WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XV, No. 10

OCTOBER • 1940

25 CENTS A COPY
$2.00 PER YEAR

IN THIS ISSUE

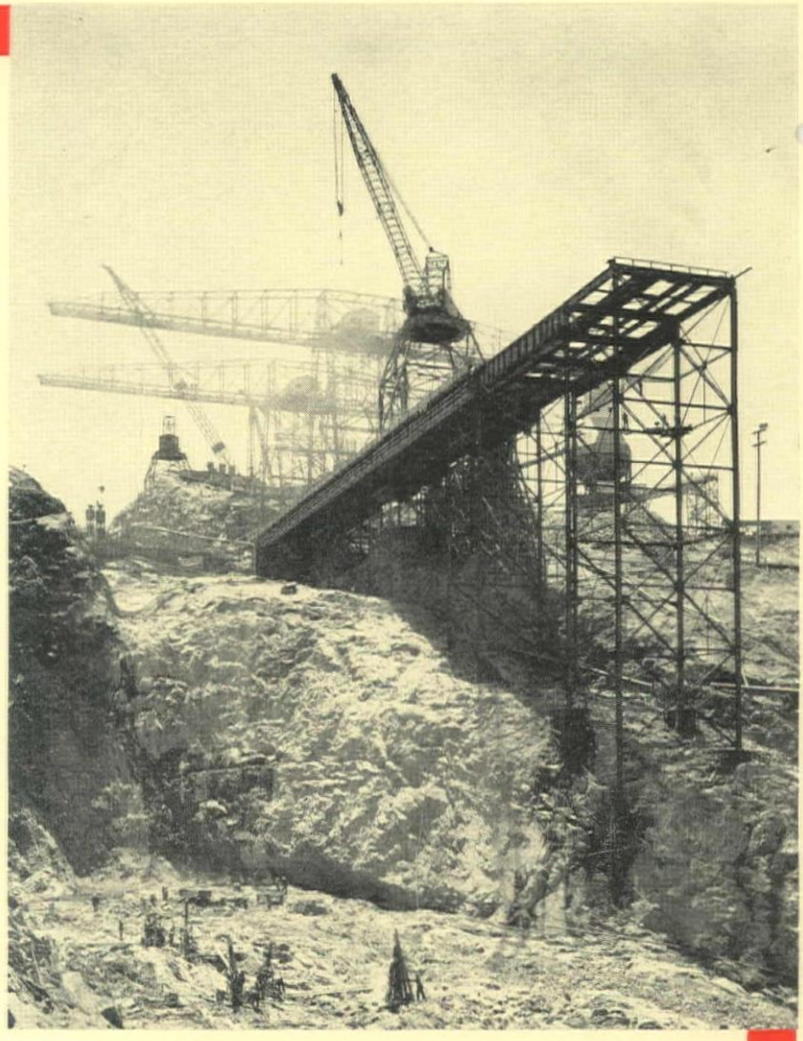
AFTER 30 years of service, sections of Los Angeles Aqueduct are being relined. Bottom and lower sides are lined while aqueduct is shut down, then partial flow is resumed and concrete placed on upper sides as shown (see page 331).

TWO AMERICAN REVOLVERS KEY MACHINES IN FRIANT DAM CONSTRUCTION PLANT

Long boomed, fast traveling and famed for accurate placement of loads, the two

Model 10125 AMERICAN REVOLVERS

are twin masters of ceremonies on the big Friant Dam job of Griffith Company and Bent Company north of Fresno, California. Each will lift 17,000 pounds at 325 FPM. Each places a maximum of 140 cubic yards of concrete per hour.



One of the two Model 10125 AMERICAN REVOLVERS on the Friant Dam construction trestle. Electrically operated, 54 ft. portal type gantry, travels on four swivelling 4 wheel trucks each driven by a 15 HP motor. Travel speed 125 FPM. Boom 125 ft. long.

In addition to pouring concrete, the AMERICAN REVOLVERS do all stripping and setting of forms; place valves, reinforcing steel, etc. In a word they are big machines designed to put through a big job with speed, economy and safety.

Write for a copy of the new AMERICAN REVOLVER catalog No. 400-R-1.

AMERICAN HOIST & DERRICK CO.

NEW YORK — SAINT PAUL, MINNESOTA — CHICAGO

AMERICAN TERRY DERRICK CO. SOUTH KEARNY, N. J.

FOR *Safety*

STANDARDIZE ON THE *Genuine* CROSBY CLIP

PERFECT GRIP . . . DROP FORGED STEEL . . . HOT GALVANIZED

DEALERS WITH STOCK IN ALL PRINCIPAL CITIES

When writing to AMERICAN HOIST & DERRICK CO., *please mention Western Construction News*

Through and Through a ROCK SHOVEL

CHECK it over—a husky front end—all welded boom (and no Northwest Welded Boom has ever failed). Dipper sticks that stand the gaff—tied together with a heavy cap casting at the inner ends to increase resistance to twisting strains—no racks or pinions to wear out.

The Dual Crowd—simple, powerful—a combination of Northwest Independent Crowd plus an additional force for crowding that other shovels waste—a crowd that makes handling rock faster and easier.

Power—for the maximum job to be done—slow speed power that hangs on when the peak load is hit—the answer to the job that calls for lugging ability.

Mobility—a crawler that has been time-tested on rock work—load is distributed over small crawler rollers—no chance of jamming up on a rock and holding up relocation.

Add to this, Ball or Roller Bearings on all high speed shafts, the "feather-touch" control, the Cushion Clutch and many other Northwest refinements. You should know about these things before you buy. Let us send you complete details.

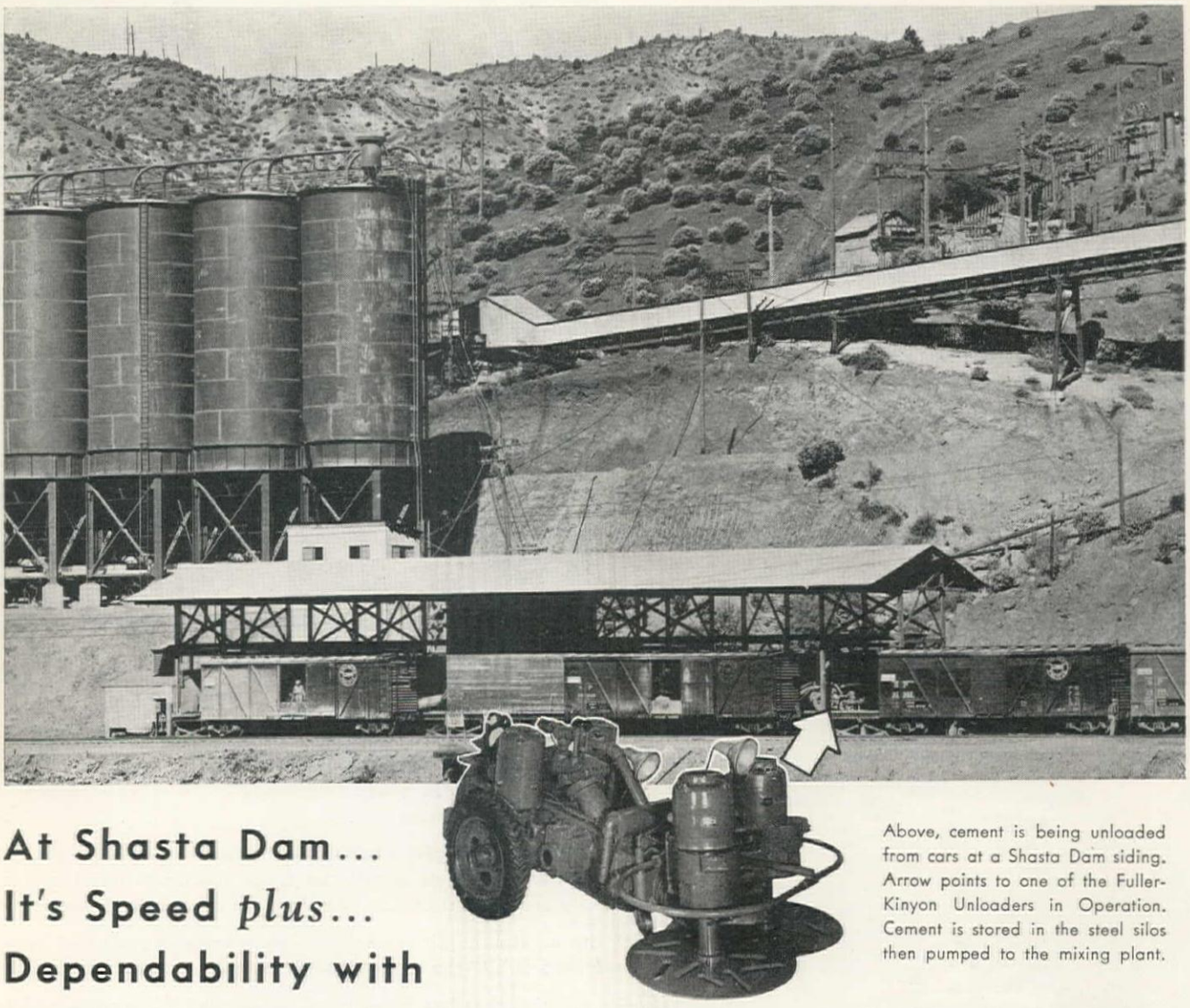
NORTHWEST ENGINEERING CO.
1736 Steger Bldg., Chicago, Illinois

Branch Offices: 255 Tenth St., San Francisco, Calif.; 3707 Santa Fe Ave., Los Angeles, Calif.; 1234 - 6th Ave., South, Seattle, Wash.; J. L. Farrell, 2450 So. Milwaukee, Denver, Colo., 1631 16th Ave., Seattle, Wash.

If it's a real Rock Shovel you won't have to worry about output in dirt

NORTHWEST

DUAL CROWD
INDEPENDENT PLUS AUTOMATIC
Digging Power Plus



Above, cement is being unloaded from cars at a Shasta Dam siding. Arrow points to one of the Fuller-Kinyon Unloaders in Operation. Cement is stored in the steel silos then pumped to the mixing plant.

At Shasta Dam... It's Speed *plus*... Dependability with

Fuller-Kinyon Remote-Control Unloaders

Calling the roll of important construction concreting jobs 'round the world would be a "roll call" of Fuller-Kinyon Unloader users. Contractors everywhere know they can depend upon the stamina, reliability and continued efficiency of Fuller-Kinyon Unloaders . . . regardless of operating conditions.

At Shasta Dam . . . the second largest and the second highest concrete dam in the world . . . you'll find these Unloaders quickly and efficiently taking bulk cement from cars. There's no breakdown, delays or demurrage charges to worry about. For Fuller-Kinyon Unloaders are ***built*** to give uninterrupted service, to speed up operations in handling cement.

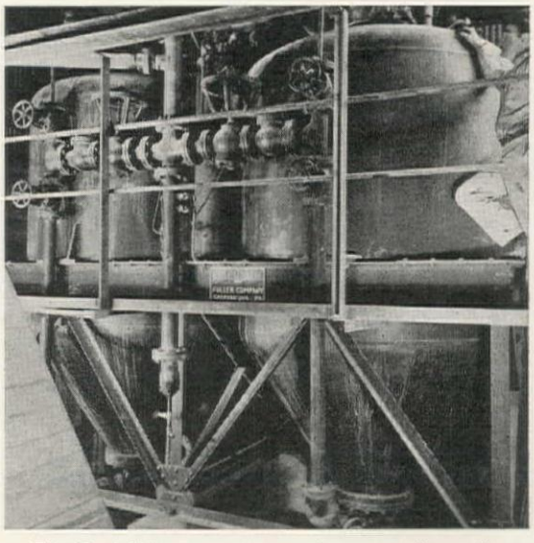
On any size job . . . large or small . . . profit-wise contractors will use an Unloader. There are many types and sizes. Call our nearest office to find the one which will suit your needs.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

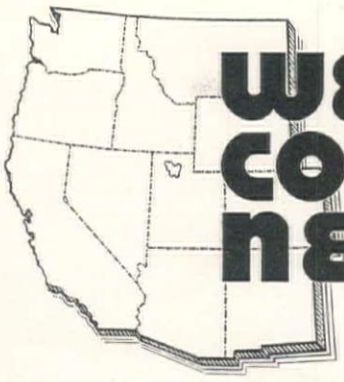
Chicago: 1118 Marquette Bldg.

San Francisco: 320-321 Chancery Bldg.



This Dual-Fluxo pump transports cement from silos to mixing plant, a distance of 3,300 feet, including 280 feet of lift.

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · · AIR-QUENCHING COOLERS · · · · BIN SIGNALS



WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

ABC

J. I. BALLARD, Editor

Late News...

BARRETT & HILP, San Francisco, Calif., has been awarded a $2,243,418 contract by the U. S. Navy for construction of six hundred low-cost housing units at the Mare Island Navy Yard, Vallejo, Calif. The job will include construction of water supply, sewerage and street lighting systems and roads and walks.

•

J. A. Terteling & Sons, Boise, Idaho, have submitted the low bid to the Bureau of Reclamation for construction of the Tule Lake tunnel in Siskiyou County, California, a short distance south of Klamath Falls, Ore. Seventeen bids ranged from $172,096 to $360,555.

•

Kern & Kibbee, Portland, Ore., submitted the low bid of $603,746 to the U. S. Engineer Department, for reconstructing the south jetty at the entrance to Coos Bay on the Oregon Coast.

•

Puget Construction Co., Seattle, Wash., was awarded a contract for construction of the power house foundation at Bonneville dam in Oregon. The amount of the contract, let by the U. S. Engineer Department, was $3,131,606.

•

Charles L. Hoskins, San Diego, Calif., has been awarded an $871,600 cost-plus-a-fixed-fee contract by the U. S. Navy for construction of temporary housing facilities for enlisted personnel at the Naval Training Station, San Diego.

•

United Concrete Pipe Corp., Los Angeles, Calif., has submitted the lowest bid to the California Division of Highways for construction of the Mokelumne River steel truss swing bridge 5 mi. west of Terminous Slough. Bid price for the structure and a timber trestle was $467,732.

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.

Contents for October, 1940

WESTERN CONSTRUCTION PUBLICATIONS, Inc.

Office of Publication . . . 333 Kearny Street, San Francisco, California

•

EASTERN OFFICE

733 Highland Ave., Glen Ellyn, Illinois (Suburb of Chicago - Telephone Glen Ellyn 1554)
DONALD F. FORSTER, Mgr.

•

Please address correspondence to the executive offices, 333 Kearny Street San Francisco, California

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

Shake off the Shackles of the SNOW Blockade

SNOW CAN BE KEPT UNDER CONTROL! —with a well-laid snow-fighting campaign, and adequate power and equipment to meet all emergencies.

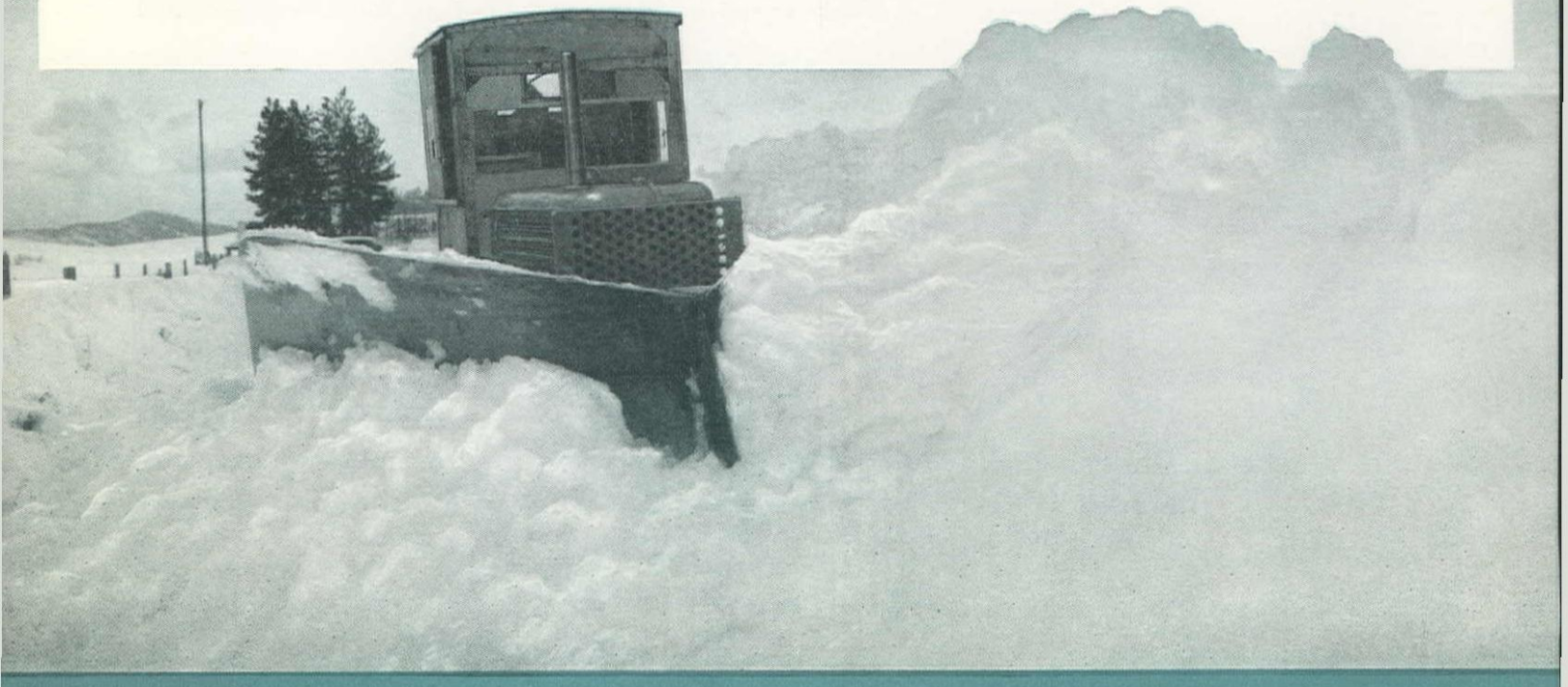
POWER is the key to the effectiveness of snow removal. *More* calls go out year after year for INTERNATIONAL POWER to handle this man's-size job. International Trucks and Tractors make an unbeatable combination. With the wide range of sizes and types available, they fit readily into any program. The truck line includes models up to powerful six-wheelers. In the tractor line there are wheel and crawler types, including the 4 New Diesel TracTracTors.

Here, under one banner, is the sound and practical answer to snow-removal needs. *Standardize* on International and enjoy all the benefits only Harvester can provide. Keep in mind that these units can be used *in many other ways throughout the year.*

Make your plans now to keep traffic moving rapidly during the winter. Build your program around International Trucks and Tractors and you won't have to worry when blizzards blow and drifts pile up. See the International Dealer or Branch for full information.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois

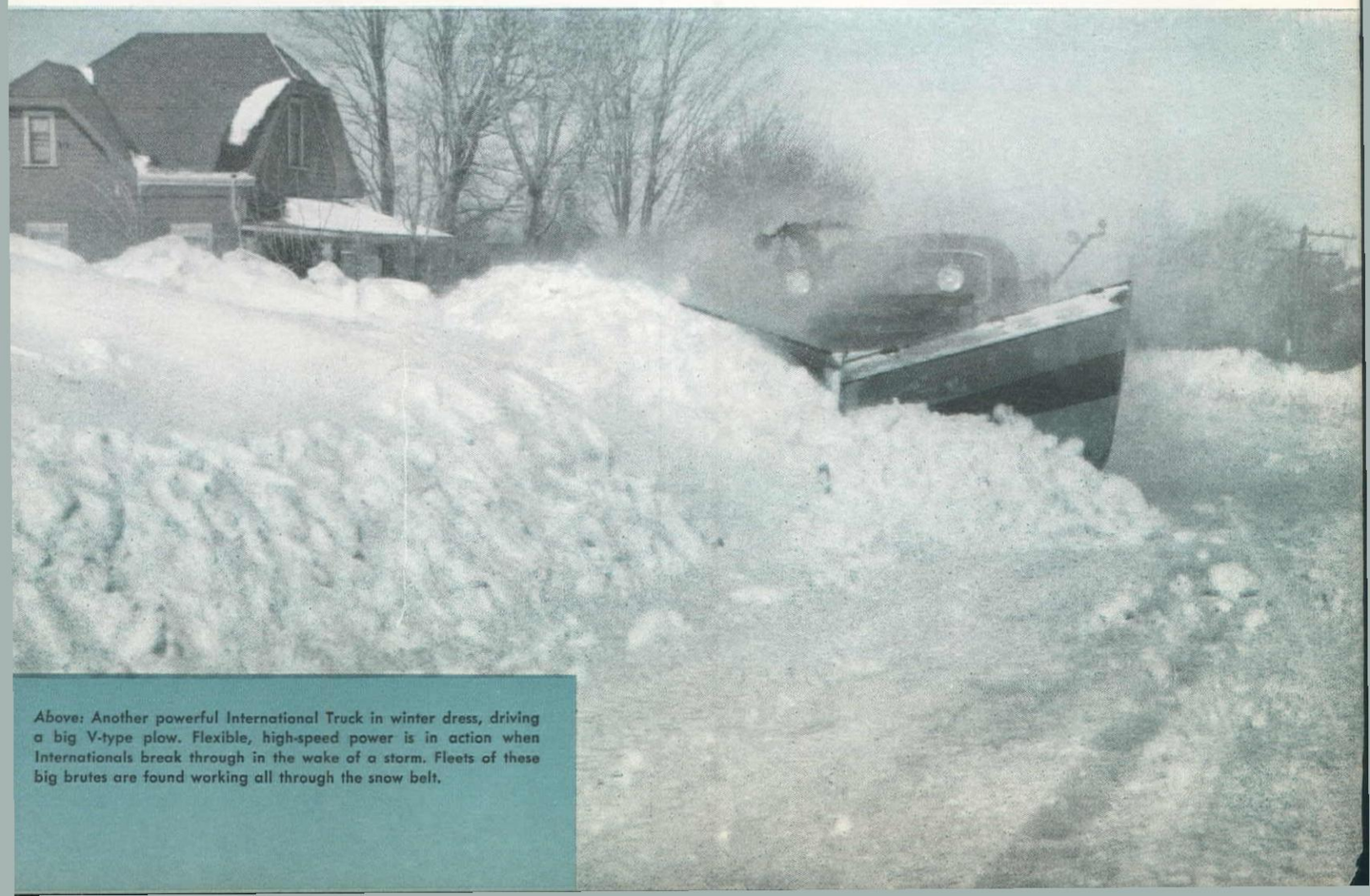
The New International DIESEL TracTracTors (one shown here cutting through drifts) will give you a brand-new idea of crawler-power efficiency, stamina, and economy in handling snow. Their fast, easy starting proves especially valuable in cold weather. Their sure-footed traction, wide range of traveling speeds, ease of handling, and maneuverability are among the many features that users are enthusiastic about.



INTERNATIONAL HARVESTER

with INTERNATIONAL POWER!

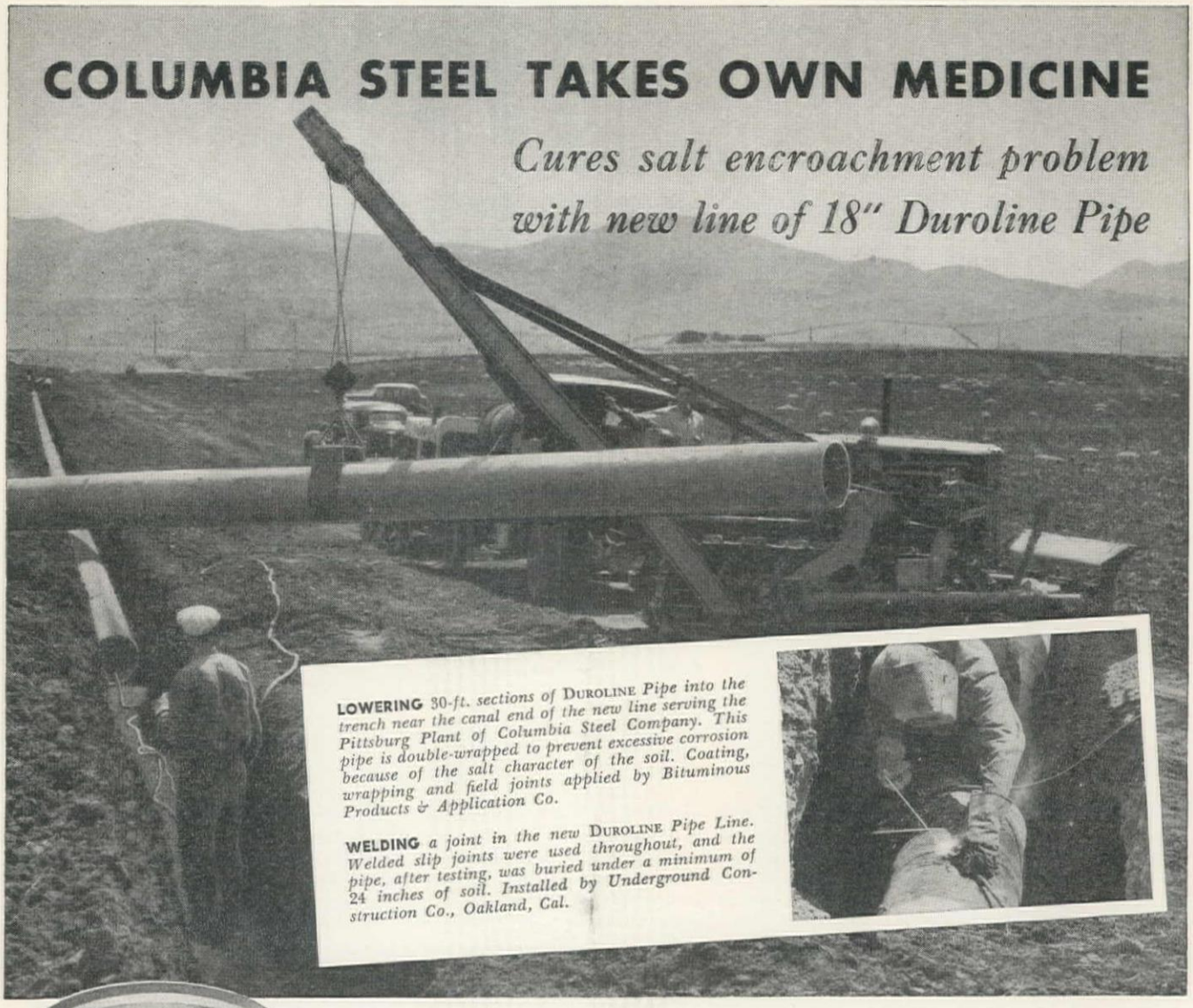
Above: Here is an example of the remarkable adaptability of International Power to snow removal. This auger-and-rotary type machine is mounted on an International Truck. An International Power Unit on the back of the truck drives the auger and blower mechanism. The snow is thoroughly pulverized and blown 75 to 100 feet beyond the road. A rapid-action loader can be obtained for work on city streets. The outfit is readily removed and the truck used for other work the rest of the year. The heavy-duty caliber of snow removal is right up International's alley—a class in which this famous line has excelled for years. In fact, for the past ten years, more heavy-duty Internationals have been bought than any other make.



Above: Another powerful International Truck in winter dress, driving a big V-type plow. Flexible, high-speed power is in action when Internationals break through in the wake of a storm. Fleets of these big brutes are found working all through the snow belt.

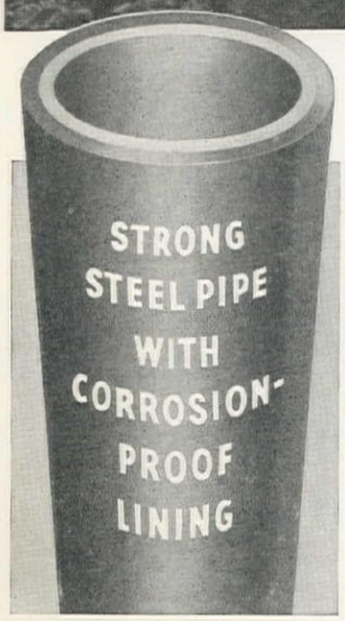
COLUMBIA STEEL TAKES OWN MEDICINE

Cures salt encroachment problem with new line of 18" Duroline Pipe



LOWERING *30-ft. sections of* DUROLINE *Pipe into the trench near the canal end of the new line serving the Pittsburg Plant of Columbia Steel Company. This pipe is double-wrapped to prevent excessive corrosion because of the salt character of the soil. Coating, wrapping and field joints applied by Bituminous Products & Application Co.*

WELDING *a joint in the new* DUROLINE *Pipe Line. Welded slip joints were used throughout, and the pipe, after testing, was buried under a minimum of 24 inches of soil. Installed by Underground Construction Co., Oakland, Cal.*



OUR representatives have for years advocated DUROLINE — the strong steel pipe with the corrosion-proof lining—for pipe lines handling corrosive waters. Now, here we are, practicing what we preach . . . installing a 9000-ft. line of DUROLINE Pipe, 18-in. O.D., to provide fresh water for our Pittsburg, Cal., plant.

The need for this new fresh-water supply resulted directly from the encroachment of salt water throughout the upper reaches of the San Francisco Bay region. To relieve this condition Contra Costa Canal, now over half completed, brings fresh water down from Rock Slough, well above the encroachment limit, and passes within two miles of our Pittsburg plant. The new DUROLINE Pipe Line will feed this fresh water, at the rate of 3000 gallons per minute, into our plant.

We chose DUROLINE Pipe for this important project for the same reasons scores of other industrial concerns have selected it. We want this line to operate at full capacity for many years. We want neither tuberculation nor breakage to cut down its efficiency. And DUROLINE meets both these requirements—at moderate cost.

You can take our word about DUROLINE — we use it at our own plant! Write today for data.

COLUMBIA STEEL COMPANY • *San Francisco*

Pacific Coast Distributors of DUROLINE Pipe Manufactured by National Tube Company
United States Steel Export Company, New York

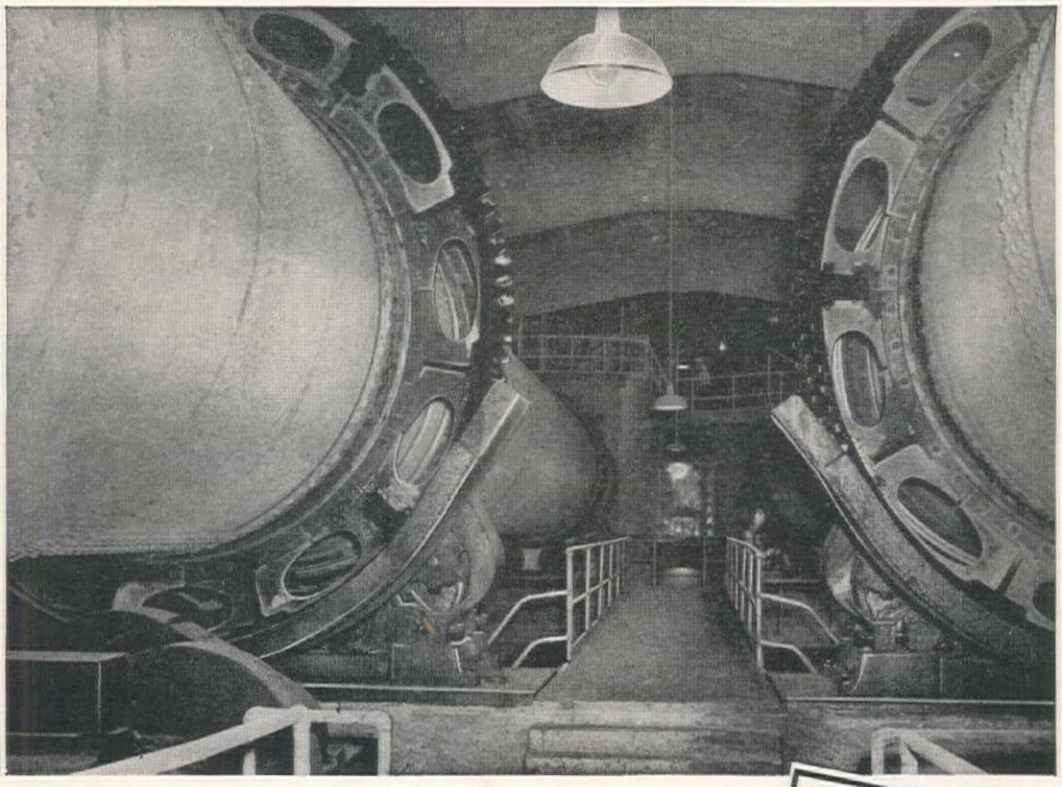
UNITED STATES STEEL

CEMENT MILL LENGTHENS GEAR LIFE

☆

TWO ROTARY KILNS in the plant of Pacific Portland Cement Co., Redwood City, Calif. Ring and drive gears are protected against wear and corrosion with Texaco Crater.

☆



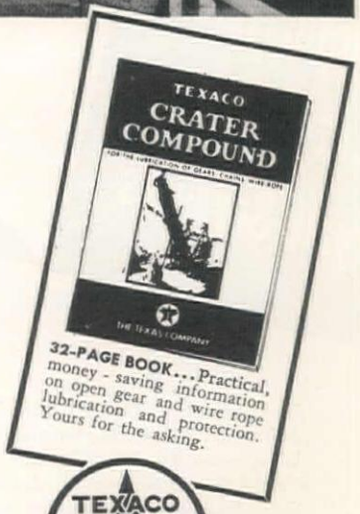
PRODUCING portland cement from oyster shells, the Pacific Portland Cement Co. has been keeping friction losses and upkeep costs to a rock bottom figure. Open gears on their kilns, oyster shell dryers and clinker coolers have shown less wear, and required practically no attention.

For 10 years, these open gear teeth have been protected against wear and corrosion by lubrication with *Texaco Crater*. *Texaco Crater* coats gear teeth with a tough, viscous water and chemical resistant film that lubricates, protects against wear and weather. Highly adhesive and cohesive, it clings, resists channeling and prevents metal-to-metal contact.

Trained lubrication engineers will gladly cooperate in making savings in your equipment. Just phone the nearest of more than 2300 Texaco warehousing points in the 48 States or write to:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York, N. Y.



32-PAGE BOOK... Practical, money - saving information on open gear and wire rope lubrication and protection. Yours for the asking.

TEXACO

TEXACO DEALERS INVITE YOU to enjoy Fred Allen in the new full-hour program of The Texaco Star Theatre . . . with Kenny Baker, Al Goodman's Orchestra and a great cast. Every Wednesday Night, Columbia Network. 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.

TEXACO CRATER

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

SET A MORE PROFITABLE
with LeTourneau Equipment

On Tractor Hauls with Extra-Capacity Carryall Scrapers

30 HEAPING YARDS PER SCRAPER — (Above) A. Teichert & Son, Inc., have six of these double-bucket LeTourneau RU Carryalls rushing to completion their 1,800,000-yard contract to rebuild ten miles of levee in Sutter Basin, near Knight's Landing, California. This large Carryall model loads like two small scrapers. The rear bucket, telescoped into forward position, is loaded first, then rides back on rails and the front bucket is loaded without pushing extra yardage up through dead weight. Thus, bigger loads are gained without increasing loading time. For high speed earthmoving over long hauls, this RU can be interchanged to Model A Tournapull operation.

TAKE fullest advantage of today's bigger, more powerful tractors, by converting their added power into extra profits with LeTourneau extra-capacity Carryall Scrapers. Built to match the power of two loading tractors with EXTRA PAY YARD performance, loads as big as 33 heaping yards can quickly be pusher boosted into the largest of these tractor-operated Carryalls. One tractor—the hauling rig—easily hauls and spreads those loads . . . thanks to LeTourneau improvements in Carryall operating ease, construction and design.

For one thing, Scraper sides and apron have been built higher to hold in the 2 to 5 extra yards that would otherwise boil over. Sheaves are centered at the tailgate for direct pull, reduce power demand on positive ejection of the larger loads. New arch-type A frame gives greater clearance to unload in double-quick time. Larger tires retain easy hauling. New "goose-neck" yoke lends greater structural strength, gives ample clearance for the larger tires.

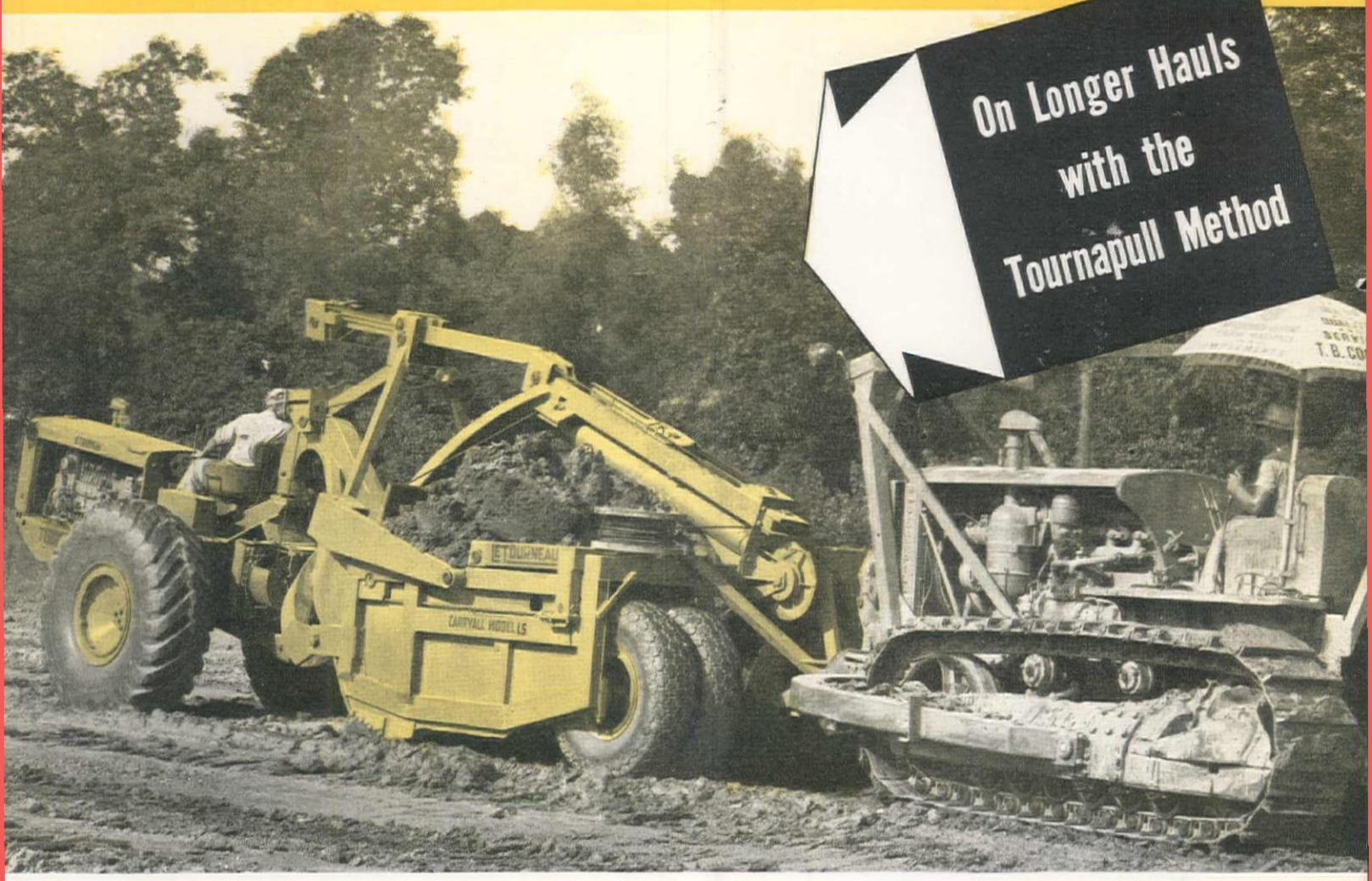
To *you*, these money-making Carryall advantages mean that now you can load, haul and spread more yardage per tractor horse-power than ever before. Ask your LeTourneau-"Caterpillar" dealer to show you the extra profit on your own job . . . NOW . . . by demonstration.

FOR LOWEST NET-COST-PER-YARD STANDARDIZE ON

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, TOURNAPULLS*, TOURNATRAILERS*, CRANES, DRAG SCRAPERS, SHEEP'S FOOT ROLLERS, PUSHDOZERS, TREEDOZERS.

*Name Reg. U. S. Pat. Off.

EARTHMOVING PACE



Turn to Tournapulls for Carryall Scraper profits over the longer hauls, where your tractors leave off. These high-speed, self-propelled Tournapulls load Carryalls with the aid of a pusher, haul at truck speeds and spread their own loads. One-man operated, they save waiting at the shovel, cut out costly, individual loading and hauling operations, save the cost of special spreading tools on the fill.

Job-Proved

Successful contractors all over the United States and in Canada are now using this revolutionary Tournapull method. On California's Hansen Dam, alone, 15 Model A Tournapulls were in operation over two full years, working 3 shifts daily, 6 days a week. In that time, they moved more than 4,000,000 cubic yards of earth.

In your case, you'll find that no other equipment on the market can deliver so much yardage for you so fast and so cheaply. Get in on the "ground floor" on the savings this modern earthmoving method offers you . . . take early advantage of Tournapull profit possibilities by seeing your LeTourneau-"Caterpillar" dealer NOW for demonstration.

HEAPING IT ON FAST — (Above) Model C Tournapull, designed for use with LS Carryall Scraper, is pusher loaded to 11 heaping yards of tough wet clay in a hurry. The job—D. B. Hill's highway contract, near Wynne, Ark. Two of these Tournapull rigs are averaging 6 round trips each every hour over one-mile cycles.

QUICK GET-AWAY FOR FAST HAULING — Speeding its load to the fill, this Model C Tournapull attains high gear travel quickly, will ride over uneven ground with bigger loads and at higher speeds than do trucks.

CONTROLLED SPREADING — Saves the cost of leveling tools on Tournapull jobs. Tournapulls spread their loads with typical Carryall precision. Large tires pack the fill solidly in normal travel. Shown is Model C Tournapull with LS Carryall working on Gibbons and Reed's highway contract, near Carlin, Nevada.

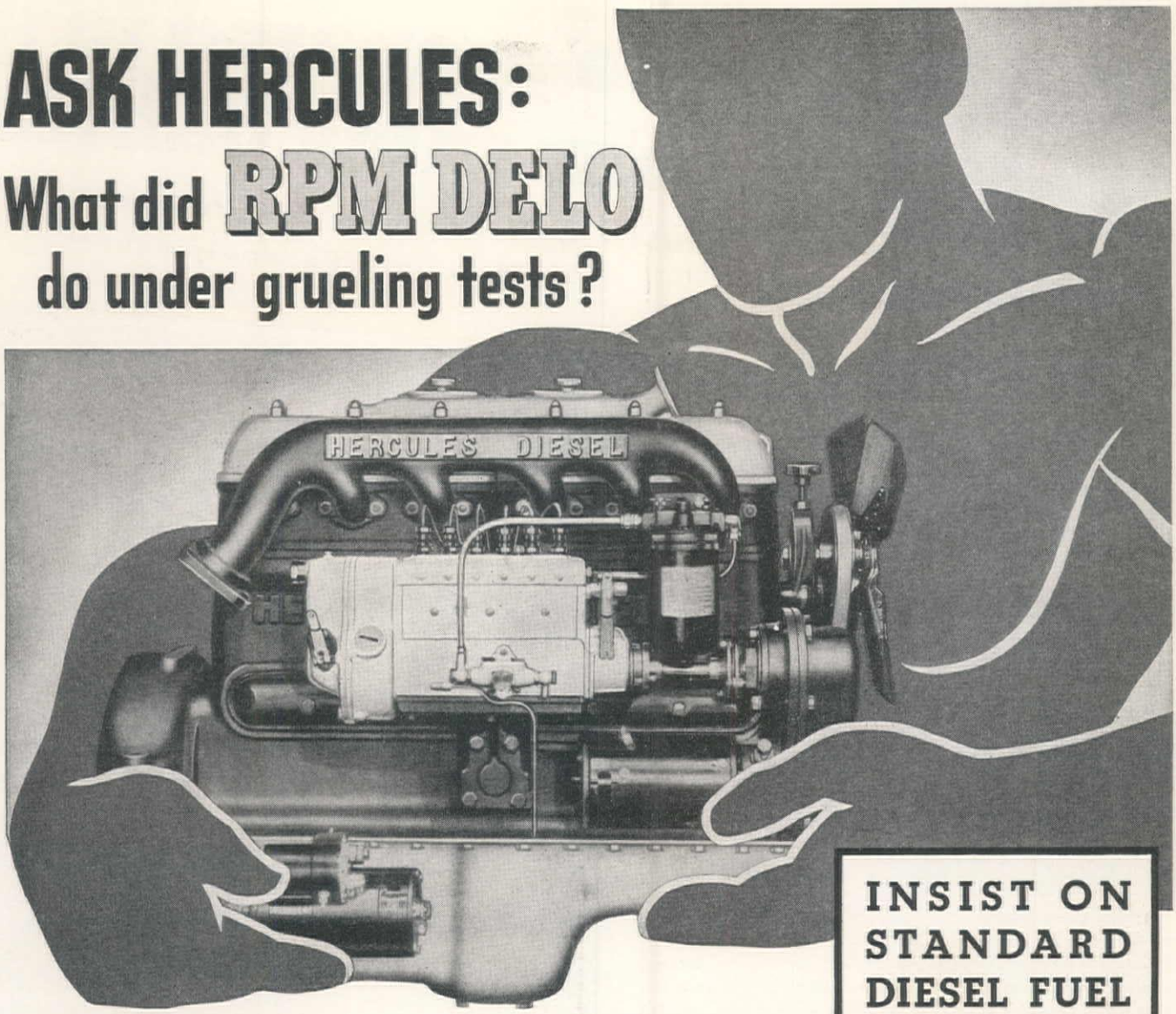
HERE'S ANOTHER MONEY-SAVER — THE TOURNA-TRAILER. On shovel work, you can further cut equipment costs by switching the Tournapull from Carryall to Tournatrailer operation. Changeover is easily and quickly made. Model C Tournapull is shown with 12 heaped yards W10 Tournatrailer.

E TOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

ASK HERCULES:

What did RPM DELO do under grueling tests?



What Hercules Motors Corporation found out means money to you:

With RPM DELO there was complete freedom from ring sticking in the severe full-speed, full-load tests as applied to Diesel engines in the Hercules laboratories. But, impressive as this is, it demonstrates only one of RPM DELO's superiorities. Over 100,000 hours of testing, in which many leading Diesel manufacturers took part, prove RPM DELO not only prevents ring sticking, bearing corrosion and sludge trouble—*but does all three for all Diesels!*

On top of this—cylinders, pistons and rings show a minimum of wear because of RPM DELO's unique ability to spread over hot metal surfaces and keep them lubricated. It never runs away from heat—never lets engine parts run dry.

Order RPM DELO for longer engine life, fewer overhauls, and higher operating profits.

UNEQUALED FOR EVERY DIESEL

RPM DELO

REG. TRADE-MARK

DIESEL ENGINE LUBRICATING OIL

INSIST ON STANDARD DIESEL FUEL

Tops for power—engine protection—smooth operation

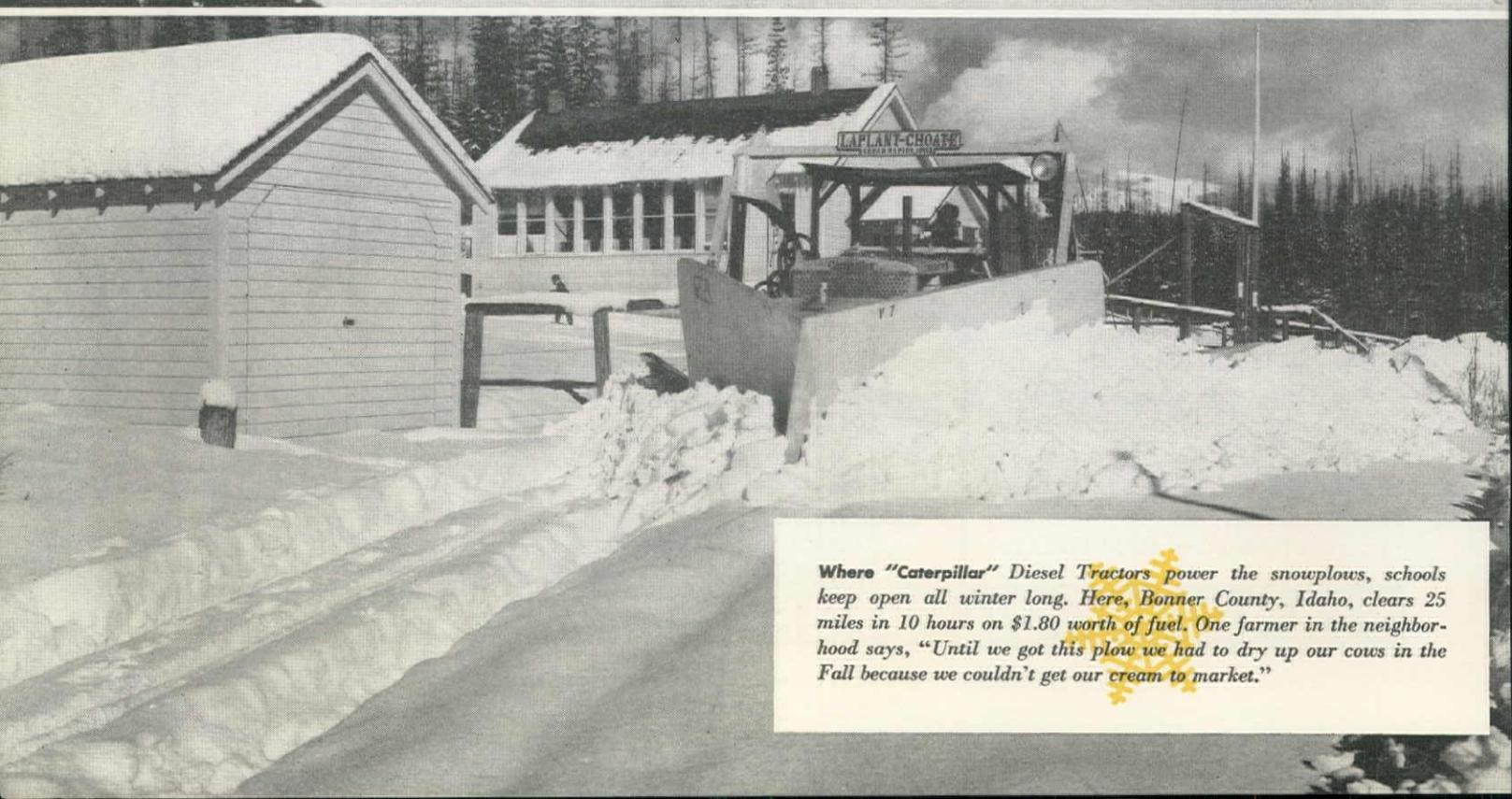
No matter how long or hard you work your Diesels, Standard Diesel Fuel delivers the same smooth, uniform, full power hour after hour. And it's the safest power you can buy. Completely distilled—100% clean—Standard Diesel Fuel protects fuel pumps and injectors from needless wear—makes them last longer. Furthermore, its carefully controlled ignition, viscosity and volatility characteristics assure complete combustion. It's the *buy* for your Diesels!

