Leg hammers.

2 Ingersoll-Rand Type N-75 Drifters.

2 Ingersoll-Rand Type CA 31 Stopers.

1 Ingersoll-Rand Column and Clamp Set for N-75 Drifter.

1 Coppus Compressed Air Driven "Vano" Blower, complete with ventilating duct pipe.

PUMPS AND PUMPING EQUIPMENT

5 6" Speed Primer, direct connected, centrifugal pumps; 3 Rex, Pumps on skids, equipped with 30-35 radiator-cooled Waukesha engine; 3 Gorman-Rupp Pumps, equipped with 35 HP. Hercules engine, on wheels.

1 C.H. & E. No. 21 Centrifugal Jetting Pump, with 4-cylinder, 40 HP., Waukesha gasoline engine, on wheels.

2 Goulds 7 x 8 Triplex Pumps without power.

1 Pomona 6", 5-stage, water lubricated pump, with Le Roi 4-cylinder engine connected with V-belt drive.

2 Cameron No. 3 Sump Pumps.

3 Ingersoll-Rand No. 25 Sump Pumps.

Large number of Novo and Fairbanks Morse Reciprocating Pumps for Water Supply.

Write, wire or phone for complete list with details and prices

R. L. HARRISON CO., Inc.

Albuquerque New Mexico

When writing to above advertisers, please mention Western Construction News.

OPPORTUNITY SECTION

When writing to above advertisers, please mention Western Construction News.

OPPORTUNITY SECTION

UNITED STATES DEPARTMENT
OF AGRICULTURE
Bureau of Public Roads

Grading, Clearing, Excavating on Big Oak Flat Road, Yosemite National Park

San Francisco, Calif., March 2, 1935.

Sealed bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p.m., on March 26, 1935, for grading Section A2 of Route 3, the Big Oak Flat Road, Yosemite National Park, Mariposa County, California, involving major items of approximately: 20 acres clearing; 107,400 cubic yards unclassified excavation; 6,200 cubic yards unclassified excavation for borrow; 1,020 cubic yards unclassified excavation for structures; 45,600 station yards overhaul; 8,500 cubic yard miles borrow haul; 1,952 lineal feet C. M. Pipe (asphalt dipped) in place; 108 cubic yards concrete; 12,000 pounds reinforcing steel; 170 cubic yards masonry; 2,600 cubic yards hand laid rock embankment; 2,800 lineal feet protection ditch. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for intermediate labor and 60 cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the **compliance with codes of fair competition**; the **subletting** and **assignment** of the contract; and to the **alternate** bids which must be submitted in case the bidder desires to offer any **foreign** articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California. C. H. SWEETSER, District Engineer.

POSITION WANTED

ESTIMATOR on Grading and Highway Work, also experienced in accounting, office management and highway construction supervision, wants steady position. Address: Box 410, Western Construction News, 114 Sansome St., San Francisco.

OFFICIAL BIDS

UNITED STATES DEPARTMENT
OF THE INTERIOR
Bureau of Reclamation
(Federal Emergency Administration of Public Works Project)

Radial Gates, Gate Hoists, Pressure Gates, Outlet Pipes, etc., for Agency Valley Dam

Washington, D. C., February 18, 1935.

Sealed bids (Specifications No. 616) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 2 p.m., March 20, 1935, and will at that hour be opened, for furnishing and delivering f.o.b. cars at the factory shipping point or at Juntura, Oregon; three 18-foot by 17-foot radial gates; three motor-driven, double-drum, radial gate hoists; two 3-foot 3-inch by 3-foot 3-inch high-pressure gates; and two 42-inch diameter welded plate-steel outlet pipes; for installation in the spillway and outlet works of the Agency Valley Dam, Vale Project, Oregon. All apparatus and materials will be installed by the Government. No charge for specifications to prospective bona fide bidders; to others $3.00 not returnable. For particulars address the Bureau of Reclamation, Denver, Colorado, or Washington, D. C.

ELWOOD MEAD, Commissioner.

UNITED STATES DEPARTMENT
OF AGRICULTURE
Bureau of Public Roads

Bituminous Treatment of Sections of Deer Creek Meadows National Highway

February 21, 1935.

Sealed bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p. m., on May 9, 1935, for bituminous treatment (light surface application) of Sections A, B, C, D and E of Route 21, the Deer Creek Meadows National Forest Highway, Lassen National Forest, Tehama County, California. The length of the project is 16.208 miles and it involves major item of work as follows: 470 tons Liquid Asphaltic Road Material, Type S.C.-2. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for intermediate labor and 60 cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the **compliance with codes of fair competition**; the **subletting** and **assignment** of the contract; and to the **alternate** bids which must be submitted in case the bidder desires to offer any **foreign** articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

UNIED STATES DEPARTMENT
OF THE INTERIOR
Bureau of Reclamation
(Federal Emergency Administration of Public Works Project)

One Seven-Room and Four Five-Room Residences at Grand Coulee

Washington, D. C., February 21, 1935.

Sealed bids (Specifications No. 615) will be received at the office of the U. S. Bureau of Reclamation, Almira, Washington, until 10 a.m., March 22, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the construction of **one seven-room and four five-room residences** at the Government camp at Grand Coulee Dam, Columbia Basin project, Washington. The work is located about 22 miles northwest of Almira, Washington. The residences will be of wood-frame construction, with siding over sheating on the exterior walls, and the interior walls and ceilings will be plaster over wood or metal lath. The foundation walls, footings and basement floors will be of concrete. The roofs will be covered with wood shingles over solid sheathing. Ceilings and attics will be insulated. Garages will be built into all residences. The heating system in the seven-room residence will be a one-pipe gravity vacuum steam heating system, and the heating systems in the five-room residences will be hot-air systems. The schedule provides for lump-sum bids for the construction of the residences except excavation, concrete, and stone facing and for unit prices for these items. The installation of plumbing, heating, and electrical facilities will be included in the lump-sum prices bid for the construction of the residences. 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. Bid security in an amount not less than 10 per cent and performance bond not less than 50 per cent will be required. The charge for copies of the specifications and drawings is $2.50, not returnable. For particulars, address the Bureau of Reclamation, Almira, Washington; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD, Commissioner.

INDEX TO ADVERTISERS