STANDARD OIL COMPANY OF CALIFORNIA

"We're prepared to win our snow battles"

Say Public Officials who own "Caterpillar" Die snow-fighting equipment

In Summer *this powerful snow fighter maintains roads and recreation areas in Lassen Volcanic National Park, California. Says Acting Superintendent Carl Swartzlow: "Our 'Caterpillar' D7 Tractor is doing a fine job of removing snow from 25 miles of park highway. It clears a mile of 4- to 6-foot drifts in a 7-hour day."*



Where "Caterpillar" *Diesel Tractors power the snowplows, schools keep open all winter long. Here, Bonner County, Idaho, clears 25 miles in 10 hours on $1.80 worth of fuel. One farmer in the neighborhood says, "Until we got this plow we had to dry up our cows in the Fall because we couldn't get our cream to market."*

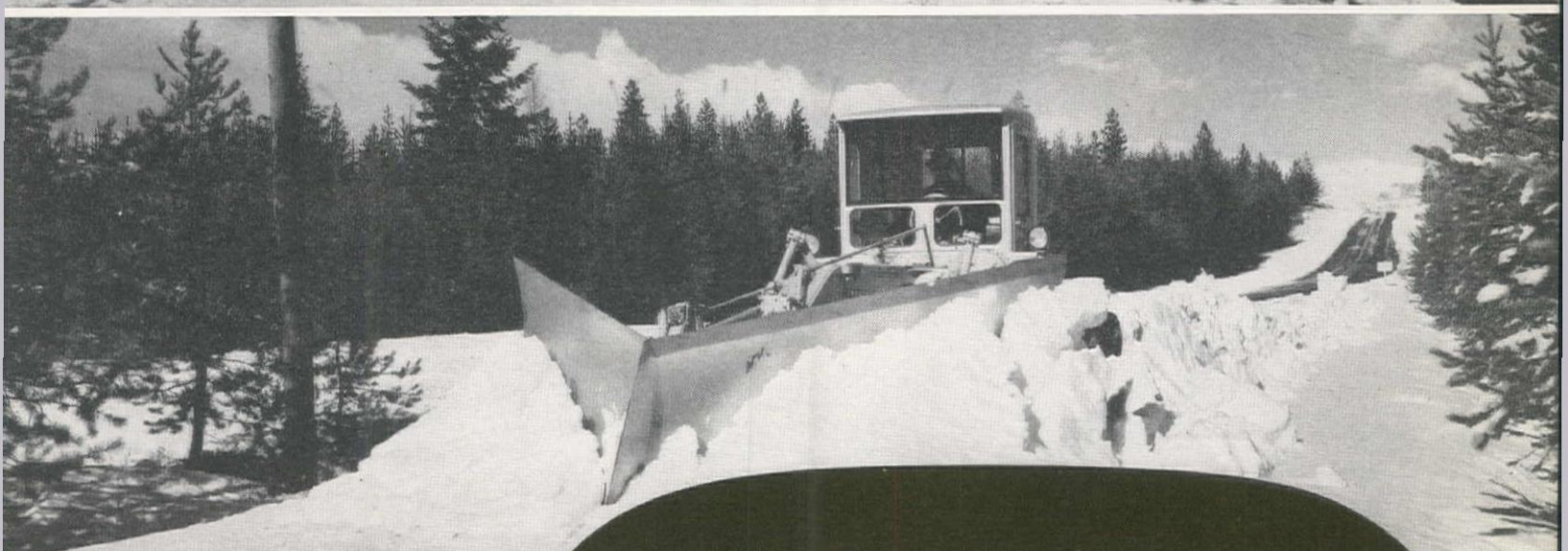
Hundreds of City, County, State and Federal Officials responsible for winter road and street maintenance know from experience that a penny's worth of "Caterpillar" Diesel Power prevents a dollar's worth of damage when business is snowed under. They'll tell you that two of the most effective snow-fighting machines ever built—the "Caterpillar" Diesel Tractor and the "Caterpillar" Diesel Motor Grader—will insure your community against the annoyance and danger of a winter blockade.

Schools can stay open—the doctor can get through when needed—business and traffic can go on as usual.

And best of all, the public funds spent for "Caterpillar" snow-removal equipment are an investment that pays year-round dividends—the same machines that keep roads open in winter build and maintain them in summer.

If you would like to have an interesting illustrated booklet on modern snow-removal methods, ask your "Caterpillar" Dealer for a copy of "Snow Fighters," or mail a postcard requesting a copy to Caterpillar Tractor Co., San Leandro, Calif.

***Cities, too, profit** by fast, sure removal of traffic-choking snow. This outfit, owned by the City of Wallace, Idaho, is a "Caterpillar" Diesel Tractor equipped with a Rotary Snow King Plow. It picks up snow from the streets and loads it into trucks on 2½ gallons of Diesel fuel an hour.*



***For high-speed,** heavy-duty snow removal many road officials say there's nothing to equal the "Caterpillar" Diesel No. 12 Motor Grader. In summer, too, it more than earns its keep by building, ditching, bank-sloping and maintaining highways at lowest possible cost.*

CATERPILLAR

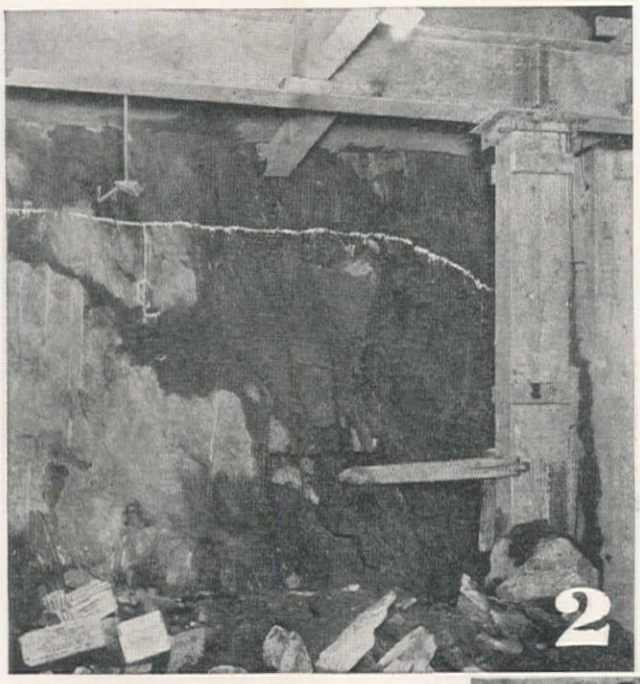
REG. U. S. PAT. OFF.

TRACK-TYPE TRACTORS • DIESEL ENGINES AND ELECTRIC SETS • ROAD MACHINERY

Caterpillar Tractor Co. • San Leandro, Calif. • Peoria, Ill.

EXPLOSIVES

NEW SIXTH AVENUE SUBWAY



NEARING completion, this project of the New York City Board of Transportation is a splendid example of modern engineering skill. Utmost precision has been needed in building the Sixth Avenue Subway—especially in blasting. The nearness of stores, office buildings, water mains, power lines, surface cars and Sixth Avenue elevated railroad, demanded expert handling and dependable explosives. At one point, for example, the new subway passes *under* the busy B.M.T. Subway and *over* the tracks of the Pennsylvania Railroad.

It is significant that Du Pont 40% Special Gelatin was extensively used for the blasting . . . further evidence that Du Pont Explosives and Blasting Accessories offer recognized dependability of performance to the highest degree.

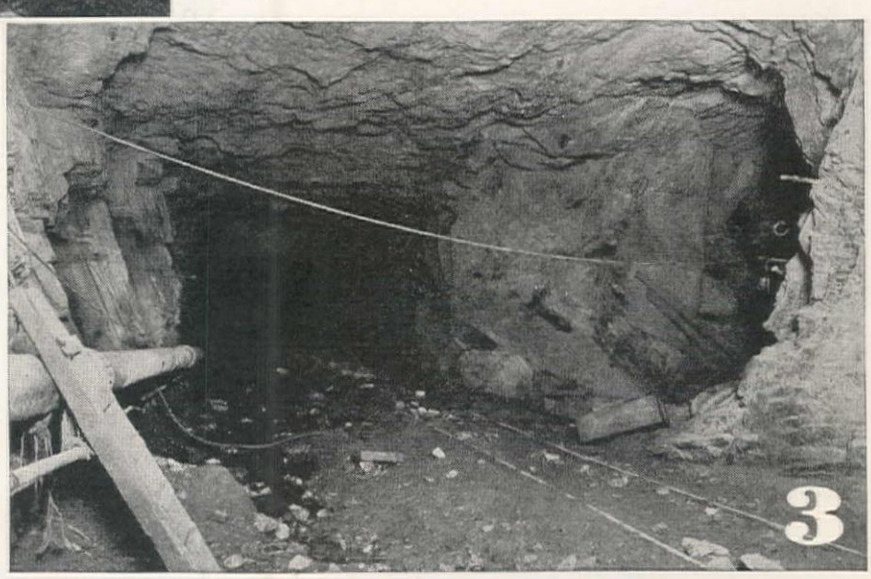
To the men whose vision and skill made this new subway possible, Du Pont extends sincere congratulations for a splendid job. And to contractors everywhere, Du Pont offers more than dependable explosives and blasting accessories. Du Pont also offers whatever technical assistance may be needed for any blasting problem—to assure a job done with maximum efficiency and minimum cost. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Seattle, Portland, Spokane, San Francisco.

1 **Drift under B.M.T. Subway and over Pennsylvania Railroad. 6th Avenue at 33rd St.**

2 **Portal of double tunnel. 6th Avenue at 46th St.**

3 **East tunnel. 6th Avenue between 28th and 29th Sts.**

Be sure to tune in . . . "Cavalcade of America," NBC Red Network . . . every Wednesday evening.



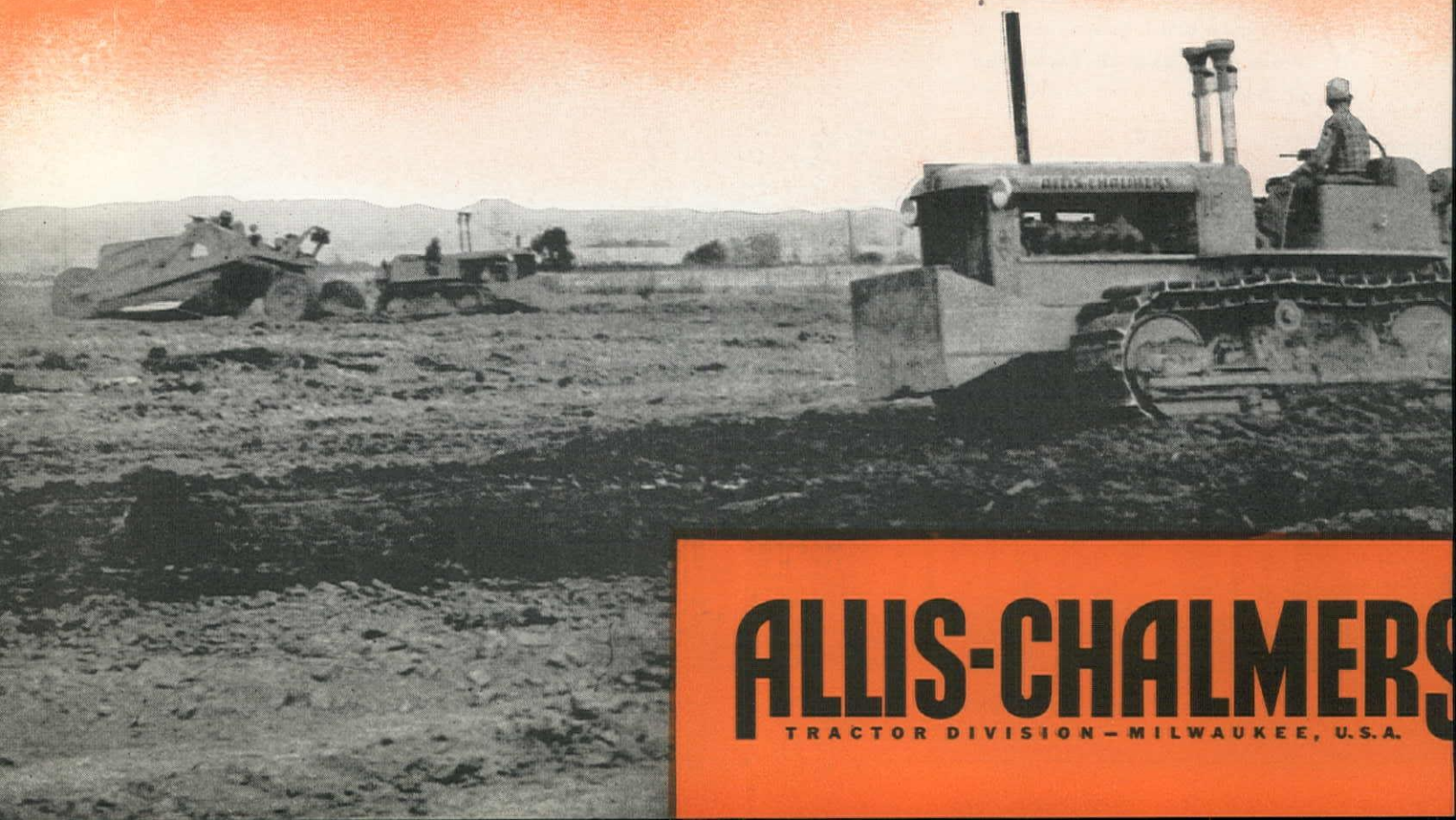
BLASTING ACCESSORIES

Now it's 16 FOR AND

BIG WEST COAST OPERATORS STEP ALONG WITH 2-CYCLE DIESELS

A demonstration PROVED HD-14's dirt-moving ability—started the ball rolling! Two were ordered immediately . . . then seven! More added as more jobs were hit! 16 HD-14's to date for Parker-Schram and Eaton & Smith—7 at Walla Walla, Washington; 5 at Scappoose, Oregon; 4 at Deer Island, Oregon. Big capacity scrapers, up to 28 yd. size, are hauled and pusher-loaded with the HD-14's.

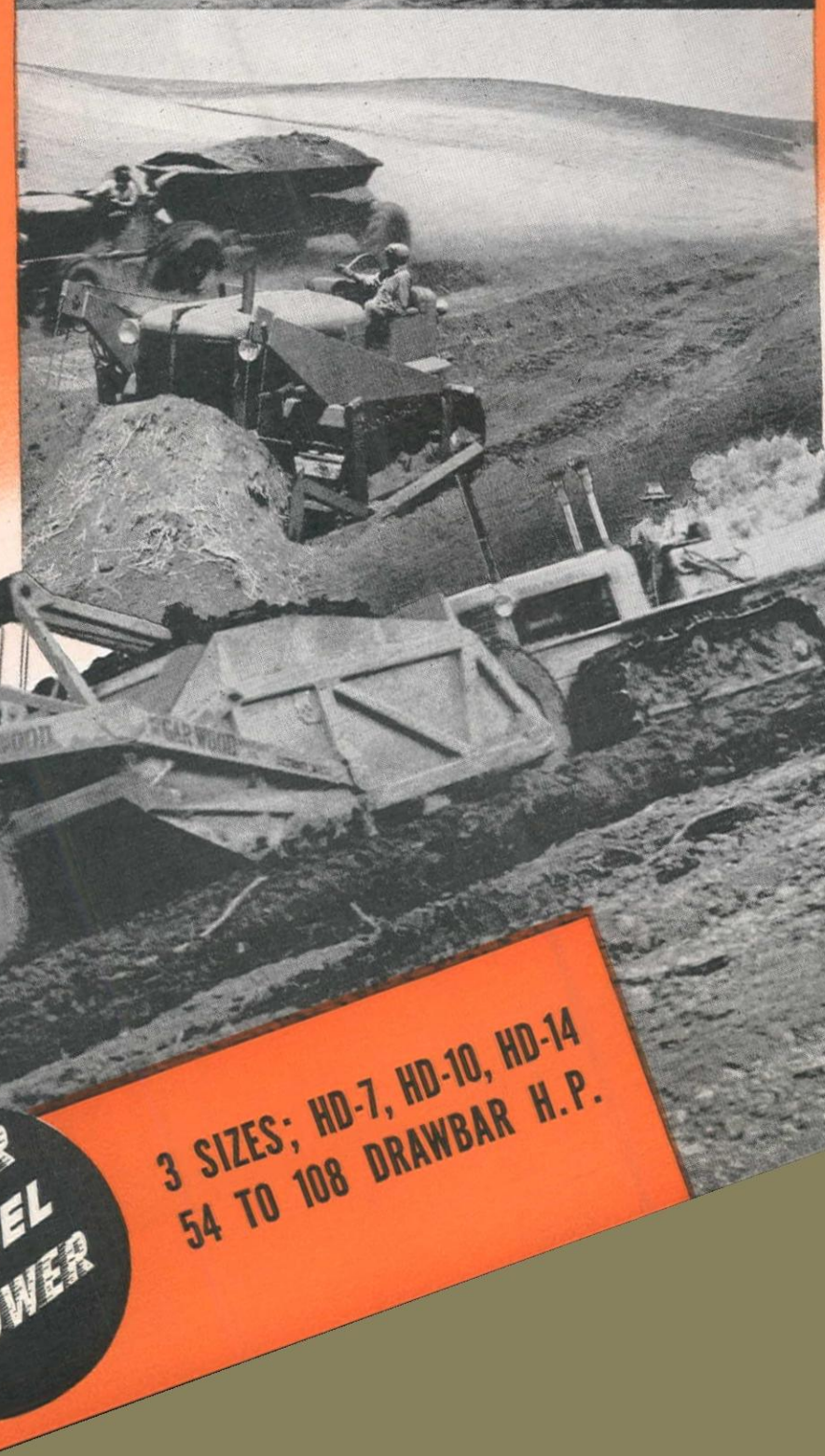
Try them . . . on your job . . . under your own operating conditions! We'll gladly arrange a demonstration.



ALLIS-CHALMERS

TRACTOR DIVISION—MILWAUKEE, U.S.A.

PARKER-SCHRAM EATON & SMITH...



Suffocating, blinding dust — filled with gritty particles — force tractor operators and engineers to wear respirators and goggles at Mill Creek Dam project — 2,700,000 yd. job near Walla Walla, Wash. Tough operating conditions ... yet everyone connected with project is enthusiastic over outstanding performance of the seven HD-14's used here — two shown in photos at right.

On Scappoose, Oregon, Levee Project four HD-14's haul big capacity scrapers, one operates as a pusher — see photo below.

FASTER DIESEL POWER

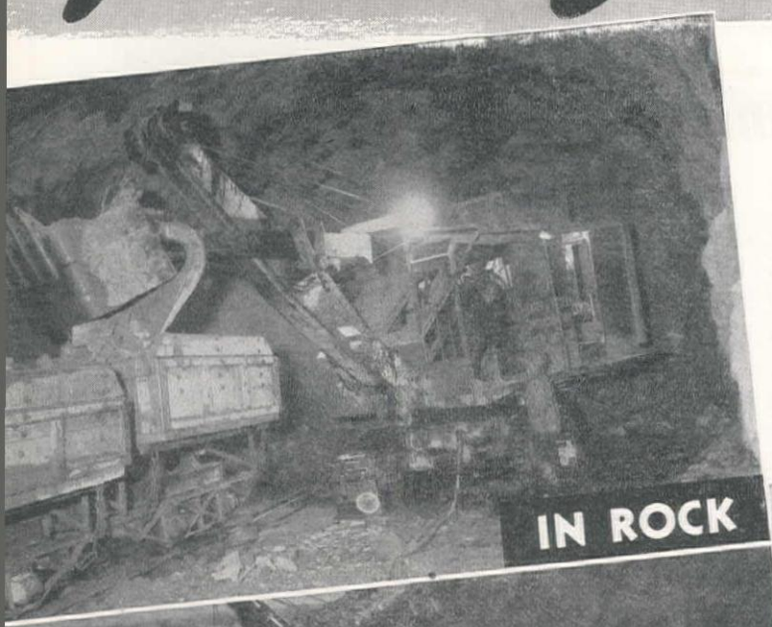
3 SIZES; HD-7, HD-10, HD-14
54 TO 108 DRAWBAR H.P.

Personal—

I have been engaged to appear on these pages by a prominent manufacturer of arc welding equipment, whose name I'm not at liberty to divulge at this time.

Alter Ego

powerful DIGGERS



It is a well known fact . . . MARION machines have the power and stamina plus sturdy construction to break records in the toughest kind of digging . . . and to do it with ease, speed and low operating cost. Buy a machine built for rock. You know it will take care of other materials. In other words . . . buy a MARION.

Write - FOR BULLETIN DESCRIBING THE SIZE AND TYPE OF MACHINE IN WHICH YOU ARE PARTICULARLY INTERESTED...

THE MARION STEAM SHOVEL COMPANY
MARION, OHIO, U. S. A.

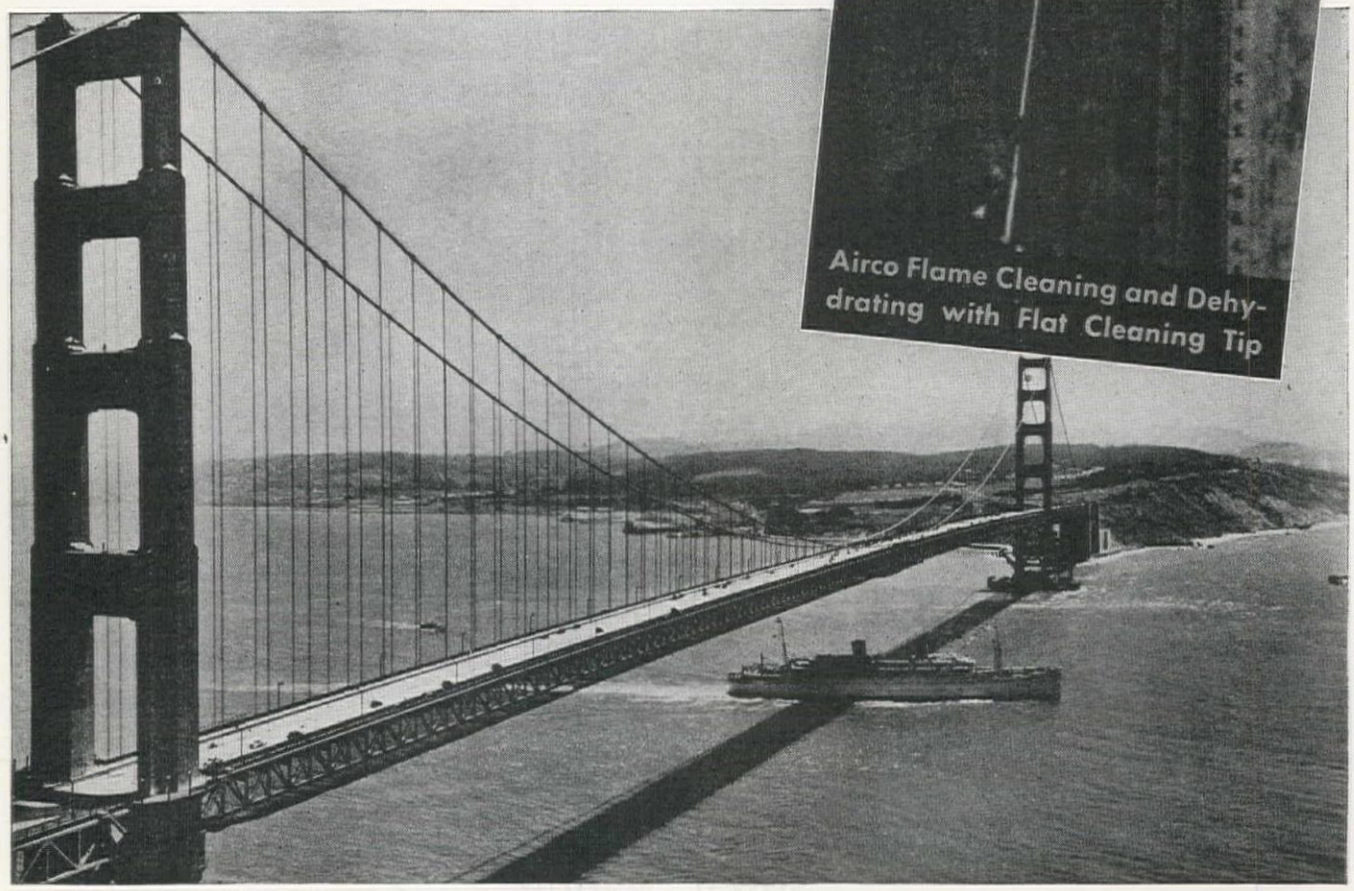
MODERNIZE with

MARION

SHOVELS • DRAGLINES • CLAMSHELLS • CRANES
PULL-SHOVELS • WALKERS from ¾ cu. yd. to 35 cu. yds. Gasoline-Diesel-Electric

Distributed by: Brown-Bevis Equipment Co., 4900 Santa Fe Ave., Los Angeles, Cal.; Howard-Cooper Corporation, Seattle, Spokane, Twin Falls; The Marion Steam Shovel Co., 571 Howard St., San Francisco, Cal.; Edw. R. Bacon Co., Folsom at 17th, San Francisco, Cal.; H. L. Niles, Howard-Cooper Corp., 307 S. E. Hawthorne Blvd., Portland, Ore.; H. W. Moore Equipment Co., 6th and Acoma Sts., Denver, Colo.; The Sawtooth Co., Boise, Idaho.

400% LONGER PAINT LIFE after AIRCO flame cleaning



Airco Flame Cleaning and Dehydrating with Flat Cleaning Tip

. . . ON THE WORLD'S LONGEST SUSPENSION BRIDGE

"Paint on bridge surfaces Airco Flame Cleaned and Dehydrated before repainting last June 10 (1939) is still in good condition, whereas the original paint required chipping and spotting after three months exposure. Flame cleaning and dehydration was not used before the original paint was applied." So reports Mr. R. G. Cone, Chief Engineer of the Golden Gate Bridge and Highway District.

Rust and scale are removed by this Airco process. It dehydrates as it cleans, leaving steel surfaces warm, dry and conducive to a lasting paint job. The apparatus used is standard, portable and flexible. It is easily and safely operated by available personnel. If you have trouble obtaining a lasting paint job on new or used structural steel — Flame Clean by the Airco Method before you paint. Write for full details.

Send for your copy of the interesting new booklet "Flame Cleaning and Dehydrating Structural Steel the Airco Way."

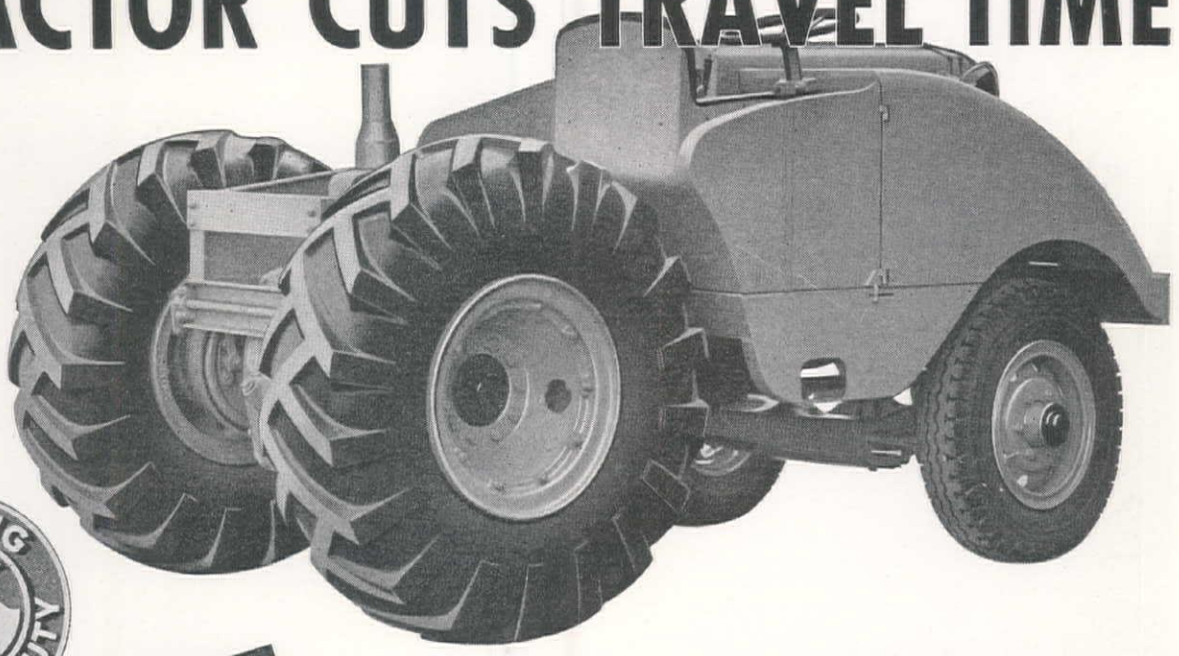
AIR REDUCTION

WESTERN OFFICES and PLANTS:

EMERYVILLE, Calif. • LOS ANGELES, Cal. • PORTLAND, Ore. • SEATTLE, Wash.

AIRCO *Anything and Everything for* GAS WELDING or CUTTING and ARC WELDING WILSON

HIGH SPEED KOEHRING TRACTOR CUTS TRAVEL TIME



KOEHRING HEAVY DUTY

Koehring Wheeler has easily controlled dumping action, at traveling speed, for any desired lift. Air-controlled front apron is easily held in any position to suit conditions. Rear apron tips forward at cutting edge hinge to force complete ejection of the load.

Koehring Wheelers **are hauled at high speeds loaded or empty by the fast traveling Koehring Tractor. Variable speeds to suit conditions, Koehring constant mesh transmission for flexibility and easy operation and large pneumatic tires permit highest possible speed—for substantial reduction of travel time—for more trips per hour—increased yardage per day.**

KOEHRING CO • Milwaukee, Wis.

HEAVY-DUTY CONSTRUCTION EQUIPMENT

HARRON, RICKARD & McCONE CO., San Francisco-Los Angeles • RAINIER EQUIPMENT CO., Seattle • EMPIRE EQUIPMENT CO., Billings
CONTRACTORS EQUIPMENT CORP., Portland • LUND MACHINERY CO., Salt Lake City • NEIL B. McGINNIS CO., Phoenix, Ariz.

NOW . . . I'M BIDDING LOWER AND EARNING MORE

No question of it — digging costs have come down! These days, to make money in the excavating business, you want a machine that gets around quickly and easily on a variety of jobs . . . a machine that's built of rolled alloy steels . . . huskier, to stand the gaff of hard digging and ask less in the way of repairs. These P&H's have shown the way with modern all-welded construction — proved themselves through six years of dependable cost-cutting production for hundreds of owners. If you're still using old-style equipment you'll find it hard to compete against these new P&H's. Why not own one yourself?

P&H EXCAVATORS

In Los Angeles, O. E. Jeffrey owns and operates this P&H Model 150 shovel (½ yd.). Here he's breaking ground for a new post office. This rugged little machine owes its speed and strength to rigid rolled-steel construction. And its mobility comes from those sturdy tractor-type crawlers. Fully described in Bulletin X-19.

★ *Ask about the new P&H Excavator Control — the key to smoother, faster operation. Bulletin X-60.*

P&H excavators are made in 18 different sizes, from ⅜ to 5 cu. yds. capacity; gasoline, Diesel or electric power. Literature is available on all models.

General Offices: 4490 WEST NATIONAL AVENUE • MILWAUKEE, WIS.

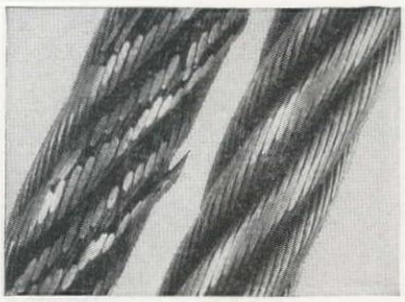
Warehouses and Service Stations: Harnischfeger Corporation, 82 Beale St., San Francisco—Seattle - Los Angeles - San Francisco
SEATTLE, WASH.: Glenn Carrington & Co., 91 Columbia St.; PORTLAND, ORE.: Electric Steel Foundry Co., 24th and York; BOISE, IDAHO: General Equipment Co., 2223 Fairview Ave.; RENO, NEVADA: R. D. Jenkins & Son, 202 E. 2nd St.; SALT LAKE CITY, UTAH: National Equipment Co., 101 West Second St., So.; WILLOWS, CALIF.: Willows Motor Sales Co.; PORTLAND, OREGON: Western Loggers Machinery Co., 302 S. W. 4th Ave.

HARNISCHFEGER CORPORATION

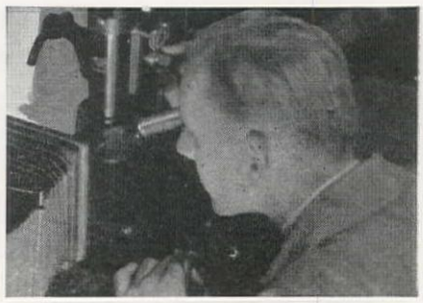
EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

When writing to Harnischfeger Corporation, *please mention Western Construction News*

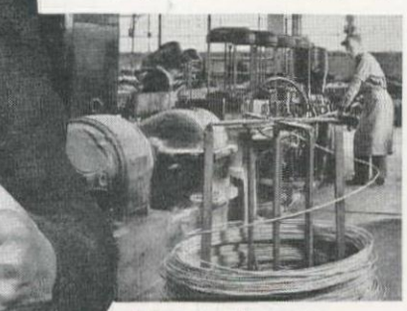
"The BETTER it's tailored the LONGER it wears!"



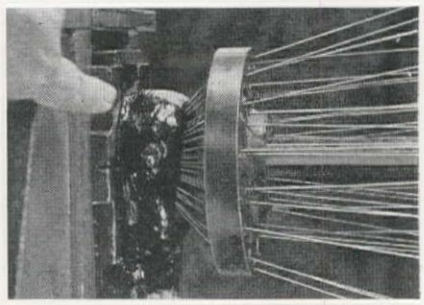
If you keep performance records on both ordinary wire rope and Macwhyte Steel-tailored rope, you'll actually SEE (as you can here): how Macwhyte steel-tailored rope outlasts ordinary rope by a *wide* margin. Let me show you why:



FIRST, there's DESIGN Tailoring. Macwhyte men are *specialists* with years of experience in the laboratory . . . the ropes they make are designed to meet your *specific* problems. That's why Macwhyte Ropes LAST so long, why they're so profitable to use.



THEN there's STEEL Tailoring. The steel used in Macwhyte ropes is not ordinary steel. And every process through which it goes . . . laboratory tests, heat-treating, baking, wire drawing . . . is done with hair-line accuracy by master workmen.



FINALLY, there's PERFECT FITTING — exact, synchronized strand FITS PERFECTLY and is FULLY PROTECTED in the finished rope by special Macwhyte lubricant, specially designed to ward off corrosion and internal friction.

BUT THAT ISN'T ALL! Macwhyte engineers the year 'round check performance on *all* kinds of jobs. They find out what rope does best on a specific job. That's why they can recommend for your specific job a rope designed, made, and field-proved to give you maximum service. In short, Macwhyte wire rope is "steel-tailored" to give you longer wear at considerably less cost. Try it.

NO. 442

MACWHYTE COMPANY

Kenosha, Wisconsin, Manufacturers of Wire Ropes and Braided Wire Rope Slings for every use. (Distributors throughout the U. S. A.) New York... Pittsburgh . . . Chicago . . . Ft. Worth ...Portland...Seattle...San Francisco.

These distributors will give you quick service:

CALIFORNIA

Los Angeles . Le Roi-Rix Machinery Co.
San Diego . . . Hazard-Gould & Co.
Salinas . . . . Cornell Tractor Co.
San Francisco . Macwhyte Company
749 Bryant Street, Phone Exbrook 4966
San Jose . Rye Tractor & Equip. Co.
Stockton . . . . . Holt Bros.

COLORADO

Denver . . . . Johnson Supply Co.

IDAHO

Boise . . . Columbia Equipment Co.

MONTANA

Missoula, Westmont Tractor & Equip. Co.

NEVADA

Elko . . . . Nevada Equipment Co.
Reno . . . . . Reno Mercantile Co.

OREGON

Eugene . . . Coast Cable Company
Grants Pass, Rogue River Hardware Co.
Klamath Falls, West-Baker Corporation
North Bend . Oregon Pacific Co., Inc.
Portland . . Columbia Equipment Co.
Portland . . . Macwhyte Company
1603 N W 14th Ave., Phone Broadway 3461
Portland . . . . Munnell & Sherrill

UTAH

Salt Lake City . The Lang Company

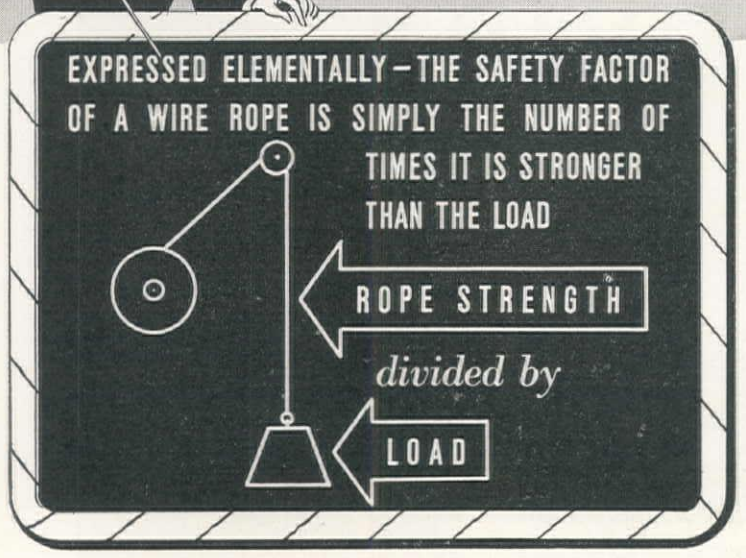
WASHINGTON

Bellingham, Powder Sales & Equip. Co.
Everett . . . . The Lloyd Company
Seattle . . Columbia Equipment Co.
Seattle . . C. Kirk Hillman Company
Seattle . . . Macwhyte Company
87 Holgate Street, Phone Main 1715
Seattle, Peterson Wholesale Hardware Co.
Spokane . . Columbia Equipment Co.
Tacoma . . Philip Hardware Co., Inc.

LABORATORY TESTED—FIELD PROVED

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

Of course YOU KNOW HOW TO FIGURE FACTOR OF SAFETY



As a user of wire rope, you want to get as much service as possible from your wire rope—and, at the same time, guard against premature failure, accidents, production delays. In other words, you're concerned about wire rope safety factor.

We would like to be able to say, "Just take your dead load and multiply it by such and such a safety factor—and, presto! that's the rope strength you need". But, unfortunately, it's not quite as simple as that.

From our experience of many years in the wire rope business. we know that in order to determine Adequate Safety for a specific wire rope installation, it is necessary to take into consideration not only dead load *but* also all other possible load stresses, such as those created by the factors listed to the right. In addition, allowance must be made for other factors, such as the degree of protection desired against production delays and accidents.

Wire rope specifications, carefully worked out on this basis for individual installations, pay many times over in longer rope life and increased rope safety. We would welcome an opportunity to cooperate with you toward this end.

JOHN A. ROEBLING'S SONS CO.
OF CALIFORNIA
San Francisco, Seattle, Los Angeles, Portland

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING
Wire Rope

But—

Adequate Safety for a specific installation can be determined only by considering all these Vital Factors:—

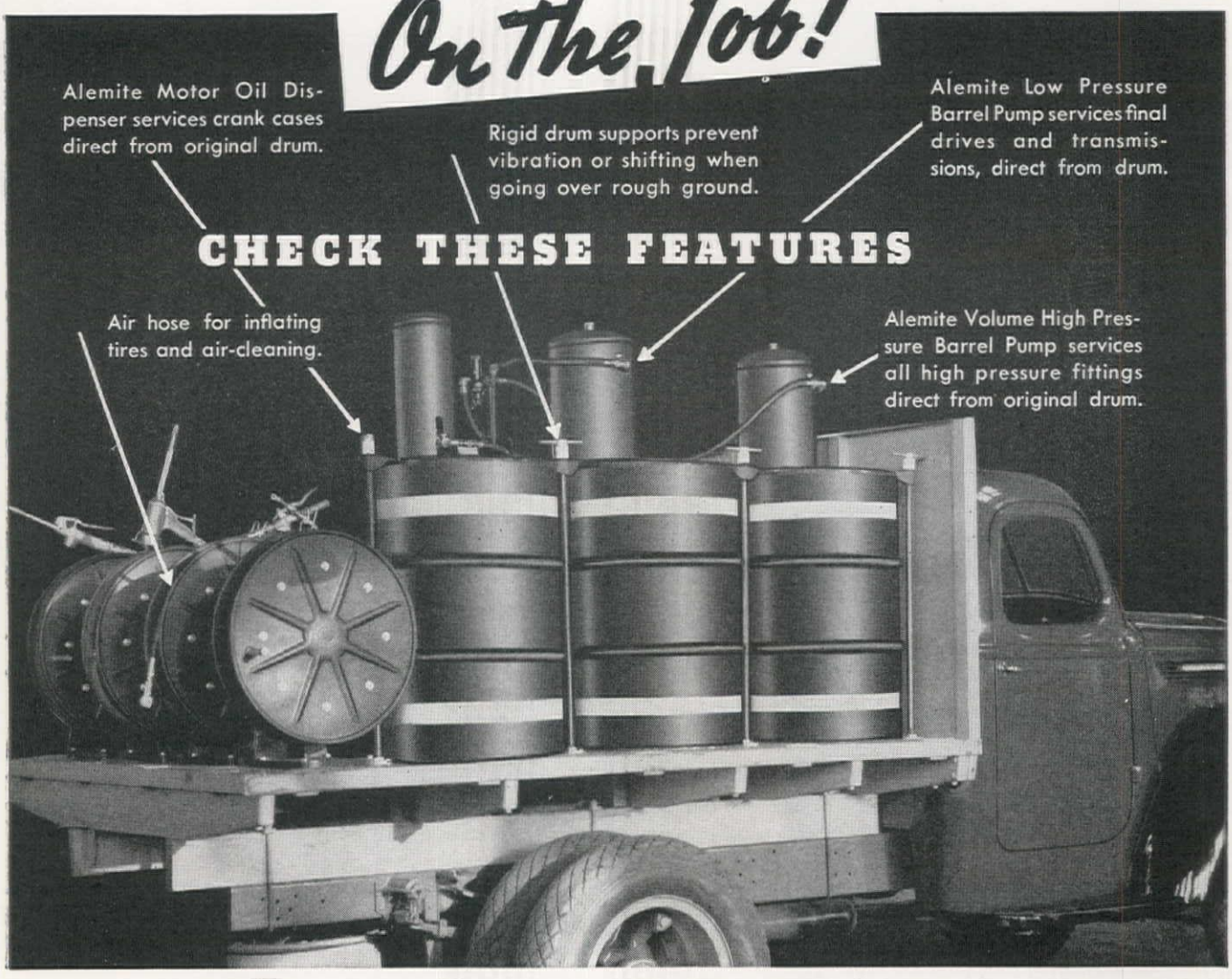
- √ ACCELERATION
- √ DECELERATION
- √ LENGTH OF ROPE
- √ SPEED
- √ ATTACHMENTS
- √ REEVING CONDITIONS
- √ DRUM CONDITIONS
- √ CORROSION
- √ ABRASION
- √ PROTECTION AGAINST PRODUCTION DELAYS AND ACCIDENTS
- √√ CONSTRUCTION AND QUALITY OF WIRE ROPE

Therefore **For longer, safer wire rope service consult the nearest Roebling office, giving all pertinent data on your installations.**

Ask about **ROEBLING "BLUE CENTER" WIRE ROPE** *... either standard or preformed*

MODERNIZED POWER LUBRICATION

On the Job!



Pays For Itself in Days!

BY providing better lubrication faster—by reducing "time out" for repairs due to faulty lubrication—by enabling you to move more yards of earth per day per machine—Alemite Portable Service Stations pay for themselves quickly, and return a handsome profit for years!

Here are some of the amazing results others are getting: Transmissions and final drives filled at the rate of 14 lbs. per minute—tractor track roll bearings lubricated in *seconds*—all high pressure fittings dependably serviced in a hurry—*direct from original drums!* Motor oil is delivered to crank cases, also direct from the original drum. And there is ample air for inflation of tires and for air-cleaning.

This illustration shows the standard model with Alemite Volume High Pressure Barrel Pump, Alemite Low Pressure Barrel Pump, Alemite Oil Dispenser, and the fourth reel for the air hose. However, the idea is flexible: You can have your own Alemite Portable Service Station made to your own special requirements! Alemite's experience is yours for the asking! Mail the coupon today for complete details!

STEWART-WARNER CORPORATION
1819 Diversey Parkway, Chicago, Ill. Dept. J
Rush complete facts and proof that Alemite Portable Service Stations pay for themselves in *days!*

Name.....
Address.....
City.....*State*.....
Firm Name.....

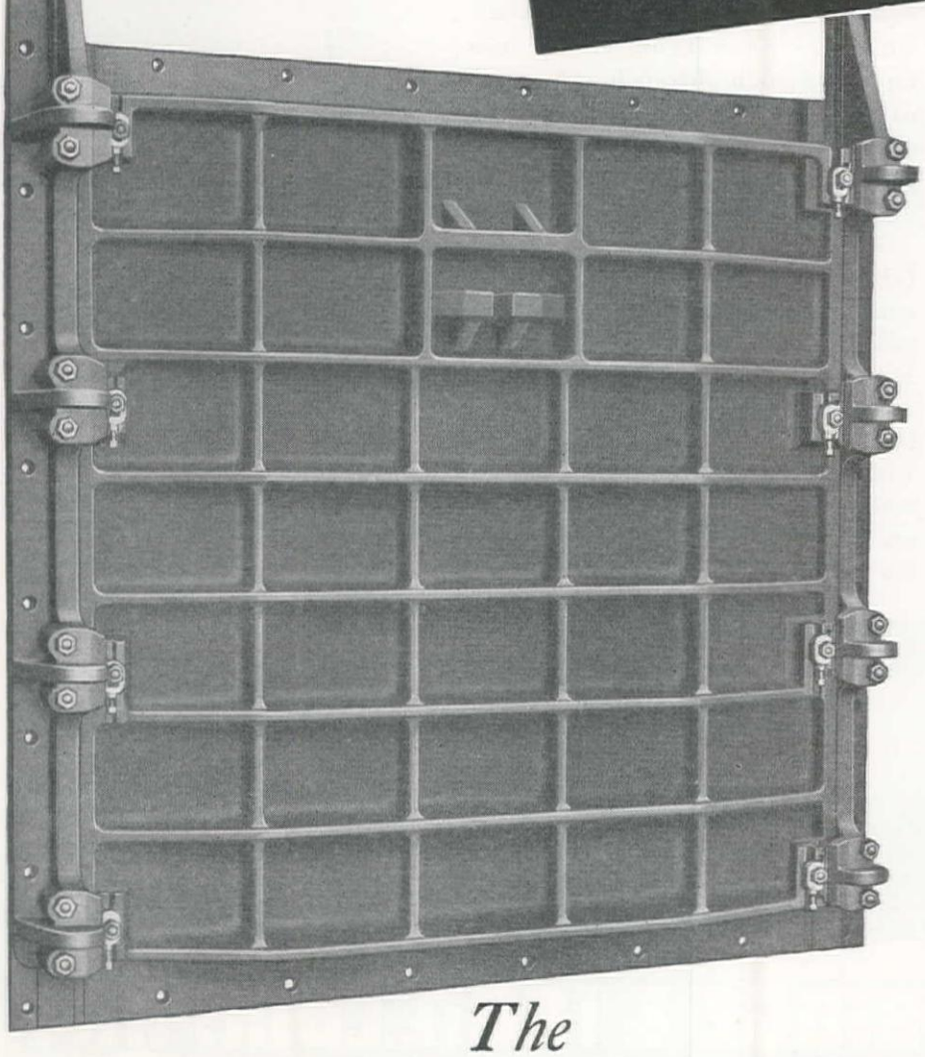
Ask Anyone in Industry!

AVAILABLE UNDER
ALEMITE "Pay As You Save Plan"

ALEMITE
REG. U. S. PAT. OFF.
INDUSTRIAL LUBRICATION
ANOTHER STEWART-WARNER PRODUCT

"The Golden Gate" for Savings...

BOTH IN INSTALLATION AND IN SERVICE



You can often sail into savings right at the start, on Chapman's Sluice Gate Line. For if your needs are out of the ordinary, Chapman's standard range of gates and operating mechanisms is so extensive that you may well be able to get what you want, *at no extra cost.*

Then, in the field, Chapman Gates go in faster and easier . . . because interchangeable parts remove any need for match-marking. And this also means that, in service, repairs or replacements may be made without costly alterations.

So before you order Sluice Gates for waterworks, sewerage or flood-control projects . . . *in fact, even before you write specifications* . . . check your requirements against Chapman's Sluice Gate Hand Book. It's well worth the time, for chances are it will *save* you time in the end . . . and a lot of money and trouble as well. *Write for your copy today.*

The

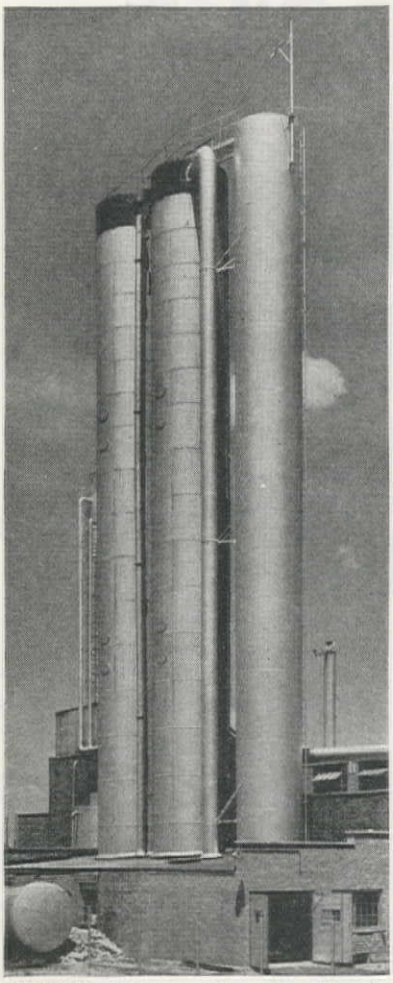
CHAPMAN VALVE

MANUFACTURING COMPANY

Indian Orchard, Massachusetts

When writing to Chapman Valve Mfg. Co., *please mention Western Construction News*

Steel Plate Equipment to meet Industries' Needs

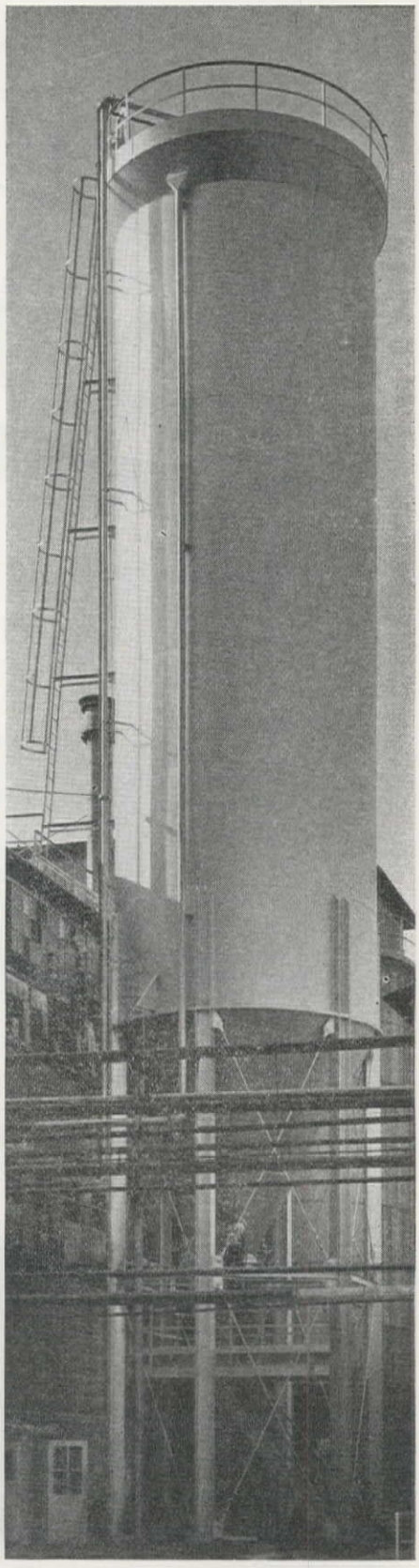


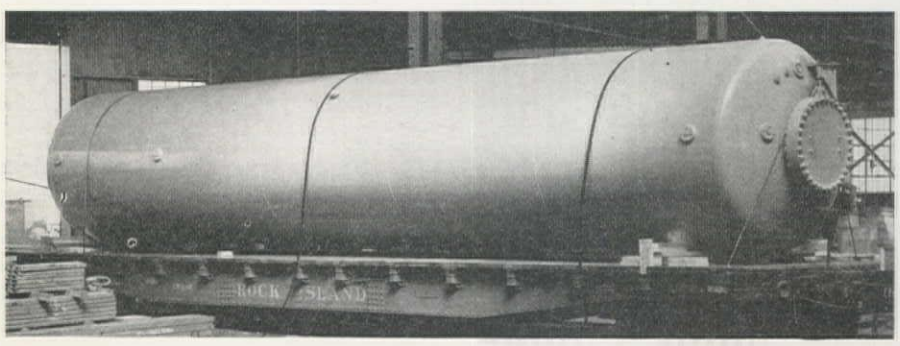
ABOVE: Three carbon dioxide absorption towers in service at a large manufacturing plant.
BELOW: 8½ ft. diam. by 45 ft. pressure vessel to house atom smashing equipment.
RIGHT: 20 ft. diam. by 85 ft. elevated ore bin of welded steel construction.

PRACTICALLY every industry is being confronted with the problem of installing steel plate equipment of some kind. It may be a welded steel bin of specialized design as illustrated at the right—a group of carbon dioxide absorption towers as illustrated at the left—or even a welded pressure vessel for housing atom smashing equipment, as illustrated below.

Whenever you are in need of equipment of this type, get in touch with our nearest office. We are equipped to build such structures of either welded or riveted construction in accordance with your detailed plans or to prepare designs to meet your specifications.

Take advantage of our extensive fabricating facilities. Installations can be shipped from the nearest of our three plants. Our experience in building tanks and steel plate work may also be of value to you. We may be able to suggest features of design which will not only improve an installation structurally but make it serve your purpose better. Write for further information or quotations.





CHICAGO BRIDGE & IRON COMPANY

San Francisco	1013 Rialto Bldg.	Dallas	Praetorian Bldg.	Cleveland	Rockefeller Bldg.
Los Angeles	1444 Wm. Fox Bldg.	Houston	918 Richmond Avenue	New York	165 Broadway Bldg.
Birmingham	1598 N. Fiftieth Street	Tulsa	Hunt Bldg.	Philadelphia	1700 Walnut St. Bldg.
Chicago	McCormick Bldg.	Detroit	Lafayette Bldg.	Boston	Consolidated Gas Bldg.

Plants at BIRMINGHAM, CHICAGO, and GREENVILLE, PA. *In Canada:* HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

October, 1940 Vol. 15, No. 10

The Census Proves the West's Growth

OFFICIAL FIGURES from the 1940 U. S. Census are now available to confirm the often repeated statement made by *Western Construction News* that the population of the West is expanding at a rate more than twice that of the Eastern states, and this continues to put the spotlight of the construction activity and progress on this region. According to a preliminary analysis of the first release of census figures, the eleven Western states showed a population increase of about 14% during the last decade, with top place going to New Mexico at 24.9%, and California second at 21.1%. The corresponding increase in the thirty-seven Eastern states averaged about 6%, which is the same as the figure for New York State, but such important states as Pennsylvania and Illinois showed gains of only 2.7% and 3.2% respectively. Several of the Mid-Western states showed net losses ranging from 2.8% in Oklahoma to 7.5% in South Dakota.

This continued rate of population increase for the West contains both direct and indirect elements of encouragement to the construction industry. With any given population increase there will always be a direct and proportionate increase in the number of shoes sold in the region, or the number of cigarettes smoked or the amount of food consumed. When the same increase is translated into construction demands the indirect requirements add materially to the direct increase indicated by the percentage figure. Rise in population means a larger proportionate need for highway facilities; it means that the need for utilities, transportation, industrial expansion, building, water supply and waste disposal are accentuated. Not only is the West continuing to show more than twice the population rise of the East, but this ratio may be taken as conservative when applied to corresponding gain in construction activity.

Research Responsibilities

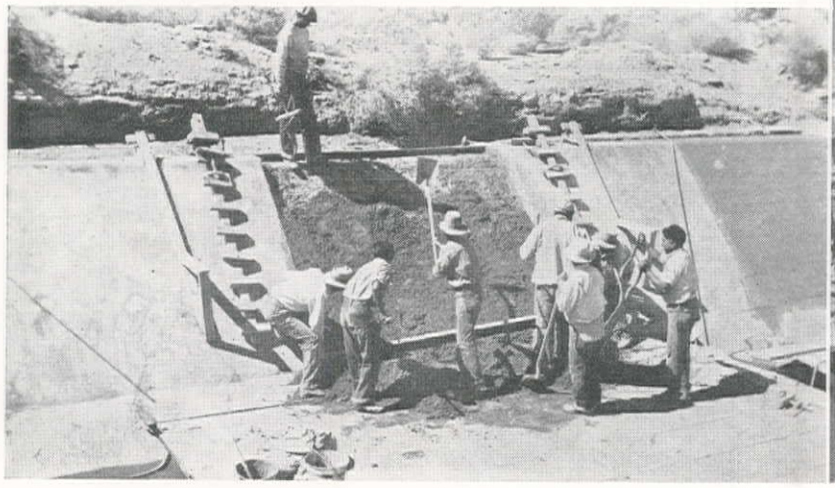
VOLUME of engineering work will always be a measure of the amount of research which can be justified economically, since investigations and tests must bear a direct relation to the ultimate cost of the work involved. Those states which have relatively large highway revenues should be leaders in programs of study to improve basic principles of highway design, and to develop new methods of construction. Thus, in the West, California has a definite responsibility in carrying on highway research that will not only be of direct use on its own highway system, but could also be of indirect service if made available to the other Western states which have similar problems, but much smaller volumes of highway revenue. This is particularly true of investigations for modern low-cost roads, because the subject is equally applicable to all Western states where distances are long and population relatively scattered.

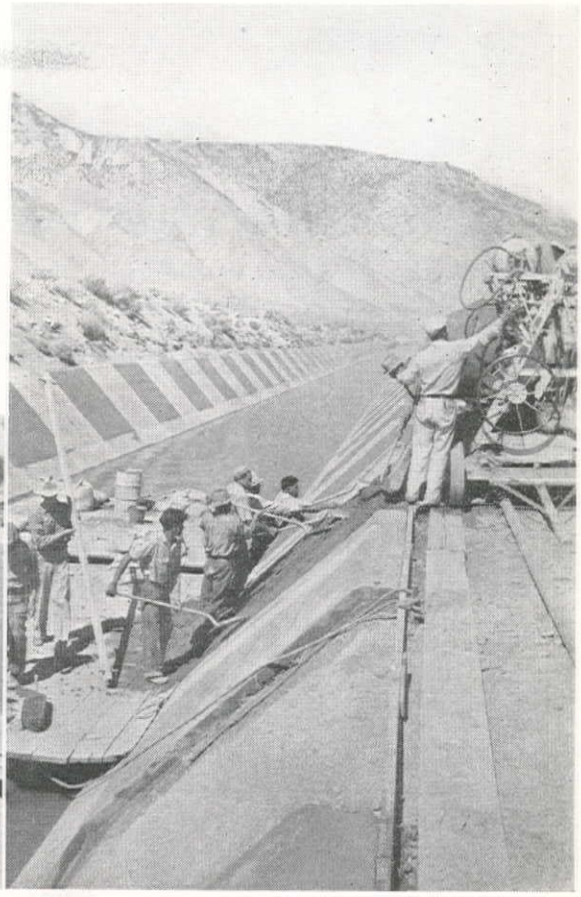
An evidence of this type of leadership is the comprehensive test program which is now being carried out by the California Division of Highways. To provide definite answers to important questions relative to the merits of different base course materials and methods of placing these materials, both as regards immediate costs and charges which will result from maintenance operations, the Division has constructed a test track which is described elsewhere in this issue. Eight different designs for base course will be tested to failure in order to provide, for the first time, information essential to answer fundamental design problems. Previous attempts to answer these problems have been based on laboratory experiments and upon opinions of those with predetermined points of view. When the test has been completed, and the results analyzed, data will be available that should save many times the cost of the experiment in highway construction for California. What is more, the information can prove of exceptional service throughout the entire West if it is made available to states with equally serious highway problems, but less money for research.

Where Civil Service Fails

CIVIL SERVICE systems are sometimes extended by over-zealous advocates into types of work where theoretical benefits are nullified by practical obstacles—one of these situations being the carrying out of construction work. For permanent positions within an organization, where individual qualifications are susceptible to standardized tests, and advances or promotions may be determined by the same means, where influences of internal and external politics may be serious problems to morale, and where the volume of work does not require rapid changes in the number or type of personnel, a civil service system, in spite of its rigidity, has peculiar advantages. An entirely different situation exists where personnel is to be selected and employed for carrying out construction jobs of relatively short duration, where timing is essential, and where team-work within the crews represents the key to getting the work done on a tight time schedule. In such a case, the very rules which provide the virtue of civil service establish serious problems. In the first place, no civil service examination can select a "construction man." Any competent superintendent will know more, at the end of the first day's work, about the qualifications of the applicant for the crew and the job than any formal examination. Further, the requirement of sending out notices to the ranking men on the list, allowing time for them to respond, getting them to the job, testing them, with necessary elimination, and securing more men by this same laborious process is no procedure with which to handicap the start on any high-pressure construction job. The normal advantages of the system are not applicable in these situations, and the results place serious restrictions on the construction work without corresponding benefits. In any large organization where civil service has its legitimate place in routine operations, there should be provisions for the necessary exemption of construction jobs.

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
October, 1940 • Vol. 15, No. 10





Aqueduct Barge Fleet—Canal Relined By Crews on Floating Platforms

After 30 yr. of service sections of the Los Angeles Aqueduct in Owens Valley are being reconditioned with 5 in. of concrete — Two-stage operations with final step carried out from barges

AFTER almost thirty years of service, a two-mile section of the concrete lined canal on the upper end of the Los Angeles Aqueduct is being relined by the Bureau of Water Works and Supply, Department of Water and Power, of the City of Los Angeles. The present work will conclude a program for relining almost five miles along the forty-mile length of open lined canal. For the remaining 35 miles, it is expected that maintenance operations, using gunite, will be adequate. This gunite work will be performed as required and may extend over a 10-yr. period. The present work, which is similar to operations carried out in 1935, 1936 and 1939, consists of placing a minimum 5-in. thickness of concrete inside the original bottom and side linings, using the old concrete as a foundation. Dimensions of the original canal section were ample so that the new lining will not interfere with adequate capacity, and necessary freeboard. This article will review the methods used in the canal relining operations.

General

For the first 20 mi. below the diversion point on the Owens River, the Los Angeles Aqueduct consists of an unlined canal. The following 40 mi., extending to the equalizing storage at Haiwee reservoir, consists of a concrete open lined section with 11-ft. bottom width, 1:1 side slopes and overall vertical depth of 13 ft., which includes freeboard, as originally constructed. This 40 mi. of canal was lined with a 6-in. thickness of unreinforced concrete which was placed in 1911 to 1913, using materials, concrete control and construction methods characteristic of that period. A finely ground tufa was used in concrete mix, replacing part of the portland cement. Details of this early concrete, characteristics of the mix and methods used in placement do not form a part of this review.

During its years of service, this concrete showed signs of gradual deterioration, especially in certain sections of the canal. This deterioration is a result of various conditions. The original work was performed in extreme temperature variations ranging from freezing to 110 deg. F. In addition, during severe winters ice jams form in this section of the aqueduct and have to be broken up by lowering the water level or by dynamiting, which has a definite effect on the life of the concrete.

A good many years ago, the maintenance operations began to include gunite repair work on some of these sections. In general, this repair work was designed to rebuild the surface of the lining back to its original form. This would involve some gunite work which was about ½-in. thick, where the concrete surface was merely roughened, and other sections had a thickness up to as much as 2 or 3 in., where the concrete was more seriously disintegrated. Experience proved that this use of gunite was unsatisfactory because, although the thin applications maintained proper bond, the thicker sections pulled loose or sloughed during the placing. Gunite technique in those days was inferior to present methods.

As a result, gunite repair was discontinued for several years. At a later date, after it had been determined that the gain resulting from rebuilding the concrete thickness to original line was not necessary to maintain adequate flow, gunite maintenance work was resumed

WITH WATER OUT, the first operation is to clean off the old concrete and place header boards for the 10-ft. panels, which are concreted alternately. The upper 8-ft. of the sides is relined from the barges, after partial flow is turned through the canal.

using a ½-in. application. This work has been carried out during several seasons, and has been successful in holding the surface of the concrete, although no effort has been made to bring the surface back to original line and smoothness. Modern methods developed for placing and curing gunite work have given satisfactory results.

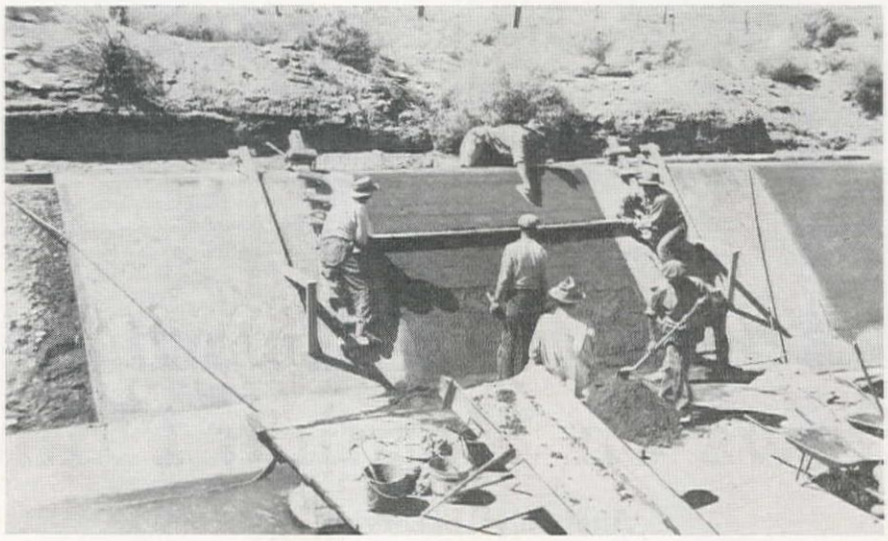
During this period of years, certain sections of the canal lining, totaling about 5 mi. in length, had disintegrated to such an extent that a complete relining program of this portion of the aqueduct was necessary. Beginning in 1935, sections of the canal were relined, and this work is being concluded during the current season.

Problems involved

One of the most difficult problems in connection with this repair work is the fact that the Los Angeles Aqueduct carries the principal water supply for the city of Los Angeles, and its operations cannot be interrupted for extended periods. By utilizing the storage available in Haiwee and Tinemuha Reservoirs, it is possible to shut down the flow in the canal for periods up to 30 days, or slightly longer under exceptional conditions. By a well planned program of construction work, it is possible to carry out the relining during a minimum time of "full shut-off," while the remainder of the work is carried out with the canal operating at partial capacity. This necessity for maintaining canal operations with minimum interruption represented an important factor in planning and carrying out the present relining work.

Preparations for relining

The first step in preparing a section of canal for relining consists of regulating the flow to expose the upper sections of the lining on the sides. Using job-made barges, with oil drum floats, crews move along the section to be relined, chipping and removing all disintegrated concrete down to the water surface. With this operation concluded, the water is completely shut off and this cleaning and preparatory work is continued along the lower sides and across the bottom of the canal.



FINISHING of the extremely dry-mix concrete consists of strike-off with a timber screed, followed by a cement wash and a light steel troweling.

First-stage concreting

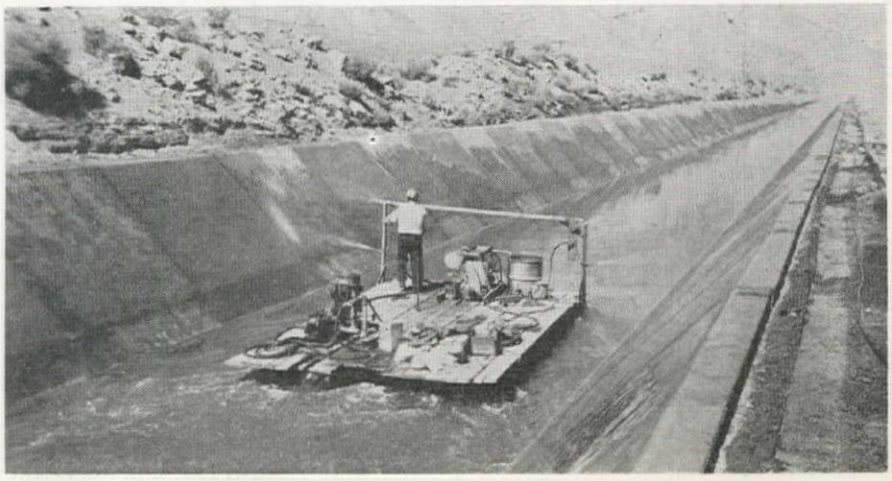
Aggregate for the new concrete consists of a pit-run material, with about 10% to 15% crushed to 1½-in. maximum size. This aggregate and sacked cement is stockpiled along the canal bank.

The important characteristic of the mix used is its dryness. The water content is sufficient to provide a consistency that can be pushed and rammed into position without danger of movement along the 1:1 slope of the sides. The consistency of this mix is similar to that used for mortar for calking joints or similar work, and appears to be only damp as compared to ordinary concrete consistency. In fact, the dryness of the mix has made necessary the use of concrete mixers with blades rebuilt to give adequate clearance so that the material will not clog the mixer.

A relining organization consists of two mixers and crews which operate several hundred feet apart, with the first crew placing alternate 10-ft. panels, and the second crew completing the sections. Two, and sometimes three, of these organizations have been operated during the relining work due to the short periods of time available.

The only forms required are 2 x 5-in. header boards which are set up across the canal, providing the 10-ft. panels. With the mixer operating on the canal bank, the concrete is discharged directly into the canal bottom, and shoveled or wheeled into place. The bottom, and an 8-ft. height (slope distance) on both sides, is placed as a unit in 10-ft. panels. After placing, the concrete is struck off and tamped into position with a timber screed. During this process, large pieces of aggregate are tamped under the surface. As soon as the screeding has been completed, a cement wash is applied to

CURING is by sprinkling from a self-propelled barge mounting a small water pump which discharges through four garden-type nozzles attached to the timber frame.



the surface and troweled into the concrete. This wash is intended to close up the surface and permit a steel trowel finish. Troweling is kept to a minimum to eliminate bringing fines to the surface, and to produce maximum hardness of finish.

After this concrete has been placed, sprinkling is used for curing, and is maintained during a 14-day period. Water for concrete mixing and for this sprinkling is available from a pipeline extending along the top of the canal bank. Placed on planks the mixers are easily pushed forward by the crews for the 20-ft. advances.

Second stage of concreting

Following the concreting of the bottom and lower sides, about 200 sec.ft. of water is diverted into the aqueduct, and the remainder of the lining work is carried on from barges. In general, the operations are similar to those used on the bottom section, and the sequence involves the placing of alternate 10-ft. panels to complete the 8-ft. lift of side lining.

The concrete mix is discharged into wheelbarrows on the barges (see illustration) and shoveled into position on the far side of the canal. When that section has been completed, the work on the slope next to the mixer concludes the 10-ft. panel. A separate barge is available for the work of the finishers while the barge carrying the concrete crew is allowed to move ahead on the canal a 20-ft. distance to the next alternate panel.

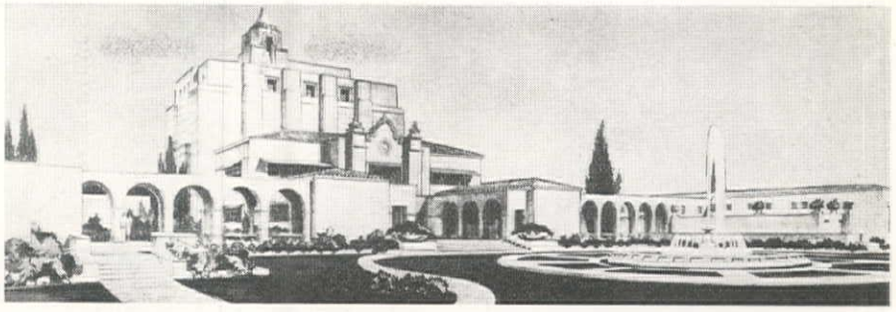
Finishing includes the cement wash and the minimum troweling as applied to the bottom section.

An interesting feature of the curing on this upper section is the use of a self-propelled barge, mounting a small pump that discharges water through several spray nozzles (see illustration). This spray barge, operated by one man, has proved a most economical method of curing the concrete during this second stage of the relining.

As the minimum thickness of this new lining is 5 in., the approximate average volume of concrete placed is 0.8 cu. yd. per linear foot of canal. In carrying out this work two crews operating four mixers place an average of 55 panels in an 8-hr. day. The 550 lin. ft. average is maintained in both the upper and lower sections of the concrete lining. The cost for relining a full section by this method is about $10.25 per lin. ft. including indirect charges and supervisory costs.

Organization

Relining operations are carried out under the general direction of H. A. Van Norman, chief engineer and general manager, Bureau of Water Works and Supply, Department of Water and Power, City of Los Angeles. J. E. Phillips is engineer in charge of operations and maintenance of the Los Angeles Aqueduct, and the relining operations are being carried out under his direction. Frank Krater, superintendent of the Owens Valley division of the Aqueduct, is in direct charge of the field work.



Filtration Plant for the Colorado Aqueduct System

The West's largest water treatment plant of 400 m.g.d. ultimate capacity being built by the Metropolitan Water District

SOFTENED and filtered Colorado River water will be available to the member cities of the Metropolitan Water District early next year with the completion of the treatment plant now under construction near the town of La Verne. The plant is located adjacent to the main feeder line of the aqueduct system between the Cajalco reservoir terminal storage and the delivery point for the service to municipalities. Concrete placing at the plant is nearing completion, and installation of equipment is under way. Designed for ultimate capacity of 400 m.g.d., and with an immediate capacity of 100 m.g.d., this will be the largest and most outstanding treatment plant in the West.

Design of plant

The general features of the treatment and softening process to be used in the plant have been indicated previously in the April, 1939 issue of *Western Construction News*, p. 145. Briefly, the plan includes the addition of lime to the total flow through the plant for preliminary softening, followed by flocculation and sedimentation. The settled water will pass through rapid-sand filters of relatively standard design. After filtration, the flow will be divided, and a pre-determined portion will be completely softened by the zeolite process. This completely softened portion of the supply will be re-mixed with the part receiving only the lime softening to provide the final softened product that will be returned to the distribution system. By regulation of the flow through the zeolite softeners, the hardness of the final supply may be regulated to any desired quality. Raw Colorado River water has an average hardness, according to the Metropolitan Water District records, of about 300 p.p.m., and the delivered water, after passing through the softening plant, will probably have a hardness ranging between 85 and 100 p.p.m. The plant also provides for the use of activated carbon, as required, and the effluent will be chlorinated before delivery into the main distribution line. The foregoing indicates that the design of the plant follows generally recognized practice and the processes will not be reviewed in detail.

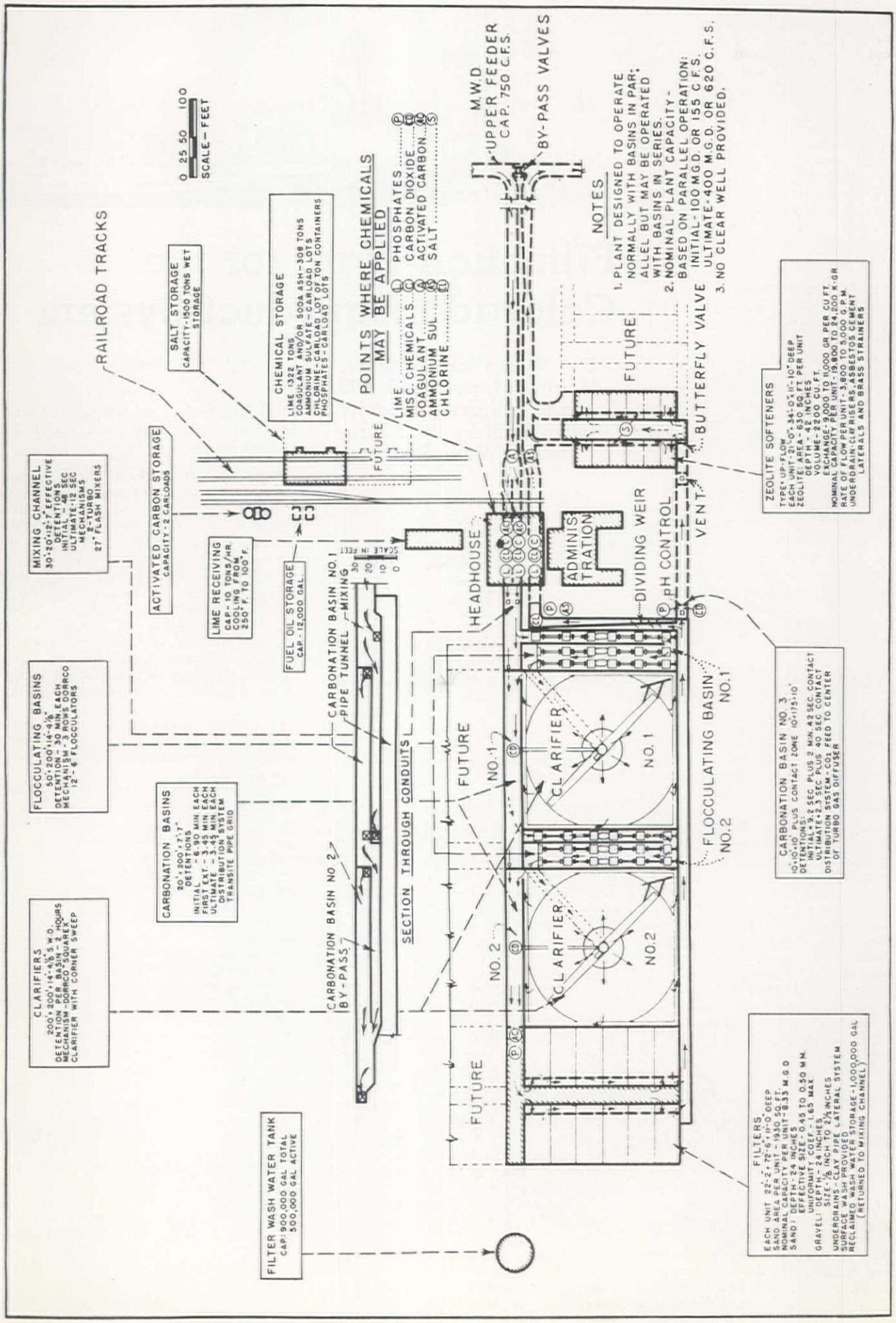
Relation to aqueduct line

The main aqueduct line terminates at Cajalco reservoir, where storage of 107,000 ac.ft. is provided. The Upper Feeder distribution system extends from this terminal storage north to near the town of Fontana, and then west to the town of LaVerne. Near this point, the Orange County Feeder (now under construction) will extend south to the member cities of Fullerton, Anaheim and Santa Ana. The treatment plant is located immediately ahead of this branch feeder. This location will make softened and filtered water available to all member cities of the District, but would permit the delivery of untreated water to agricultural areas between Cajalco reservoir and LaVerne.

Located about one-fourth mile north of the Upper Feeder, water is delivered to the plant through a short section of precast concrete pipe similar in design and construction to the Upper Feeder line, itself. The treated water from the plant flows back through a parallel line of similar design, and returns to the Upper Feeder. Gates provide for bypassing the filtration plant or diverting the complete flow through the plant. In other words, the softening plant will receive all, or none, of the flow in the feeder, with regulation provided at the outlet from Cajalco reservoir.

Bids for construction of the plant were called for under both unit and lump sum. The complete unit bids were published in *Western Construction News*, December, 1939. The Griffith Co. presented the lowest total under the unit bid set-up, with a figure of $1,632,992. This company also presented a lump sum bid of $1,619,900 for the plant complete, and received the award of contract. Subsequent arrangements were made to have the work carried out by the Weymouth Crowell Construction Co.

The variety of construction operations involved in the building of the plant and the installation of necessary equipment is indicated by the fact that



Design of the Water Treatment Plant for the Colorado River Aqueduct

as many as 26 sub-contractors had been at work on the project.

Construction procedure

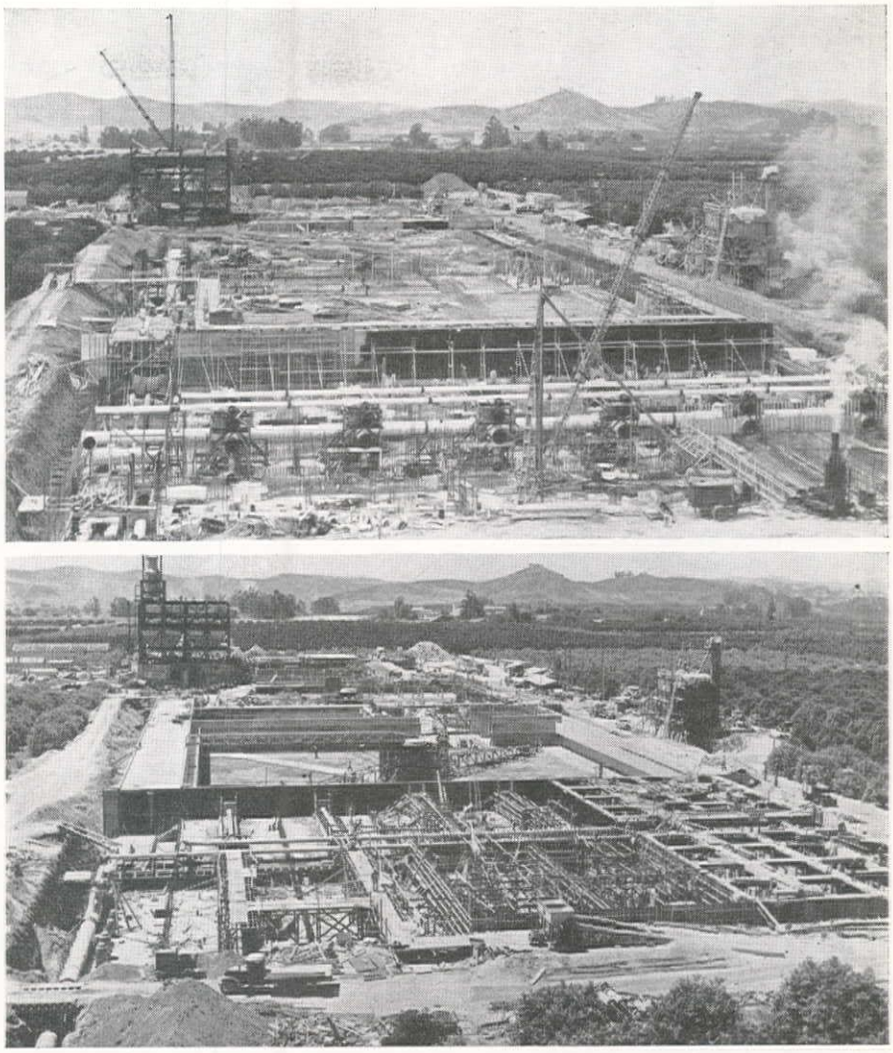
The work of building the treatment plant has not involved unusual problems of construction, but has required careful co-ordination of operations to keep the many elements of the work in line with a plan laid out to meet the time requirement. In general, the work has included elements of excavation for the large conduit and settling basins, the placing of about 30,000 cu. yd. of concrete in thin walls and slabs, the erection of a structural steel headhouse, and the building of a reinforced concrete administration building, which includes office and laboratory facilities. During these construction operations, the program required the co-ordinated operations of many subcontractors in placing equipment and carrying out the specialized phases of the job.

Concrete aggregate, supplied from a commercial plant, was batched at the site. These batches, with the required amount of water, were placed in mixer trucks operating over the entire area.

A special feature of the concrete wall construction is the extra concrete shell placed around the outside of the settling basins to provide against possible seepage. The two large settling basins, each 200 ft. square, rise above ground level and form the exposed walls for part of the main structure. On the outside of these structural walls, forming the sides of the basins, corrugated metal is placed and an outside concrete wall added as a protection against discoloration.

The accompanying pictures illustrate the size of the area occupied by the plant, and the general stages of construction operations. The artist's sketch shows the appearance of the completed plant. Design and operating characteristics are indicated in the large diagram.

The administration building will contain extensive laboratories, properly equipped for all phases of research and control work. A lecture room will also be provided, where visiting groups may receive instructions as to the functioning and operation of the plant.



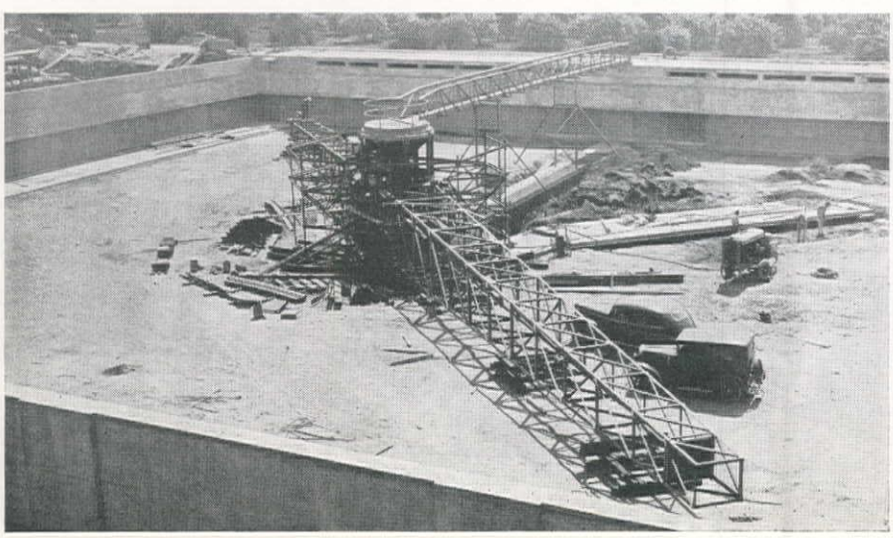
STAGES of construction progress showing (above) the general excavation, head house steel being erected and piping for the filters in the foreground; (below) clarifier equipment being installed, and concrete pouring under way on the filters.

A steel tank of 900,000-gal. capacity provides the wash water for the filters. Lime for softening will be received from commercial kilns and cooled at the treatment plant before storage in the bins of the headhouse. Experiments have indicated that the used lime may be reclaimed as part of the future plant operations, but this will not be undertaken during present operations. Salt for the regeneration of the zeolite softeners is stored wet at the plant, and the saturated brine is available as needed.

The most serious problem in the plant operation results from the need for disposing of the brine used for regenerating the zeolite softeners. Located in a rich agricultural area, and surrounded by orange groves, it was necessary to remove this brine to existing sewers. At the present time, an 18-mi. line of centrifugally cast concrete pipe, 18 to 20 in. in diameter, is being constructed to deliver this waste brine into the existing sewer system of the Los Angeles County Sanitation Districts.

The treatment plant is being constructed by the Metropolitan Water District under the general direction of F. E. Weymouth, chief engineer and general manager. Julian Hinds is assistant chief engineer. Elements of the distribution system, including the treatment plant, are being built under the supervision of R. B. Diemer, distribution engineer. B. H. Martin is resident engineer at the plant, and Olen Evans is field superintendent for Weymouth Crowell Construction Co.

SIZE of the plant can be appreciated by the clarifiers which are 200 ft. square with a 14-ft. 4-in. side wall depth. The detention period is 2 hr. per basin.



Concreting Started on

THE START of concrete placing at Shasta Dam by Pacific Constructors, Inc., has placed in operation all of the plant and equipment installed by the contractor to produce and handle the 6,000,000 cu. yd. of concrete required for this structure which will be the second largest and the second highest concrete dam in the world. Shasta Dam will provide storage on the Sacramento River above the town of Redding, Calif., for the Central Valley Project which is being built by the U. S. Bureau of Reclamation.

This article is confined to a review of the concrete production and handling plant, leaving a description of forms and the details of placing concrete to a later article, when operations become more standardized as placing approaches the design rate of about 6,000 cu. yd. per day. Previous articles have covered many phases of the Shasta Dam project, and a complete list of these references is indicated in the accompanying table.

Operations of the Columbia Construction Co., under a separate contract for the production of finished aggregate from the gravel deposit near Redding and its delivery to the job, have been described more recently (aggregate production plant, *WCN*, August, 1940, and conveyor belt system, *WCN*, June, 1940). This article takes over the movement of the aggregate as it leaves the 9½-mi. conveyor system at the railroad siding of Coram, located about ½ mi. downstream from the dam site.

Aggregate storage and handling

The terminal of the aggregate delivery system, designed and built by Columbia Construction Co., is located at the Coram siding of the Southern Pacific railroad line. Prior to the decision to use a conveyor system for transporting aggregate from Redding, it was assumed that aggregate would be delivered by railroad train (stated in the specifications), and track hoppers had been designed and built for receiving this aggregate. In fact, if the present aggregate delivery system had been indicated during the preliminary stages of construction work at the dam site, it is conceivable that the arrangement of the concrete mixing and handling system might have been considerably different than that in use at the present time.

To distribute the sand and four sizes of coarse aggregate into the track hoppers, Pacific Constructors, Inc., has installed a shuttle conveyor, moving on tracks spanning the hopper. This shuttle permits the depositing of aggregate into the various compartments which have a total capacity of about 15,000 tons. The operator at the terminal of the main conveyor system is notified by telephone of changes in the size of aggregate on the belt, and a time interval permits changing of the shuttle to the necessary bin.

In the interest of reducing the dust nuisance at the bin, and to provide cooling effect on the aggregate after its 1-hr. and 40-min. trip on the conveyor, sprinklers have been installed near the end of the line.

Under the 500-ft. length of hopper, the usual reclaiming tunnel and feeders have been provided for delivering aggregate to a conveyor system extending about 1,000 ft. to the main aggregate stockpile. As the aggregate leaves the reclaiming tunnel, it is weighed by recording conveyor scale, which provides a cumulative record of the materials going into the stockpile.

Operations at this point are on a one-shift basis at the present time, with a crew of three men required.

Stockpile storage

Realizing that concrete mixing and placing should not be dependent upon the continuing delivery of aggregate, either by train or by conveyor, the contractor provided for the storing of 150,000 tons (live storage) of finished aggregate. Based on a concreting rate of 6,000 cu. yd. per day, storage provides for a full 15 days of concreting.

This storage is located on a flat area (see illustration) convenient to aggregate delivery and the concrete mixing plant. A reclaiming tunnel 1,000 ft. long is provided under the stockpiles which are proportioned in accordance with the use of the various sizes in the mix. The excavated slopes above the reclaiming tunnel have been lined with Gunite to control the drainage which is delivered into a separate system, keeping it off the conveyor belt.

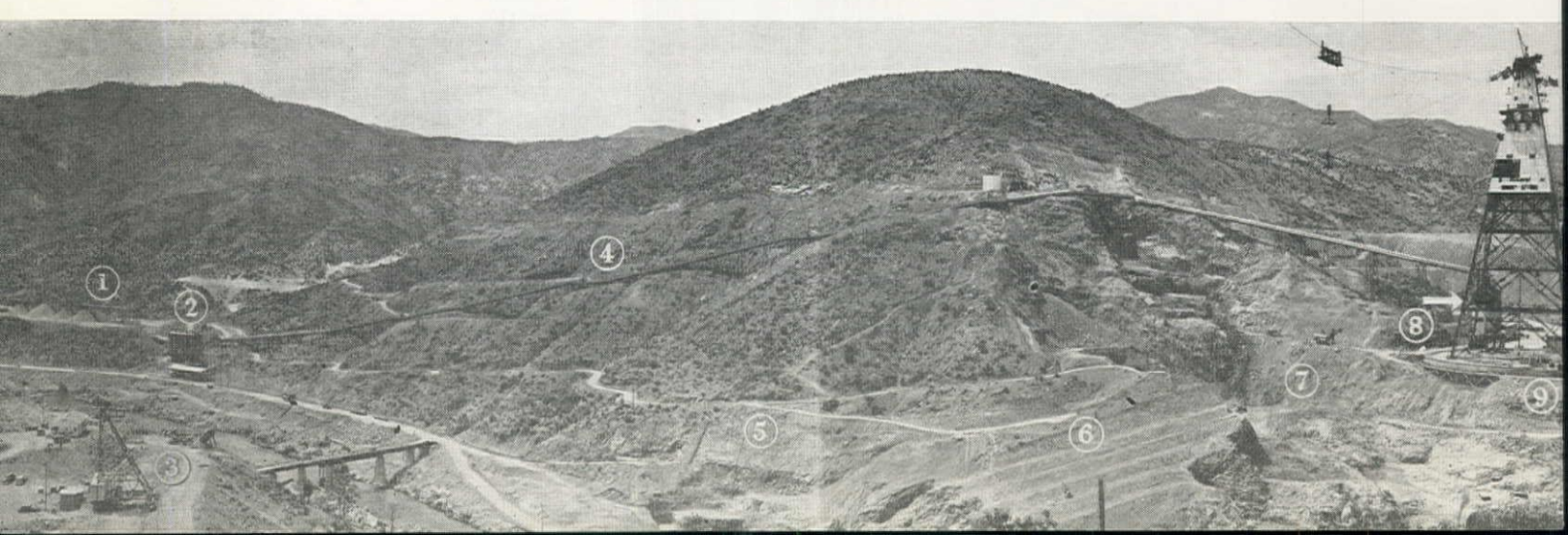
An "airplane" tripper delivers the various classes of aggregate from the conveyor into these storage piles. An interesting feature of this discharge system is an electric control which insures that the tripper is spotted over the correct storage pile corresponding to the size of aggregate being fed from the track hopper before the conveyor can be operated. This interlocking system eliminates the possibility of delivering the wrong size of aggregate into the stockpiles.

To control the temperature of the aggregate in these stockpiles, sprinkling is done during the summer months. Tests indicate that the heat of the sun does not penetrate more than a foot or so into the aggregate piles, and the evaporation loss is effective in reducing temperatures within the bulk of the material. Specifications require that concrete shall not be placed in the dam at a higher temperature than 85 deg., and with sprinkled aggregate, it has not been necessary to resort to other means to keep within this limit during the current season.

Conveyor system

The belt conveyor system, which extends from the track hoppers to the main storage, and from there to the bins at the concrete mixing plant, consists of 14 flights of 36-in. belt, and has a design capacity of 1,050 tons per hour. The shuttle belt over the track hoppers is of 48-in. width, and the wing belts on the airplane tripper are 42-in. size.

Supports for the 7,250-ft. (slope distance) conveyor system are welded steel construction, and in general, have been designed in standard 50 and 100-ft. truss lengths for economy of fabrication and erection. General arrangement of the conveyor is indicated in the accompanying illustrations.



PANORAMA showing the route of concreting materials from stockpile to mixing plant: (1) Main stockpiles of 150,000-ton (live) capacity, (2) cement unloading siding and silos, (3) tail tower of the cableway which will handle concrete in the powerhouse area, (4) conveyor for moving aggregate from storage to mixing plant, (5) powerhouse excavation, (6) penstock location, (7) abutment excavation, (8) concrete mixing plant behind head tower, and (9) transfer point where concrete is placed in 8-yd. buckets.

Plant at Shasta Dam 6,000,000 cu. yd. Job

Manufacturing and handling system is placed in operation by contractor—Units include aggregate storage and conveying, cableway transportation of 8-yd. batches, and special concrete transfer car and bucket

With the exception of the section over the main storage piles, the entire conveyor system is enclosed in a corrugated metal covering. To provide supports and clearance for this cover, the vertical truss members were extended by using a box-type of truss design. On the upper-chord bracing of this truss system, wooden stringers were placed and the sheet metal nailed directly to this simple supporting system. The contractor estimates that the cost of this covering over the conveyor will be more than offset by the savings effected by protecting the belting from the weather, and by the advantage of being able to operate continuously under all weather conditions. Rollers on the conveyor are of the sealed bearing type which require no attention, reducing the operating and maintenance costs of the installation to a minimum.

The alignment of the conveyor as it approaches the dam site provides for passing the end of the abutment without interference. The saving in elevation which would have been effected by running the conveyor through the structure directly to the concreting plant did not equal the inconvenience in providing, maintaining and closing the opening through the structure.

Between the main storage and the concreting plant, the conveyor is operated under instructions from the concrete plant end to provide the proper regulation of feed. Telephone communication with the main storage allows the proper loading of material on the belt.

Cement and water

Bulk cement is unloaded from cars and is stored directly in the ten 6,000-bbl. steel silos provided near this siding. Discharge from this storage moves by screw conveyor to the main pumping plant which delivers into a 10-in. line mounted on the aggregate conveyor trusses and delivering to storage in the concrete mixing plant. This cement pumping line is about 3,300 ft. long, and includes 280 ft. of lift. Because all the cement will be produced at the same mill blending will not be required, although the arrangement of the discharge from the storage silos would permit such mixing if necessary. Compressed air for the main cement pump is provided from the lines available on the job, and does not include a separate compressor installation.

Mixing water is obtained from the project system which includes a 5,400-bbl. storage tank on the abutment near the mixing plant. In order to secure water for the batchers at a lower pressure, which will allow better metering, an auxiliary tank of 100-bbl. capacity has been constructed near the mixing plant.

Concrete mixing plant

In general, the concrete mixing plant follows the design used on the Grand Coulee Dam project. It contains five 4-yd. mixers arranged in a circle and discharging into a central hopper. Although the five mixers will always be available for use, present plans call for steady output from four of the units, with the fifth available either as a standby or for handling special mixes.

The structural steel tower supporting the mixing plant, batchers and storage bins is 60 ft. in diameter, and 135 ft. in height. In the upper section, aggregate storage for 8 hr. of concreting is provided. Discharge from the aggregate conveyor is distributed by rotating feeder into the various compartments.

A single system of batchers, using automatic weighing control, delivers aggregate for the mixes into a feeding chute which discharges by means of a swivel throat into the mouths of the concrete mixers.

Handling of the mixers is similar to the arrangement in other modern plants, with push-button and interlocking control, making the operations almost automatic. A continuous chart provides a record, indicating the weight of material in each mix, the mixing time and other characteristics.

From mixing plant to forms

The outstanding feature of the system developed to move concrete from the mixing plant to the forms is the use of special hopper cars between mixing plant and cableways, as compared to using the cableway buckets. The movement of concrete from the mixing plant to a position where it can be picked up by the cableway system is on a circular track eccentric to the head tower and passing directly under the discharge from the concrete mixers. The hopper cars operating to this track are of special design, prepared under the immediate direction of F. T. Crowe, general superintendent.

These units were rebuilt from the motors and frames of old interurban electric cars, and both trucks are motorized. On this heavy frame, with adequate additional support provided, there have been constructed two 8-yd. hoppers of conical design with side-discharge doors controlled by a gate operated with compressed air. The supply of air is provided by a compressor on the car, and handles both the brakes and the dis-

CONVERGING on the head tower, the seven cableways are arranged to cover the dam and powerhouse area. Weight of concrete, bucket, and rope and carriage total about 33 tons, handled with a 6% sag in the main track cable.

MAJOR ARTICLES ON SHASTA DAM

charge doors for the concrete hoppers.

This system of transfer car provides several advantages in concrete handling. Among these advantages are: (1) buckets do not have to be placed directly on the car, which is a difficult operation; (2) the time lost in transferring the hook from the empty bucket to the full one is completely eliminated, and this always eliminates an element of hazard; (3) the number of buckets, involving not only original cost but maintenance, is reduced to a minimum; (4) the transfer of concrete from hopper to bucket involves much less time than the previous system of changing buckets at the car.

Using the present system, the empty 8-cu. yd. bucket is brought into the loading position on a depressed level below the circular track, and is spotted directly by the cableway operator. While this placing is being done, the concrete car and its operator remain at a safe distance, which reduces an operating hazard. As soon as the bucket is placed, and the operating lines slacked out of position, the hopper car operator moves into position, and within a 6 to 8-sec. period, discharges an 8-yd. hopper directly into the bucket, and then moves back out of position. The cableway operator, who is able to watch this operation from his position on the operating floor of the tower 260 ft. above the ground, then starts the bucket moving to the forms.

Cableway operators' stations, as reviewed in the article describing the head tower, are located just above the hoist floor and occupy positions at windows which enable them to see the position of the buckets being loaded and the entire dam site area. The carriages of the three long cables are painted distinctive colors to eliminate the possibility of these three operators confusing their lines over the long distance of nearly one-half mile.

FROM THE HEADTOWER the three main cableways cross the dam site with 2,670-ft. spans to the radial tail towers shown in the background. The abutment excavation is clearly indicated and the Sacramento River is shown flowing in the prepared channel along the side of the concrete. To the left of the abutment excavation is the vista house built by the Bureau of Reclamation for the convenience of visitors.

Cableway characteristics

Track cables are of the lock-coil type, 3-in. in diameter. The endless rope is 1⅛-in. of both flattened strand and preformed type, with independent wire rope center. Load, dump and button ropes are ⅞-in. of standard 6x19, superplow type.

Up to the present time the average cycle for the complete trip of the buckets is about 4½ min., although this time is expected to drop to about 3½ min. in the future. The loads handled by the cableways during concreting work include: 6 tons for the bucket; 16 tons of concrete and an estimated additional load of about 11 tons for rope and carriage, totaling about 33 tons. These loads are handled with the main track cable at a 6% sag.

The carriages have eight main track wheels in each of the double units, and are of trussed construction, carrying oil tanks for the main cable.

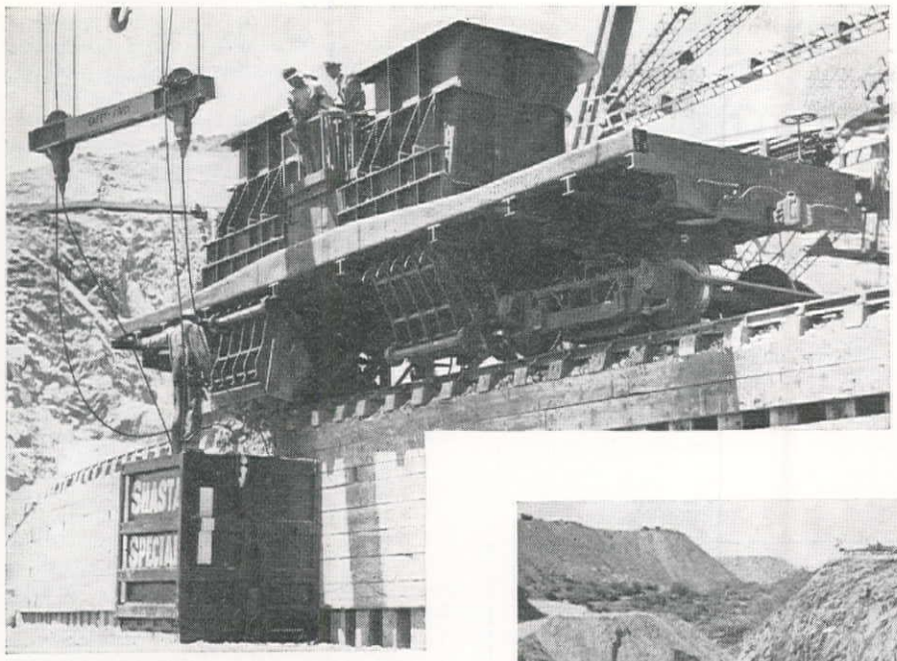
At the other end of the trip, the handling of the bucket is directed by a signal man, who is also in direct contact with the hoist operator through radiophone and signal bell. A feature of this communicating system is the radiophones operating from compact portable sets located near the signal man. Each of these radiophone sets operates on a fixed frequency between the transmitter and the receiving end at the head tower. By this communicating system, the signal man directs the hoist man by remote control to spot the bucket in the proper place in the form.

Another feature of the concrete placing equipment is the special design of the bucket, which permits the discharge of the concrete under complete control of the operator. The dump rope which operates on a 2-part connection regulates the gate opening at the bottom of the bucket, and it is possible for only a fraction of a bucket load to be discharged, or for the discharge to be stopped by the hoist operator under orders from the form.

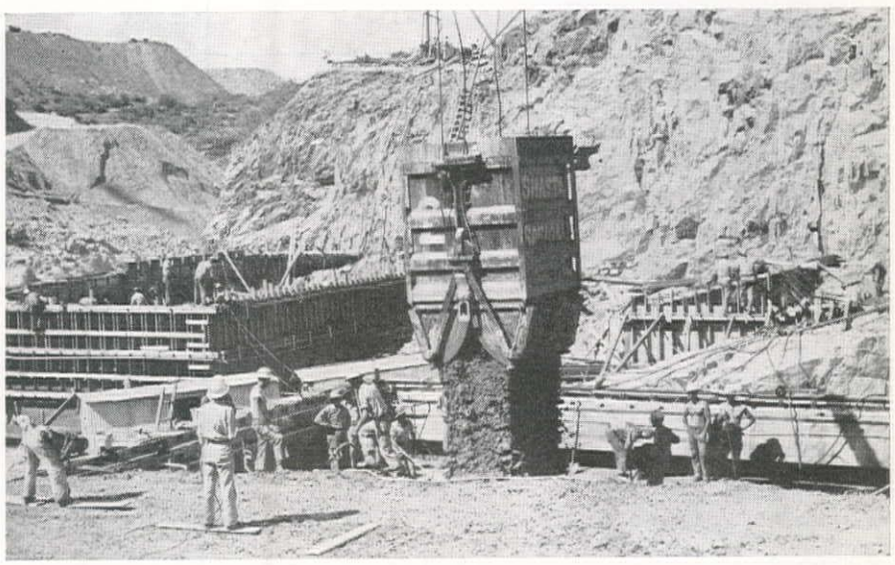
Work in the form

The operations carried on within the form, both prior to and during the placing of concrete, are very similar to those on other modern concrete dams. Prior to the placing of a 5-ft. lift, the various crews carry out the work of placing and adjusting forms, installing grout and cooling pipes, together with other miscellaneous structures which may occupy this particular section of the dam. After these arrangements have been completed, inspected and approved, a bucket of grout is deposited and broomed across a portion of the block. The mass concrete is then deposited by 8-yd. bucket loads, and is placed in about 18-in. lifts across the surface until the 5-ft. lift has been completed. Vibrators are used freely in handling the mix and to make it flow around the various structures within the form.

About three hours after the pour has been completed, a 2-in. layer of sand is



TRANSFERRING concrete from the mixing plant to the 8-cu. yd. buckets, the contractor is using this specially designed type of car with quick opening door that discharges the load in a few seconds.



IN THE FORMS the concrete bucket is directed to desired point of discharge by signalman who uses radio-phone to give orders to the hoist operator in the head tower.

spread over the surface of the concrete. This is a new procedure in the curing of mass concrete developed by the Bureau of Reclamation dams. In theory, the laitance which may produce a thin film on the surface of the relatively dry mix attaches itself to this damp sand, and is removed in this manner. There is no cutting of the concrete, or sand blasting, required with this system of concrete curing.

After the required 72 hr., this sand is removed and is re-used on fresh blocks. The thin film of sand remaining on the concrete is then washed off with an air and water jet, which prepares the surface of the concrete for the next lift. About 16 cu. yd. of sand are required for this 2-in. layer, and the amount of waste has not been determined as yet, although preliminary figures indicate that some of it is re-used as many as five times. For this curing operation, the regular concreting sand is being used, although this particular mix would not be necessary for this purpose.

Details of forms and the procedure of handling concrete on the dam will be reviewed at a later time, when these operations have been stepped up to regular output. At the present time, about 40 blocks are being poured, and concrete output is running about 3,000 cu. yd. per day.

Organization

Shasta Dam, which is the main storage unit of the Central Valley Project, is being constructed by the Bureau of Reclamation, under the general direction of John C. Page, commissioner, and S. O. Harper, chief engineer. J. L. Savage is chief design engineer, and K. B. Keener is engineer in charge of dam design.

For the Central Valley Project, Walker R. Young is supervising engineer, with headquarters in Sacramento, Calif., and Ralph Lowry is construction engineer in charge of the Kennett Division. Grant Bloodgood is field engineer, and W. A. Dexheimer is in charge of field inspection. Concrete control on Shasta Dam is under the direction of Douglas Wood.

Contract for the construction of Shasta Dam is held by Pacific Constructors, Inc. A complete list of the contractor's administrative and field personnel accompanied the article which described preliminary construction work appearing in the October, 1938, issue of *Western Construction News,*

The panorama view and the picture of the bucket discharging are photographs taken by Howard Colby.

MAJOR UNITS OF EQUIPMENT

Aggregate Handling	
Shuttle Belt at delivery hopper and tripper and main storage pile	Bodinson Manufacturing Co.
Conveyor Belting	B. F. Goodrich Co. and Pioneer Rubber Co.
Troughing rolls	Conveyor Co.
Sealed bearings for rolls	New Departure Bearing Co.
Drives, pulleys, shafting, etc.	Dodge Manufacturing Co.
Motors and switches for conveyor	Westinghouse Mfg. Co.
Feeders and Feeder drives	J. D. Christian Eng. Co.
Cement unloading and pumping	Fuller Company
Concrete Mixers	Koehring Company
Aggregate bins, batchers and recording equipment	C. S. Johnson Co.
Cableways, hoists, carriages, take-ups and blocks	Lidgerwood Co.
Cableway control system	General Electric Co.
Track cables and operating ropes—	Pacific Wire Rope Co. and American Steel and Wire Co.
Tail towers for cableways	Consolidated Steel Co.
Motors and drive gearing for tail towers	Westinghouse Mfg. Co.
Derrick for tower maintenance	American Hoist and Derrick Co.
Elevator for head tower	Colby Steel and Engineering Co.

•

PRELIMINARY studies leading toward the construction of a $140,000 sewage disposal plant at Eugene, Ore., have been undertaken by R. L. Stockman, consulting engineer of Baker, Ore. Present studies include investigation of the sewage flow into the Willamette River, and the possible sites for the plant.

First Dams Built for the Willamette Basin Project

Construction advances on Fern Ridge and Cottage Grove jobs in Oregon under direction of the Corps of Engineers

CONSTRUCTION work on two of the seven flood control dams, which are units of the Willamette River project in western Oregon, is well under way with about 75% of the embankment in place for Fern Ridge dam and operations concentrated on the spillway at Cottage Grove dam. Both structures are of the earthfill type with concrete overflow spillways. Contractors' operations are fairly well standardized with the use of tractors and scrapers on embankment work. The chief problem encountered has been that of ground water in the borrow pits and spillway excavation at Fern Ridge dam.

The Willamette River project is a combined flood control, navigation, power development, irrigation and stream pollution reduction project being carried out by the Corps of Engineers on the Willamette River and its tributaries between the Cascade and Coastal mountain ranges in western Oregon with project headquarters located at Eugene, Ore., where the present work is centered. Comprehensive descriptions of the project were published in the January, 1937, and April, 1938, issues of *Western Construction News*. Construction work now in progress consists of building flood control reservoirs on two tributaries of the Willamette River. Five more dams are contemplated of which two will be earthfill and three concrete, either arch or gravity sections.

In addition to construction of the dams, the locks at Oregon City will be reconstructed; the channel of the river between Oregon City and Albany will be improved; facilities will be provided for migratory fish; development of power is contemplated at a number of sites; and ultimately surplus water will be available for irrigation purposes. The estimated total cost of the project is $66,870,000 and expenditure of $11,300,000 has been authorized to permit the completion of Fern Ridge, Cottage Grove and Dorena dams. Construction of the latter structure will probably be started early next year.

Design of Fern Ridge

Fern Ridge dam is being built on Long Tom River and Coyote Creek about 12 mi. northwest of Eugene. It is an earth embankment with a maximum height above foundation of about 44 ft., and a crest length of 6,360 ft. In addition to the main structure, there are two smaller dike sections similar to the main dam in cross-section but only 6 and 12 ft. high with crest lengths of 850 ft. and 3,200 ft. respectively.

The earth embankment consists of three zones, a central impervious zone with a small random pervious zone upstream faced with a 2-ft. layer of dumped riprap, and a heavy pervious section downstream faced with 1 ft. of top soil. At the downstream toe a disposal zone is also provided. Near the downstream toe a special drain runs the entire length of the embankment with outlet laterals spaced every 500 ft. The drain consists of 8-in. perforated and bituminous coated metal pipe surrounded by 1½ ft. of washed gravel and 2 ft. of borrow pit gravel and placed at the elevation of the stripped foundation. Laterals are similar except they are laid directly on the stripped foundation without gravel underneath.

The foundation for the embankment is impervious material lying below the top soil. The borrow pit for embankment material is located downstream from the dam with the near shoulder of the pit 250 ft. from the axis of the dam. Lateral drains empty into open ditches which spill into the pit. The spillway and outlet works are founded on rock in the channel of the Long Tom River near the west end of the dam.

One of the most unusual features of the dam is the automatically controlled spillway which will maintain a constant pool elevation in the reservoir at the maximum pool elevation of 373.5 ft. The spillway is designed as a reinforced concrete structure 294 ft. long from face to face of the wing walls with six openings having a total clear length of 204 ft. The controlling mechanism will consist of six 34x18-ft. automatic, hydraulically operated, counter-weighted radial gates. With the weir crest at El. 358.5 the reservoir level will be controlled at El. 373.5 through the automatic operation of the radial gates.

Water for the gate control system enters through a 30-in. intake protected by a trashrack in the reservoir and rises through a well in one abutment to a series of orifices and weirs at various elevations. Passing through the orifices it enters a 30-in. header which extends through the length of the spillway. Float wells in each pier and the two abutments are fed from the header by 6-in. risers. When the water in the float wells rises above the fixed elevation of the pool, the movement of the floats is transmitted to the gates through cables, permitting the counterweights to open the radial gates by gravity. Below the constant pool elevation the weight of the floats counterbalances the counterweights, keeping the gates closed. Constant flow is maintained through the system by adjustable discharge outlets from the header. A rise of 1 in. in the pool level will cause the gates to open about 2 ft.

In addition to the spillway there will be an outlet control works consisting of four 8x8-ft. fixed wheel lift gates with a maximum capacity of 8,450 c.f.s. The ca-

Fern Ridge Dam Data

Reservoir

Normal Pool El.	373.5
Storage Capacity	102,000 ac. ft.

Outlet Control

Four 8x8-ft. fixed wheel lift gates	
Sill El.	340.0
Capacity at Max. Head	8,450 c.f.s.

Spillway

Six automatic radial gates	34x18 ft.
Weir crest El.	358.5
Net Clear Length	204 ft.
Maximum Height	48 ft.
Capacity at Norm. Pool El.	45,000 c.f.s.

Main Dam

Crest Length	6,360 ft.
Crest El.	379.5
Maximum Height	44 ft.
Freeboard	6 ft.

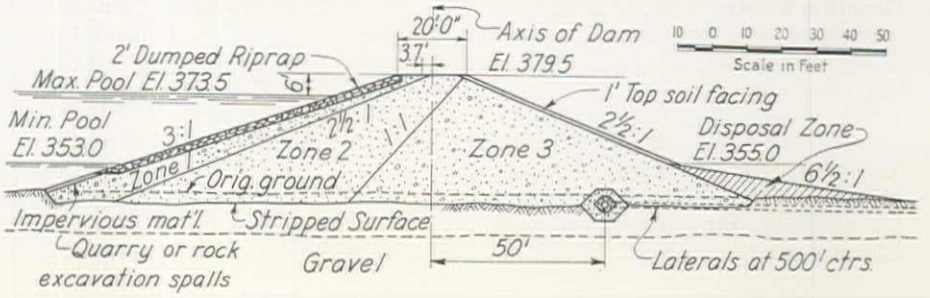
Dike No. 1

Crest Length	850 ft.
Crest Width	20 ft.
Maximum Height	6 ft.
Slope, Downstream	2:1
Slope, Upstream	2½:1

Dike No. 2

Crest Length	3,200 ft.
Crest Width	20 ft.
Maximum Height	12 ft.
Slope, Downstream	2:1
Slope, Upstream	2½:1

FERN RIDGE DAM design provides special drainage facilities due to the high level of the water table in the vicinity of the site. Perforated pipe in gravel envelope connects with laterals at 500-ft. intervals, discharging into borrow pit excavation.



pacity of the spillway at El. 373.5 is 45,000 c.f.s. Maximum height of the spillway and outlet structure above bedrock is 48 ft.

Construction progress

On March 5, 1940, twenty bids for the construction of Fern Ridge dam were opened at Eugene with Morrison-Knudsen Co., Inc., of Boise, Idaho, submitting the low figure of $723,591. A complete summary of the unit bids appeared in the April, 1940, issue of *Western Construction News*. The contract was awarded to the low bidder and preliminary work was started during May.

With the borrow pit located only a short distance downstream from the dam the contractor had placed about three-quarters of the embankment by the middle of September, using an equipment fleet of 13 tractors and eleven scrapers. Except for a closure section near the spillway the embankment was within about 15 ft. of crest elevation.

Some difficulty has been encountered with water in the pit which has required the contractor to dry the material before compaction. Loam and gravel are taken from the pit and placed on the embankment by scraper where the material is permitted to dry when necessary. Disc harrowing mixes the two materials to form the impervious section and also facilitates drying. A heavy wet gumbo encountered in the pit has been utilized by placing thin layers on the embankment and drying before mixing with gravel.

The spillway construction is being carried out by a subcontractor, and by the middle of last month about 50% of the concrete had been placed. The spillway is founded on rock across the channel of the Long Tom River which is being carried around the spillway in a temporary channel. Coyote Creek has been diverted some distance upstream from the dam through a mile-long channel to the diversion channel of the Long Tom River, and the two streams passed through the construction work together.

The concreting plant consists of wooden aggregate bins, a 1-yd. concrete mixer, a cableway suspended from timber towers at each end of the spillway, and an overhead bridge spanning the spillway and mounted on rails which run the full length of the structure on both sides. Aggregate and cement are hauled from Eugene by truck. Mixed concrete is picked up from the mixer by the cableway and dumped into a hopper on the overhead bridge and from there delivered to the pouring location below through a long elephant trunk. Power for the cableway is supplied by an oil-fired steam boiler located near the mixing plant.

SPILLWAY CONSTRUCTION at Fern Ridge Dam indicating the contractor's method of concrete distribution from the batching plant in the foreground. Spillway discharge will be controlled by six automatic hydraulically-operated radial gates.

Forms are fabricated in a carpentry yard near the spillway, individual forms being constructed for each pour. The spillway channel below the dam will be protected by 300 ft. of 3-ft. grouted rock paving. Rock for the spillway and for the dumped riprap on the upstream face of the dam is being taken from a quarry in the reservoir near the spillway.

Design of Cottage Grove

Cottage Grove dam is being constructed on the Coast Fork of the Willamette River about 6 mi. south of Cottage Grove and about 28 mi. south of Eugene. It is an earthfill structure with a maximum height above foundation of 95 ft. and a total crest length, including the spillway, of 2,095 ft. The central impervious core is flanked downstream by a heavy pervious section and upstream by light pervious section. The upstream face is protected by a 2-ft. blanket of riprap. At some locations an additional zone of waste material will be placed at the toe of the embankment to further stabilize the fill.

The spillway, located at the right abutment of the dam in the river channel and founded on solid rock, is a gravity section concrete overflow with a crest length of 264 ft. and a maximum height of 91 ft. The outlet works will consist of three conduits through the spillway section controlled by hydraulically operated vertical lift gates. Capacity of the spillway will be 42,800 c.f.s. and of the outlet works 2,580 c.f.s. Downstream the channel will be paved with concrete for a distance of 600 ft. from the spillway. The most outstanding feature of the construction will be the use of absorptive form lining on the spillway. This is believed to be the first time absorptive form lining has been specified by the Corps of Engineers.

Cottage Grove Dam Data

Reservoir

Normal Pool El.	791.0
Storage Capacity	33,000 ac. ft.

Dam and Appurtenances

Maximum Height	95 ft.
Crest Length	2,095 ft.
Crest El.	808.0
Spillway Crest Length	264 ft.
Spillway Capacity	42,800 c.f.s.
Outlet Works Capacity	2,580 c.f.s.

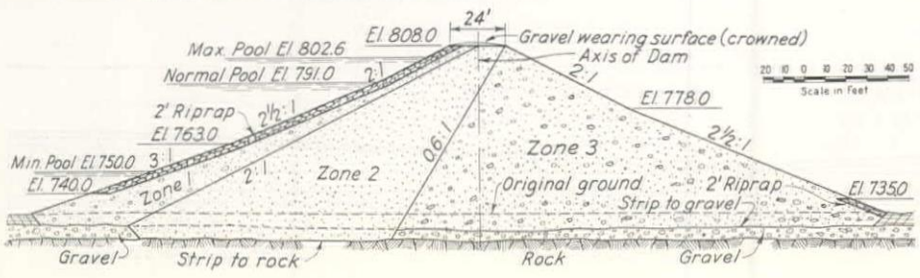
Contractor's progress

Bids for the construction of Cottage Grove dam were opened about the middle of June of this year, and the contract awarded to T. E. Connolly, Inc., of San Francisco, Calif., whose bid of $769,930 was the lowest of thirteen submitted. Complete tabulation of the unit bids submitted were published in *Western Construction News*, July, 1940.

Construction operations were begun during July and some embankment has been placed, although the greatest part of this work will not be performed until next year. Most of the foundation stripping has been completed and the contractor at the present time is concentrating his efforts on spillway excavation. The construction schedule calls for raising the spillway at least to streambed level before winter floods halt the work, and completion of both dam and spillway before the following winter. Pouring of concrete in the spillway is scheduled to start during October.

The contractor has established, in a shop building just downstream from the

COTTAGE GROVE DAM is similar to Fern Ridge in the relative position of the impervious section, which is located almost entirely upstream from the center-line with both side slopes inclined toward the reservoir.



dam, a two-unit diesel-electric plant which develops all of the electric power used on the job. In the same building is located a diesel driven compressor which furnishes all compressed air used on the job. Excavation and embankment are being performed by an equipment fleet which includes six tractors and four scrapers.

Organization

The Willamette River project is being carried out by the Corps of Engineers, U. S. A., and is under the general supervision of the Portland District, North Pacific Division. Construction headquarters of the project are located in the area office at Eugene. Lt. Col. C. R. Moore is district engineer at Portland and Lt. E. G. Herb is in charge of the Eugene area office.

Operations of Morrison-Knudsen Co., Inc., at Fern Ridge dam are under the direction of M. G. Kennedy. The subcontract for construction of the spillway is held by Rocca & Co. of San Rafael, Calif., and the work of that organization is being directed by J. Rocca.

At Cottage Grove dam Earl Walsh is superintendent for T. E. Connolly, Inc.

Test Track Built to Study Highway Base Materials

California Division of Highways constructs road sections for tests to develop data on relative costs—Information to be secured on economics of stabilization

TO DEVELOP basic information on the relative advantages of various types of select or stabilized materials for use in low-cost road design, the California Division of Highways has recently built, and placed in operation, a test track which is being operated to destruction under heavy truck traffic conditions. In this test track have been installed eight sections of different design, and results of the studies are expected to develop data that will aid in evaluating factors of economical design, including both the cost of initial construction and the subsequent maintenance work.

Design of test track

The track is of oval design, with test sections installed on the two tangents which are connected at the ends by semicircular arcs. Each of these tangents is slightly more than 200 ft. in length, providing two 100-ft. sections for testing.

Because the study was to be made as an accelerated test, the design of the highway cross-section was made to provide a subbase of minimum supporting value, so that breakdown of the test material would occur within a reasonable length of truck-operating time.

The design includes means for saturating the subgrade material, and maintaining it in this uniform condition. Details of the test track design are indicated in the accompanying cross-section drawing. On either side of the 15-ft. width of track, ditches were excavated, equipped with 4-in. drain tile below the subgrade level, and then backfilled with gravel. The water supply pipes were placed in these ditches.

After excavating the original topsoil from the site down to impervious hardpan, a 6-in. layer of porous sand was placed across the track to provide for distributing the supply of sub-surface water. The surface of this sand layer is level. On this porous base, a 12-in. layer of the silty clay was placed to provide the unstable subgrade when it had been brought to a saturated condition. The top of this subgrade is also level.

Upon this subgrade, the test materials were deposited. These taper in thickness from 3 in. near the center of the track to a maximum of 18 in. in a distance of 100 ft., which constitutes the test section. The relation of these layers of material is indicated in the accompanying longitudinal profile. In order to establish uniformity in the application of the truck loads on these test sections, the entire track was covered with a 2-in. asphaltic surfacing (ROMC-4). The curved ends of the track were built with a crusher run base, on which was placed the 2-in. wearing surface.

Each of the 100-ft. test sections is further divided along the center line of the test road, which permits the installation of different materials under each wheel track. This design provides eight test sections in the track as designed and built.

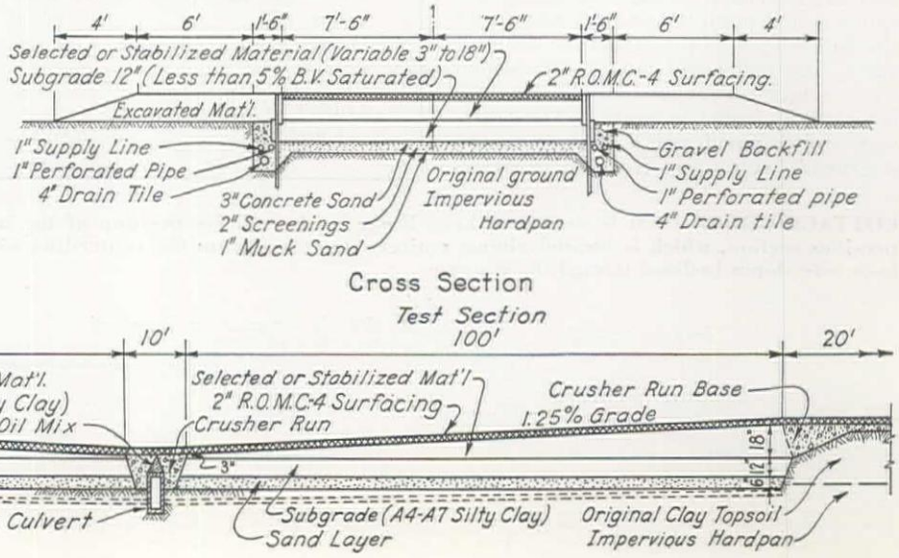
The materials which were placed in the eight test sections are indicated in the accompanying table. They range from an untreated select material to materials stabilized with (1) portland cement, (2) emulsified asphalt and (3) cutback. To insure uniformity in the construction of the eight test lengths, all of the materials were prepared in the adjacent mixing plant of a local contractor, hauled to the site, and placed on the compacted subgrade in varying thickness, as already described. These materials were compacted, as nearly as possible, under normal highway conditions, including the use of tamping roller, followed by surface rolling with rubber-tired or steel rollers. Following completion of placing this selected or stabilized test material, the surfacing was applied, and the track was ready for the beginning of the test.

Before the actual test run was started, a series of studies was made on pressures within the materials resulting from the truck load, using cells installed during the construction of the track, and deflections were measured at corresponding positions. These deflection and pressure measurements will be repeated near the close of the test program.

Testing procedure

Prior to the start of the test run, water

TEST TRACK DESIGN which provides unstable subgrade of saturated silty-clay to accelerate the breakdown of the select or stabilized materials which are the subject of the investigation. Note the tapering thickness of the test materials which insures relatively rapid initial results.



UNDER TEST with the eight different types of base material subjected to the load of a highway department truck with 12,000 lb. on the rear axle. Truck speed is 15 m.p.h. and the direction is reversed at regular intervals. NOTE: The two-exposure photograh produces the appearance of two trucks.

was admitted through the delivery system until its elevation reached the top of the sand layer. This placed the water surface against the bottom of the imported soil of low-bearing value (A4-A7 silty clay). Within less than 24 hr. capillary action had provided complete saturation through the 12-in. thickness of this material, with water content ranging from 27 to 24%. Under these conditions, the soil presented a bearing value of not more than 5%. As a result of this plan, the unstable material was not inundated, but was saturated entirely by capillary action.

The test load was applied by a truck of the Division of Highways operated around the track, and guided by lines which placed its wheels uniformly on either side of the center line. The truck was operated at an arbitrarily selected speed of 15 m.p.h. This speed was considered sufficient to introduce dynamic forces and impact. A slower speed would reduce the desired effect of impact, and would tend to provide a loading more related to static pressures.

The truck reverses directions at regular intervals, and is stopped to permit measurements to be taken every 100 cycles. As the test progresses, the number of trips between measurements will be extended.

The design of the track was intended to produce fairly rapid failures under the thinnest section of selected or stabilized test sections, and to give sufficient stability at the maximum thickness to resist the breakdown under a heavy trucking load. The progressing breakdown from the thinnest section toward the maximum thickness provides one of the indexes of the test study.

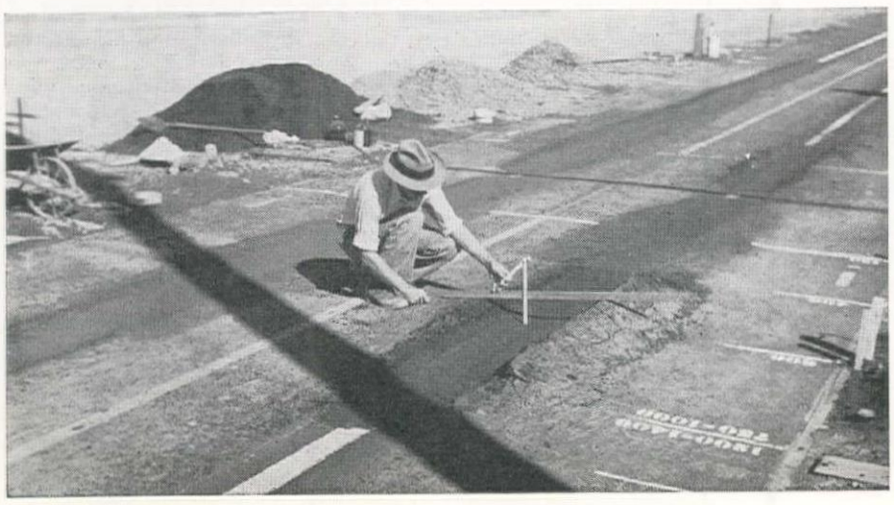
The original load placed on the truck was measured at 17,000 lb. on the rear axle representing the legal permissible limit allowed on California state highways. This load began to indicate such a rapid breakdown on the thin ends of the test sections that it would have been difficult to make adequate observations on the various materials under examination. With this load, failures would have progressed so rapidly that adequate comparisons would have been impossible. As a result, the load on the truck was reduced to 12,000 lb., on the rear axle. This load has produced a more gradual rate of breakdown among the various test materials, permitting more accurate study of progressive failure. Present plans call for increasing the test load back to the legal limit after failures have reached a minimum under a large number of trips.

As an arbitrary definition for "failure" of the test section, a depression of one-half inch below the level of the adjacent surface was selected for the purpose of the test. Whenever the depression of the tire track exceeds one-half inch, the position is marked on the adjacent surfacing, and stakes permit ready inspection as to the depth of the selected or stabilized material at this point of breakdown. Thin patches of bituminous surfacing are placed by hand to restore these depressions to original grade, so that the weight of the truck will be equalized on both wheels, and any tendency for the load to bounce will be eliminated. After the broken-down sections have produced ruts which are

CHARACTERISTICS OF MATERIALS INSTALLED IN TEST TRACK

Type of Material Tested	Bearing Value	Treatment
1—Crusher Run Base	100%	Untreated
2—Cemented Gravel Mixture	50%	Untreated
3—Cemented Gravel Mixture	50%	Stabilized with 5% asphalt emulsion
4—Cemented Gravel Mixture	50%	Treated with 6% portland cement
5—Sand-clay Mixture	15%	Untreated
6—Sand-clay Mixture	15%	Stabilized with 5% asphalt emulsion
7—Sand-clay Mixture	15%	Treated with 6% portland cement
8—Sand-clay Mixture	15%	Stabilized with 5% MC-2 cutback and 5% water

BREAKDOWN with accompanying bulging indicates the progressive failure of the bases under test. A ½-in. depression in the tire track is used as an arbitrary measure of "failure" and the marks along the side of the track record the number of truck trips. Temporary patches of bituminous materials are used to maintain a smooth track.



difficult to prepare, these sections of surfacing, stabilized material and unstable subgrades, are dug out by hand and backfilled with stable gravel, and the test is considered complete for these particular sections.

Results of the tests will receive comprehensive study by the California Division of Highways in the interest of developing economical factors in design construction and maintenance. The advantages of stabilization as a means of reducing the volume of required material will be one of the important factors developed through the test.

Organization

The construction and test of this track have been carried out by the Materials and Research Department as a research project of the California Division of Highways, under the direction of Frank W. Clark, director of public works, and Charles H. Purcell, state highway engineer. The following departments collaborated in the specifications for the test track, its construction and operation: Surveys and Plans, Fred J. Grumm; Construction, R. M. Gillis; Maintenance, T. H. Dennis; and Materials and Research, T. E. Stanton.

Unusual Joint Featured on Concrete Lined Steel Pipe

California Water Service Co. constructs 6-mi. water supply line to serve two steam electric generating plants at oil refineries in Contra Costa County

By J. A. WADE, Chief Engineer
and
H. P. WENRICK, Engineer
California Water Service Co.
San Jose, Calif.

CONSTRUCTION of a 6-mi. industrial water supply line in Contra Costa County, California, by the California Water Service Co. included the use of an unusual rubber joint on 24 and 21-in. steel pipe with centrifugally cast concrete lining and a gunite outer coating. Designed to furnish water ultimately from the Contra Costa Canal of the Central Valley project, alternate lines have been provided to meet the demand for water until a year-round supply is available in the canal.

Serves steam plants

The operation of the three large steam plants now under construction by the Pacific Gas & Electric Co. at the refineries of Associated, Shell and Union Oil companies in Contra Costa County, California, involves the handling of large quantities of water. Arrangements for boiler feed water are covered by the contracts with the oil companies but make-up water for the condenser systems had to be obtained by the P. G. and E. on the outside. At Oleum, the power company decided to use salt water for condensing purposes due to the cost of getting fresh water, but at Martinez and Avon the securing of water which would cause less damage to equipment was feasible and found to be an economy.

The California Water Service Co. serves this region with domestic water and has ample pumping facilities at Mallard Slough where water of extremely low salt content is available usually six months in the year. Also, the Contra Costa canal, now under construction, is expected, after the reservoir behind Shasta Dam has had time to fill, probably in four or five years, to carry fresh water the year around to a point within 2½ mi. of the Avon plant and 5½ mi. of the Martinez plant. The California Water Service Co. entered into a contract with the P. G. and E. to construct the facilities required to make available at the two refineries water from either Mallard Slough or the canal. Contracts were also made with the oil companies to meet their requirements for industrial water.

The facilities provided include approximately 6 mi. of 24 and 21-in. pipe line and two booster stations. The pipe line starts at the Contra Costa canal directly behind the hotel in the town of Clyde, runs along the toe of the north embankment of Chenery reservoir, westerly across the Associated Oil Co. tank farm, then north across the A. T. & S. F. R. R. to a point directly west of the village of Avon on the edge of the marsh traversed by Walnut and Pacheco Creeks. To this point the pipe is 24-in. internal diameter. It now divides into two 21-in. internal diameter lines, one going north to Avon through streets and along the county road, the other striking westerly across the marsh and along the edge of the Shell tank farm to the steam plant near Shell Avenue. The line crosses two main highways and four railroads, all in conduit.

Alternate supply system

Where the new line crosses the pipe line from Mallard Slough to Chenery reservoir, there is a cross-connection. Either Mallard or Canal water or a mixture of the two may be put into the line at any time. Where the line passes Chenery filter plant it is connected through a by-pass with a battery of booster pumps. Where the line splits near Avon the second booster station is located, on the branch to the Shell plant. Both booster stations have standby units. All units are operated by automatic pressure control.

When Chenery reservoir is being filled, it will be necessary to operate both booster stations. When no water is going into the reservoir, sufficient head can be developed at Mallard to carry water to Avon without boosting. When water is taken from the Canal the Chenery booster will not be required for any condition of flow that can be foreseen now. The Avon booster will always be required for lifting water to the Shell plant.

The pipe is a composite of steel and concrete consisting of a welded steel shell 25 and 22-in. outside diameter of 12-gage metal in thirty foot lengths, a centrifugally placed concrete lining approximately ½ in. in thickness and an outside protection of gunite ¾ in. thick reinforced with welded steel mesh. Where the ground was particularly bad the steel mesh and gunite were doubled giving 1½ in. of gunite with two rings of steel fabric. The steel shells were tested to 18,000 lb. per sq. in.

Rubber lock joint

The joint was made up with a special bell and spigot and a rubber ring gasket. The bell and spigot ends were rolled from specially rolled steel sections much heavier than the pipe, welded into a ring and pressed into perfect circles, being stressed during the process beyond the elastic limit of the metal. The ends were welded to the shell and the welds tested before the pipe was lined. In joining, the rubber ring is placed over the spigot end and the spigot then pushed into the bell.

The ring, circular in cross section before joining, is flattened in the process of pushing the spigot into the bell to a section about ⅛ by about ¾ in. In a job involving a total of 31,000 ft. of pipe there were only two instances where the gasket failed to go into place properly. In these two joints the test showed high leakage at low pressure; the faulty joints were found without difficulty and the defect corrected by welding the two pipes together. Generally speaking, there was no field welding involved in this type of joint.

After the joint was made, it was plastered smooth on the inside by hand so that the cement lining is continuous and without any metal being exposed. On the outside the joint was wrapped with a flexible form and encased with cement and sand mortar. In our opinion the life of a steel shell protected in this manner should be very long, even under the severe conditions to which it will be subjected.

The type of joint was chosen because of the fact that the contract was entered into early in the spring and it was recognized that there would be a certain amount of water to contend with. The joint is quickly made and does not require the maintenance of a dry trench. The efficiency of the joint is clearly demonstrated by the leakage tests which were run on the line after completion.

Leakage tests

The specification required that all indications of concentrated leakage should first be noted and corrected. Following this the line was to be disconnected from the source of supply and the pressure brought up to 90 pounds with a hand pump. This pressure was maintained for a period of four hours by pumping from a calibrated barrel.

The line was tested in two sections; the first consisting of 13,610 ft. of 24-in. and 3,812 ft. of 21-in. There were 467 24-in. joints and 128 21-in. joints. Total leakage in four hours was 269 gallons but some of this was past a valve which refused to hold.

The second test involved 14,126 ft. of 21-in. pipe with 473 joints. The leakage in four hours amounted to 63 gallons or about 0.8 gallon per joint per 24 hours.

Bends in the pipe were provided for by bending individual sections after the lining and coating had been completed, but before the pipe was removed from the plant. Bending at each cut was restricted to a maximum of 18 deg., and where larger bends were required successive cuts were made.

The procedure in making bends consisted of chipping of the gunite and burning through about half the diameter of the pipe on the outside of the bend. The pipe was then bent to the correct shape, the cut patched by rewelding, and the lining and coating replaced by hand. As a result of this procedure changes of bearing in the pipe line resembled long radius curves.

Creek crossing

The character of the ground through which the line passes varies from marsh to hard rock, but the pipe was not supported except at creek crossings. The crossing of Pacheco Creek, classed as a navigable channel by the War Department, was made at a depth of about 12½ ft. To make the excavation a dragline dredge cast in a series of three earth dikes across the upstream side of the channel, each dike retaining the water at successively lower levels.

At the third dike a timber bulkhead was placed and the ditch excavated between that and a timber bulkhead on the downstream side. It was found that even long piles would not provide sufficient bearing to support the pipe and a system of floating supports was devised. Piles 16 to 20 ft. long were driven on 20-ft. centers along both sides in the bottom of the ditch. These were capped longitudinally along the pipe line by 4x6-in. timbers, and a continuous bridge constructed by laying 3x12-in. timbers across the two lines of piles.

The pipe was then laid on top of the timber structure. Buoyancy tests made of the structure showed that the pipe and timber supporting structure lacked only 10 lb. per ft. from actually floating, and it was considered that this deficiency would be made up by the rigidity of the pipe and structure. All work of excavation, pipe laying and backfilling was done by the dredge floating in the channel.

Most of the excavation was made by a trench hoe and an excavator. The ditch was 3 ft. wide and the depth over the line averaged about 4½ ft. Under three railroad grades 48-in. corrugated metal culverts were jacked and the pipe laid through without special supports but with the ends of the culverts bulkheaded.

Organization

Construction of the pipe line was done under the direction of the California Water Service Co. of which the writers are chief engineer and engineer, respectively. W. C. Brown was resident engineer on the job.

Excavation and backfilling of the trench were done under contract by the Roberts Island Dredging & Improvement Co., Inc., of Antioch, Calif., with Carl Newberry as superintendent. The excavation contract included the work at Pacheco Creek.

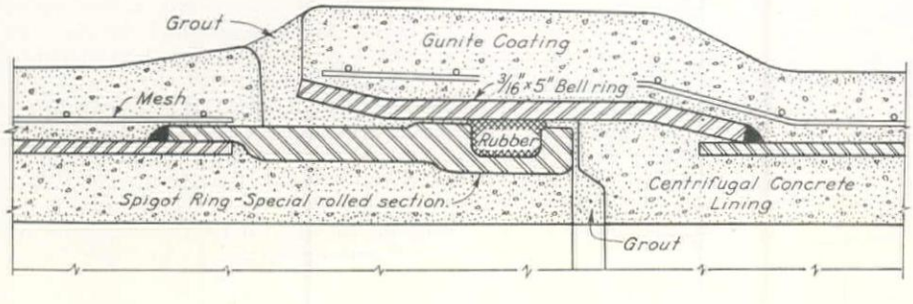
The steel pipe was spiral welded 22 and 25-in. shell, furnished by the California Corrugated Culvert Co., which also provided the 48-in. corrugated metal culverts.

Lining, coating and laying as well as bending special sections of the pipe were performed in the Berkeley shop of the American Concrete and Steel Pipe Co. of Los Angeles. France Geary was in charge of the work at the plant which included lining, coating and bending; and Charles Mead was in charge of the field work including laying and completion of the joints. The joint is a patented process known as the Lock Joint Rubber Expansion Joint.

PULLING UP with chain jack to complete the bell and spigot joint and compress the rubber ring seal.

PREPARING the spigot end by placing the rubber seal in groove. Bell and spigot are special steel ring sections welded to the shell.

JOINT DESIGN features a rubber ring seal which is circular in section until the joint is made up by jacking the spigot end into the bell. The rubber is compressed into the section indicated, and the joint is completed by applying cement plaster to both sides.



•

A GANTRY CRANE, with a carrying capacity of 150 tons, has been ordered for use in handling the huge bulkhead gates and hoists for Grand Coulee Dam. The Star Iron and Steel Co., Tacoma, will furnish the crane on its bid of $105,380, which was the lowest of three bids received and opened by the Bureau of Reclamation at Denver, Aug. 12. The crane will be of the outdoor traveling-gantry type, electrically operated, provided with a 150-ton fixed hoist and a 27-ton trolley hoist.

A History of Irrigation in Idaho's Snake River Valley

Sixty years of reclamation solving problems resulting from peculiar lava bed formation

By E. R. HARRINGTON
Albuquerque, N. Mex.

THE AUTHOR of this article is at present head of the science department of the Albuquerque, N. Mex., high school. He spent six years in southern Idaho and during part of this time was assistant water master for the irrigation districts about which he writes. He is the author of a number of articles which have been published in technical magazines, including the *Journal of Geology*.

—*Editor.*

ON AN EARLY exploration of the Pacific Northwest, Captain Bonneville crossed some of the most recent lava flows of the Snake River plains and was impressed by their barren nature. Washington Irving quoted the Captain as referring to the region as "An area where nothing meets the eye but a desolate and awful waste; where no grass grows or water runs and where nothing is to be seen but lava!" A present-day traveler crossing the Snake River plains is more likely to be impressed by the rich farming lands of the region. The deserts have been quite largely transformed and their transformation is a saga of early settlers who saw visions rising from sage brush plains.

In comparatively recent geologic times (Eocene), southern Idaho was a rough, maturely dissected plain across which the Snake River ran in a course somewhat to the north of its present position. The valley was wide and had many tributaries from the rugged granite mountains from the north. Much of the valley floor was rhyolite and adesite and a number of large ridges of these materials rose high above the level of the master stream.

Times changed in the later geologic periods. The great flows of Miocene andesite were partly eroded away and basalt flows took the stage. Fissures opened in the ragged plain and black, highly liquid basalt was poured out through thousands of fiery vents and black coiling snakes of lava spread to intersect each other and to writhe their hissing way across the streams. For many thousands of years over an area of 200,000 sq. mi. this fiery display continued with but brief geologic intermissions, the last flow occurring less than a thousand years ago.

Over much of the region the land subsided under the tremendous weight of the basalt as it continued to be poured out, the result being that the land gained little or nothing in elevation in spite of the many cubic miles of liquid rock heaped upon it. During the brief respites from volcanic activity, streams picked their way across the smoking lava and gravel beds were formed along the channels.

The Snake River was impounded and a large, shallow lake covered much of southwestern Idaho. Into this lake went waterworn gravel, volcanic ash and dust, and fiery tongues of lava from the vents along its shores. The lake was filled and eventually drained as its lava dam was cut through but still the flow of basalt continued until the granite Sawtooth Mountains in central Idaho and the rhyolite ridges to the south stood as a rugged coast and islands lapped by a smoking, black sea of almost level lava.

The Snake River, rising in what is now Yellowstone Park, picked its way across this black plain in very recent geologic times, swinging in a wide arc to the south, then to the north and across the uprising Seven-Devils region where it has cut a gorge deeper than the Grand Canyon of the Colorado. Taking advantage of the lava cracks, the river soon sliced its way downward to the more impervious rhyolite over which the black basalt had been poured. Streams from the high mountains of central Idaho debouched upon the lava plains but soon lost themselves in the cracked and broken flows, quickly reaching the water table several hundred feet below.

Only one stream, the Malad, reached the Snake River from the north in a distance of 300 mi., though the central mountains receive much snow and many streams make the start. Only the Malad, formed by the joining of the Big Wood and Little Wood Rivers, was of sufficient strength to pick its way across the 50 mi. of lava and find its way to the master stream in a surface channel. The rest of the streams reached the impervious rhyolite far below and flowed along the water table later to burst out in thousands of springs in the north wall of the Snake River Canyon.

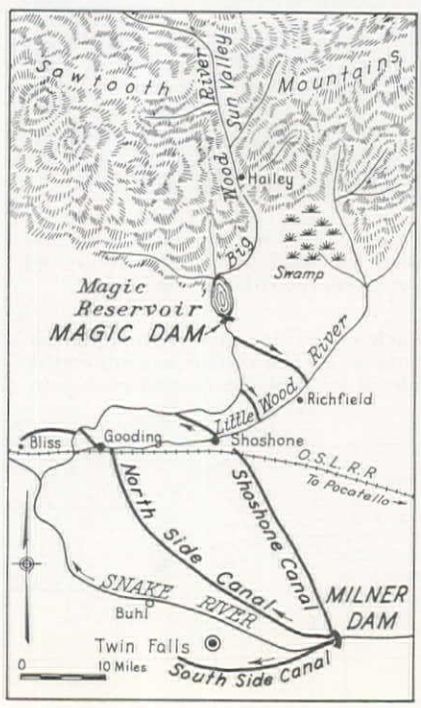
From the dry lake beds to the southwest and the great mountain talus slopes to the north the never-ceasing winds dusted the jagged lava with a sprinkling of soil, similar to loess. Sage brush grew in the thin soil and formed a lodging place for additional wind-borne material. Grass and other hardy plants that could survive with a yearly rainfall of less than 12-in. gave the veneer of soil a permanence so that it could not be taken away in the same way that it had come.

The soil's thickness varied from nothing up to 50 ft. or more and its richness was such that it supported fine growths of sagebrush and grass. The land's possibilities were referred to by Lewis and Clark but it was not until the late seventies of the past century that any appreciable amount of southern Idaho land was put into cultivation. Rainfall was too small for dry farming so irrigation was necessary and irrigation in a lava region presents many difficulties.

The first irrigation practiced was near the headwaters of the smaller streams but enterprising westward-moving settlers could not long ignore the green sagebrush plains on both sides of the Snake River Canyon. Here there was an abundance of water, but as they went farther downstream the canyon deepened rapidly and finally became so deep that it no longer afforded a possibility for surface water. The last available point for taking out water to the plain was the Milner Rapid, the "Cauldron Lynn" where a Lewis and Clark boating party came to grief many years before. Below this rapid or fall the Snake River plunged into a canyon, which from an irrigation standpoint was clearly impossible.

High-line ditches were, accordingly, taken out on both sides of the river at Milner, a crude diversion dam marking the start of the South Side and the North Side Canals. The ventures prospered and more secure diversions and headings were made, the ditches were extended and more land put under cultivation. A number of towns sprang up ranging in size up to 15,000 people in the prosperous little city of Twin Falls.

AREA discussed by the author is chiefly between the Snake River and the Sawtooth Mountains in the vicinity of Twin Falls, Gooding and Shoshone. Milner Dam was completed in 1905 as a hydraulic fill with timber core. Magic Dam is also a hydraulic fill with a sheet pile core and was completed in 1909.



Additional water was sometimes needed as greater acreage went into cultivation and so the great American Falls Dam was put in 50 mi. above Milner, one of the world's largest artificial lakes being formed for the storage of flood waters.

During the rise of irrigation works along the Snake, the early settlers on the Wood Rivers had not been idle. Many settlers were irrigating from these streams in the late seventies and the early eighties, and the coming of the railroad had given added impetus to the towns of Shoshone and Gooding. More settlers came into the valleys until more land was under cultivation than could be supplied by the natural flow of the streams during a dry year. This was specially true of the Big Wood River which was subject to quick runoff of high water and a rapid dwindling of natural flow late in the summer. This river also traversed a rough lava bed in which percolation losses were staggering. The Little Wood River, while smaller, was more constant in flow, having a tighter stream bed and being fed the year 'round from the Silver Creek swamps.

The early settlers naturally were accorded prior water rights by law, but it is difficult for an old right holder to get this water if some late comer settles above him on the stream and proceeds to take it anyway. No trouble resulted while the stream was in flood, carrying plenty of water for all, but when the flow became insufficient for all rights, troubles were sure to come. If an early settler far down the Big Wood River had a water right of date 1880, calling for 5 sec.-ft. of water, then no water right of a later date was to be honored until his 5 sec.-ft. of water could be delivered.

This sometimes meant that the settlers far up the river might have to let their crops burn up in order that 50 sec.-ft. of water might flow down the stream, taking a tremendous percolation and evaporation loss as it went, in order that the old settler far down the stream might receive his full quota of 5 sec.-ft.! When a farmer's crops are burning from lack of water he is likely to defy the law and decide that 50 sec.-ft. of water should not be sacrified to furnish such a small amount 30 mi. away. He and his neighbors will throw a diversion dam across the stream and will take all the water until the users downstream organize in a body and come up and tear it out. In such a way the rule of the mob could quickly displace the application of the law. This was specially true when there were several water administering bodies on each stream.

Further complications came in. By law, if a certain person could, in some fashion, demonstrate that he had lessened the loss in a stream by some work, or that he had developed a certain additional flow of water by swamp drainage, then he could claim, and receive, a "perpetual" right. This right must be supplied before any other right could be filled. A number of these rights were obtained on upper Little Wood River and since the users were up near the stream's headwaters they could be sure of obtaining their full decreed rights.

In addition, the floods in Big Wood River did not often coincide with those in the Little Wood River, usually coming somewhat earlier. At an early date some enterprising farmers in the valley of the Little Wood, took flood waters from the Big Wood River and dumped this water, via the Cottonwood Canal, into the Little Wood River, ran it down this channel for a few miles and then took it out on their farms. It often happened that this Cottonwood Canal right (a Big Wood right) was good and water was being delivered on it, when older rights on the Little Wood River were shut off because of lack of water. Such a Little Wood decree owner would then point to the undeniable fact that flow in the Little Wood River was high and that his right should be good.

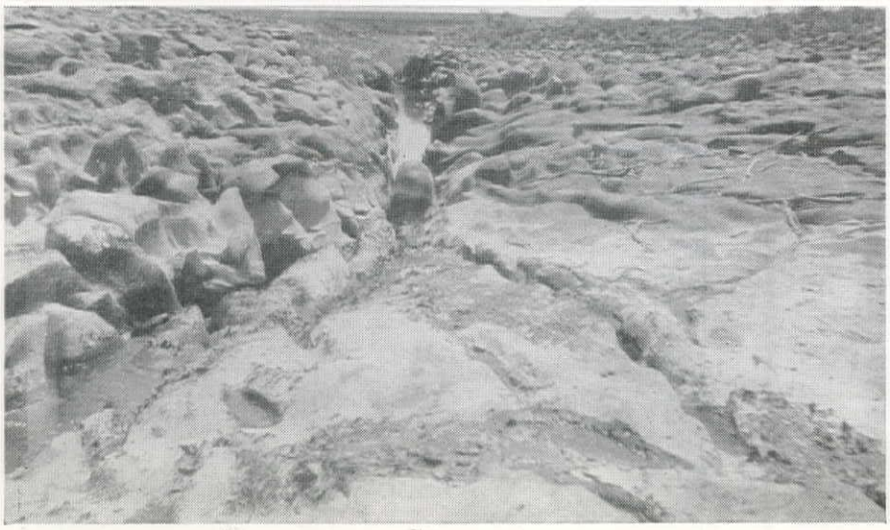
New complications entered the picture. According to the Carey Act of Congress, reservoirs could be established to utilize the flood waters of a stream. A good reservoir site was found on the Big Wood River just before the stream left the rhyolite and emerged upon the shattered basalt plain. An earth dam, holding back some 200,000 ac-ft. of water was built and new lands put under cultivation. Many old rights were traded for shares in the reservoir or for "Carey-Act" water. A high-line canal was run from Big Wood River across to the Little Wood River near Richfield.

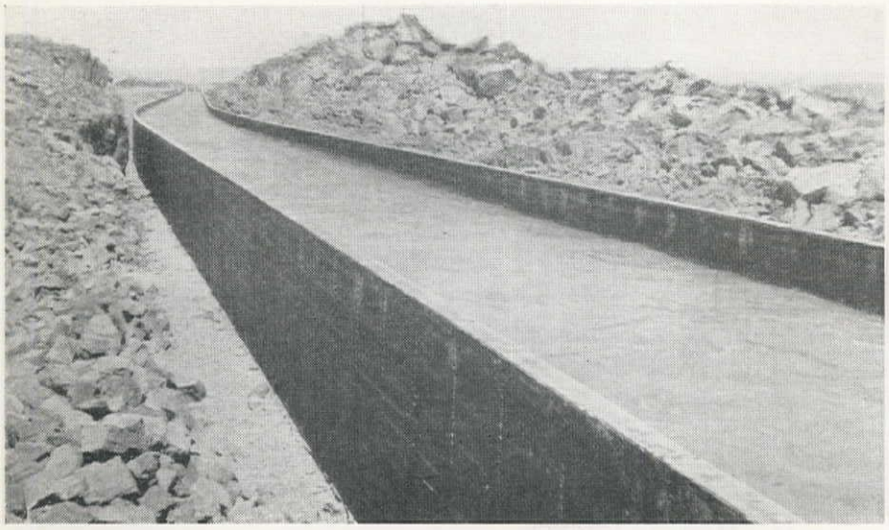
The Big Wood Canal Co. was organized and administered as a separate unit. Various canals were taken out of both streams to irrigate new lands around Richfield, Shoshone, and Gooding. During bad years when the Magic Reservoir did not fill completely the Carey-Act farmers were accused of trying to steal the decreed water of those farmers who had not traded in their natural flow rights. In other years, when the natural flow was low but the reservoir contained an abundance of water, the decreed rights were often accused of taking more than their share.

To complicate the situation still more, some land west of Gooding was put under cultivation by a subsidiary of the North Side Canal Co. This canal came

A RECENT lava flow on the Snake River Plains north of Shoshone illustrates some of the geological history of southern Idaho. Only a small amount of soil has collected over this lava bed.

LAVA GORGE section of the Big Wood River a few miles below Magic Dam accounts for large percolation losses in the river. Aided by swift water and abundant gravel, the stream cuts its way down through the cracked lava very quickly.





CONCRETE FLUMES are required in many places in southern Idaho because percolation losses in the lava rock may be greater than the entire canal flow. This is a section of the Shoshone Canal between the Little and Big Wood Rivers north of Shoshone.

from the Snake River and irrigated lands around Jerome. A branch from this same general canal system took out to the north and dumped into the Little Wood River near Gooding. This Snake River water used the Little Wood channel for a couple of miles, was taken out by a large canal and dumped into Big Wood Channel, stayed there for a mile or so before being taken out by another ditch and sent to irrigate the lands around Bliss, some distance west of Gooding.

Such was the complicated system of irrigation on the Wood Rivers about the time of the World War! Probably ten different water masters, part-time and full-time, made efforts to administer small parts of the system. Each one, hard pressed by the people he represented, sought to obtain all the water that was due him with the result that considerable friction developed and violence was more than common.

A "Moses" was certainly needed and one rose in the burly shape of the late S. H. Chapman who organized the water users on the Wood Rivers and became their first engineering administrator. From a bickering, fighting chaos he formed Districts 7AB and 11AB into smoothly working units. He perfected a bookkeeping system for the whole region. Every morning he received gage readings on all streams and canals. Posting these on a carefully prepared desk chart he could then calculate where every second-foot of water was going. From the heights of stream flow he could determine what rights could be delivered and could dispatch orders at once. If a run was being made by the Cottonwood Canal, the North Side, or the Big Wood Canal Co., he could tell exactly how much water was released and how much could be delivered after all channel losses were properly prorated.

The water master knew his books, the law, and the rivers. Of still greater importance, he had a fine knowledge of men and an unswerving honesty. He was a strong and tireless worker. Some thirty gages had to be working perfectly in order that the bookkeeping system work without loss of irrigation water. At various times gaging stations would lose their accuracy due to some changes in the channel bed, stones, mud, or moss. The bookkeeping system would show up this discrepancy and would indicate that one of several stations might be "off". At such frequent intervals the water master or one of his assistants would go post-haste to the particular region and measure the stations with a current meter. This water measuring was being carried on continually because only by keeping the stations under almost perfect control could such a complicated district be kept in harmonious operation.

In 1928 a new complication was added to the Wood River Irrigation District. A canal was taken from the Snake River at Milner, thence across the intervening 50 mi. of lava to the Little Wood River near Shoshone. This was storage water from the American Falls reservoir 100 mi. away and it was dumped into both the Little Wood and the Big Wood Rivers. This additional water complicated the work of the water master somewhat but lessened the chances of bad years due to lack of water.

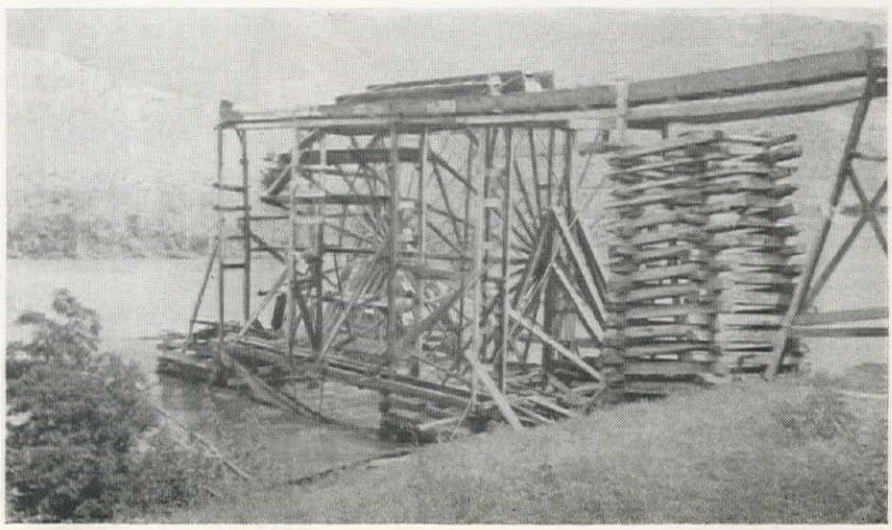
The building of the canal was somewhat of a feat in itself. Basalt is hard to run a ditch through, the rock being hard to work with explosives. In addition the lava is filled with cracks, holes, and large caves once occupied by sub-surface flows of lava, now drained away. Water flowing into these cracks or caves will fall, practically without resistance, to the water table several hundred feet below. There it will flow along the impervious rhyolite until it pours back into the Snake River from the large springs in the canyon wall on the north.

These great springs, some flowing as much as 1000 sec.-ft., are located between Twin Falls and Buhl but the canyon is 800 ft. deep here and the water cannot be taken out for irrigation. The canals across the lava must be built carefully. In a few places the basalt is tight enough to hold the water after a season or two of silting up. In many places concrete patches must be used and in other localities a complete concrete ditch must be made.

Almost all of the water is sometimes taken from the Snake River at Milner. This is no concern to the farmers down the river as the large springs cause the volume of the stream to double itself in no more than 20 mi. In addition, once the canyon of the Snake begins the available land along the river is in such a narrow piece that little of it can be irrigated except by large irrigation wheels, which are probably found no other place in America.

The Southern Idaho farms are, as a rule, prosperous and well kept. The summers are rather short and hot but the winters are not excessively severe and the snowfall is not great on the plains. There is a heavy fall of snow in the Sawtooth Mountains to the north, this caus-

IRRIGATION WHEELS are used on the Snake River below Milner Dam where the canyon is too deep for water to be taken out except to irrigate the narrow strips of low land in the canyon. The wheel raises the water about 20 ft. and irrigates about 30 ac. of alfalfa.



ing the building of the famous Sun Valley winter playground on the upper Big Wood River. There are many falls and rapids in the Snake River and the many power plants furnish cheap power to the region. The kerosene lamp is seldom seen on a southern Idaho farm and more than 50% of the farms are electrified. The latest electrical devices are common in the country as well as in the towns and rural electrification is a reality and not a dream. In the towns hotels and schools are sometimes heated by electricity.

Idaho is a new but an up and coming state whose fame does not rest only upon Sun Valley, Craters of the Moon, Ice Caves, America's deepest canyon, fine hunting and fishing, the Shoshone Falls, the production of silver, butter, sugar beets or the Idaho potato. It might also boast first place in rural electrification and the nation's most complicated irrigation district.

National Defense Highways Provide Convention Theme

American Association of State Highway Officials meeting in Seattle, Wash., adopt resolution urging the completion of adequate military roads in the United States

"MAKE the Highways Safe for the Army" might well have been the motto of the more than 550 delegates who attended the twenty-sixth annual national convention of the American Association of State Highway Officials in Seattle September 16-19 where the problem of making the nation's roads adequate to meet military demands was the principal topic. And paramount among resolutions adopted was one calling upon the Federal Government to make sufficient funds available as will insure early completion of an adequate system of strategic highways necessary for proper defense. The same resolution pledged the services of the Association in carrying out the program.

Indicating the magnitude of the defense highway program, Congressman James W. Mott of Oregon in his address to delegates recommended Congress pass a special bill to make possible a $1,000,000,000 schedule of construction and improvement. Mott is a member of the House roads committee.

Consensus of delegates and speakers at the conclave was that reconstruction and not construction of new super-highways is the primary problem. Widening, straightening and strengthening of highways, construction of by-passes to route traffic around large population centers, and reconstruction of bridges to bring them at least up to the minimum loading standard of H-15 were listed by engineers as first steps in improving the highway system.

Enthusiastically determined to solve the problem of defense highways, the delegates to the convention from every state in the nation gathered in Seattle Monday, September 16. While business sessions were concluded Thursday morning, delegates continued on pleasure trips which ended in Oregon Friday with a trip around the Mt. Hood Loop and luncheon at Timberline Lodge on Mt. Hood. The trip to Oregon was made by caravan after the new Narrows bridge at Tacoma was inspected Thursday afternoon.The pontoon bridge across Lake Washington, Seattle, was visited Wednesday after Charles E. Andrew, chief consulting engineer, Washington Toll Bridge Authority, addressed the delegates on the design and construction of the span.

A FEW quotations from addresses:

"I think it would not be out of place to remind you that if war should occur tomorrow, it would be a military impossibility to move an army with its tanks, artillery, supply trucks and other equipment over the highway from Seattle to San Francisco." —Congressman James W. Mott.

"It is important that all highway departments look first to their bridges. Weak bridges render roads otherwise suitable useless for military purposes."—A. W. Brandt, superintendent of public works, State of New York.

"The most apparent general lack in existing rural highways is the too-narrow shoulder widths."—T. H. MacDonald, Federal Commissioner of public roads.

"The various states have listed 59,000 miles of state roads that need rebuilding, 26,000 miles that should be widened, 21,000 that should be relocated, and 21,700 bridges that should be widened or rebuilt."—W. C. Markham, executive secretary of the A. A. S. H. O.

"The weakness in Washington is the fact all traffic funnels into the narrow and crooked highway from Vancouver up through Kalama and Kelso."—Henry F. Cabell, chairman of Oregon State Highway Commission.

"More can be gained by by-passing large centers of population than by widening existing pavements and road sections."—A. W. Brandt.

Business sessions were held in the Olympia Hotel and presided over by Henry F. Cabell, retiring president, and chairman of the Oregon State Highway Commission. J. S. Williamson, South Carolina state highway engineer, was elected new president of the Association at its concluding meeting. Detroit was tentatively selected as the 1941 convention city. George H. Henderson, chief engineer, division of roads and bridges, Rhode Island, was re-elected treasurer. Those named to the executive committee were: A. W. Brandt, superintendent of public works, State of New York; C. W. Brown, chief highway engineer, Missouri; and T. H. Cutler, chief highway engineer, Kentucky. W. C. Markham, Washington, D. C., is executive secretary of the Association.

Vice-presidents, selected by districts, are: Ezra B. Whitman, chairman of Maryland state highway commission; C. J. Sherlock, Alabama state highway director; E. L. Roettiger, chief highway engineer, Wisconsin, and R. L. Bobbitt, Texas highway commissioner.

Enlarging upon his proposal for a billion-dollar appropriation from Congress, Congressman Mott said he believed the new defense program should be in addition to the regular Federal Aid work, with the government contributing the major portion of it. Said he:

"I should say not less than 75% of the cost, and perhaps as much as 80 or 85% should be borne by the Federal government, instead of the 50-50 contribution which now prevails."

Declaring the main highways are ideally located for defense purposes, in the opinion of the War Department, Congressman Mott expressed confidence in the ability of road builders to continue their efforts toward national defense objectives without the confusion and uncertainty which marks other phases of the defense program.

One of the outstanding addresses at the convention was made by T. H. MacDonald, Federal Commissioner of Public Roads, who said state-wide surveys form a secure foundation for sound policies, and provide the detailed information for effective and immediate action toward making the highways suitable for military and defense purposes. He said the road building organizations of state highway departments must be used to carry on the active engineering and supervision of any defense highway program.

MacDonald declared he believed the extension of free flowing highways through metropolitan areas, as a problem in the strategic urban network, embodies the greatest task if really efficient highway transport is to be secured. In those areas, MacDonald said, the most rapid increase in local traffic, already carried upon overloaded highways, can be expected. Regarding standards for roads which will be used for large scale training maneuvers, MacDonald had this to say:

"The structural requirements to meet minimum military needs correspond closely to those which have been accepted as the minimum to meet civil highway transport needs. The H-15 spec-

ification loadings which have been standard for rural bridges are adequate to carry all military loadings which are proposed up to the present time. The 9000-pound wheel loading for road surfaces, provided the traffic is carried on pneumatic tires, is in line with the capacity of standard highway pavements."

In a paper read to the convention in his absence, A. W. Brandt, superintendent of public works, New York State, stressed the importance of remedying deficiences in the present highway system before any super-highways are built. He urged construction of by-passes around large, congested cities, and said:

"More can be gained by by-passing large centers of population than by widening existing pavements and road sections (in cities)." Turning to the requirements of roads for military use, Brandt continued:

"The standards of construction set up by the Department of Public Roads are not unreasonable, although it may be difficult and expensive to secure sight distances of 650 ft. and 10-ft. shoulders in mountainous country. We have been given the alternative, however, of turnouts one-half mile long at intervals of four miles on each side of the road, staggering them so that such turn-outs will occur every two miles.

"It is important that all highway departments look *first* to their bridges," Brandt continued. "The minimum standard calls for an H-15 loading. In New York state we build an H-20 loading on all routes. We have found the average H-20 bridge costs only 10% more than an H-15 bridge, and the extra strength is good insurance in case of emergency. An H-20 bridge will more than pay for its extra cost through its longer life, even on roads which will never carry loads in excess of 15 tons," Brandt said.

Diversion of highway funds to other purposes was flayed by Secretary Markham in his address, and the convention later passed a resolution condemning that practice. It asked that steps be taken to insure all highway user revenues be devoted solely to providing more adequate highway service.

Pointing out road builders in the Pacific Northwest have had to build heavy-duty highways to support logging trucks, Henry F. Cabell, retiring president, said he believed these roads sturdy enough to handle the ordinary run of troop and transport movement in time of war, although they would probably not support the heaviest of tanks. In common with other highway officials, Cabell said he felt the coast routes must be improved, with especial attention paid to bridges.

The problem of railroad grade crossings was discussed by J. G. Brennan of Washington, D. C., grade crossing engineer for the Association of American Railroads. He urged improved highway signs be installed to warn motorists of dangers ahead at crossings. Under the Federal grade crossing program, about 6,000 of the 230,000 grade crossings in the nation have been eliminated or protected in recent years at a cost of $280,000,000, Brennan continued.

He declared many grade crossings might be eliminated entirely and traffic diverted to other crossings. As to the future, Brennan suggested no new highways be constructed across railroad lines at grade level.

Forest highways came in for consideration by the convention which expressed itself as being concerned over the fact only 42% of the planned Class I system of such roads is constructed. By resolution, the Associated urged Congress to provide increased appropriations in order to bring the Class I system to a parity with the Federal aid system.

Curved Alignment of Diversion Tunnel Complicates Survey at Mud Mountain

A COMMENDABLE record in surveying was made recently by the alignment section of the Army Engineers at Mud Mountain Dam on the 23-ft. tunnel, which was holed through on May 13. This 1,976-ft. tunnel was worked from both ends and holed through on a slight curve. When engineers had checked up they found the alignment to be off just a trifle over .01 ft. on line and .015 ft. on grade.

In a tunnel location where a long backsight is possible this accomplishment would not have been unusual, but from the lower portal the alignment crew had only 150 ft. for a backsight because of the narrow box canyon of the White River. Concrete monuments were placed every 300 ft. in the tunnel, which was driven on tangent except for the last 120 ft. from the upper portal. Since it was necessary to timber the tunnel throughout its entire length because of the condition of the rock structure, the survey crews had to be ready to help line up every 4-ft. timber set. This meant 456 set-ups in the timbering from the lower portal, and 15 from the upper portal, which was driven only 108 ft. on a curve with a 200-ft. radius.

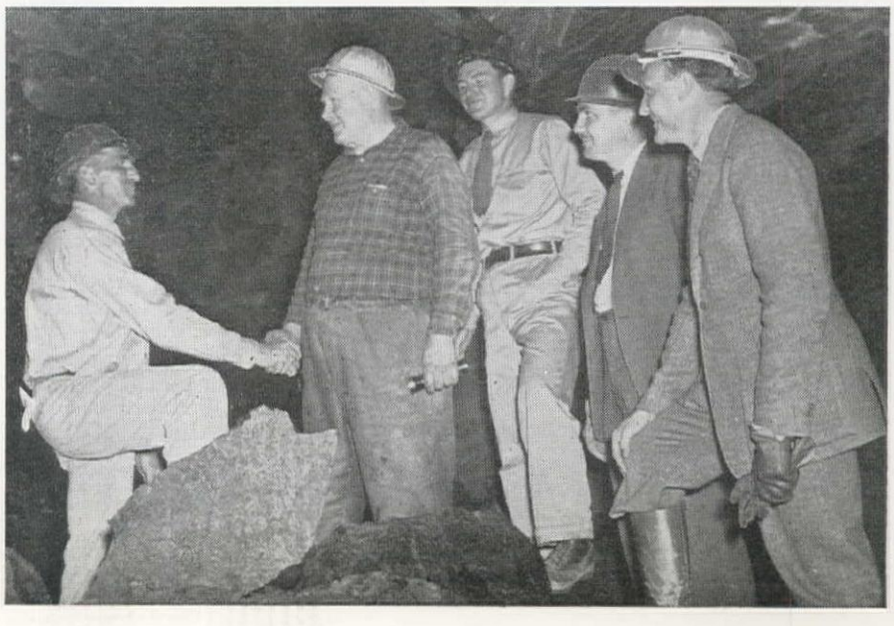
Because of the large size of the tunnel, a target was devised which could be hung at the spring-line, instead of on a tripod as is customary on smaller bore tunnels. This was used to spot overbreaks.

K. C. Danstrom, assistant to James A. Moody who supervised this work, had charge of the work from the lower portal for about 1,800 ft., and J. J. Monahan was chief of party carrying the line on the curve at the upper portal. Other party chiefs were R. B. Burelbach, W. K. Clemons, William Berryman, H. E. Myers, and Bernard Small.

Another outstanding achievement of the alignment section was the absence of any lost-time accidents—or accidents of any sort, during the six and a half months the tunnel was being bored. Although the engineers had to clamber over rocky canyon walls several hundred feet above the White River in running their lines, and pass in and out of the tunnel while muck cars were shuttling back and forth, not a single accident was sustained. The entire U. S. Engineer force at Mud Mountain Dam, numbering about 155, has gone more than 680 days without a lost-time accident. Much of the credit for this record goes to the men on alignment work because of the hazards involved.

Mud Mountain Dam is being constructed by the Guy F. Atkinson Co. under the supervision of the U. S. Engineer Office, Seattle District, of which Colonel B. C. Dunn is district engineer.

AT THE HOLING THROUGH congratulations are exchanged: (Left to right) Stancer Frost, acting safety inspector, U.S.E.D.; Jack Nelson, tunnel superintendent, Guy F. Atkinson Co.; A. H. Rodes, chief inspector, U.S.E.D.; W. E. Hoy, assistant resident engineer, U.S.E.D.; and Capt. A. G. Trudeau, Corps of Engineers, chief construction division, Seattle District.



Construction Design Chart

LVIII . . . Concrete Airport Runways

By JAMES R. GRIFFITH
Professor of Structural Engineering
Oregon State College

AVOIDING the controversial issue of relative merits of materials, the following discussion gives a quick method of determining the slab thickness of concrete airport runways. It is based on Older's corner stress formula as modified by F. T. Sheets.[1]

The recommended formula for the interior thickness of runway slabs is

$$t_i = \sqrt{\frac{0.70\ W\ I\ c}{S}}$$

In which

t_i = Interior slab thickness, in.;
W = Static wheel load, lb.;
I = Impact factor;
c = Coefficient of subgrade support;
S = Concrete stress, lb. per sq. in.

Whether a tail skid or tricycle landing gear is used, two wheels represent the basis of the first contact on landing. Thus the static wheel load is one-half of the gross plane weight.

The impact may vary over a large range from a low value for correct landings by commercial pilots, to a high by student pilots. It is thought that 100% impact represents a reasonable average, so a factor of $I = 2$ is recommended in the formula.

The coefficient (c) for subgrade support is a function of the allowable bearing power of the supporting soil. The following values are recommended:

Bearing Power of Soil		Value of "c"
Lb. per Sq. In.	Tons per Sq. Ft.	
5	0.36	1.096
10	0.72	1.000
20	1.44	0.900
30	2.16	0.842
40	2.88	0.800
50	3.60	0.770

The allowable stress (S) in the concrete is a function of both the modulus of rupture of plain concrete and the number of repetitions of stress applications. It is recommended that a value of

$$S = \frac{\text{Modulus of rupture}}{1.6}$$

be used, which would permit many years of handling peak capacity of heavy transport planes.

The gross weight of land planes may vary through a very large range, and with the present trend it is difficult to anticipate where the maximum will be. At the present writing, the 45-passenger Douglas DC4 with a gross weight of 65,000 lb., is one of the heaviest. The maximum to be used will depend upon the class of airport and someone's guess. Fortunately for purposes of slab design, the heavier planes have the most experienced pilots who set their planes down gently resulting in a low impact factor.

For a solution of the chart, a line drawn between the "B" scales and one drawn between the "A" scales, must intersect on the "SUPPORT." Lines have been drawn on the chart for the assumptions:

Bearing power of soil = 40 lb. per sq. in., $c = 0.8$,
Concrete stress, $S = 700$ lb. per sq. in.
Gross plane load = 20,000 lb.

The necessary internal slab thickness is seen to be $t_i = 4.0$ in. By formula we have

$$t_i = \sqrt{\frac{0.70\ W\ I\ c}{S}}$$

$$= \sqrt{\frac{0.70 \times 10{,}000 \times 2.0 \times 0.8}{700}}$$

$$= 4.0 \text{ in.}$$

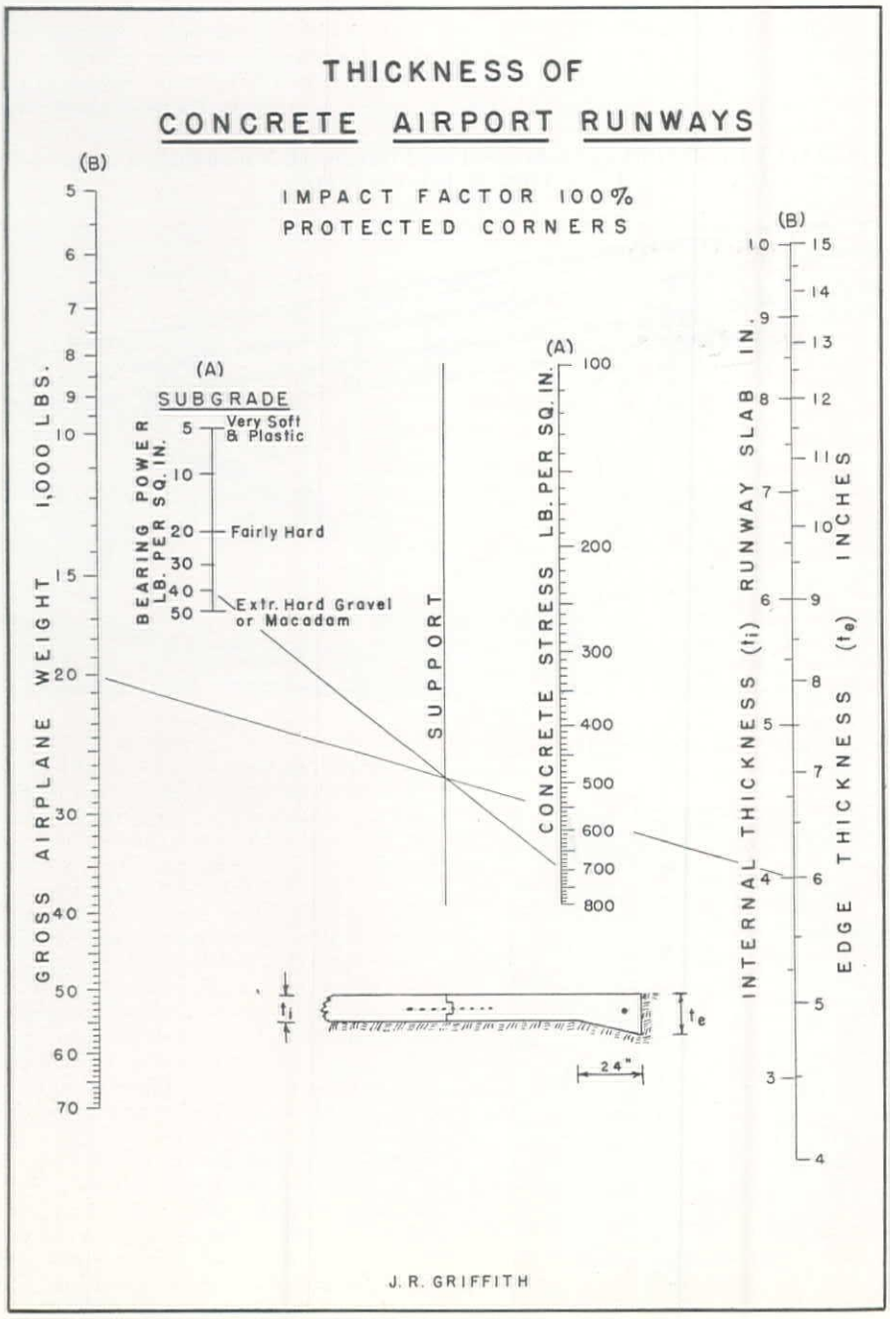
When the corners are protected by painted and greased shear bars, the edge should be thickened in the outer 2 ft. to a value of

$$t_e = 1.275 \sqrt{\frac{0.96\ W\ I\ c}{S}}$$

$$t_e = 1.275 \sqrt{\frac{0.96 \times 10{,}000 \times 2.0 \times 0.8}{700}}$$

$$= 5.97 \text{ in.}$$

This value is checked by that found on the chart on the scale for edge thickness.



1. No. HB11, Concrete Information, Portland Cement Association.

Auxiliary Kick-Back Blade

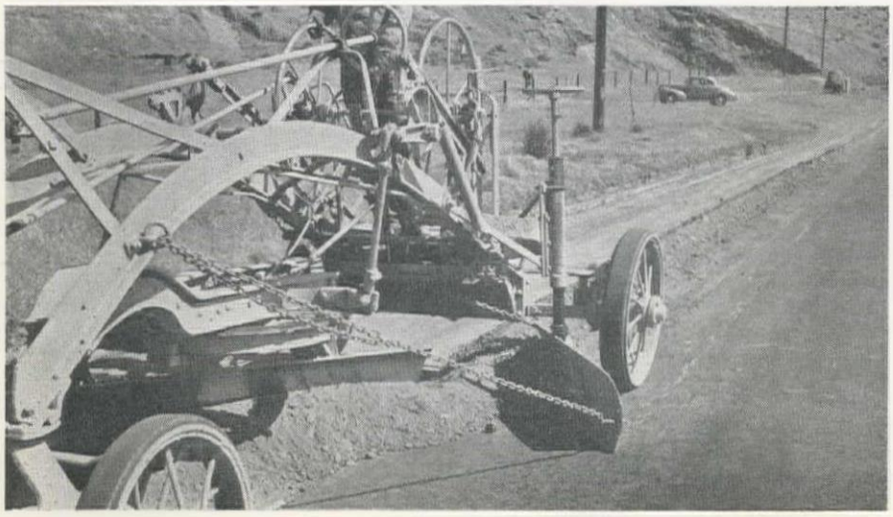
BLADING earth or gravel surfaced shoulders of paved highways always presents a problem in providing for safety of traffic while the grading is in progress. Many state highway maintenance departments use an auxiliary blade attached to the grader in some manner which removes loose material from the pavement during the same pass of the machine which throws it up there.

From time to time these pages have presented illustrated descriptions of several of these attachments. The maintenance forces of District No. 5 of the Washington Department of Highways with headquarters and shop located at Yakima use the auxiliary blade attachment but with variations in the way of supports and adjustments.

Known as an auxiliary kick-back blade and used on tow blades, the attachment consists simply of a 4-ft. moldboard section with blade supported from a bracket attached to the grader frame. The bracket holds a section of inside threaded tube in a vertical position through which passes a threaded rod. The blade is connected to the lower end of the rod by a single pin, permitting the blade to rotate vertically about its support and thereby follow the surface of the pavement or shoulder. The auxiliary blade is mounted in front of the left rear wheel and on an extension of the line of the main blade, catching material as it comes around the inside end of the main blade and moving back off the paved surface. The auxiliary blade can be adjusted and held at any desired angle by chains at each end connected to the main frame. A hand wheel at the top of the supporting threaded rod allows for vertical adjustment.

Lacey V. Murrow is director of highways for Washington and Norman Hill is district engineer at Yakima. Arthur M. Rhodes is shop foreman at Yakima and Earl Moorhead is master mechanic.

TOW BLADE auxiliary used in the Yakima division of the Washington Highway Department is a floating blade supported by a single pin.



Pipe Dolly Carries Long Crane Boom

By CLAYTON M. ALLEN
Assistant General Construction Superintendent
Los Angeles Bureau of Power and Light

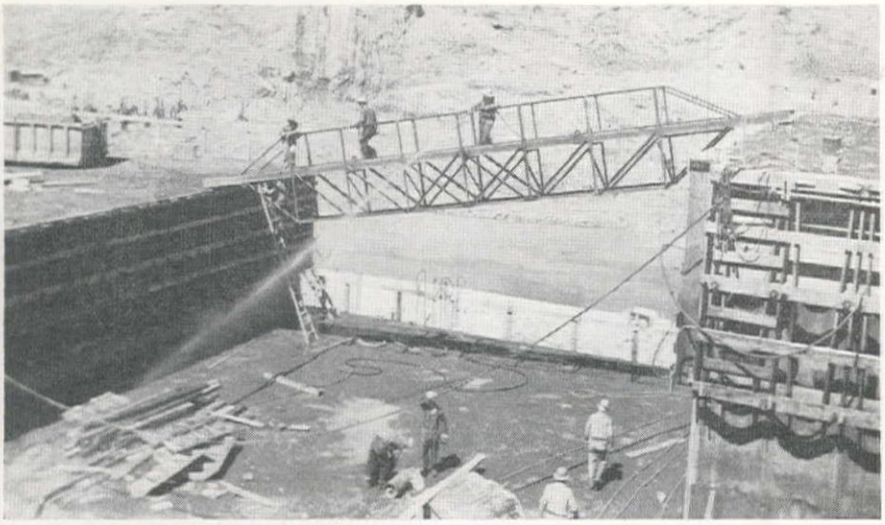
ERECTION of 120-ft. single-circuit, steel towers on the third 287,000-volt Boulder transmission line of the Los Angeles Bureau of Power and Light with a 105-ft. boom crawler crane in desert country was a pioneering step.

SPECIALLY DESIGNED and fabricated steel framework is mounted on a pipe dolly to carry a 105-ft. crane boom 1,000 ft. between towers.

To facilitate the moving of the crane with its long boom from one tower to the next, construction engineers of the Bureau temporarily converted a two-wheel, pneumatic-tired pole dolly into a "boom dolly" by fabricating a welded framework of 3 and 2-in. angle iron.

When soft blow sand was encountered, double wheels were installed with 32x6-in. pneumatic tires which allowed the moves of approximately 1,000 ft. from tower to tower to be made without difficulty. The framework of the dolly was constructed so as to keep the boomed down position high enough so that the boom could be raised by the crane without other power.

The crane used was a P&H with an 80-ft. boom to which was added a 25-ft. jib boom making a total boom length of 105 ft. For moves the crane lowered the boom onto the dolly framework and crawled across country, pushing the boom along in front of it on the dolly.



CONCRETE WORKERS AT SHASTA DAM USE PORTABLE BRIDGE

TO PROVIDE safe and convenient walkways between blocks on Shasta Dam, Pacific Constructors, Inc., have designed and built a number of welded steel foot-bridges for the use of the numerous workmen required to travel over this area. The difference in elevation maintained between the blocks would otherwise mean the extensive use of ladders by many workmen carrying tools and materials. The bridges are lifted and moved from location to location as required by the cableway equipment overhead.

Driving Steel Sheet Piling

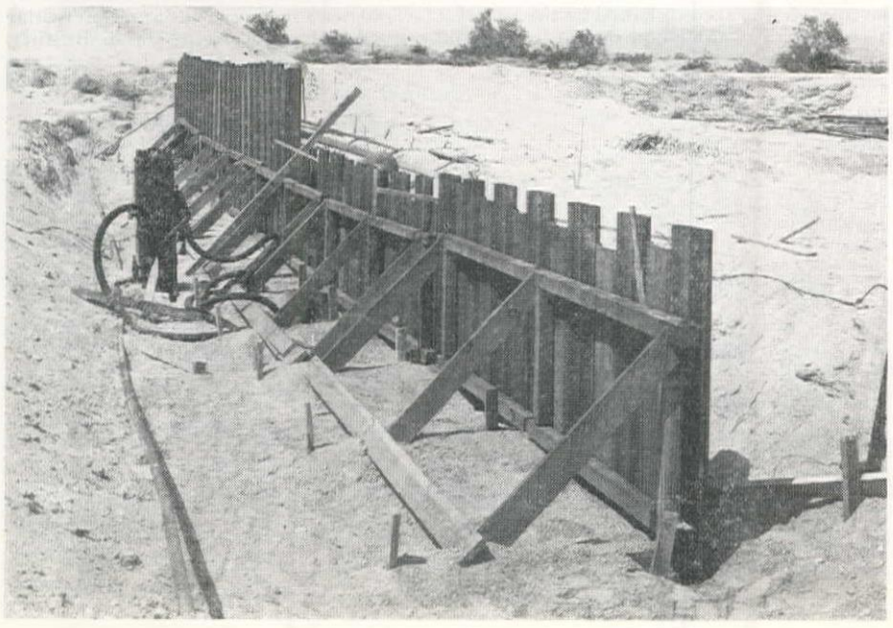
SECTIONAL timber frames were used to support steel sheet piling driven beside siphons of the Coachella canal to prevent erosion. A description of the work on the second 40-mi. section of the canal which is a part of the All-American Canal project in southern California appeared in the July, 1940, issue of *Western Construction News*.

The accompanying photograph shows the piling in place with one side of the supporting frames in place and the other side removed. By constructing these supports in movable sections the contractor was able to reuse the same supports at each piling location. Thirty-two siphons of various lengths were required to carry the Coachella canal under washes, and each of these structures was protected against erosion by steel sheet-piling cut-off walls and rock fills placed on the downstream side of each siphon and along its entire length.

The piling are 10 ft. long and very in length from 166 to 291 ft. A trench 2 ft. deep is dug and the frames set up in the trench. The piling are driven by a McKiernan-Terry No. 7 steam hammer handled by a truck crane. Steam is supplied from a 50 hp. oil burning boiler mounted on skids and dragged from site to site by a tractor, or for long distances lifted onto a low bed trailer and hauled by truck. No leads are used under the hammer, only short pants attached to the bottom of the hammer.

After the driving is completed the frames are removed and the trench backfilled with rock riprap. Driving is always done at night so that a complete view of the operations is not available.

STEEL sheet piles were driven between two sets of timber supporting frames which could be moved from site to site as the work progressed. Supports similar to those on the left had been removed from the right side of this cut-off wall before the picture was taken.



Compressor Trucks Used as Moving Dollies

NEARLY every construction job is equipped with one or more portable compressors, and occasionally it becomes necessary on a job to move a small building without the usual equipment being available for this type of work.

At Grand Coulee dam the Bureau of Reclamation forces had several small buildings to move but did not have the usual dollies at hand. With several portable compressors available it was decided to borrow the trucks from these. The trucks were equipped with solid rubber tires and roller bearings, and were husky enough to carry five or six tons.

Long 12x12-in. timbers were shoved through underneath the buildings and a "goose neck" made from scrap 8-in. I-beams to fit each end. A short piece of 4-in. I-beam was bolted to each truck axle and a 1-in. bolt welded to the top flange in the center of the section to act as a king pin (see illustration).

The goose necks were made by welding an 8-in. length of 1¼-in. pipe to one end of the 8-in. I-beams which could then be slipped over the king pin on the truck described in the previous paragraph. A strap of ½x4-in. was welded to each side of the I-beam at the other end, extending below the beam slightly more than 12 in., and a bearing plate of

HOW

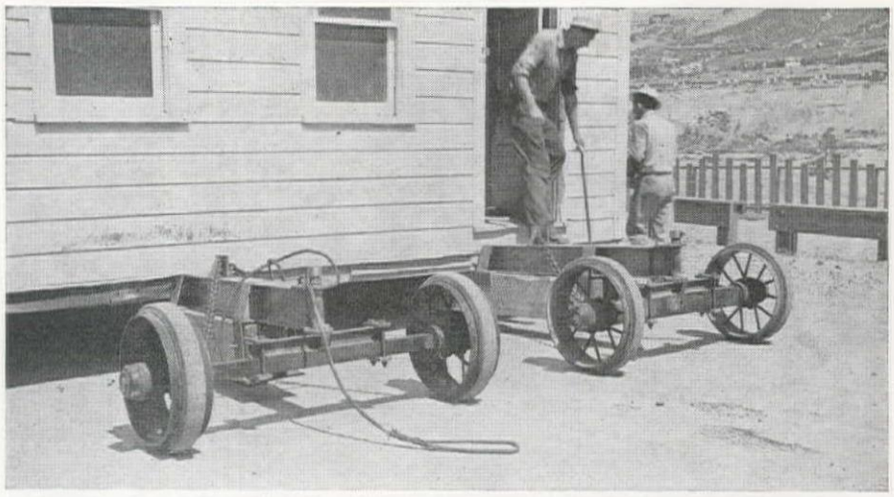
WAS IT DONE

in your case? Have you developed a tricky little idea that might help someone else out of a tight spot? A penciled note to the editor is all that is necessary.

HOW ½x6-in. steel plate welded between the straps. The straps were braced across the web of the beam by short sections of 8-in. I-beam welded perpendicularly to the main beam and providing a width of slightly more than 12 in. between the straps on either side of the beam.

Similar straps were placed farther forward on the I-beam, thus providing two loops underneath the beam in which the 12x12-in. timber could be supported. The chief feature of the goose necks was that they could be applied to any timber without the necessity of framing, and were held in place by the weight of the building.

With two of these compressor truck dollies in the rear, the front end of both timbers was supported by a single heavy duty dolly which was coupled to a truck providing the motive force.



COMPRESSOR trucks serve (above) in place of the usual dollies for moving buildings at Grand Coulee Dam. Special goose necks carry the timbers supporting the building. A rubber-tired dolly in front (left) supports both timbers and is connected to the motive power.

SEND in your short cuts or special uses of equipment that have helped out in tight spots. Snapshots and penciled descriptions are all that is required and you will get the credit for good ideas.

Tractor Crane Speeds Job In Handling Cement Vats

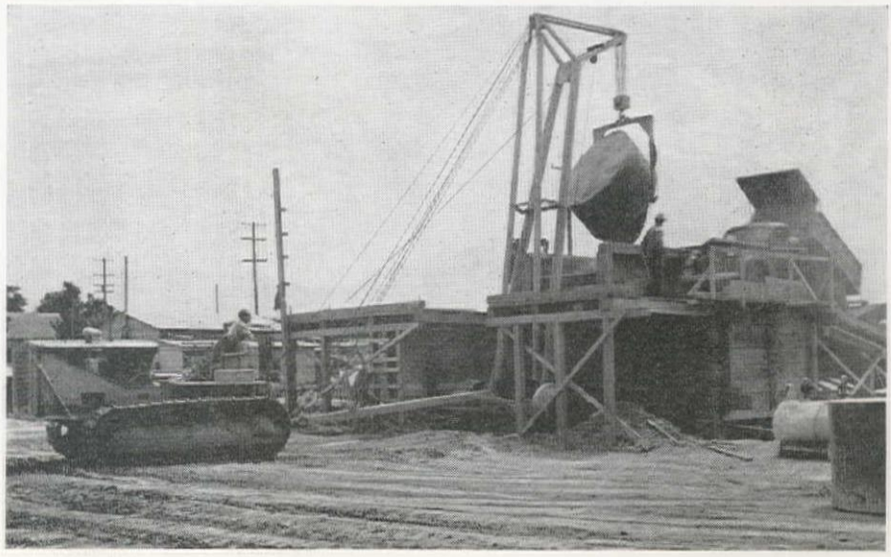
ADVANTAGE was taken of a unique use for tractor cranes when Roy L. Houck, Salem, Ore., contractor was recently engaged in paving a section of the Pacific Highway in the vicinity of Albany, Ore. Bulk cement was trucked to the job in 6-ton circular vats and transferred to a hopper at the batching plant.

Cement was hauled to the job during the night shift and unloaded at the plant by means of a 30-ft. LeTourneau tractor crane and Caterpillar D8 tractor equipped with a double drum power control unit. Empty tanks were placed back on the truck following the unloading operations.

During the day, the tractor and crane unit transferred cement from the vats to the batching hopper as required by paving operations. The vats could be picked up from the unloading point, the crane moved forward and backed into position beside the hopper and dumped. The dumping was accomplished by the second line from the power control which tipped the vat. Then the crane carried the vat back and it was ready to be loaded onto the hauling truck at night.

About 30 tanks were handled each day without the installation of special equipment, the tractor and crane being among the usual equipment of the contractor.

DUMPING 6-ton circular cement vats into the batching plant for an Oregon highway paving job was accomplished by the use of a LeTourneau tractor crane and Caterpillar D8 tractor. The same equipment loaded and unloaded the vats during the night shift.



NEWS OF WESTERN CONSTRUCTION

OCTOBER, 1940

Federal Aid Funds Authorized for Next Biennium

PRESIDENT ROOSEVELT signed the 1940 Hayden-Cartwright Federal Highway Act on Sept. 5, which authorizes the expenditure of $327,000,000 for the construction of highways throughout the forty-eight states for the fiscal years 1942 and 1943. Provisions in the act authorize the Reconstruction Finance Corporation to aid the states in the acquisition of necessary rights-of-way for highway projects eligible for Federal Aid. Such negotiations must be routed through the various state highway departments and must be approved by the Public Roads Administration.

The bill, as signed by the Chief Executive, authorizes the following expenditures:

Federal-aid System	$100,000,000
Secondary Roads	17,500,000
Grade Crossings	20,000,000
Forest Highways, etc.	10,000,000
Public Land Roads	1,500,000
National Park Roads	4,000,000
Parkways	7,500,000
Indian Roads	3,000,000
Total	$163,500,000

Authorization to use funds for the specific purpose of improving highways of strategic importance to national defense is provided in the act. Use of funds to pay entire engineering costs of surveys, plans, specifications, estimates and supervision of construction of national defense highways, on order of the Federal Works Administrator, in cooperation with the Secretary of War, the Secretary of the Navy or other empowered national defense agency is also authorized by the new act.

When informed that President Roosevelt had affixed his signature to the new Hayden-Cartwright Federal Highway Act, Hal G. Sours, president of the American Road Builders' Association, stated: "While the present sum for each of the two years 1942 and 1943 is a substantial reduction, as compared with the total amount originally introduced, it is, nevertheless, an increase over the amount passed by the Senate. When the bill was first considered by the House, it called for $238,000,000. The House passed a bill calling for $178,500,000. After Senate debate, the bill passed with the yearly sum cut to $160,500,000. Before the bill went to the White House, however, the total was boosted in conference to $163,500,000. The President's approval is indication, I believe, that the administration is fully aware of the absolute importance of good roads to national preparedness. There is a double national asset in modern highway construction that I want to point out. Roads are not like other defense weapons. They are not stored up in warehouses like guns and ammunition. They are not tied up at naval bases like fighting ships. They are not housed in hangars like airplanes. They are not held in waiting for the eventuality for which they were prepared. Modern highways continue to adequately serve the day-by-day pursuits of peacetime motoring America — they are also ready to immediately serve any future defense demands."

Contractors Nominate National President

THE executive committee of the Associated General Contractors has nominated M. W. Watson, of Topeka, Kansas, to succeed H. B. Zachry, of Laredo, Texas, as president in 1941, according to managing director Edward J. Harding. D. W. Kimball, president of Owen-Ames-Kimball Co., Grand Rapids, Michigan, was nominated vice-president to succeed Mr. Watson. If elected, the officers will assume their positions at the annual convention at Houston, Texas, Feb. 17-19, 1941.

Mr. Watson carries on extensive highway, bridge, and building operations in Kansas, Missouri, Nebraska, Colorado and Texas. He is vice-president of the A.G.C. for 1940. He has been chairman of the highway contractors' division, member of the advisory board and executive committee, and of the Joint Cooperative Committee of the American Association of State Highway Officials and the A.G.C. He entered the general contracting field in 1923. Previously he had been state highway engineer for Kansas, and in early stages of highway development in charge of experimental road work for the Illinois Highway Department.

Mr. Watson is a member of the American Society of Civil Engineers, Kansas Engineering Society, Topeka Engineering Club and civil organizations.

U. S. Reclamation Benefits Reported To Congress

THE FEDERAL reclamation program is geared to give security to approximately 500,000 families in 17 western states in the next ten years, John C. Page, Commissioner, Bureau of Reclamation, has reported to a special Congressional Committee. These families would be self-sustaining on irrigated land or in cities and towns that rise or expand in the wake of irrigation developments. In a statement prepared for presentation to the committee investigating interstate migration of destitute citizens, Commissioner Page outlined the Bureau of Reclamation's program for water conservation in connection with the critical droughts in the last decade, the migrations that have followed, and the resultant pressure of population on the irrigated states westward.

E. B. Debler, hydraulic engineer, Bureau of Reclamation, discussed with the committee irrigation characteristics of the arid and semi-arid regions west of the 100th meridian. He emphasized the opportunities water conservation offers to stabilize conditions for the support of a larger population in that area. Mr. Debler said preliminary studies indicated that if all the remaining land in the West for which water appears to be available were under irrigation, only about 22,000,000 additional acres could be brought into cultivation. This acreage, which is about the same as that now under irrigation, would support an additional population of 6,300,000 persons and create property values of $16,000,000,000.

Commissioner Page explained that a major feature of the current reclamation program is the rehabilitation of agricultural areas in the Great Plains and similar areas through water conservation and utility projects authorized by the Congress of 1939. These projects are designed to anchor farm families in their present locations. Older objectives of the program include the development of settlement opportunities for migrant farm families who have fled westward from droughts and the development of supplemental water for established irri-

(*Continued on page 359*)

Contractor Heads State Flood Control Group

COORDINATION of flood control and water conservation projects throughout California will be undertaken by a new statewide Flood Control Committee of the California State Chamber of Commerce. The committee, composed of representatives from all of the Chamber's six regional councils, will be headed by George G. Pollock, of Sacramento, regional vice-president, director of the State Chamber, and a well known contractor.

The committee just appointed will continue the program inaugurated several years ago by a committee under the chairmanship of the late James M. Burke, of Visalia. The eighteen point flood control policy for California, formulated by that committee, has been adopted by the State Chamber Board, and approved by the California Irrigation Districts Association.

The new committee will conduct an intensive study of flood control problems in California, and will also work toward coordination of the work of local, state and Federal agencies, so as to develop a consistent, long term development program. The committee will function as part of the State Chamber's Natural Resources Department.

Personnel of the committee, by districts, includes: Central Coast District, Howard Jack, Cholame; Walter Wilkinson, Watsonville; Geo. C. Holberton, San Jose; and H. L. Haehl, San Francisco. San Joaquin Valley, Warren Brown, Clovis; C. Kaupke, Fresno; and L. W. Hesse, Merced. Sacramento Valley, Geo. G. Pollock, Sacramento; Stephen Downey, Sacramento; Jesse Poundstone, Grimes; and A. T. Spencer, Gerber. North Coast, Senator Irwin Quinn, Eureka; Everett Cox, Ukiah; and Stanley Jones, Napa. Central Valley, Chas. Olinger, Modesto; R. E. Hartley, Oakdale; and Karl Brueck, Stockton. Southern California, J. J. Prendergast, Redlands; C. L. Preisker, Santa Maria; H. S. Gilman, San Dimas; Wm. A. Smith, Los Angeles; and H. E. Hedger, Los Angeles.

Washington to Modernize Pacific Highway to Everett

ABOUT $14,000,000 will be required for the reconstruction of the Pacific Highway, by the Washington Highway Department, north from the Oregon border to Everett. The plans for this long-range highway construction program have been announced recently by Lacey V. Murrow, state director of highways. The project provides for the reconstruction of this important Pacific Coast highway route to ultra-modern design, providing 4 lanes of divided highway with 2 deg. curves and 5% maximum grade. The completed project will reduce the highway distance from Vancouver to Olympia from 119 mi. to 101 mi. The estimated expenditure does not include the $1,500,000 which is being spent on this route during the current biennium.

The work will be carried forward in several individual projects as funds become available. At the present time, grading is under way on a section from Vancouver to Woodland, and it is expected that two lanes of this new highway will be ready for traffic next season. In general, the new highway will be of the same design and type as the completed section now in use from Olympia to the Nisqually cutoff. The design provides for two 21-ft. pavements, separated by a 4-ft. neutral zone, with 9-ft. shoulders on either side.

Plan Arizona Aqueduct

THE NEED for a supplemental supply of water in the area adjacent to Phoenix, Ariz., has resulted in a proposal for the construction of an aqueduct from Parker Dam on the Colorado River. The original estimate places the cost of such a project at about $15,000,000. Present plans are in a preliminary stage, with indications that federal financing will be requested. The supply will supplement the water now available for the Salt River and Casa Grande valleys.

•

ABOUT 180 airports will be improved, enlarged and equipped for emergency use in the State of California as part of the National Defense program, according to an announcement released by the Civil Aeronautics Board. The cost of this airport development program in the State of California will total more than $20,000,000.

Rocky Mt. A.W.W.A. Section Holds Meeting

THE fourteenth annual convention of the Rocky Mountain Section of the American Water Works Association was held in Denver Sept. 16-18. Over 150 waterworks engineers, superintendents and others in allied interests convened at the three-day program. Many papers were presented relative to operation and design of filtration plants, sewage treatment plants, and service lines. Among proposals that would result in new legislation was that of initiating a bill for the state legislature that would require the licensing of water superintendents, and operators in charge of water purification or treatment plants and sewage treatment plants.

William A. Peters of Jerome, Idaho, was elected chairman of the Rocky Mountain Section of the American Water Works Association at the closing session of the fourteenth annual meeting. Robert L. Streeter of Gillette, Wyoming, was elected vice-chairman, and Ben V. Howe, Colorado State Sanitary Engineer, was re-elected secretary-treasurer. The next meeting of the section will be held in Santa Fe next fall.

At the closing session it was agreed that the association would sponsor a four-day school for water works operators and that it would be held in Denver next January or February. Engineers and operators in the association will conduct discussions and give lectures on technical problems. Members from Colorado, Wyoming, New Mexico, Southern Idaho, and Western Nebraska are expected to attend.

The closing day of the meeting was given over to the problems of the Rocky Mountain Sewage Works Association and a discussion of various proposed amendments to state laws governing the establishment of sewerage district.

Los Angeles Engineering Organization Designing U. S. Navy Fleet Facilities

ENGINEERING work for the fleet operating facilities to be built by the U. S. Navy at San Pedro, Calif., will be carried out by Allied Engineers of Los Angeles. This engineering group is a recent consolidation of consulting engineers and architects in Los Angeles, organized to be available for this type of Government defense work. The president of the organization is Donald R. Warren, consulting structural and civil engineer. Other members of the group include Paul R. Williams, architect; Adrian Wilson, architect; E. L. Ellingwood, mechanical and electrical engineer; C. A. Sanborn, mechanical and electrical engineer; E. A. Evans, structural and civil engineer; and S. B. Barnes, structural and civil engineer.

Present plans call for the project to be the world's largest naval operating base, with accommodations for drydocking and repairing the largest ships of the fleet. The original plans, for which engineering work was started by Allied Engineers, totalled approximately $5,500,000, including major items of dredging, $1,500,000, and a breakwater at $1,430,000, with the remainder consisting chiefly of building construction, including $500,000 for a shop and assembly building.

Subsequent reports indicate that the Navy expects to expend more than $18,000,000 on these facilities.

Contract for carrying out the work is held by the Guy F. Atkinson Co. of San Francisco, and George Pollock of Sacramento.

Allied Engineers has headquarters in the Architects Building, Los Angeles, and is carrying forward field and office work under the general direction of Donald R. Warren.

U. S. Engineers Board Visits Western Work

A BOARD of U. S. Army Engineers has completed an inspection trip through the West, which included visits to most of the important construction projects under way or planned by the Corps of Engineers. The group was headed by Brig. Gen. Thomas M. Robins, Assistant Chief of Engineers and senior member of the board. Included in the group were the division engineers from other parts of the country and representatives from Washington headquarters.

The trip was designed to familiarize the board with river and harbor problems throughout the West, and was stated to have no military significance. Beginning in southern California, they visited harbor development projects along the coast, and then inspected current work on the Friant Dam job, as well as the sites for other flood control structures in the San Joaquin Valley. After stopping at San Francisco, the group continued north, visiting Shasta Dam and the flood control work being carried on by the Corps of Engineers in the Willamette Valley. After inspecting harbor improvement projects in the Pacific Northwest, the board visited the Grand Coulee Dam project.

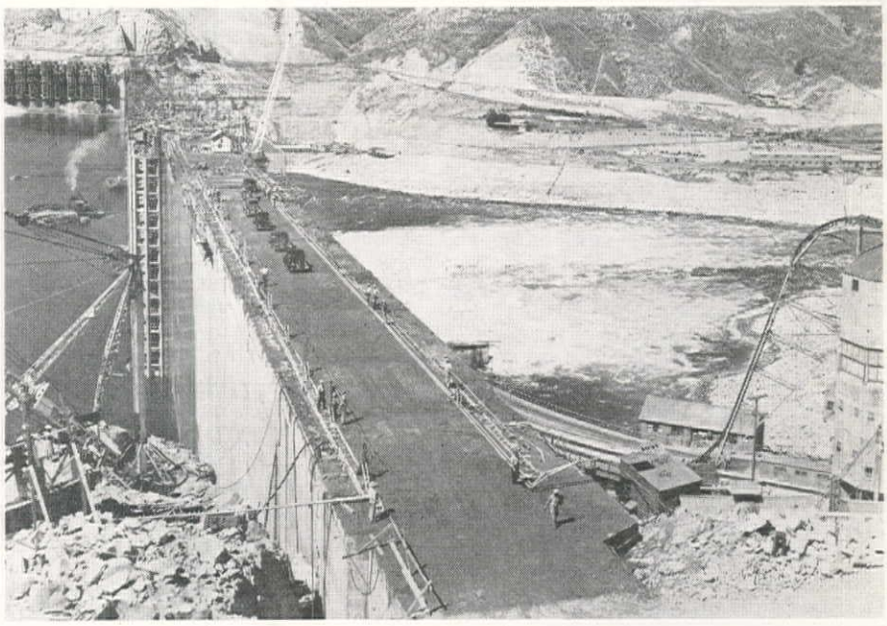
During the trip, the board was accompanied by division and district engineers of the U. S. Engineer Office in connection with visits to work being carried out under their jurisdiction.

Bureau of Reclamation Controls Boca Dam Use

"THE uncompleted nature of the project, and the unsatisfactory repayment and excess land situation have rendered it inadvisable to turn over the operation of the project to the district." This statement, contained in a letter written by John C. Page, Commissioner of Reclamation, to Congressman Scrugham, indicates the present situation relating to the use of Boca Dam. Directors of the Washoe County Water Conservation District claim that the $80,000 expended by the Bureau of Reclamation in excess of the payment obligated under the construction contract was unauthorized by the District. The District has declined to assume this additional financial responsibility in connection with the construction of the dam.

There is also a question relating to ownership of land within the district since several parcels exceeded the 160-ac. total for single ownership provided as a minimum of the contract between the District and the Bureau.

Boca Dam is completed with exception of minor details, and the reservoir has been filled, but the use of this water and the regulation of storage is still in the hands of the Bureau of Reclamation.



AUTOMOBILES ARE NOW DRIVEN ON TOP OF GRAND COULEE DAM

WITH 700 ft. of Grand Coulee Dam's crest completed, workmen are driving their cars on what will eventually be a 4,300-ft. highway across the Columbia River. The 30-ft. roadway section will be directly over a waterfall larger than Niagara as the Columbia spills over the dam.

California Toll Bridge Authority Purchases Two Private Owned Bridges

ON September 16, the State of California acquired ownership and began operation of the Carquinez and the Antioch bridges across the upper end of San Francisco Bay. These structures were built and operated under private ownership until their recent purchase by the California Toll Bridge Authority. Following several months of negotiations relating to the state financing of the purchase through the issuance of revenue bonds, secured by tolls from the two structures, the American Toll Bridge Co. sold the two bridges to the State of California.

The Carquinez Bridge, located on the main highway route from the San Francisco Bay region to Sacramento and highways leading east and north, is of cantilever design, and includes two 1,100-ft. spans, with 500-ft. anchors at both ends, and an approach viaduct which makes the total length of the structure 4,500 ft. The general design of the structure was reviewed in *Western Construction News*, May 10, 1926, at the time the project was under construction.

Public agitation to have the state take over the structure resulted from the rate of toll which was charged by the private company. Action of the California State Railroad Commission recently reduced the toll rate to 50 cents per car, but this rate has been further reduced to 30 cents with the initiating of state control.

The Antioch Bridge includes a 320-ft. lift span, one 320-ft. fixed span, 2,100 ft. of deck truss spans, and 1,900 ft. of reinforced concrete trestle. This structure crosses the channels of the Sacramento and San Joaquin Rivers east of the town of Antioch. It was also owned and operated by the American Toll Bridge Co.

Appropriate ceremonies were held at the Carquinez Bridge site on Sept. 16, at which time the deed for the structure was transmitted from President W. W. Morrish of the American Toll Bridge Co. to Frank W. Clark, Director of Public Works, who turned it over to Governor Culbert L. Olson.

The net cost of the two bridges to the state was $5,593,000, and the Authority has authorized the issuance and sale of serial bonds of the revenue type amounting to $6,443,000.

Oregon Department Plans Coast Highway Improvement

PLANS for a $2,000,000 long-range construction program to improve the Oregon coast highway from Newport to Kernville have been recently discussed by R. H. Baldock, state highway engineer, and the state highway commissioners. The highway department has estimated that such an improvement and reconstruction program would involve a cost approaching $100,000 a mile for the 21-mi. section. In one section, it might be possible to utilize several miles of old railroad rights of way. Present plans call for keeping the alignment as near as possible to the rugged coastline to emphasize the advantages of the route for tourist travel.

Sewerage Improvements Planned at Los Angeles

THE need for carrying forward the extensive proposed improvement program on the sanitary sewerage system for the City of Los Angeles has been brought to a head by the California State Board of Health suspending the permit which allows the city to discharge sewage into Santa Monica Bay at its Hyperion screening plant. Complete plans have been made by the Los Angeles Department of Public Works which provide for the repair and reconstruction to existing trunk sewer lines, and the building of an adequate treatment plant to replace the existing screening plant. In fact, preliminary work for the new plant was started several years ago under WPA labor. This work involved the excavation of the necessary area at the site. No further work has been done on the improvement program.

Financing problems have delayed further work on this much needed plan. The latest development has been the proposal that a tax be levied on water users, to be paid in proportion to and along with their water bills, which would finance the sewerage improvement program. This plan would involve the need for a charter amendment, and it has been proposed that such an amendment be submitted to the voters next spring.

San Diego Voters to Pass On $4,300,000 Water Plans

THE WATER supply situation of San Diego, Calif., has resulted in plans for including two bond issues, totaling $4,300,000, on the November ballot. The bond issues would provide for the construction of the San Vincente Dam at an estimated cost of $3,550,000, and extensive improvements to the water distribution system. City officials have indicated that deficiencies which exist in the distribution system of San Diego, have resulted from the small amount of water-main construction carried out during the past decade. In this period, the population has expanded rapidly, and with the increase in U. S. Navy activity and related industrial expansion, the municipality is faced with a serious water problem to maintain an adequate supply for future requirements.

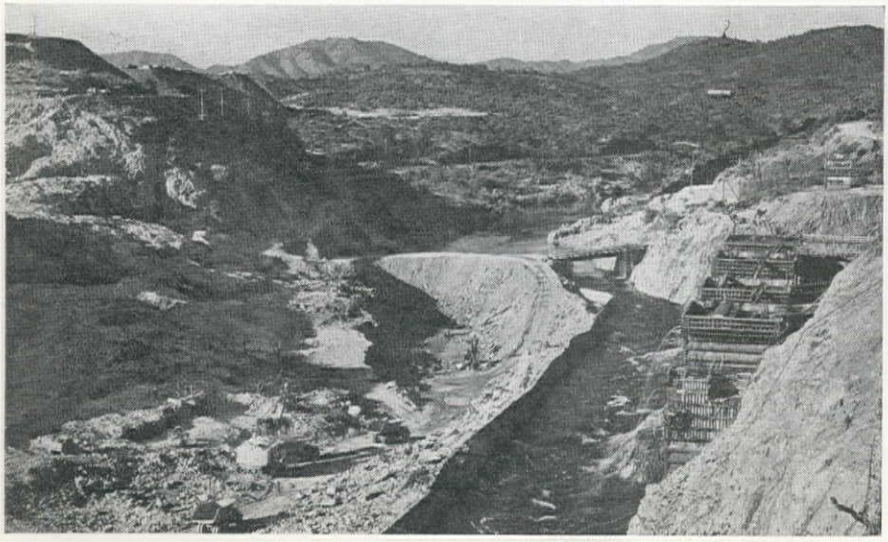
War Department Asks Completion of Viaduct

ADMINISTRATIVE backing for a highway viaduct to connect Sacramento and North Sacramento, eliminating the possibility of traffic interruption during flood periods, has been indicated in a recent statement issued by Governor Olson. The desires of the War Department have been a factor in this administrative action, because this particular section of highway provides access to the new Army Air Depot which is located north of Sacramento. At the present time, the highway extending north from Sacramento is not only inadequate but is located at an elevation below the levee system, and there is always the danger of traffic interruption during the flood season on the Sacramento River.

Surveys for the project, which were completed some time ago, have indicated a cost estimate of $600,000, but the commission has been inclined to postpone the initiating of the project. As a result of the Army request for improvement in this highway link, the State Department of Public Works indicates that funds may be made available in the near future.

EXCAVATION IN THE SACRAMENTO RIVER BED AT SHASTA DAM

Forced into a prepared channel by a temporary dam, the Sacramento River has been diverted past the Shasta Dam site by Pacific Constructors, Inc., and excavation is well advanced in the stream bed. The diversion channel extends along the edge of the first concrete to be placed in this structure, which is being built by the Bureau of Reclamation. Present progress and concreting procedure are reviewed in an article in this issue (p. 336).



A.G.C. Convention

THE Twenty-second Annual Convention of the Northern California Chapter, Associated General Contractors, will be held in San Francisco, December 20-21, according to a preliminary announcement issued by Floyd O. Booe, secretary-manager. The convention will include business sessions, presenting speakers covering subjects of general interest to contractors, together with sessions devoted to discussion of current problems within the industry. President Stanley A. Ball will be in charge of arrangements. The convention will conclude with the usual annual banquet and entertainment.

Caddoa Dam Contractors Get Notice to Start Project

FORMAL notification to begin construction on the Caddoa Dam in eastern Colorado has been received from the U. S. Engineer Department by the contracting organization which presented the low bid of $7,160,754. This contracting group consists of W. E. Callahan Construction Co., Gunther and Shirley, and Rohl-Connolly. These organizations presented the low bid to the U. S. Engineer Department on July 10 (complete unit bids, *WCN*, August 1940). The structure, which will provide for flood control and water conservation on the Arkansas River, has been renamed the John Martin Dam.

According to announcements from the site, construction work will start slowly, and will not be ready for rapid expansion until next spring. Headquarters have been established by the contractor at the site, and with the official notification, preliminary work will be started at once.

Washington Authority Will Refinance Pontoon Bridge

PLANS have been completed by the Washington Toll Bridge Authority for refinancing the revenue bonds which were issued to finance the state's share of the Lake Washington pontoon bridge and the Tacoma Narrows bridge. The refinancing will involve $9,020,000 worth of revenue bonds, and estimates indicate that a lower interest rate will effect a saving of more than $1,500,000 in interest. Whether this reduction in financing cost will be used to lower the established bridge tolls, or to advance the date when the bridges will be toll-free, has not been indicated. The original financing for the Lake Washington Bridge involves $5,500,000 worth of 4%, 30-yr. bonds, with the remaining $3,900,000 of total cost financed by means of a PWA grant. The bridge at Tacoma was financed by a $2,900,000 PWA grant and $3,520,000 of bonds purchased by the RFC.

WPA Operations Declared Unsuited to Defense Work

AT A conference of representatives from the western chapters of the Associated General Contractors, held in San Francisco on September 13, a resolution was adopted relating to use of contract operations in the National Defense Program. The resolution condemned the extension of WPA operations into the field of constructing armories, camps, airports, and other military projects. The resolution pointed out specifically the slow, inefficient and extravagant aspects of WPA work, and referred to the need for speed in connection with National Defense plans. The resolution included the following statement:

"BE IT FURTHER RESOLVED, That the performance of private enterprise in completing National Defense projects in record-breaking time at costs below those estimated by military officials demands the consideration of National Defense officials for the use of the facilities of the private construction industry and all of its great organization of expert personnel and modern efficient machinery in producing our National Defense facilities in the shortest possible time at the lowest ultimate cost."

White River Diverted At Mud Mountain Dam

DIVERSION of the White River at the Mud Mountain damsite was effected on Sept. 1 by the Guy F. Atkinson Co. with the blasting of a cofferdam which permitted flow through the 23-ft. diameter tunnel. Progress and construction operations on this flood control structure, being built near Tacoma, Wash., under the direction of the Corps of Engineers, were reviewed in the last issue of *Western Construction News*. Diversion of the stream past the site will permit excavation to be carried down into streambed, enabling preparations to be completed for the beginning of the fill. Under a modified plan outlined in the article last issue, the dam will have a compacted earth core, with heavy rockfill embankments on both sides.

Intermountain Utilities Plan Transmission Lines

PLANS for the construction of a $2,500,000 transmission line to connect utility systems of five states—Utah, Idaho, Montana, Oregon and Washington—are nearing completion. The plan was announced by the Utah Power and Light Co. When completed, the high-tension system will connect 280 existing privately owned steam and water power stations, with an aggregate capacity of 3,000,000 hp. The plan provides for immediate construction with the first unit of the 160,000 volt line to extend 270 mi. from Anaconda, Mont.

Edward J. Harding Dies; Manager of A.G.C.

EDWARD J. HARDING, managing director of the Associated General Contractors of America, died suddenly Oct. 5, having left his office Friday noon, and stopped overnight for a visit with his mother, Mrs. Julia A. Harding, of Plainfield, New Jersey, intending to take a boat from New York

Edw. J. Harding

City for a short vacation cruise to the West Indies. He was accompanied by his wife.

Mr. Harding was one of the most outstanding and widely known men in the construction industry, and had been managing director of the A.G.C. since 1930. In addition to his regular duties, he was serving as a member of the Construction Advisory Committee to the Army and Navy Munitions Board assisting in the defense construction program, and was a member of the Federal Advisory Council for Employment Security.

Mr. Harding had been with the A.G.C. for 21 years; after its formation in 1919 he became field secretary, in 1926 membership manager, and in 1929, assistant general manager. He traveled extensively, and his acquaintance with general contractors and their problems was unequaled. From 1917 to 1921 he had been manager for the James Stewart Co., general contractors, New York City. Some of the construction projects under his management were Camp Pike, Little Rock, Ark.; Camp Bragg, Fayetteville, N. C.; Coast Air Station, Long Island; Camp Barges, Baldwinville, N. Y.; naval base and arsenal, Norfolk, Va.; and two projects at St. Nazaire, Vincennes, France.

Mr. Harding was born in Plainfield, N. J., June 13, 1889.

U. S. Reclamation Program

(*Continued from page 355*)

gated areas threatened with retrogression to desert by shortages of water.

Commissioner Page noted that for the first time in history, the decennial census in 1940 shows that the five states of the northern Great Plains, where there is little or no irrigation, had a net loss in population. Of 397 counties in the Dakotas, Nebraska, Kansas and Oklahoma, 319 showed a decrease. In contrast, practically every county where Federal reclamation projects are located registered an increase in population, ranging as high as 70 per cent, largely the result of migrations from the drought areas.

In the 11 Western states, where agriculture is dominated by irrigation, the increase in population since 1930 was more than double the average rate for the country as a whole. "If one compares the population records for irrigation counties one with another, and then contrasts these figures with the records of the dry counties, the importance of irrigation in the development and the secure growth of these Western states becomes clear," the Commissioner said.

Citing Federal relief expenditures in the 17 arid and semi-arid states of $2,500,000,000 during the last seven years, Commissioner Page said the outlay seemed to be $250,000,000 more than the 1930 population would have justified on a per capita basis. He suggested excess expenditures at least could be traced to the uprooting of farm families by the drought and their migration westward in search of irrigated land on which to settle and become self-sustaining. Reclamation project farmers required relief in few instances. Owing to lack of irrigated land necessary to permanent agriculture in the arid states, only a few of the migrants have been settled where they could support themselves. They depended to some extent on seasonal agricultural employment, but relied principally on relief.

Commissioner Page explained that what the reclamation programs can accomplish in the next 10 years would be governed by funds made available for construction work. At the present rate of appropriations of reimbursable funds and with a limited diversion of relief funds for water conservation and utility projects in the Great Plains and similar areas of the West, he said, results that he summarized as follows could be accomplished:

1—Forty to fifty thousand farm families now in the West will be settled on irrigated land where they will be self-sustaining.

2—Seventy-five to one hundred thousand additional families will be supported in cities, towns and villages which will rise or expand in the wake of irrigation developments.

3—Eighty-five thousand farm families in areas now facing shortages of water will be made secure in their present locations, while three times the rural population will be stabilized as well.

4—Twenty to twenty-five thousand families remaining in the Great Plains and similar areas will be rehabilitated.

Southern California A. G. C. Honors the Achievements of M. W. D. Engineers

Testimonial dinner given those who directed the building of the Colorado River Aqueduct

RECOGNITION of the record made by the engineering staff of the Metropolitan Water District of Southern California during the seven periods of construction operations on the Colorado River Aqueduct was the occasion of a testimonial dinner on Sept. 26, sponsored by the Southern California Chapter of the A.G.C. The accomplishment of the officers and engineers of the district in carrying out the record project at a cost of $20,000,000 less than the original estimate was cited as an outstanding example of efficiency by a governmental agency. General Manager Weymouth, members of the district board of directors, and staff engineers and executives were guests at the dinner attended by representatives of general contracting firms from California and eleven other states.

The dinner was given to pay tribute to the efficient and economical manner in which the largest water supply system in the United States has been successfully constructed by the Metropolitan Water District, according to Frank J. Connolly, Manager of the Southern California Chapter. Among the contractor representatives present were many of the 223 contracting groups which have been engaged in various phases of aqueduct construction work.

Spokesmen for the contractors at the dinner meeting were Robert V. Edwards, general manager of the American Concrete and Steel Pipe Co., and president of the A.G.C. Chapter; J. Carson Agnew, manager of Winston Bros. Company, and Frank J. Connolly.

In citing the records established by the district in construction efficiency and economy, Connolly stated:

"At the conclusion of the performance of this great volume of complicated construction we, as experienced business men, knowing the facts, wish to publicly tell you and the citizens of Southern California that in the construction of the aqueduct, we have witnessed what we consider a shining, outstanding example in governmental efficiency.

"Your management and engineering staffs have set new high standards in public service. Headed by one of the greatest construction engineers and administrators of the nation, Frank E. Weymouth, you were bound to succeed. Mr. Weymouth surrounded himself with other top-notch engineers and executives, who have earned the respect and admiration of the construction industry by their intelligent, skillful, fair, and honest administration. They have also won our affection and personal friendship, all of which we wish to express publicly tonight.

"The whole enterprise has a brilliant record. First, its conception, next the opportune time selected for construction, then the efficiency and economy with which it was done, and finally the completion of the project ready to deliver an ample water supply at such a critical time, at the very moment when southern California stands upon the threshold of a new era, during which we are expected to make important contributions to our National Defense and the future development of the great Southwest. By delivering water at the opportune time you have removed the last limitation upon the full use of southern California's resources and the complete development of this area."

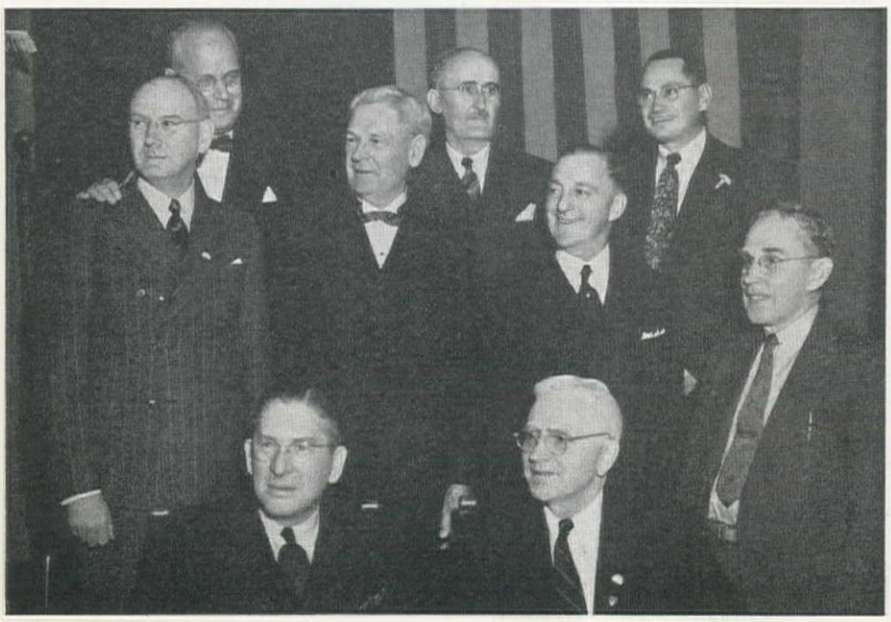
President Edwards of the Contractors Association characterized General Manager Weymouth of the Metropolitan Water District as one of America's greatest engineers, past and present, and praised his accomplishments in guiding the complex and huge task of solving the hundreds of engineering and administrative problems which confront the district organization.

"The general policies of the Metropolitan Water District on contracts and its inspection of jobs under construction have been strict and effective and at the same time fair and impartial," said President Edwards. "District officers and engineers achieved results. They obeyed the letter and the spirit of competitive bidding. For every job to do there was a specification clearly defining it. Bids were called on an equitable basis and the award of the contract was made solely upon a determination of the low responsible bidder. A breakdown anywhere along the way would have destroyed the essence and worthiness of competitive bidding. In the Metropolitan Water District there *were* no breakdowns."

Mr. Agnew, in his remarks, directed attention to the exceptional safety records established by the district and the contractor builders of the Aqueduct.

"Painstaking safety measures were constantly and meticulously prosecuted. The magnitude of this branch of the undertaking may be visualized when we realize that approximately 38,000 individuals worked directly on this project over a period of about seven years; and that for approximately two of these years 10,000 men were constantly on the payrolls. About $180,000,000 were spent and despite the hazards inherent in much of this total volume of work, the fatal accident frequency was less than 50% of that customary in heavy construction activity."

AT THE RECOGNITION DINNER: (Standing, left to right) Franklin Thomas, vice-chairman, board of directors, Metropolitan Water District; J. Carson Agnew, Winston Bros. Co.; W. P. Whitsett, chairman, board of directors, Metropolitan Water District; Julian Hinds, assistant chief engineer, M.W.D.; Victor Rossetti, director, M.W.D.; Robert V. Edwards, president, Southern California Chapter, A.G.C.; J. M. Gaylord, chief electrical engineer, M.W.D.; (seated, left to right) F. J. Connolly, manager, Southern California Chapter, A.G.C.; F. E. Weymouth, general manager and chief engineer, Metropolitan Water District.



Montana Highway Dept. Plans Highest State Bridge

PLANS for the highest bridge to be designed by the Montana State Highway Commission have been completed and submitted to the Public Roads Administration for a structure to span the Two-Medicine River. According to D. A. McKinnon, state highway engineer, construction would be started immediately following Federal approval of the project.

The structure will have a length of 760 ft., and will cross the river on the Glacier Park Cutoff near Browning. This cutoff has been graded and surfaced.

Washington News

. . . for the Construction West

By ARNOLD KRUCKMAN

Washington, D. C.—The Greenslade Board will be out on the West slope in October or November. This new Navy organization is important to you because it takes the place of the Hepburn Board. As you will recall, the Hepburn Board of survey and recommendations, since 1938, has guided the development of Naval shore facilities. The new survey will determine the plan for shore expansion made necessary by the recent legislation requiring 70% fleet expansion. Two members of the new Board live in California. Capt. Edmund Almy, senior force engineer, lives in Los Angeles; Commander Kendall B. Bragg, construction engineer, lives at Carmel. Rear Admiral John W. Greenslade, head of the Board, is senior fleet commander and is well known on the Coast. The other members are Capt. Russell S. Crenshaw; Capt. Duette W. Rose, Supply Corps; Capt. James C. Byrnes, Jr., Bureau of Ordnance; Commander John J. Ballentine, Bureau of Aeronautics; and Commander James L. Holloway, Jr., who will act as secretary of the Board.

The first three studies required, touch the Pacific Coast immediately. The Board is directed, as quickly as possible, to formulate a policy as to commercial facilities for shipbuilding and ship repair; for fleet facilities; and for aeronautic facilities. It also is required to present a program for storage, Marine Corps, ordnance, housing for Naval personnel, hospital resources, radio, Naval Research Laboratory, and other shore construction and building for the Navy. Its recommendations will chart the development of Navy shore business for a number of years to come.

Awards come fast

Awards and contracts for all kinds of national defense work have come so fast that even we, here in Washington, have difficulty in keeping abreast of them. The total of everything for the nation roughly is, so far, $7,000,000,000. More than a billion is being spent on construction. On the last day of September the total for the area West of the Rocky Mountains is $758,597,450.58. Of this aggregate it is estimated that over $500,000,000 will be spent for construction. And, naturally, more is coming. Public 99, signed late in September, provides $329,519,902 for expansion of military posts, and for cantonments and camps; and it provides the additional sum of $8,744,000 to lease or buy the land that may be needed. Details about this construction program are not available because the confusion here at present is even more bewildering than it was during the days of 1917 and 1918. Plans and specifications issue from the Quartermaster General Construction Section in the most sketchy form. The chief object is to get them into the hands of the general contractor. The greatest responsibility at the moment rests upon him. The man in charge locally on the job is the nerve center.

Army camps established

The most reliable sources in the War Department state they anticipate at the least one-third of the construction program will rapidly be developed in the West. We hear much here about a great, probably the greatest, national cantonment to be built in the area between Salt Lake City and Ogden. The same sources, informally and unofficially, expect another camp or cantonment in Nevada, probably somewhere in the general vicinity of Las Vegas. The old World War neighborhood of Camp Lewis, in Washington, is expected to be one of the outstanding points of permanent military concentration. In discussions here they mention for particular expansion Ft. Rosecrans, near San Diego; Ft. Elliott, near the Naval Air Station on North Island in San Diego Bay; the Long Beach airport for military uses; Reeves Air Field at San Pedro; Ft. McArthur, near San Pedro; the Santa Monica Air Field; and they expect a Reserve Camp may come into existence at Elysian Park in Los Angeles.

March Field, at Riverside, Calif., undoubtedly will be expanded into the nation's largest Army air training station; the Los Angeles Airport will become an important military facility; Camp Ord, between Salinas and Monterey, in California, is scheduled to be one of the largest camps in the United States; there will be decided expansion at Moffett and Hamilton Fields, in the vicinity of San Francisco; at McChord Field, near Tacoma; and Spokane is to have one of the four major air stations of the nation. The Bellingham airport, and the Snohomish County airport near Everett, are programmed for extensive improvements. And, naturally, Mare Island, the Puget Sound area, the Bremerton Naval Station, the Sand Point Naval Air Station near Seattle, and the Tongue Point station on the Columbia, all are major military works that will be largely expanded.

There is a bill in Congress, which will probably be law in October, providing funds for the building of armories and drill halls in various Montana centers. The list of places mentioned here as potential centers for military construction work on the Coast also includes Ft. Huachuca and Ft. Tuthill, in Arizona; Stockton, San Luis Obispo, Berkeley, Camp McQuaide, California; Denver and Pueblo, Colorado; Schofield Barracks, Ft. Shafter, Hickam Field, Wheeler Field, and Pearl Harbor, Hawaii; Missoula, Montana; Midway Island; Ft. Stevens, Oregon; Samoa; Wendover Field and Ft. Douglas, Utah; Nichols Field, Philippines; Ft. Worden, Vancouver Barracks, Washington; Guam, Ft. F. E. Warren, Wyoming.

Housing military forces

The various appropriations either already made or pending provide a huge housing development in connection with the various military centers. The Army and Navy are spending upwards of $200,000,000 provided from various funds; the President has allocated another $100,000,000 from his contingent funds; the Federal Works Administrator also will have $150,000,000 specifically for housing construction, and the USHA is spending some of its funds for multiple low-cost housing projects for national defense. Congress has fixed a minimum of $3,000 per dwelling for national defense homes of certain types; the Army and Navy are spending from $7,500 to $14,500 per dwelling on most of the homes the services are building; and Interior Secretary Ickes pays an average of from $5,000 to $6,000 for each of the 16 homes (with garages) his department is building in the Pacific Northwest as the start in its national defense housing program. It appears many sections of the Government will take part in this housing program, and that we shall be housed, willy nilly.

Highways and defense

You have doubtless had much discussion of the military priorities of the Federal road building program. Federal Works Administrator Carmody has told you about 25,000 or 30,000 mi. of highways on the West slope are to be widened to a uniform 24 ft., with 4-ft. shoulders, and with alternate parking places 2,000 ft. long, every 2 mi.; and with flight strips, and 700 bridges to be strengthened to be able to carry 50-ton tanks 50 ft. apart at 4 m.p.h. We hear that the West will build over 1,500 mi. of "access" roads, new highways to reach cantonments, camps and bases.

You have probably had word about the 100 airports to be built immediately by the Civil Aeronautics Authority, a certain number to be located just south of the Canadian border in the West. HR 10530 provides $620,000 to construct 62½ mi. road between Nixon and Gerlach, Nevada. HR 10523 directs that taxes derived from gasoline and lubricating oil be apportioned among the states according to the Federal Road Aid distribution, the funds to be matched by state funds, and not more than 60% to be spent on primary roads. The Alaska International Highway Commission is made the beneficiary of an undetermined appropriation in a recent bill.

There still is no substantial representation in the National Defense Advisory Commission organization for the West slope. Pending the election, Rep. Scrugham and others felt it was unwise to hold the meeting scheduled at which the western delegation was to crystalize action. Meanwhile, however, a mem-

orandum was presented to Commissioner Edward R. Stettinius, Jr., by some officials in the Government from the West, suggesting a definite plan for West slope representation. Mr. Stettinius told me he liked the idea decidedly.

The suggestion proposed that a regional national defense committee be created, composed of persons representing the business interests, the civic and commercial organizations, and the public and political units, of the entire West slope. The plan assumed that the regional committee would work both within the National Commission and as a regional subdivision in the West. The plan was circulated for discussion within the National Defense Advisory Commission and reached Frank Bane, the co-ordinator of state organizations in the Commission.

Mr. Bane modified the plan by proposing that the governor of each state be made the head of affairs in his state. This was regarded as a dilution of the idea that might defeat its purpose; and there, at present, it rests. And there it will undoubtedly rest until the election

(*Continued on page 44*)

Personally speaking...

S. O. Harper, K. B. Keener and **Frank A. Banks,** well known engineers of the Bureau of Reclamation, were awarded honorary Doctors' degrees during recent months. S. O. Harper, chief engineer of the Bureau, was awarded the honorary degree of Doctor of Science on June 10, 1940, by the University of Colorado, in recognition of his long service with the Bureau in the development of the water resources of Colorado and other western states. K. B. Keener, senior engineer, dams, was awarded the honorary degree of Doctor of Science on June 10, 1940, by Ohio Wesleyan University, his alma mater. F. A. Banks, construction engineer at Grand Coulee Dam, was awarded the honorary degree of Doctor of Engineering by his alma mater, the University of Maine, on June 10, 1940.

•

L. E. Ott, formerly resident engineer for the Washington Toll Bridge Authority during construction of the Lake Washington Pontoon Bridge at Seattle, is now manager of Dry Dock Associates at the Portsmouth Navy Yard, Norfolk, Va. He is supervising the construction of a drydock for shipbuilding.

•

C. W. Nash, Wenatchee, Wash., has been appointed to supervise the engineering work on the 600-mi. transmission line to be constructed by the Lincoln Electrical Cooperative, with headquarters at Davenport, Wash. **Wm. Eckoff,** Sand Point, Idaho, has been appointed resident engineer for the job.

•

H. J. Doolittle, district engineer for the U. S. Indian Service at Seattle, Wash., was sent to Juneau, Alaska, during September for a month's work in connection with the road program of the Indian Service in Alaska. During his absence **Norman B. Conway** was acting district engineer.

•

Lacey V. Murrow, director of state highways for Washington, has been ordered to a year's active duty with the U. S. Army. He holds the rank of Lieut. Col. in the Air Corps. **James A. Davis** has been appointed acting state highway director; **M. L. Mook,** assistant construction engineer, has been appointed office engineer, succeeding **O. R. Dinsmore,** who will be assistant state highway director. **A. E. Bates** will be assistant construction engineer.

•

C. L. Albertson, associate engineer, Bureau of Reclamation, on the Roza Division of the Yakima Project, has been promoted to the position of engineer, and transferred to the Altus project in Oklahoma. He will be succeeded by **C. E. Klingensmith** who was resident engineer on the Roza diversion dam.

•

A. M. McClain, city engineer of LaGrande, Ore., has been appointed resident engineer for the LaGrande airport project by the Civil Aeronautics Authority.

•

Steve Wallace, Jr., for many years with the Denver office of the Public Roads Administration, has resigned to accept a position as safety engineer with the Consolidated Aircraft Manufacturing Co. at San Diego, Calif.

•

John T. Lay, assistant county engineer of Clallam County at Port Angeles, Wash., has been appointed acting county engineer to fill the vacancy left by **Herbert W. Pollock,** who is on active duty with the National Guard.

•

Charles Powell, Denver engineer and at one time with the Bureau of Reclamation, has gone east to accept a connection with the U. S. Army at Fort Knox, Ky.

•

George W. Sperring, for the past three years with the Soil Conservation Service at Safford, Ariz., has accepted a position as mechanical engineering draftsman with the U. S. Navy, and has been assigned to the Puget Sound Navy Yard, Bremerton, Wash.

•

Harold Ohannesian, senior engineering aide with the U. S. Engineer Department, has been transferred from the inspection division at Prado Dam to the rivers and harbors section in the Los Angeles office.

•

Donald Morgan, inspector with the Bureau of Reclamation on the All-American Project, Yuma, Ariz., has been transferred to Friant Dam.

•

Claire Titus, formerly with Roza division of the Yakima Project at Yakima, Wash., has been transferred to the Portland, Ore., office of the Bonneville power project.

Obituaries . . .

Albert K. Warren, chief engineer and general manager of the Los Angeles County Sanitation Districts, died on August 28, in Los Angeles. He was born in 1887, and was educated in Illinois. From 1908 to 1914, he was engaged in location and construction of railroads in the Northwest, coming to California in 1914, where he entered the office of the Los Angeles County surveyor. During his work in that department, he was impressed with the need for sanitary facilities in Los Angeles Co., and was instrumental in securing the enactment of the County Sanitation District Act in 1923. The sanitation districts south of the City of Los Angeles were formed during 1924, and Mr. Warren served continuously as chief engineer and general manager of the district organization from its inception until his death.

•

Lieut. Col. Layson E. Atkins, 48, Corps of Engineers, U. S. A., took his own life late in September in San Francisco. Col. Atkins suffered a nervous breakdown while assigned as district engineer at Seattle, Wash., and had been undergoing treatment at Letterman Hospital.

•

Orrin C. Smith, 57, engineer for the Bureau of Reclamation at Denver, Colo., died on July 5, 1940. He was born in Wisconsin in 1883, and had been engaged on reclamation projects in Washington, Oregon, Nebraska, and Montana before being transferred to the Denver office of the Bureau in 1930.

•

Henry M. Morse, 75, retired bridge engineer, who designed the Broadway bridge in Portland, Ore., and the Aurora Ave. bridge in Seattle, Wash., died in Oswego, Ore., on Sept. 25.

Supervising the Jobs . . .

R. S. Mackey is supervising the construction of two reinforced concrete bridges over the San Joaquin River and San Joaquin River overflow between Fresno and Madera Counties north of Fresno, Calif. **Carl Elder** is carpenter foreman, and **M. Bailey** is labor foreman on the job. The contract for the work was awarded to Campbell Construction Co., Sacramento, Calif., on a low bid of $134,935.

•

Ray Hollern is superintendent for the Union Construction Co., of Great Falls, Mont., in charge of 8.6 mi. of highway grading which includes construction of drainage structures and two timber pile bridges on the Wisdom-Divide road in Deer Lodge County, Mont. **N. D. Robinson** is office manager for the contractor, and **Fey Ramsey** is master mechanic. Bid price for the job was $122,832.

•

R. K. Ames, formerly assistant superintendent for the General Construction Co. in connection with construction of drydock No. 4 at the Navy Yard, Bremerton, Wash., is now field superintendent for C. F. Lytle Co., of Sioux City, Iowa, engaged on the outlet structure for Denison dam, being constructed near Denison, Texas.

•

W. J. Isbell, superintendent for the Isbell Construction Co., Reno, Nev., is supervising a 5.7-mi. highway grading and surfacing job for that organization on the North Fork Feather River forest highway in Plumas County, California. **Frank Zielenski** is assistant superintendent. Foremen on the job include **Charles Baughn,** grade; **Jack Roche,** clearing; and **Charles Peterson,** concrete. The low bid for the work was $169,558.

•

C. C. Bieswanger is superintendent for the Angeles Gravel & Supply Co., Port Angeles, Wash., directing the construction of two reinforced concrete approach spans and four piers for the Spokane River bridge in Stevens and Lincoln Counties, Washington. **Dick Owens** is president of the Angeles Gravel & Supply Co.

•

Neal Saul is in charge of 0.7 mi. of grading and paving on Arroyo Seco parkway, Los Angeles, Calif., for **J. E. Haddock, Ltd.,** of Pasadena, Calif., who was awarded the contract at a bid price of $79,699. **Andy Larsen** is grading foreman on the job.

Carl Johnson is superintendent for Sam Bergesen of Tacoma, Wash., in charge of constructing a $104,500 recruiting reception center at McChord Field between Tacoma and Olympia. **Al Briles** is carpenter foreman, and **A. G. Seland** is labor foreman.

•

Knud Jensen and **W. C. Swenson** are superintendent and assistant superintendent, respectively, directing construction of a $75,900 utilities building at Moffett Field near Sunnyvale in Santa Clara County, Calif. Carl N. Swenson, San Jose, holds the contract.

•

Walter G. Sagunsky and **O. W. McIntyre** are superintendent and assistant superintendent, respectively, directing the construction of Big Dry dam and spillway in Garfield County, Montana. J. L. McLaughlin, Great Falls, Mont., was awarded the contract for the work on a bid price of $81,725.

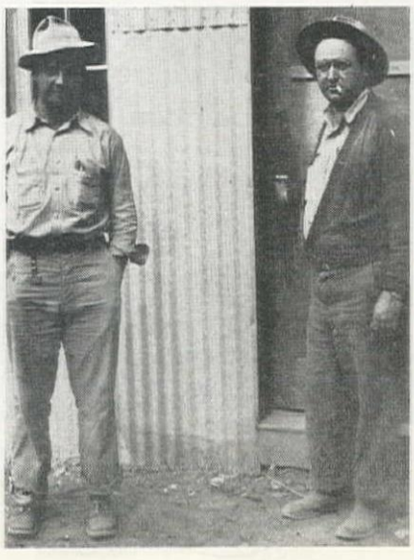
•

Hans Koch is in charge of the general construction of a gymnasium building at the Theodore Roosevelt high school, Fresno, Calif. The contract for the job was awarded to Trewhitt, Shields & Fisher of Fresno, Calif., on a low bid of $89,981.

•

M. L. Simpson, superintendent for N. M. Ball Sons, Berkeley, Calif., is supervising the grading and plantmix surfacing of 2.4 mi. of highway in the vicinity of Hagney's and Lanes in Mendocino County, Calif. **W. T. Spencer** is the contractor's engineer and **Roy Gregor** is office manager. Foremen on the job include **Roy Jones** and **C. B. Bowman,** grade; **Hap Grey** and **Carl Trent,** labor; and **W. D. Sorenson,** master mechanic. Word from the job early in September indicated that the grading was just getting started.

W. T. SPENCER (left) and M. L. Simpson, engineer and superintendent, respectively, for N. M. Ball Sons on the Mendocino County highway job.



•

John Nielson is supervising construction of an assembly hall and chapel at the Preston school of industry, Ione, Calif. The contract for general construction is held by Azevedo Construction Co., Sacramento, Calif., which submitted the low bid of $72,426.

•

Dan Fiorito is the superintendent in charge of 1.4 mi. of paving between Seattle and Renton, Wash. He is being assisted on the job, which includes construction of a timber trestle undercrossing, by **Joe Fiorito** and **Don Fiorito.** Northwest Construction Co., Seattle, Wash., holds a $119,526 contract for the work.

•

Dick Rowell has been directing the work of oiling about 4 mi. of the North and South highway in the vicinity of Bundy and Culdesac, Idaho, for the Triangle Construction Co. of Boise, Idaho. Oiling of 14.7 mi. between Greer and Kamiah on the Lewis and Clark highway has recently been completed by the same company.

•

H. A. McGagen has been made superintendent of the Mariposa section of the All-Year highway to Yosemite National Park, following the transfer of **Glen Mahon,** superintendent for the Valley Construction Co., to another job in the vicinity of Colusa, Calif.

•

Arthur Sather, a member of the Coeur d'Alene, Idaho, contracting firm of Sather & Sons, is directing construction of a seawall and dike embankment on Coeur d'Alene Lake and the Spokane River in Coeur d'Alene. To be done under the direction of the Corps of Engineers, the contract price of the job was $113,540.

•

Henry Ohlsen and **Roy Brust** are the superintendents directing work on the depot supply building at Hill Field near Ogden, Utah, for Peter Kiewit Sons Co., Omaha, Neb. **O. Gathers** and **John Hoppe** are the contractor's engineers; **Charles T. Larson** is timekeeper and **Jack Greerson** is office assistant. Foremen on the job include **A. Austin,** steel forms; **H. Hoover** and **C. Edwards,** carpenter; **R. Brock,** plant; **C. G. Metcalf,** steel erection; **F. Higgins,** reinforcing steel; **O. H. Benson,** concrete; **M. Davis,** labor; and **C. Williams,** concrete finishing.

•

A. M. Harsh is supervising construction of a 0.4-mi. highway grading and

1. **Barrett & Hilp.** San Francisco, Calif. (3 Lorains) use 2 Moto-Cranes for handling concrete on large housing project.
2. **Shull Moto-Crane Service.** Huntington Park, Calif. handle steel girders with Moto-Crane at Shasta Dam.
3. **Jack Shields.** Bakersfield, Calif. (7 Lorains) uses Moto-Crane equiped as dragline to dig slush pits in oil fields.
4. **Griffith Co. & Bent Co.**, Los Angeles, Calif. (6 Lorains) set up machinery with Moto-Crane at Friant Dam.

MORE MOTO-CRANES*

ON THE WEST COAST!

● New converts to Mechanized Moto-Crane* Service are being added daily. Look at the names above — prominent contractors who know crane values from A to Z. And look at the jobs — every one a "toughy" where only proven equipment has a look in.

When so many big contractors hand big jobs to a newcomer you know it has something. And here's the answer. The Moto-Crane meets the needs of our fast moving times. It laps up the miles, moving speedily to and on the job on 10 rubber-tired wheels — is mounted on a special Crane Carrier built for highway and off-the-road travel — has a Balanced Center Drive turntable offering direct-to-the-point power application, increased capacities and a more simplified construction — may be converted readily to clamshell, dragline, shovel or back-digger — is available in three sizes.

Would you care to see the Moto-Crane's advantages demonstrated on the job? You can. Just call or write your local Universal-Lorain distributor. He'll introduce you to the newest thing on wheels — you'll like it.

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO

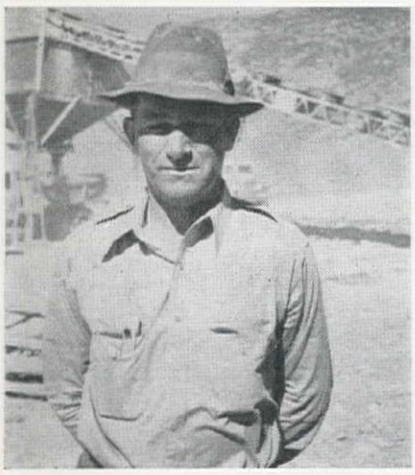
UNIVERSAL LORAIN MOTO-CRANE*

NO JOB TOO SMALL OR SHORT — NO JOB TOO BIG OR TOUGH

*Trade Mark

Distributed by

LeROIX-RIX MACHINERY CO., Los Angeles; PETRIE MACHINERY CO., Billings, Mont.; CATE EQUIPMENT CO., Salt Lake City; LIBERTY TRUCKS & PARTS CO., Denver; RIX COMPANY, INC., San Francisco; WILSON EQUIP. & SUPPLY CO., Cheyenne, Wyo.; A. H. COX & CO., INC., Seattle; COLUMBIA EQUIPMENT CO., Portland, Spokane, Boise; McCHESNEY-RAND EQUIPMENT CO., Albuquerque; ARIZONA-CEDAR RAPIDS CO., Phoenix, Ariz.



A. M. HARSH, superintendent for Heafey-Moore Co. and Fredrickson & Watson Construction Co., Oakland, is in charge of a highway job near Cloverdale, Calif.

plantmix surfacing job in the vicinity of Cloverdale, Calif. The contractor is Heafey-Moore Co. and Fredrickson & Watson Construction Co., Oakland, Calif., and the bid price was $72,732. **George Passmore** is timekeeper on the job.

•

Duffey Reed, Jr., is the superintendent for Cavanaugh Construction Co., Twin Falls, Idaho, on a highway construction job in the vicinity of Harding, Mont.

•

Paul White is general superintendent and **B. C. Dolle** is assistant superintendent for Peter Kiewit Sons, Omaha, Neb., in charge of construction work at the Salt Lake City, Utah, airport. **Sidney Kent** is the contractor's engineer, and **R. A. Hyde** is office manager.

•

Earl Walsh, assistant superintendent at Deer Creek dam near Provo, Utah, for the past two years, has been transferred to Cottage Grove, Ore., where he is superintendent of construction for the Cottage Grove dam being constructed by T. E. Connolly, Inc., San Francisco, Calif., under the direction of the Corps of Engineers.

•

C. D. "Jerry" Fox, who has been in the Panama Canal Zone laying out work for the Thompson-Markham Co., has returned to that company's job at Draper where he is preparing to line the Alpine and Draper tunnels of the Provo project.

•

S. L. Mendenhall, Jr., superintendent for W. W. Clyde of Springville, Utah, is directing the work on a highway construction job at Deeth, Nev. **Chris Rasmussen** is concrete foreman; **Alma Miner** is bridge foreman; **J. S. Hayes,** excavation foreman; **Arthur Cramer** and **Thad Wilkerson,** grade foremen; and **Fred Lee,** office manager. **George Griffith** is resident engineer on the job for the Nevada Highway Department, and **S. C. Faulkald** is bridge inspector.

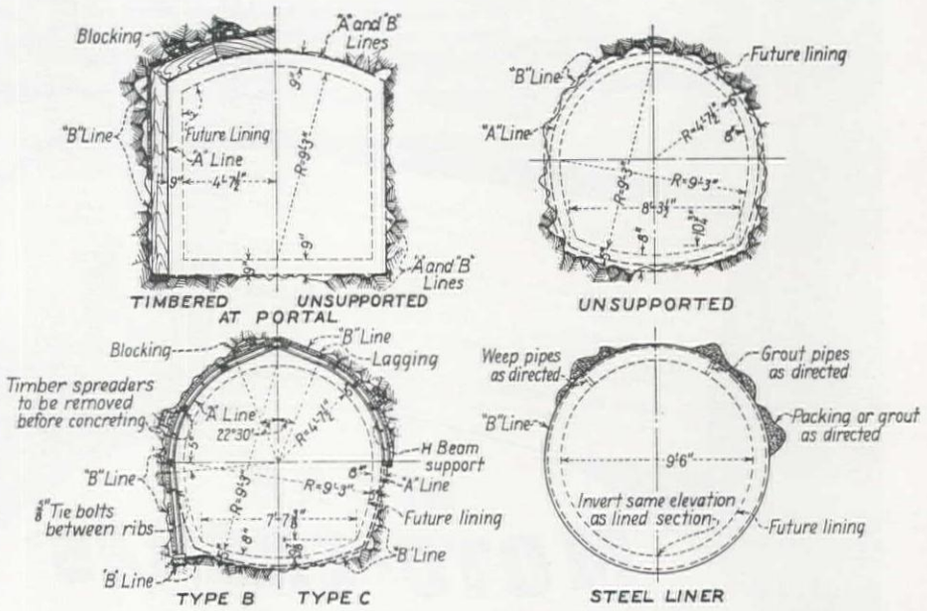
UNIT BID SUMMARY

Tunnel...

Utah—Weber County—Bur. of Recl.—Excavation

Contract awarded to Utah Construction Co., Ogden, Utah, $727,575, by the Bureau of Reclamation, Provo, for excavation, installing timber and steel supports and grouting of about half the Duchesne tunnel, a unit of the Provo River project, located about 24 mi. east of Heber. The schedule begins at station 321-75, which is the outlet portal on the Provo River, and ends at station 163-35. The inlet portal is at station 5-10 on the North Forth of the Duchesne River.

The outlet portal is located at an elevation of about 8,160 ft., close to U. S. Highway 150. The nearest railroad terminals are at Heber and Park City. The schedule contemplates driving, installing permanent supports and grouting only with lining left for future completion. Dimensions of the various sections are shown in the accompanying drawing. Hydraulic properties are as follows:



Section	A	V	Q	r	n	S	d/D
Present (unlined)	89.6	4.17	374	3.26	.035	.002	.88
Future (lined)	62.73	9.56	600	2.84	.014	.002	.82

Time allowed for completion is 900 calendar days. The Government will furnish cement for grout and all pipe and fittings for permanent installation in connection with pressure grouting operations. The contractor is required to furnish all sand for grout; all permanent steel tunnel supports; permanent timbering; steel liner plates and gaskets for tunnel lining if required; timber required to fill spaces outside of permanent timber lagging; gravel and spalls to fill spaces back of plate-steel tunnel lining; water used for mixing grout; oakum or other suitable material for calking grout pipes; and all other materials not a part of the completed construction work.

Logs of test pits and borings and cores of borings were available to inspection of bidders at Provo, but were not included in the plans and specifications. The requirement for the performance of work under some of the items and the amount of work which will be required will depend upon conditions encountered in the construction of the tunnel, and these conditions were judged to be impossible of even approximate predetermination. The quantities in the schedule are for the purpose of comparing bids only and bidders were warned not to construe them as an indication of the amount of the work to be performed.

Bids were received from the following contracting organizations:

(1) The Utah Construction Co. $727,575
(2) Lowdermilk Bros. 851,350
(3) The Gordon Construction Co. 923,970
(4) The Arundel Corporation and L. E. Dixon Co. 973,225
(5) Ralph A. Bell, A. Teichert & Son, Inc., Hanrahan Co. ..... $ 994,185
(6) W. W. Clyde & Co. 1,000,260
(7) Thompson Markham Co. 1,028,250
(8) United Concrete Pipe Corp. 1,338,250

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
27,000 cu. yd. excav., com., in open cut	.25	1.45	.30	2.00	1.00	.50	.50	4.00
7,000 cu. yd. excav., rock, in open cut	1.00	1.45	1.00	2.00	2.00	1.50	1.50	4.00
54,700 cu. yd. excav., all classes, in tunnel	11.75	13.25	15.35	15.50	16.30	16.80	17.00	20.00
480,000 lb. furn. and inst. perm. steel supports	.07	.07	.08	.07	.06	.065	.08	.10
325 M.F.B.M. furn. and erect. perm. timbering	80.00	90.00	60.00	42.00	70.00	50.00	60.00	$100
90,000 lb. furn. and inst. steel liner plates	.075	.07	.08	.07	.07	.065	.10	.25
125 cu. yd. washed grav. outside liner plates	8.00	15.00	3.00	10.00	5.00	3.00	10.00	6.00
1,000 lin. ft. drill. grout holes not more than 10 ft. deep	1.00	2.00	1.00	.50	1.00	1.50	2.00	1.00
500 lb. plac. grout pipe and connections	.50	.50	.50	.15	.20	.25	.40	1.00
2,000 cu. ft. pressure grouting	1.25	2.00	1.25	1.00	1.00	1.00	2.00	1.50

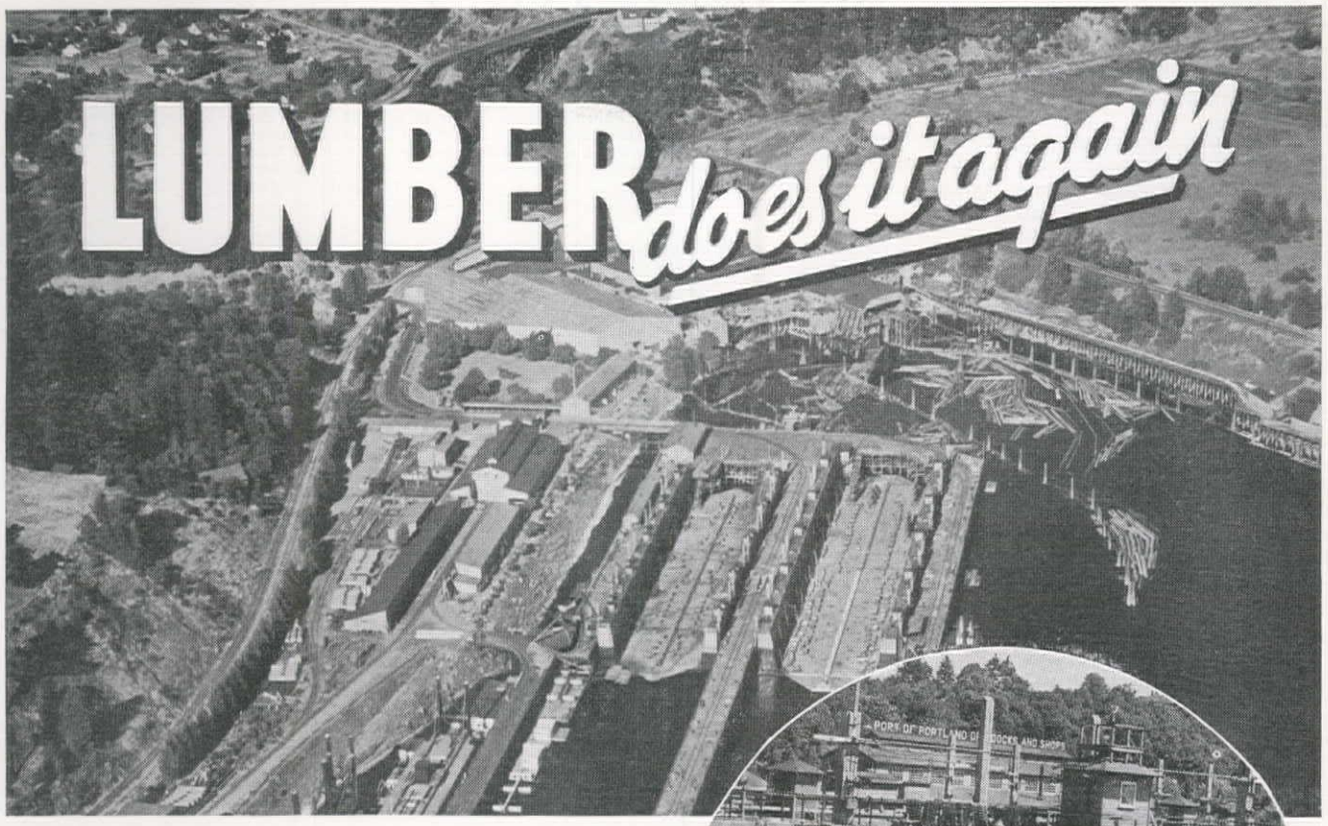
Montana—Teton County—Bur. of Recl.—Concrete Lining

Contract awarded to Williams Construction Co., Helena, $18,610, by the Bureau of Reclamation, Fairfield, for the placing of concrete lining in Tunnel No. 1, Pishkun Canal on the Greenfields Division of the Sun River Project, Montana. Bids were received from the following:

(A) Williams Construction Co. $18,610
(B) Thomas Staunton 19,895
(C) C. & F. Teaming and Trucking Co. 21,406
(D) M. F. Kemper 22,126
(E) Benjamin H. Sheldon 23,550
(F) Werner and Webb 23,758
(G) J. C. Boespflug $24,131
(H) Barnard-Curtiss Co. 28,255
(I) McLaughlin Construction Co. 29,165
(J) Frank J. Haas 29,040
(K) Colonial Construction Co. 30,375
(L) The Gordon Construction Co. 34,678

(1) Lump Sum trimming rock in tunnel
(2) 125 cu. yd. backfill in invert
(3) 1,040 cu. yd. concrete in tunnel lining

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
(1)	$1200	$800	$1000	$2053	$2500	$1950	$2800	$5000	$1500	$1500	$4000	$2000
(2)	2.00	3.00	6.00	2.50	2.00	3.90	4.25	3.00	5.00	4.00	3.00	3.50
(3)	16.50	18.00	18.90	19.00	20.00	20.50	20.00	22.00	26.00	26.00	25.00	31.00



. . . With the Help of TECO TIMBER CONNECTORS——

Lumber and TECO CONNECTORS are a great team for getting important jobs done quickly and economically—Together they permit a low-cost type of construction for jobs heretofore thought possible only in steel.

This huge Port of Portland Drydock was completed between the spring of 1939 and 1940, at a cost of $185,000. More than 1,250,000 feet of Douglas fir lumber was required for the 126 x 450-foot structure. Successful conclusion of this work is one more piece of evidence illustrating a seven-year development of timber as an engineering material . . . an expansion made possible by the connector system.

Facilities for mill fabrication of timber parts have kept step with the greatly improved efficiency of timber engineering . . . More than 3,000 different shapes were prefabricated and then treated for the Portland Drydock.

Stocks of TECO Timber Connectors are always available at the following Pacific Coast Warehouses—

SAN FRANCISCO—Timber Engineering Co. of Calif.
85 Second St.

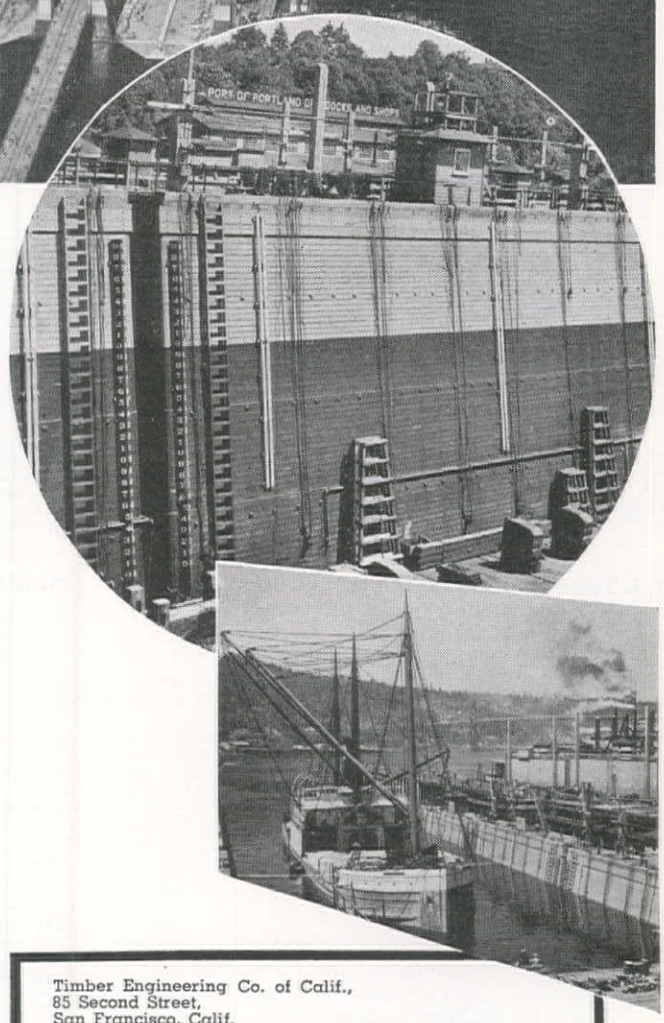
PORTLAND—Timber Structures, Inc., 303 S. W. First Ave.

SEATTLE—Northwest Bolt & Nut Co., 4518 - 14th Ave., N. W.

LOS ANGELES—Summerbell Roof Structures, 754 E. 29th St.

TIMBER ENGINEERING CO. OF CALIFORNIA

85 SECOND STREET, SAN FRANCISCO



Timber Engineering Co. of Calif.,
85 Second Street,
San Francisco, Calif.

Please send us your List of Available Literature on the connector system of engineering for all kinds of construction, and the names of concerns which have fabricating facilities.

Name.....

Street.....

City..... State.....

When writing to Timber Engineering Co., *please mention Western Construction News*

M. S. Ross is general superintendent for Carl B. Warren, supervising the concrete pipe line section of the Salt Lake Aqueduct near Pleasant Grove, Utah. **J. E. McDonald** is in charge of excavation and pipe laying. **Jean Simon** is plant foreman and **G. L. Wooton** is carpenter foreman. Crane operators on the job include **Ray Beaudette, Glen Whitney** and **Frank Whitney.**

•

W. D. Mendenhall is supervising construction of a highway job near Nephi, Utah, for G. W. Mendenhall & Sons Construction Co. of Springville.

•

L. R. Barrick is in charge of 11.3 mi. of grading and gravel surfacing on the Jordan-Circle road in McCone County, Montana. Foremen on the job are **Bob Ledingham** and **Charles Harris.** Lobnitz Bros., Ashton, Idaho, were awarded the contract on a low bid of $88,650.

•

I. F. "Ike" Lindsay, well known construction superintendent at the present time engaged on reconstruction of the first Sacramento River crossing at Redding, Calif., for the United Concrete Pipe Corp. and the American Bridge Co., suffered a severe back injury due to a fall last month and spent several days in the hospital. However, he expects to be back on the job soon.

•

Arthur Weisburg is construction engineer for Heafey-Moore Co. and Fredrickson & Watson Construction Co., of Oakland, Calif., on the Davis underpass job near Davis, Calif. In addition to his other jobs he is supervising the concreting and general labor on the project.

•

H. I. Talcott, formerly connected with the Isbell Construction Co., is now employed as master mechanic for C. C. Woods of Lodi, Calif., on a highway construction job near Lodi.

•

Dennis F. Hill is truck foreman for Morrison-Knudsen Co., Inc., on the Los Angeles River improvement project in Los Angeles, Calif. He reports the job going fine with 48 trucks working 24 hr. per day.

•

Robert Gentle, concrete finishing foreman for the McDougall Construction Co. on their contract for the Roza division of the Yakima project near Yakima, Wash., has been employed as a cement finisher by the Siems-Drake-Puget Sound Co., and is now working on the Sitka Naval Air Base at Sitka, Alaska.

•

Elmer "Shorty" Parsons, recently concrete foreman for Trewhitt, Shields & Fisher on the Russian River bridge at Hopland, is now working as concrete finisher for Heafey-Moore Co. and

Highway and Street . . .

Arizona—Coconino County—B. P. R.—Grade

Tanner Construction Co., Phoenix, $63,552, low to the Bureau of Public Roads, San Francisco, California, for 3.7 mi. grade and structures on the Flagstaff-Clints Well National Forest Highway in Coconino National Forest. Bids were received from the following:

(1) Tanner Construction Co. $63,552
(2) W. E. Orr 65,334
(3) Fisher Contracting Co. $68,699

		(1)	(2)	(3)
	Force Account obliterating old road and seeding slopes	$250	$250	$250
18	acre clearing	$300	$150	$225
18	acre grubbing	60.00	75.00	$125
9,800	cu. yd. stripping and storing topsoil	.20	.15	.20
24,000	cu. yd. unclassified excavation	.94	1.00	1.00
335	cu. yd. unclass. excav. for structures	2.00	1.50	2.25
38,500	cu. yd. unclass. excav. for borrow	.35	.41	.42
25,500	sta. yd. overhaul	.02	.05	.02
24,200	cu. yd. mi. borrow haul	.25	.25	.25
8,750	lin. ft. furrow ditches	.07	.15	.10
3.629	mi. finishing earth graded roads	$300	$300	$500
940	M. gal. watering	1.25	1.50	2.00
86	cu. yd. class "A" concrete	30.00	28.00	32.00
11,400	lb. reinforcing steel	.06	.08	.06
26	cu. yd. cement rubble masonry	24.00	20.00	25.00
874	lin. ft. 18-in. C. G. S. M. Pipe	3.00	2.50	2.30
276	lin. ft. 24-in. C. G. S. M. Pipe	4.00	3.50	3.10
106	lin. ft. remove, clean and stockpile existing C. M. pipe	1.50	1.00	1.50
8	each right of way monuments—type A	3.50	5.00	5.00
2	each concrete maintenance posts	6.00	10.00	8.00
1	each 4-unit cattleguards	$700	$750	$800
540	lin. ft. barbed wire fence	.20	.20	.15
25	each culvert markers	4.00	5.00	3.50

Utah—Garfield County—P. R. A.—Grade and Culverts

Miner Bros. Construction Co., Provo, $18,718, low to the U. S. Public Roads Administration, Ogden, for 0.364 mi. grade and construction of structures on the Panguitch-Tropic Highway in Powell Forest. Wire mesh and wire for riprap will be furnished by the Government. Bids were received from the following:

(1) Miner Bros. Construction Co. $18,718
(2) Ora Bundy 19,983
(3) Floyd S. Whiting 21,720
(4) Reynolds-Ely Construction Co. $24,234
(5) J. W. Whiting Construction Co. 20,814

		(1)	(2)	(3)	(4)	(5)
2,700	cu. yd. unclassified excavation	.20	.30	.20	.20	.40
400	cu. yd. unclassified excavation for structures	1.50	2.50	2.00	2.00	2.00
9,500	cu. yd. unclassified excavation for borrow	.18	.15	.20	.20	.20
30,200	sta. yd. overhaul	.01	.015	.02	.01	.01
0.349	mi. finishing earth graded road	$200	$200	$100	$200	$200
106	cu. yd. class A concrete	20.00	17.70	25.00	30.00	21.00
19	cu. yd. class B concrete	20.00	25.00	25.00	30.00	20.00
66	cu. yd. class D concrete	21.00	21.00	25.00	30.00	21.50
17,000	lb. reinforcing steel	.055	.057	.06	.07	.055
1	bridge 75 ft. steel bridge superstructure	$8000	$7350	$8500	$8540	$7500
46	lin. ft. 18-in. C. G. S. M. pipe culvert	1.75	2.00	2.00	2.00	2.00
16	lin. ft. 30-in. C. G. S. M. pipe culvert	3.25	4.00	5.00	4.00	4.00
44	lin. ft. 36-in. C. G. S. M. pipe culvert	5.00	6.00	6.00	6.00	6.00
30	lin. ft. relay 30-in. C. G. S. M. pipe culvert	.60	2.00	1.00	1.00	1.00
1	each 75 ft. detour bridge	$1000	$1450	$1500	$2000	$1400
1	each remove bridge station 5+46, store at Panguitch	$100	$700	$100	$1000	$500
110	cu. yd. rock and wire riprap	2.50	3.00	5.00	5.00	5.00
9.3	M. F. B. M. treated timber sheet piles	$100	$130	$100	$125	$140

New Mexico—Catron County—B. P. R.—Grade

Brown Bros., Albuquerque, $53,767, submitted the low bid to the Bureau of Public Roads, Denver, Colorado, for 2.441 mi. grade and structures on the Datil-Reserve-Dry Creek Highway in Apache National Forest. Bids were received from the following:

(1) Brown Bros. $53,767
(2) Ernest W. Everly 60,578
(3) L. R. Allison $66,668

		(1)	(2)	(3)
84,000	cu. yd. excavation, unclassified	.26	.32	.38
1,260	cu. yd. unclassified excavation for structures	1.00	2.00	2.00
70,000	sta. yd. special overhaul	.04	.03	.02
2,000	cu. yd. mi. special overhaul	.40	.35	.50
300	hr. tamping or sheep's foot roller operation	5.00	2.50	4.00
2.43	mi. finishing earth graded road	$200	$200	$200
611	cu. yd. class "A" concrete	20.00	19.00	20.00
58	cu. yd. class "D" concrete	22.00	28.00	30.00
71,300	lb. reinforcing steel	.05	.06	.06
66,500	lb. structural steel	.07	.08	.08
676	lin. ft. CGSM pipe, 24-in.	3.00	4.00	4.00
100	lin. ft. CGSM pipe, 30-in.	4.00	5.00	5.00
80	lin. ft. CGSM pipe, 36-in.	5.00	6.00	6.00
13	each concrete maintenance post	5.00	15.00	10.00
7,200	lin. ft. barbed wire fence	.06	.055	.10
2	each 12-ft. gates	20.00	18.00	25.00

California—Trinity County—State—Grade

Contract awarded to Clifford A. Dunn, Klamath Falls, Ore., $72,876, by the California Division of Highways, Sacramento, Calif., for 3.4 mi. grade, concrete cribbing, rock slope protection, and drainage facilities at various locations between Big Bar and Helena. Bids were received from the following:

(1) Clifford A. Dunn $72,876
(2) Scheumann & Johnson 87,054
(3) A. S. Vinnell Co. 87,695
(4) Hemstreet & Bell $86,476
(5) Poulos & McEwen 94,997

		(1)	(2)	(3)	(4)	(5)
L. S.	clearing and grubbing	$500	$3000	$5000	$500	$1500
200	M. gal. water	1.00	1.50	2.10	2.00	1.00
38,100	cu. yd. roadway excav. w/o class	.74	.95	.87	.92	1.00
1,350	cu. yd. structure excav.	3.80	1.50	3.10	1.50	2.10

(Continued on next page)

Bodinson Airplane Tripper Distributes Shasta Dam Aggregate

Bodinson airplane tripper removing aggregate from the conveyor belt in center and depositing it in stock pile at the left by means of the belt at right angles to the main conveyor.

DEPENDABLE performance and low operating costs of Bodinson equipment are two reasons why it was chosen to distribute and place in separate piles the four sizes of aggregate coming over the nine-mile conveyor from Redding. The main storage piles here provide for the storing of 250,000 tons of aggregate.

The BODINSON AIRPLANE TRIPPER used in connection with this conveyor delivering aggregate to SHASTA DAM, is an example of the *Specialized Engineering* Service that is intrusted to Bodinson.

We point with pride to the very important part that Bodinson plays in this gigantic handling system which produces a steady flow of concrete into the dam.

No matter how large or complicated the problem may be, the experience of Bodinson's Engineers can solve your problem, and their plant can fabricate the equipment. The wide extent to which Bodinson equipment is used in the large and small construction plants is the result of the performance and low-cost operation of former installations.

This SPECIALIZED ENGINEERING SERVICE is available to all Contractors and Engineers. Why not use it?

WORLD'S LARGEST BUILDERS OF DRAGLINE GOLD DREDGES

BODINSON MFG. CO.

2401 BAYSHORE BLVD. **SAN FRANCISCO**

OTHER BODINSON INSTALLATIONS

San Francisco Bay Bridge
Los Angeles Aqueduct
Pardee Dam
Coolidge Dam
Exchequer Dam
Boulder Dam
Grand Coulee Dam
Bonneville Dam
O'Shaughnessy Dam
Parker Dam
and others.

★

OTHER BODINSON EQUIPMENT

Rock and Gravel Plants
Central Mixing Plants
Asphalt Plants
Portable Rock Plants
Gold Recovery Plants
Concrete Batching Plants
Conveyors
Elevators
Power Transmission Machinery
Screens—Revolving & Vibrating
Structural Steel—Feeders—
Hoppers and Bins, etc.

When writing to Bodinson Mfg. Co., *please mention Western Construction News*

Fredrickson & Watson Construction Co. on the elevated highway at San Rafael, Calif.

•

J. E. Mayo, who resigned his position with the Los Angeles Department of Water and Power to join the construction staff of A. Teichert & Son on the Mono canal job, has returned to the Department of Water and Power at Los Angeles, Calif.

•

Ross B. Murphy is working as mechanic for the Macco Construction Co., at Leevining, Calif., repairing and maintaining heavy construction equipment and electrical equipment.

•

Edward Wilmas, formerly with Spillway Builders at Fort Peck, Mont., has returned to Fort Peck following some work in gold mining at Helena, Mont., and is now operating a dragline for Truman Bowen Co.

•

H. C. Reiger is master mechanic for Hemstreet & Bell, Marysville, Calif., contractors, and is in charge of all tractor and truck repairs on their job near Folsom, Calif.

•

Charles H. Smith is miner foreman for Pacific Constructors, Inc., on shaft work for grouting tunnels at Shasta dam.

Washington News

(Continued from page 362)

is past. Meanwhile one of the Federal agencies has assigned two men to go up and down the length and breadth of the West slope to visit every large user of metal and steel products; to appraise the real shipbuilding activities, and the business of the chemical plants, and the actual production and stimulus of the business in the airplane industry.

It is hoped the information, in a practical form, will be available when the election is over, and that it will be useful in throwing the regional defense organization into gear. There is a feeling here that the West slope, one-third of the geographical area of continental United States, despite its paucity of voters, by reason of its actual and potential wealth, renders such important service to the nation, that it has the right to demand its share in the national defense program on a par with the other two-thirds of the United States.

Western states credit good

The Federal Home Loan Bank Board reports that Nevada, Wyoming, Washington and Oregon are the best small loan credit risks in the United States; and census reports New Mexico as 3rd highest in population increase during the past ten years, with California next, Nevada 5th, Idaho 6th, Arizona 7th, Oregon 8th, and Wyoming, Washington, Colorado, Utah and Montana well up in the list. Reclamation Commissioner John C. Page reports that every

28,000	mi. yd. haul	.20	.12	.14	.12	.10
143	stas. finishing roadway	10.00	10.00	7.00	5.00	5.00
4,275	cu. yd. imported surf. matl	.75	.70	1.15	1.25	.65
300	lb. bar reinf. steel	.10	.08	.14	.10	.10
8	cu. yd. class "A" P.C.C. (structs.)	35.00	30.00	55.00	40.00	50.00
12,500	cu. yd. hand placed rock slope protect	1.50	2.10	1.40	2.00	2.40
112	lin. ft. 18-in. C.M.P	2.20	2.10	2.70	2.00	2.00
74	lin. ft. 24-in. C.M.P	3.20	3.25	3.85	3.00	4.00
167	lin. ft. cleaning and salvaging pipe culverts	.90	.60	.55	1.00	1.00
129	lin. ft. relaying salvaged pipe	.60	1.00	.65	.50	1.00
290	each 5"x8"x6'0" reinforced conc. headers	3.30	4.40	5.80	5.00	5.00
610	each 5"x10"x6'0" reinforced conc. headers	4.00	5.70	7.20	5.50	5.50
1,135	each 6"x6"x6'0" reinf. concrete stretchers	2.50	2.70	4.90	4.00	5.00
615	each 6"x8"x6'0" reinf. concrete stretchers	3.00	3.20	5.60	4.50	5.00
175	each 6"x10"x6'0" reinf. concrete stretchers	4.00	3.90	6.80	5.00	6.50
65	each 10"x6"x10" conc. filler blocks	1.00	1.00	1.40	1.00	2.00

Montana—Deer Lodge County—State—Grade

Contract awarded to Union Construction Co., Great Falls, $122,833, by the Montana State Highway Commission, Helena, for 8.6 mi. grade and construction of drainage structures; construction 2 treated timber pile trestle bridges on the Wisdom-Divide Road. Bids were received from the following:

(1) Union Construction Co. $122,833
(2) S. J. Groves & Sons 137,827
(3) Peter Kiewit Sons Co. 136,576
(4) Nilson Smith Construction Co. $126,402
(5) S. Birch & Sons 139,659
(6) Max J. Kuney 138,697

		(1)	(2)	(3)	(4)	(5)	(6)
264,025	cu. yd. unclass. excavation	.26	.35	.35	.33	.31	.36
1,628	cu. yd. culvert excavation	1.00	1.50	2.00	.75	2.00	1.00
378,600	sta. yd. overhaul	.02	.015	.01	.01	.02	.02
360	sq. yd. grouted riprap	6.00	3.00	3.00	3.00	8.00	1.50
3,969	cu. yd. earth cushion material	.30	.30	.50	.34	.25	.25
1,000	M. gal. watering	1.60	2.00	1.00	1.20	3.25	1.00
420	lin. ft. 15-in. rein. conc. pipe culv.	3.00	2.15	2.50	2.50	3.00	2.10
164	lin. ft. 18-in. rein. conc. pipe culv.	5.00	2.75	3.00	3.00	3.75	2.70
2,012	lin. ft. 24-in. rein. conc. pipe culv.	6.00	4.25	4.00	3.50	5.00	4.00
104	lin. ft. 30-in. rein. conc. pipe culv.	7.00	5.80	5.00	5.00	6.75	7.00
288	lin. ft. 36-in. rein. conc. pipe culv.	9.00	8.00	7.00	7.00	8.50	8.00
116	lin. ft. 42-in. rein. conc. pipe culv.	10.00	10.00	9.00	9.00	10.90	9.00
480	lin. ft. 48-in. rein. conc. pipe culv.	13.00	12.00	11.00	11.00	14.00	12.50
524	lin. ft. 18-in. corr. met. syphon pipe	4.00	2.60	4.00	3.00	3.75	3.00
152	lin. ft. 24-in. corr. met. syphon pipe	6.00	4.00	5.00	4.00	5.00	4.50
88	lin. ft. 30-in. corr. met. syphon pipe	8.00	5.00	6.00	5.00	5.75	5.50
3.83	cu. yd. class "B" concrete	30.00	30.00	40.00	40.00	40.00	40.00
4,300	lin. ft. wood slat snow fence	.22	.25	.25	.25	.25	.25
46	each wood station markers	10.00	3.00	3.00	2.00	7.50	3.00
114	each conc. r/w monuments	5.00	3.00	3.00	3.00	5.00	3.00
1,750	lb. structural steel	.10	.10	.20	.10	.15	.20
57.45	M.F.B.M. treated lumber	$112	$120	$125	$120	$155	$100
3.01	M.F.B.M. untreated lumber	$115	$120	$125	$120	$110	$100
24	each 20-ft. treat. timber piles	40.00	25.00	25.00	22.00	30.00	25.00
13	each 25-ft. treat. timber piles	45.00	35.00	30.00	28.00	35.00	30.00
13	each 30-ft. treat. timber piles	50.00	45.00	35.00	35.00	42.00	35.00
2	each 40-ft. treat. timber piles	50.00	50.00	50.00	45.00	55.00	45.00
22	cu. yd. gravel ballast	5.00	2.00	3.00	2.00	4.00	4.00

Wyoming—Yellowstone—B. P. R.—Grade and Surface

Lowdermilk Bros., Denver, Colo., $279,553, low to the Bureau of Public Roads, Denver, for 4.65 mi. of grading, surfacing and construction of structures on the Grand Loop Highway in Yellowstone National Park. Bids were received from the following:

(A) Lowdermilk Bros. $279,553
(B) Taggart Construction Co. 310,053
(C) J. L. McLaughlin 310,574
(D) Max J. Kuney Co. 316,609
(E) Megarry Bros. 319,901
(F) Olof Nelson Construction Co. 322,486
(G) Peter Kiewit Sons' $323,984
(H) Leach Bros. 346,657
(I) McNutt Bros. 358,186
(J) Barnard-Curtiss Co. 358,594
(K) Northwestern Engineering Co. 370,411

(1)	Force Account maint. of secs. accepted for traffic	(26)	6,700 lb. structural steel
(2)	28 acre clearing	(27)	261 M.F.B.M. trtd. timber creos. pres., incl. brg. iron
(3)	11 acre grubbing	(28)	105 cu. yd. class "A" cem. stone mason.
(4)	28,000 cu. yd. stripping and storing topsoil	(29)	48 lin. ft. 18-in. C.G.S.M. pipe (16-ga.)
(5)	190,000 cu. yd. unclass. excav.	(30)	2,948 lin. ft. 24-in. C.G.S.M. pipe (14-ga.)
(6)	4,100 cu. yd. unclass. excav. for struct.	(31)	110 lin. ft. 30-in. C.G.S.M. pipe (14-ga.)
(7)	107,000 cu. yd. unclass. excav. for borrow	(32)	156 lin. ft. 36-in. C.G.S.M. pipe (12-ga.)
(8)	1,610,000 sta. yd. special overhaul	(33)	136 lin. ft. 36-in. C.G.S.M. pipe (10-ga.)
(9)	136,000 cu. yd. mi. special overhaul	(34)	120 cu. yd. hand-laid rock embankment
(10)	2,000 hr. tamping or sheepsfoot roller oprn.	(35)	50 cu. yd. loose riprap
(11)	1,320 cu. yd. foundation fill	(36)	2,400 lin. ft. 6-in. clay sewer pipe underdr.
(12)	375 units obliteration of old roads	(37)	12 sq. yd. grouted rubble gutter
(13)	600 cu. yd. local subgrade reinforcement	(38)	2,700 lin. ft. hub-high treated rustic guardr.
(14)	21,000 ton 2-in. heavy base course	(39)	22,000 cu. yd. replacing topsoil
(15)	940 units watering	(40)	72,000 sta. yd. overhaul, topsoil, pile to placement
(16)	310 hr. roller operation	(41)	300 cu. yd. mi. overhaul, topsoil, pile to placement
(17)	1 each furnishing roller	(42)	160 units seed and seeding
(18)	Lump Sum water plant or plants for project	(43)	6 each embankment protectors
(19)	10,200 ton crusher-run top course	(44)	190 lin. ft. 8-in. C.G.S.M.P. drains
(20)	54,000 gal. MC-1 cutback asph. for pr. ct.	(45)	400 lin. ft. stone barrier
(21)	4.649 mi. C-1 roadmix surfacing laid	(46)	Lump Sum removal of old structures
(22)	5,600 ton cl. "C" new aggr., grad. "A"	(47)	Force Account misc. items
(23)	56,000 gal. MC-3 ctbk. asph. for C-1 roadm.		
(24)	147 cu. yd. class "A" concrete		
(25)	22,200 lb. reinforcing steel		

		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
(1)		$500	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
(2)		$200	$400	$150	$200	$250	$300	$200	$250	$250	$250	$200
(3)		$200	$200	$125	$100	$100	50.00	$100	$250	$200	$250	$200
(4)		.20	.20	.18	.45	.20	.20	.20	.25	.25	.20	.25
(5)		.30	.29	.51	.40	.37	.35	.44	.40	.44	.55	.60
(6)		1.00	1.50	1.50	1.50	1.00	1.50	1.00	2.00	2.00	2.00	2.00
(7)		.25	.19	.22	.25	.35	.35	.35	.40	.30	.30	.25
(8)		.01	.10	.0075	.005	.01	.01	.005	.01	.01	.01	.015
(9)		.10	.15	.10	.12	.10	.15	.10	.15	.15	.12	.10
(10)		3.50	6.00	3.50	5.50	4.00	3.00	4.50	4.00	4.00	3.50	3.75
(11)		2.00	1.00	1.00	2.00	2.00	1.00	.50	1.00	2.00	1.50	.35
(12)		5.00	2.50	10.00	5.00	2.00	3.00	10.00	8.00	5.00	5.00	5.00
(13)		2.00	2.00	1.50	1.20	2.00	1.00	1.00	3.00	1.00	1.00	.45

(Continued on next page)

county in the United States with a reclamation project increased its population, some as high as 70% during the past 10 years. The Mountain States added 11.5% population.

Under the latest supplemental appropriation the Bureau of Reclamation received $400,000 for the Pine River project in Colorado; the Geological Survey was given a fund to expand its survey for strategic and critical minerals. S 3501 provides that 52½% of all funds derived from money recovered from the Standard Oil Company of California shall be placed in the Reclamation fund. Under Act 9734 the Reclamation Bureau is directed to develop the Saco Divide unit on the Milk River under the Fresno Dam and Reservoir. Another Act amends the Central Valley legislation to improve navigation, regulate flow of the San Joaquin River and Sacramento River, to control floods, provide storage, and to deliver stored waters; and it provides for construction of a distributing system under the Reclamation Bureau, which also is authorized to generate and sell electricity.

Bonneville receives $3,850,000 for new construction and for maintenance and operation. Other legislation provides for the expansion of the Coast Guard Air Station at San Diego; and the Corps of Engineers is authorized to make certain improvements in the San Diego Harbor for the national defense. Similar work is ordered at Los Angeles, Long Beach, Sitka, Kodiak, and Keehi Lagoon, Hawaii.

(14)	.95	1.50	1.00	1.30	1.00	1.20	1.25	1.25	1.55	1.25	1.40
(15)	2.00	1.50	1.50	1.20	2.00	1.00	1.00	1.50	2.00	2.00	2.00
(16)	4.00	4.00	3.00	5.00	4.00	3.00	3.00	5.00	5.00	3.00	4.00
(17)	$100	50.00	$300	$1000	$500	$300	$600	$500	$500	$500	$150
(18)	25.00	$500	$200	$200	$500	$100	$200	$100	$500	$300	$150
(19)	1.00	1.50	1.10	1.40	1.50	1.30	1.25	1.25	1.75	1.65	1.50
(20)	.10	.12	.09	.08	.10	.10	.065	.08	.09	.085	.07
(21)	$925	$1000	$400	$800	$1000	$800	$2000	$1000	$600	$1000	$1300
(22)	1.15	2.00	1.20	1.30	2.00	1.30	1.25	1.50	3.00	1.65	1.60
(23)	.11	.12	.09	.08	.10	.10	.065	.08	.09	.085	.07
(24)	22.00	25.00	33.50	30.00	40.00	28.00	30.00	25.00	35.00	30.00	35.00
(25)	.055	.055	.06	.07	.07	.08	.06	.07	.07	.10	.055
(26)	.12	.105	.10	.12	.20	.20	.10	.15	.20	.15	.12
(27)	$125	$131	$127	$110	$150	$150	$140	$140	$130	$135	$150
(28)	25.00	20.00	25.00	30.00	25.00	20.00	30.00	30.00	30.00	25.00	40.00
(29)	2.00	2.00	2.00	2.10	2.25	2.50	2.00	2.00	2.00	2.75	2.00
(30)	2.90	3.00	2.85	3.50	3.00	3.00	2.50	2.75	2.75	3.00	2.85
(31)	3.25	3.50	3.70	4.30	4.00	4.00	4.00	3.50	3.50	4.00	3.45
(32)	5.00	5.20	5.75	7.20	5.00	6.00	6.00	5.00	5.50	6.50	5.10
(33)	6.00	6.50	6.85	9.00	6.00	7.00	7.00	6.00	7.00	7.50	6.15
(34)	2.00	4.00	4.00	5.00	4.00	3.00	6.00	3.00	15.00	5.00	11.00
(35)	4.00	3.00	4.00	3.00	3.00	2.00	5.00	1.00	1.00	3.00	6.00
(36)	2.00	1.50	1.10	1.50	1.00	1.00	1.00	2.50	2.00	1.75	1.00
(37)	5.00	5.00	10.00	15.00	5.00	4.00	5.00	5.00	10.00	5.00	4.00
(38)	2.00	2.15	1.70	2.00	2.00	2.50	1.50	2.00	1.75	1.75	1.50
(39)	.40	.25	.40	.50	.20	.50	.46	.50	.40	.35	.35
(40)	.01	.01	.01	.01	.02	.01	.015	.01	.01	.015	.02
(41)	.20	.12	.15	.25	.25	.20	.20	.15	.15	.30	.20
(42)	10.00	10.00	12.00	3.00	4.00	4.00	10.00	5.00	3.00	6.00	4.00
(43)	20.00	20.00	25.00	15.00	20.00	20.00	40.00	25.00	20.00	25.00	25.00
(44)	1.50	1.50	1.25	1.50	1.00	1.00	2.00	1.50	1.50	2.00	1.50
(45)	2.00	.75	1.50	1.50	1.00	1.00	1.00	1.00	1.00	1.50	1.00
(46)	$500	$1400	$1750	$2000	$2000	$1500	$3000	$1000	$790	$1500	$2657
(47)	$5000	$5000	$5000	$5000	$5000	$5000	$5000	$5000	$5000	$5000	$5000

California—Sutter County—State—Grade and Surface

Contract awarded to Hemstreet & Bell, Marysville, Calif., $10,884, by the California Division of Highways, Sacramento, for 0.4 mi. grade and plantmix surfacing on a crusher run base at Berg and Lomo. Bids were received from the following:

(1) Hemstreet & Bell $10,884
(2) Claude C. Wood 13,934
(3) C. M. Syar 13,333

		(1)	(2)	(3)
1	lot clearing and grubbing	$150	$500	$150
125	M. gal. water	1.50	1.50	1.25
2,000	cu. yd. roadway excavation w/c	.40	.60	.28
110	cu. yd. structural excavation	1.00	1.50	1.50
3,800	mi. yd. overhaul	.10	.15	.08
750	cu. yd. imported borrow	.60	.70	.58
380	cu. yd. removing concrete	1.50	3.00	3.00
22	stas. finishing roadway	5.00	5.00	5.00
2,050	ton crusher run base	1.90	2.00	2.60
925	ton min. aggr. (P.M.S.)	2.60	3.50	3.25
6	ton liq. asph. SC-2 (pr. ct. & P. O. Tr.)	15.00	20.00	14.90
46	ton liq. asph. ROMC-4 or 5 (P.M.S.)	12.00	12.00	16.00
27	ton sand (pr. ct. & P. O. Tr.)	1.50	2.00	2.25
1,200	sq. yd. asph. paint binder	.05	.10	.02
100	lb. bar reinf. steel	.07	.10	.07
3	cu. yd. P.C.C. class "A" (struct.)	30.00	30.00	25.00
58	lin. ft. 12-in. C. M. P.	1.50	2.00	1.50
138	lin. ft. 18-in. C. M. P.	2.00	2.50	2.00
42	lin. ft. rem., cl. and salv. pipe culv.	.50	1.00	.60
4	each culvert markers	3.00	3.00	2.75
20	each guide posts	2.70	2.50	2.75
45	each rem., salv. gd. post and culv. markers	.20	.50	.40
300	lin. ft. metal plate guard railing	1.50	2.00	1.50
64	lin. ft. rem. and salv. guard railing	.70	.50	.50
11	each monuments	3.00	3.00	2.75

Idaho—Teton County—P. R. A.—Grade and Surface

Contract awarded to Carl E. Nelson, Logan, Utah, $29,386, by the Public Roads Administration, Ogden, Utah, for 5.4 mi. grade and surface on the Teton Forest Highway in the Targhee National Forest. Bids were received from the following:

(1) Carl E. Nelson $29,386
(2) Hoops Construction Co. 30,307
(3) Olof Nelson Construction Co. 30,509
(4) Herrick and Yancey $32,747
(5) Birch and Sons Construction Co. 35,994

		(1)	(2)	(3)	(4)	(5)
1,500	cu. yd. unclassified excavation	.50	.35	.80	.40	1.10
100	cu. yd. unclassified excavation for structures	2.00	1.50	1.50	3.00	3.00
7,300	ton crusher run bottom course	.75	.85	.90	.80	.90
7,700	ton crusher run top course	.75	.85	.90	.90	1.10
200	ton supplemental crushed gravel	.60	.60	.90	.70	1.10
500	M. gal watering	1.00	1.00	1.00	2.00	2.00
10	days roller operation	25.00	20.00	20.00	25.00	30.00
1	each furnishing roller	$300	$100	$100	$300	$300
All required	furnishing water plant or plants	$200	50.00	$100	$200	$300
11,000	gal. cutback asphalt for prime coat, grade MC-1	.10	.095	.08	.11	.07
5.449	mi. roadmix surfacing laid	$500	$600	$550	$600	$800
4,800	ton class "B" new aggregate, grading A	.80	.90	.90	.80	1.10
410	ton class "B" cover aggregate	2.50	2.50	2.00	3.50	2.00
49,300	gal. slow cur. asph. for class "B" roadmix, grade SC-3	.09	.0775	.07	.10	.07
10,200	gal. cutback asph. for class "B" seal, grade RC-3	.10	.0975	.09	.12	.08
12	lin. ft. 12-in. corr. gal. sheet metal pipe	2.00	1.50	1.50	2.00	2.00
444	lin. ft. 18-in. corr. gal. sheet metal pipe	3.00	2.50	2.00	2.25	2.50
58	lin. ft. 24-in. corr. gal. sheet metal pipe	3.50	3.50	3.50	3.00	3.00
10	lin. ft. 36-in. corr. gal. sheet metal pipe	7.00	7.00	6.00	5.00	4.00
.04	mi. mixing maintenance windrow	$1000	$900	$600	$800	$1000

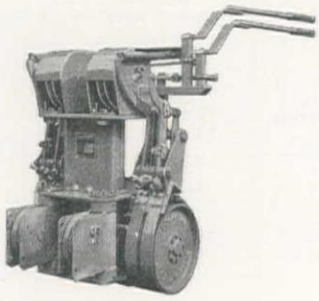
California—Humboldt County—State—Grade

Contract awarded to Joseph Shaw, Crescent City, Calif., $69,411, by the California State Division of Highways, Sacramento, for .3 mi. grade and plantmix surfacing and slope protection work at Shibely and Greenlaw Bluffs. Bids were received from the following:

(1) Joseph Shaw $69,411
(2) R. E. Campbell 73,168
(3) Fred J. Maurer & Son 92,885
(4) Harold Smith $99,730
(5) E. E. Smith & N. M. Ball Sons 102,690
(6) Engineers Limited 118,979

(Continued on next page)

Buckeye BLADE DESIGN gives you "PAYLOAD PLUS"



BUCKEYE G-L-T
Power Control Units

HERE'S the Power Control Unit that gives you split-second response and brute strength for the toughest jobs. Built in Medium Duty Models with adaptors for all sizes and makes of tractors, and Heavy Duty Models for big machines — single or double, narrow or wide drums for operating all types of cable-controlled equipment. *Transmits full engine power to line* smoothly and evenly without jerking impact. Write today for full details and description of outstanding features.

LOOK at the earth piled high above that Buckeye blade —a blade *that's higher and longer than the average to start with!* You can get a bigger payload in front of a Buckeye Bulldozer or Trailbuilder every time — and your tractor will handle it—because Buckeye's patented blade curvature *rolls* the dirt ahead with the least power —no "dead" load, no dirt falls back on radiator. It's the same as putting more "horses" in your engine!

Add to this the natural digging action of The Buckeye cable-controlled blade that creates its own down pressure, the perfect balance that keeps the full length of the crawlers on the ground for greater traction, the rugged, simple, close-coupled construction of the unit and you'll see why these "Western Type" Dozers will give you more yardage per day. Write now for details!

BUCKEYE TRACTION DITCHER COMPANY
FINDLAY ~ OHIO

BUILT BY Buckeye

When writing to Buckeye Traction Ditcher Co., *please mention Western Construction News*

		(1)	(2)	(3)	(4)	(5)	(6)
L. S.	clearing and grubbing	$1200	$500	$1500	$600	$1000	$200
560	M. gal. water	1.00	1.00	1.00	2.00	1.50	1.50
40,400	cu. yd. rdwy. excav. w/o class	.25	.31	.30	.36	.34	.60
160	cu. yd. structure excavation	.80	1.50	2.00	1.50	1.50	1.00
10,000	sta. yd. overhaul	.015	.01	.01	.01	.01	.02
36,500	cu. yd. imported borrow	.32	.38	.65	.58	.45	.80
1,150	cu. yd. rock filling material	.70	1.20	3.00	1.25	1.50	1.20
17	stas. finishing roadway	10.00	10.00	10.00	8.00	5.00	20.00
1.5	tons liquid asphalt, SC-1A (prime coat)	30.00	30.00	20.00	25.00	30.00	24.00
3,100	sq. yd. asphalt paint binder	.06	.06	.10	.10	.03	.18
725	ton min. aggr. (plantmixed surf.)	4.00	3.00	4.50	4.50	5.00	6.00
33	ton liq. asph., ROMC-3 (plantmixed surf.)	20.00	20.00	20.00	16.00	20.00	24.00
100	lb. bar reinforcing steel	.06	.06	.06	.08	.10	.15
2	cu. yd. class "A" P.C.C. (structures)	30.00	30.00	30.00	30.00	40.00	40.00
440	cu. yd. sacked concrete riprap	8.50	9.50	9.00	10.00	10.00	13.00
2,200	cu. yd. trench excavation	.40	.75	1.00	.50	.70	1.10
8,100	sq. ft. wire and rock mattress	.45	.35	.50	.36	.40	.70
20,500	lin. ft. rdwd. tim. memb. (defl. and crib)	.90	.90	1.00	1.30	1.50	1.15
39,700	sq. ft. wire mesh (deflectors)	.10	.09	.11	.12	.14	.16
14,000	cu. yd. gravel backfill (deflectors)	.60	.60	.70	1.05	1.20	.80
78	lin. ft. 18-in. C. M. P.	2.00	3.00	2.00	3.00	2.00	1.50
96	lin. ft. 30-in. C. M. P.	3.00	5.00	4.00	4.00	4.00	3.50
680	lin. ft. temporary guard railing	1.30	1.00	1.00	1.00	1.25	1.25
150	lin. ft. log guard railing	2.00	1.00	3.00	2.00	2.00	2.00
4	each culvert markers	3.00	3.00	4.00	3.00	3.00	3.00
12	each guide posts	3.00	4.00	4.00	3.00	3.00	3.00

Irrigation . . .

New Mexico—Quay County—Bur. of Recl.—Outlet

Contract awarded to Henry Shore, Grand Junction, Colo., $23,600, by the Bureau of Reclamation, Tucumcari, New Mexico, for construction of irrigation outlet at the Conchas Reservoir and a rating section of the Conchas Canal, about 30 mi. northwest of Tucumcari. Bids were received from the following:

(1) Henry Shore $23,600
(2) P. M. Bowen 23,897
(3) J. A. Tobin Construction Co. $26,982
(4) Jahn-Bressi-Bevand Constructors, Inc. 45,229

		(1)	(2)	(3)	(4)
18,500	cu. yd. excavation	.55	.24	.55	.75
1,000	cu. yd. backfill	.15	.28	.40	.55
1,450	cu. yd. compacting backfill and embankments	.30	.38	1.00	1.98
590	cu. yd. concrete in structures except floor slabs and paving	15.00	19.00	16.00	30.80
50	cu. yd. concrete in floor slabs and paving	12.00	18.00	14.00	15.40
98,000	lb. placing reinforcement bars	.0225	.026	.02	.033
100	sq. yd. dry-rock paving	1.50	2.40	2.50	4.40
400	cu. yd. riprap	1.25	5.85	3.00	3.30
156	lin. ft. installing rubber water stops	.30	.25	.50	1.65
378	sq. ft. installing elastic joint-filler material	.20	.25	.40	.55
1	M.F.B.M. erecting timber in structures	75.00	45.00	80.00	$110
2,100	lb. installing handrails	.02	.065	.10	.22
14,800	lb. installing miscellaneous metalwork	.02	.0725	.06	.20

California—Merced County—District—Excavation

S. C. Cody, Rt. No. 1, Glenn, Calif., and Nick Della, P. O. Box 1214, Porterville, Calif., at .169 per cu. yd., submitted identical bids and were low to the Merced Irrigation District, Merced, Calif., for excavation and disposal of approximately 56,600 cu. yds. of material from the westerly side of the existing cut in the Merced Irrigation District Main Canal in Section 12, about 10 mi. northerly from Merced, Calif. The contractor shall commence work on October 1, 1940, and shall complete the work on or before the 31st day of December, 1940. Bids were received from the following:

	Bid Price Per Cu. Yd.		Bid Price Per Cu. Yd.
S. C. Cody	.155	Rexroth & Rexroth	.21
Nick Della	.155	Volpa Brothers	.20
Bert Calvert	.23	Claude C. Wood	.195
Brown Materials Co., Ltd.	.169	M. J. Ruddy	.174
Marshall Hanrahan	.276	R. McGray	.20
Griffith Co.	.21	W. J. Smith	.25
C. E. Huls	.24	J. Jensen	.2475
Macco Construction Co.	.188		

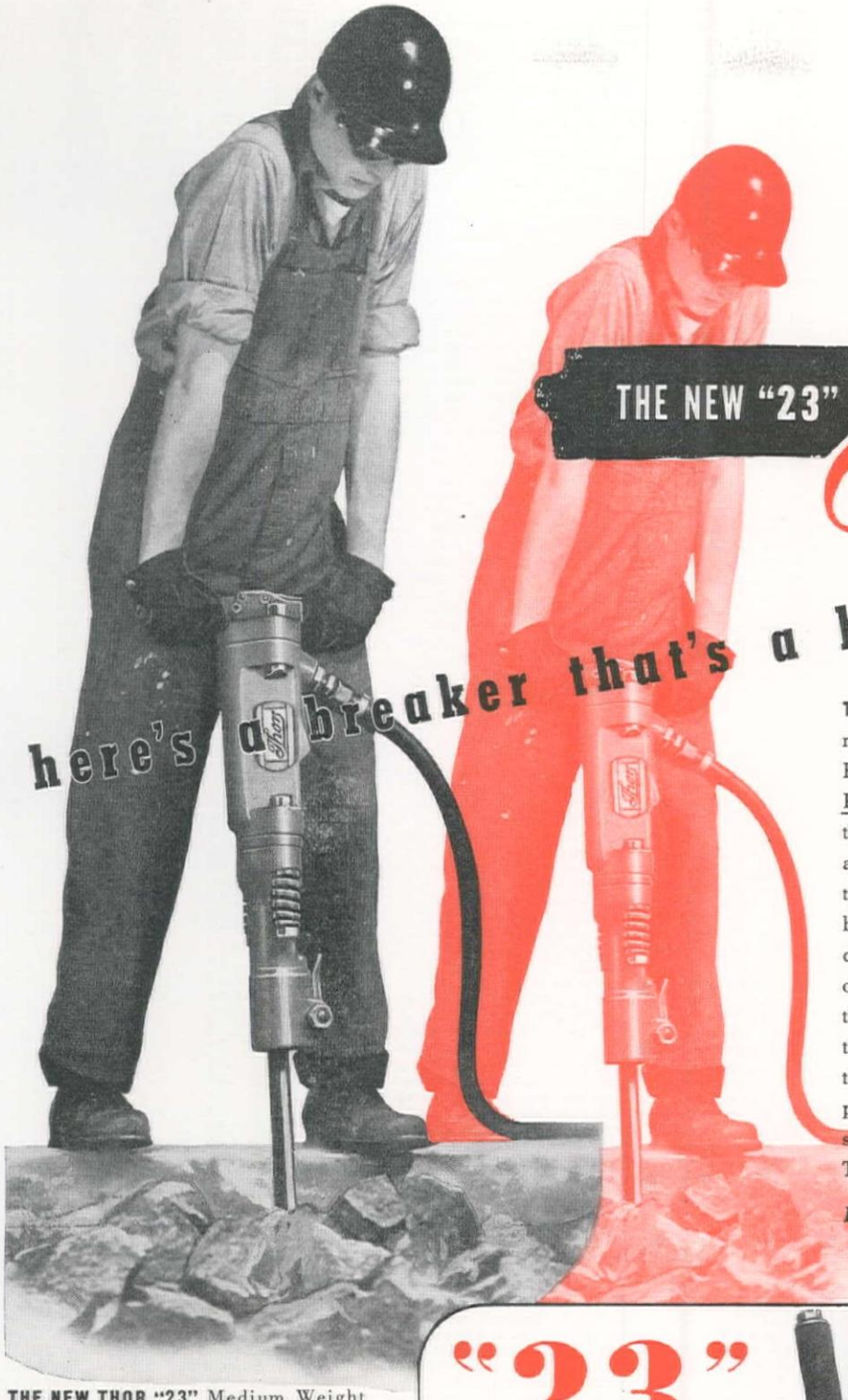
Washington—Okanogan County—Bur. of Recl.—Canals and Dikes

David A. Richardson, Leavenworth, $120,255, low to the Bureau of Reclamation, Coulee Dam, Wash., for the construction of 16 reinforced-concrete rearing ponds; the drainage and water systems of the rearing ponds, and adjacent buildings; the canal for the water supply from the Methow River, the spring-water collecting ditch and all canal and ditch structures; the roadmix, oil surfacing on the roads to the hatchery building and residences; the grading around the rearing ponds; and the gravel surfacing around the rearing ponds and hatchery building. The work will be done at the Winthrop station for migratory-fish control, Columbia Basin Project, Washington, and is located on the Methow River about 1 mi. west of Winthrop, Wash. Bids were received from the following:

(1) David A. Richardson $120,255
(2) C. F. Davidson Co. 135,213
(3) West Coast Construction Co. $145,856
(4) Barnard-Curtiss Co. 170,228

		(1)	(2)	(3)	(4)
Lump Sum	remov. beaver dams and debris from creek channel	$10,000	$1500	$2500	$500
Lump Sum	removing existing structures	$500	$150	$1100	$200
8,550	cu. yd. excavation for canals, ditches, and channels	.55	1.00	.60	.80
5,000	sta. cu. yd. overhaul	.05	.10	.05	.05
2,840	cu. yd. excavation for grading	.50	.45	.50	.80
8,630	cu. yd. excavation for pipe trenches	.60	1.00	.80	.85
11,350	cu. yd. excavation for structures	.70	1.00	.65	.90
8,910	cu. yd. compacted fills	.20	.30	.25	.60
2,590	cu. yd. backfill of pipe trenches	.20	.15	.35	.30
1,960	cu. yd. compacting backfill in pipe trenches	.30	.30	.50	.70
1,310	cu. yd. backfill about structures	.30	.25	.40	.50
5,200	cu. yd. earthfill in dikes	.40	.50	.45	.55
3,470	cu. yd. riprap	2.00	3.00	2.00	2.20
380	sq. yd. dry-rock paving 12 in. thick	1.00	2.00	1.25	2.50
25	sq. yd. dry-rock paving 8 in. thick	1.00	2.00	1.25	4.00

(Continued on next page)



THE NEW "23" Thor

here's a breaker that's a bonus maker!

THE BREAKER WITH THE EXTRAS . . . that's Thor's new medium weight Paving Breaker, the "23"! Extra Power . . . Extra Output . . . and Extra Profits are yours on every job. But let's back those claims with *facts*. First, Thor Engineers, always a step ahead, have designed a new block type piston hammer that increases foot pound blows so greatly that this medium weight machine delivers the power and turns out the work of many a *heavy weight* machine! They've given the "23" perfect balance . . . easy riding qualities . . . and a handle that's remarkably *cool* . . . to cut fatigue and increase output. All these points stack up to one mighty important conclusion — If it's Extra PROFITS you're after, Thor's new "23" Breaker is the machine for you!

For full information on the "23", write today for Bulletin JMC-26A.

THE NEW THOR "23" Medium Weight Paving Breaker makes fast work of cutting wall, floor, and street openings; spike driving; and many similar jobs.

Thor
Portable Power
TOOLS

COCHISE ROCK DRILL MFG. CO.
A Division Of The
INDEPENDENT PNEUMATIC TOOL CO.
6200 E. SLAUSON AVE., LOS ANGELES, CALIF.

Birmingham, Milwaukee, Boston, New York, St. Louis, Buffalo, Philadelphia, Toronto, Cleveland, Pittsburgh, London, Detroit, San Francisco

When writing to CHICAGO PNEUMATIC TOOL CO., *please mention Western Construction News*

36	sq. yd. grouted paving	5.00	3.50	2.00	5.00
540	cu. yd. crushed gravel or crushed rock base course for road surf.	2.50	4.00	3.00	2.80
265	cu. yd. crushed gravel or crushed rock surf. course for road surf.	2.50	4.00	3.00	4.00
18,400	gal. watering	.01	.004	.01	.005
1,750	gal. applying bituminous prime and seal coats for road surf.	.10	.06	.10	.20
5,870	gal. distrib. asphaltic oil for surface course of road surfacing	.10	.06	.10	.30
3,820	sq. yd. mixing, compacting and finishing road-mixed oil surf.	.10	.30	.30	.40
22	cu. yd. coarse sand for seal coat of road surfacing	3.00	4.00	2.00	4.50
1,010	cu. yd. gravel surf. around rearing ponds and hatchery building	2.50	3.00	2.00	3.00
625	lin. ft. laying 12-in. diameter sewer pipe with uncemented joints, embedded in gravel	.75	.90	.80	1.30
820	lin. ft. laying 10-in. diameter sewer pipe with uncemented joints, embedded in gravel	.70	.80	.80	1.20
400	lin. ft. laying 8-in. diameter sewer pipe with uncemented joints, embedded in gravel	.65	.70	.70	1.00
300	lin. ft. laying 6-in. diameter sewer pipe with uncemented joints, embedded in gravel	.60	.60	.70	1.00
180	lin. ft. laying 39-in. diam. sewer pipe with cemented joints	1.30	2.00	4.25	3.40
455	lin. ft. laying 36-in. diam. sewer pipe with cemented joints	1.30	2.00	4.25	3.10
250	lin. ft. laying 27-in. diam. sewer pipe with cemented joints	1.30	1.00	3.00	3.00
240	lin. ft. laying 24-in. diam. sewer pipe with cemented joints	1.30	1.00	3.00	2.40
80	lin. ft. laying 21-in. diam. sewer pipe with cemented joints	1.00	1.00	2.50	2.20
370	lin. ft. laying 18-in. diam. sewer pipe with cemented joints	.70	1.00	2.00	2.00
10	lin. ft. laying 10-in. diam. sewer pipe with cemented joints	.80	1.00	1.50	1.50
265	lin. ft. laying 4-in. diam. sewer pipe with cemented joints	.20	.20	.50	1.00
1,125	lin. ft. erecting 26-in. diam. continuous woodstave pipe	1.00	1.00	1.40	2.00
1,720	lin. ft. laying 6-in. diam. machine-banded woodstave pipe	.40	.30	.30	.45
600	lin. ft. laying 36-in. diam. welded steel pipe	1.00	1.50	2.60	2.00
300	lin. ft. laying 30-in. diam. welded steel pipe	1.00	1.50	2.50	2.00
80	lin. ft. laying 24-in. diam. welded steel pipe	1.00	1.50	2.00	1.80
540	lin. ft. laying 22-in. diam. welded steel pipe	1.00	1.00	1.75	1.50
130	lin. ft. laying 20-in. diam. welded steel pipe	.90	1.00	1.60	1.50
120	lin. ft. laying 18-in. diam. welded steel pipe	.60	1.00	1.50	1.40
180	lin. ft. laying 16-in. diam. welded steel pipe	.60	.70	1.45	1.40
120	lin. ft. laying 14-in. diam. welded steel pipe	.50	.70	1.40	1.40
290	lin. ft. laying 10¾-in. diam. welded steel pipe	.50	.50	1.20	1.30
310	lin. ft. laying 10-in. diam. welded steel pipe	.40	.50	1.10	1.30
140	lin. ft. laying 8-in. diam. welded steel pipe	.30	.50	1.00	1.00
105	lin. ft. laying 4-in. diam. welded steel pipe	.20	.30	.40	.60
60	lin. ft. laying 4- and 6-in. diam. galvanized steel pipe	.50	.20	.25	.50
170	lin. ft. laying 2-in. diam. galvanized steel pipe	.08	.20	.20	.30
540	lin. ft. laying 1½-in. diam. galvanized steel pipe	.08	.15	.18	.20
345	lin. ft. laying ¾-in. diam. galvanized steel pipe	.08	.15	.15	.20
5	assemblies install. goose-neck assemb. for ¾-in. di. serv. conn.	5.00	20.00	1.50	4.00
1	assembly install. 36-in. gate valve in valve chamber	40.00	75.00	50.00	50.00
1	assembly install. 20-in. gate valve in valve chamber	40.00	45.00	30.00	40.00
2	assemblies install. 20-in. gate valve and valve box	40.00	45.00	35.00	30.00
1	assembly install. 12-in. gate valve in valve chamber	20.00	20.00	20.00	30.00
3	assemblies install. 10-in. gate valve and valve box	20.00	15.00	20.00	20.00
1	assembly install. 8-in. gate valve in valve chamber	15.00	15.00	20.00	20.00
5	assemblies install. 6-in. gate valve and valve box	15.00	10.00	10.00	15.00
2	assemblies install. 4-in. gate valve and valve box	15.00	15.00	10.00	10.00
5	assemblies install. 4-in. gate valve in manholes	4.00	10.00	10.00	10.00
1	assembly install. 1½-in. gate valve and valve box	3.00	10.00	5.00	5.00
2	hydrants placing fire hydrants	23.00	35.00	27.50	35.00
3	washers placing street washers	27.00	25.00	25.00	30.00
880	sq. ft. constructing concrete sidewalks	.20	.20	.20	1.00
370	lin. ft. constructing concrete curbs	1.25	1.00	1.00	1.00
2,400	cu. yd. concrete in structures	18.50	22.00	27.08	30.00
333,000	lb. placing reinforcement bars	.02	.015	.02	.04
100	sq. yd. waterproofing inside of water tank	.30	1.00	.50	.50
L. S.	construct. screen and valve chambers, except concrete	$1000	$200	$500	$280
11	M.F.B.M. erecting timber in structures	20.00	50.00	60.00	50.00
103,500	lb. installing standard steel and wrought iron piping	.03	.05	.06	.06
2,750	lb. installing slide gates	.04	.07	.06	.05
2,100	lb. installing revolving screen	.04	.06	.06	.10
29,400	lb. install. flat screens, floor plates, and gratings	.02	.04	.06	.05
975	lb. installing motor-driven, deep-well, pumping unit	.05	.05	.16	.10
32,300	lb. installing miscellaneous metalwork	.04	.05	.07	.05
200	lin. ft. installing electrical metal conduit	.50	.10	.36	.50
20	lb. installing electrical conductors	1.00	.20	2.50	1.00
4	lb. installing ground wires	1.00	.50	6.00	1.00
L. S.	constructing wood-pole power lines	$125	$424	$908	$500
125	lb. installing electrical apparatus	1.00	.20	1.25	.50

Idaho—Payette County—Bur. of Recl.—Canal

Vernon Brothers, Boise, $84,573, awarded contract by the Bureau of Reclamation, Boise, for construction of earthwork and structures, Graveyard Gulch and Langley Gulch wasteways, Payette Division, Boise Project. For the Graveyard Gulch wasteway earth section No. 2 is 16,800 ft. long, bottom width 14 ft., water depth 7.8 ft. and 1½:1 side slopes. Earth section No. 3 is 10,800 ft. long, bottom width 10 ft., water depth 5.8 ft. Hydraulic properties of the respective sections are: A=200.46 and 108.5 sq. ft.; V=3.02 and 5.57 ft.; Q=606 and 604 c.f.s. For the Langley Gulch wasteway earth section No. 1 is 300 ft. long, bottom width 10 ft., water depth 4.7 ft. Earth section No. 2 is 18,100 ft., bottom width 8 ft., water depth 3.4; side slopes in both sections are 1½:1. Hydraulic properties of the respective sections include: A=80.14 and 44.54 sq. ft.; V=2.24 and 4.02 ft.; Q=179 c.f.s. Bids were received from the following:

(A)	Vernon Brothers Co.	$84,573	
(B)	J. A. Terteling & Sons	88,961	
(C)	Henry L. Horn	93,568	
(D)	Clare Schweitzer	93,594	
(E)	S. A. Marshall and Geo. R. Stacy	94,199	
(F)	Reynolds-Ely Construction Co.	98,640	
(G)	George B. Henly Construction Co.		$102,220
(H)	David A. Richardson		102,761
(I)	J. W. Brennan and Lobnitz Bros.		138,850
(J)	Wheeler and England		120,260
(K)	Elkhorn Construction Co.		127,544
(L)	McNutt Bros.		139,732

(1)	350,000	cu. yd. excav. for wasteways	
(2)	6,000	cu. yd. excav. for structures	
(3)	250,000	sta. cu. yd. overhaul	
(4)	2,000	cu. yd. compacting embankments	
(5)	16,500	cu. yd. backfill	
(6)	9,500	cu. yd. compacting backfill	
(7)	3,035	cu. yd. concrete in structures	
(8)	332,000	lb. placing reinforcement bars	
(9)	6,000	sq. yd. dry-rock paving	
(10)	328	lin. ft. driving timber piles	
(11)	76	M.F.B.M. erect. timber in struct.	
(12)	1,296	lin. ft. lay. 12-in. diam. C. M. P.	
(13)	64	lin. ft. lay. 15-in. diam. C. M. P.	
(14)	56	lin. ft. lay. 36-in. diam. C. M. P.	
(15)	96	lin. ft. erecting No. 36 metal flume	
(16)	62	lin. ft. erecting No. 42 metal flume	
(17)	100	lin. ft. erecting No. 48 metal flume	
(18)	1,150	lb. install. misc. metalwork	
(19)	Lump Sum	removing existing struct. and salvaging reusable materials	

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
(1)	.06	.065	.06	.059	.07	.10	.08	.128	.08	.10	.11	.13
(2)	.45	.20	.50	.43	.30	.50	.60	.128	.50	.70	.50	1.50
(3)	.015	.005	.03	.03	.02	.01	.01	.015	.015	.01	.03	.01
(4)	.15	.10	.09	.29	.25	.10	.20	.35	.30	.10	.60	.25
(5)	.10	.12	.10	.09	.13	.20	.15	.10	.10	.10	.15	.15

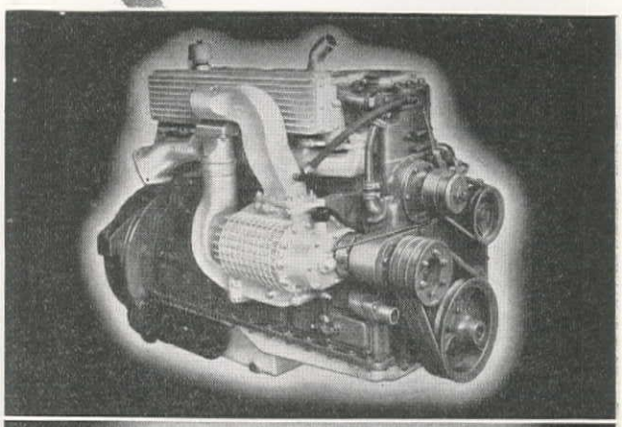
(Continued on next page)

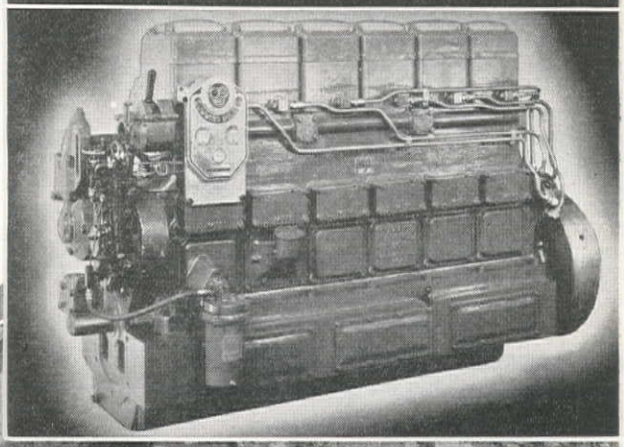
THIS BRUTE WORKS 3 SHIFTS

The contract called for moving 400,000 yards of solid rock . . . one of Contractor Clyde Wood's "toughest jobs to date." Operating 24 hours a day, the Cummins Diesel which powers this Koehring 801 had to take plenty of punishment.

Asked what he thought of the engine's power, Mr. Wood said: "So powerful it snapped the boom in two . . . the *best engine in every respect* I have ever used."* And for this ample power and assured dependability, the fuel consumption is only 5½ to 6 gallons per hour. In addition, these savings are fully protected with the Cummins Diesel's simple service requirements and low maintenance costs. Cummins Engine Company, 1916 Wilson Street, Columbus, Indiana.

*Mr. Wood also operates 6 Cummins Diesel-powered tank trucks.





Top: Model HBIS-600 (Supercharged) Cummins Dependable Diesel. 200 hp. at 1,800 rpm.

Right: Model KI-600 Cummins Dependable Diesel. 210 hp. at 1,000 rpm.

Starting at the top of the mountain, the Cummins Diesel-powered Koehring 801 shovel has carved its own way down 350 feet in making room for the power house being installed at Parker Dam by the Dept. of Interior, Bureau of Reclamation.

SALES AND SERVICE—Fresno, California, Cummins Diesel Sales Corporation; **Los Angeles, California,** Diesel Motor Sales & Service Corporation; **Nanaimo, B. C.,** Cummins Diesel Sales of B. C.; **Phoenix, Arizona,** Cummins Southwest Diesel Sales Corporation; **Portland, Oregon,** Cummins Diesel Sales of Oregon, Inc.; **Salt Lake City, Utah,** Intermountain Diesel Sales Corporation; **San Francisco, California,** Cummins Diesel Sales Corporation; **Seattle, Washington,** Cummins Northwest Diesel Sales, Inc.; **Spokane, Washington,** Cummins Diesel Sales of Oregon, Inc.; **Vancouver, B. C.,** Cummins Diesel Sales of B. C.

CUMMINS Dependable DIESELS

(6)	.25	.30	.35	.395	.30	.20	.50	.30	.60	.10	.52	.40
(7)	12.50	14.00	14.00	14.00	13.00	12.00	13.00	11.75	15.90	18.00	15.00	14.75
(8)	.015	.015	.015	.015	.015	.01	.02	.0125	.0175	.025	.03	.022
(9)	1.25	1.50	1.30	1.23	1.60	1.50	1.50	1.00	1.30	1.30	1.80	3.45
(10)	1.00	1.00	.80	1.00	1.75	1.00	2.50	1.00	$100	.50	1.20	1.25
(11)	15.00	15.00	10.00	15.00	20.00	25.00	40.00	15.00	12.00	45.00	22.00	25.00
(12)	.25	.25	.20	.15	.25	.50	.30	.30	.25	.20	.60	.25
(13)	.25	.30	.25	.17	.50	.50	.40	.30	.25	.20	.60	.30
(14)	.75	.75	.50	.40	1.50	1.00	1.00	1.00	.50	1.00	1.20	.70
(15)	1.25	1.00	.80	.70	1.00	2.00	2.00	1.00	.40	1.00	1.00	.20
(16)	1.25	1.25	.90	.80	2.00	3.00	3.00	1.00	.50	1.00	1.40	.25
(17)	1.25	1.50	1.00	.90	2.00	4.00	4.00	1.00	.50	2.00	1.40	.30
(18)	.05	.03	.03	.03	.10	.05	.08	.08	.03	.40	.15	.20
(19)	$150	50.00	50.00	$260	$300	$200	$200	$150	50.00	$300	$200	$200

Montana—Gallatin County—State—Overpass

Contract awarded to McLaughlin Construction Co., Livingston, $69,000, by the Montana State Highway Commission, Helena, for construction of a 6-span steel and concrete viaduct and approach road over N. P. railroad tracks east of Manhattan. Bids were received from the following:

(A)	McLaughlin Construction Co.	$69,000	
(B)	Thomas Staunton	75,968	
(C)	C. & F. Teaming and Trucking Co.	79,754	
(D)	S. J. Groves & Sons Co.	87,484	
(E)	Frank J. Haas	69,289	
(F)	J. C. Boespflug Construction Co.	73,028	
(G)	Blanchard Bros.	$99,340	
(H)	W. P. Roscoe Co.	70,347	
(I)	Inman & Okerberg	80,630	
(J)	Lease & Laigland	82,468	
(K)	Inland Construction Co.	89,862	
(L)	Peter Kiewit Sons Co.	78,564	

(1)	93,555 cu. yd. unclass. excav.							(16)	0.271 mi. proc. 32-ft. oiled width			
(2)	154 cu. yd. culvert excavation							(17)	118 sq. yd. process road apps.			
(3)	72 lin. ft. 15-in. corr. metal pipe culv.							(18)	3,126 gal. seal coat with 95+ oil			
(4)	64 lin. ft. 24-in. corr. metal pipe culv.							(19)	2,852 lin. ft. comb. gird rail and header			
(5)	84 lin. ft. 42-in. corr. metal pipe culv.							(20)	50 lin. ft. No. 18 metal ditch lining			
(6)	0.128 M.F.B.M. lumber in headgates							(21)	3 each wood station markers			
(7)	3,424 ton base course cr. gravel							(22)	21 each conc. r/w monuments			
(8)	1,894 ton grade "A" top course surf.							(23)	147,000 lb. structural steel			
(9)	169 ton stone chips							(24)	137,800 lb. reinforcing steel			
(10)	250 cu. yd. binder							(25)	240 cu. yd. class "A" concrete			
(11)	500 yd. mi. overhaul on binder							(26)	416.5 cu. yd. class "D" concrete			
(12)	200 M. gal. watering							(27)	6 cu. yd. class "X" concrete			
(13)	100 hr. rolling							(28)	566 lin. ft. concrete handrail			
(14)	11,624 gal. appl. of MC-3 road oil							(29)	565 cu. yd. structure excavation			
(15)	0.243 mi. proc. 24-ft. oiled width											

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
(1)	.19	.178	.22	.25	.17	.18	.45	.175	.29	.21	.305	.22
(2)	1.00	1.00	1.00	1.00	1.00	.90	.95	1.00	1.00	1.00	1.45	1.00
(3)	2.25	2.00	2.00	1.50	1.40	1.90	2.50	1.40	1.75	3.00	1.80	3.00
(4)	3.50	3.00	3.00	2.50	2.50	3.00	3.60	2.50	3.00	4.00	3.25	4.00
(5)	7.00	7.00	7.00	5.50	5.50	6.50	7.00	5.75	6.50	5.00	7.40	7.00
(6)	$200	$200	$100	$100	$100	$110	$250	$100	$100	$150	$150	$300
(7)	.60	.75	1.00	1.00	.65	.80	1.50	.75	1.00	.75	.80	1.00
(8)	.85	1.30	1.25	1.35	1.25	.90	1.50	1.20	1.10	1.00	.85	1.00
(9)	4.00	3.50	4.00	4.05	3.00	2.50	6.40	3.00	3.50	5.00	2.90	5.00
(10)	.10	.25	.20	.15	.10	.20	.63	.25	.50	.20	.30	.10
(11)	.10	.15	.20	.30	.05	.10	.25	.15	.25	.15	.30	.05
(12)	1.25	1.50	1.00	2.15	1.00	3.00	1.90	1.50	1.50	4.00	1.50	1.00
(13)	4.00	3.50	4.00	3.00	4.00	3.50	3.80	3.50	3.50	4.00	3.60	5.00
(14)	.0925	.12	.10	.12	.10	.12	.10	.12	.109	.12	.12	.10
(15)	$1000	$800	$1500	$1500	$1000	$1000	$1270	$800	$2500	$800	$1000	$2000
(16)	$1000	$1000	$2000	$1500	$1000	$1200	$1650	$1000	$3000	$1200	$1500	$3000
(17)	.30	.25	.20	.50	.20	.20	.65	.25	.20	.20	1.00	.50
(18)	.09	.15	.12	.11	.10	.14	.12	.15	.105	.15	.14	.10
(19)	1.30	1.60	2.00	1.50	1.35	2.00	.95	1.50	1.50	1.00	1.75	1.50
(20)	1.00	1.40	1.00	1.00	1.50	.60	1.25	2.00	1.00	1.00	1.35	2.00
(21)	5.00	3.00	2.50	3.00	2.00	5.00	2.50	5.00	3.00	2.00	4.00	3.00
(22)	10.00	3.00	5.00	3.00	2.20	5.00	2.50	5.00	5.00	5.00	5.00	3.00
(23)	.077	.08	.075	.10	.0729	.075	.075	.071	.07	.08	.089	.075
(24)	.058	.07	.06	.07	.059	.06	.057	.071	.055	.07	.075	.06
(25)	24.00	30.00	20.00	25.00	26.00	26.00	25.40	23.00	25.00	30.00	25.00	24.00
(26)	25.00	30.00	37.00	30.00	27.00	28.00	25.40	26.90	26.00	35.00	34.50	32.00
(27)	40.00	50.00	80.00	25.00	30.00	$110	38.00	50.00	30.00	50.00	30.00	32.00
(28)	3.00	4.00	3.50	6.00	5.00	3.50	6.30	2.50	2.50	6.00	3.20	5.00
(29)	3.00	1.90	1.00	4.00	2.50	2.00	2.50	2.50	3.00	5.00	1.50	2.00

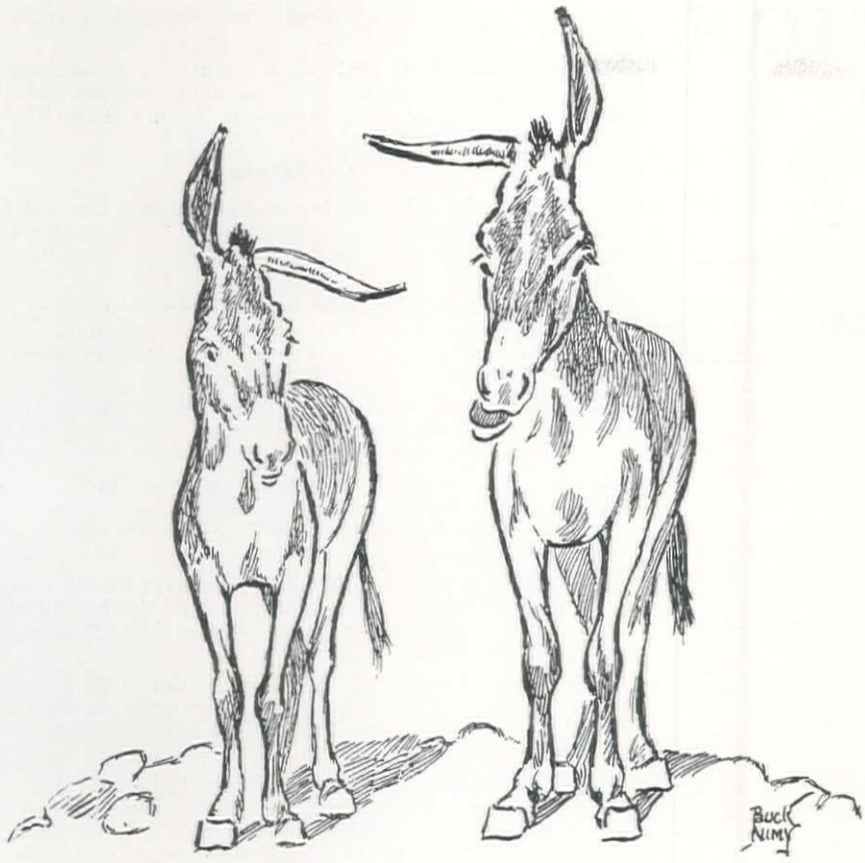
California—San Luis Obispo County—State—Concrete Girder

Dan Caputo, San Jose, $68,388, awarded contract by the California Division of Highways, Sacramento, for construction of a reinofrced concrete girder bridge on concrete bents with pile foundations, across San Luis Obispo Creek 6 mi. south of San Luis Obispo. Bids were received from the following:

(A)	Dan Caputo	$68,388	
(B)	C. W. Caletti & Co.	77,840	
(C)	J. E. Haddock, Ltd.	78,584	
(D)	R. H. Travers	79,746	
(E)	Oberg Bros.	79,811	
(F)	Byerts & Dunn	$82,268	
(G)	Trewhitt-Shields & Fisher	82,692	
(H)	Gibbons & Reed Co.	84,934	
(I)	M. J. B. Construction Co. & F. Kaus	88,207	
(J)	Utah Construction Co.	94,554	

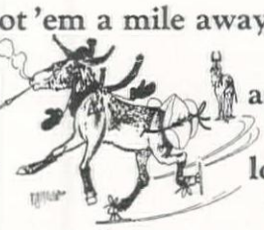
(1)	1 lot clearing and grubbing							(9)	39 cu. yd. class "A" P.C.C. (railing)	
(2)	2,600 cu. yd. roadway excav. w/o class.							(10)	9,200 lb. misc. iron and steel	
(3)	225 cu. yd. structure excav. (type "A")							(11)	10,760 lin. ft. furnish. untr. Douglas fir piles, ind. test piles	
(4)	1,000 cu. yd. structure excav. (type "B")							(12)	1,600 lin. ft. furnish tr. Douglas fir piles	
(5)	411,000 lb. furn. bar reinf. steel							(13)	308 each drive tr. and untr. Douglas fir piles, incl. test piles	
(6)	411,000 lb. placing bar reinf. steel							(14)	1 lot misc. items of work	
(7)	76 cu. yd. class "A" P.C.C. (footing blocks)									
(8)	1,480 cu. yd. class "A" P.C.C. (structure)									

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
(1)	$100	$500	$500	$1500	$200	$1000	$1400	$250	$1000	$500
(2)	.50	.50	.25	.30	.35	.40	.50	.20	.80	.46
(3)	2.50	4.00	4.70	1.00	3.00	4.00	3.40	5.00	3.50	10.00
(4)	1.50	1.50	1.50	.60	2.50	1.00	1.11	.85	3.00	2.50
(5)	.03	.035	.036	.037	.03	.04	.03⅓	.04	.034	.036
(6)	.01	.01	.006	.02	.01	.01	.009	.008	.009	.011
(7)	15.00	20.00	16.25	12.00	15.00	15.00	20.00	15.00	20.00	20.00
(8)	23.00	25.00	27.00	25.00	25.00	24.00	27.70	31.00	31.80	35.00
(9)	52.00	60.00	55.00	50.00	50.00	60.00	54.00	65.00	60.00	55.00
(10)	.135	.16	.16	.17	.16	.20	.12	.20	.17	.16
(11)	.31	.28	.34	.40	.40	.35	.35	.36	.35	.30
(12)	.80	.75	.76	.90	.90	.80	.83	.85	.87	.75
(13)	15.00	25.00	16.00	18.00	35.00	24.00	31.00	16.50	15.00	22.00
(14)	$800	$900	$3000	$500	$1000	$4500	$350	$750	$1400	$650



There's no use arguing...

THERE'S NO USE ARGUING, Sadie, when the contractors on the Sacramento River levee work, near Marysville, replace their two line rigs with Wooldridge *3-line* Scrapers you can be sure they are a darn-sight cheaper to operate—and deliver a greater profit. 53 out of 62 of those scrapers are Wooldridges. You can spot 'em a mile away. With "boiling bowls" they load faster...on the fill they get swung nimbly around and on their way back to the cut in a few seconds time because their loads can be ejected in sixth gear. Even with the addition of the *third line* there are but two operating levers. Because each control cable performs but *one* job, (1—bowl hoist, 2—apron control and 3—load ejector) cable life is doubled! That's just another way of saying that while you're cutting yardage costs you get trouble-free operation —you can rest assured. Ask for the booklet explaining this more profitable way of moving earth. Wooldridge Manufacturing Company, Sunnyvale, California.



WOOLDRIDGE

"BOILING BOWL" SCRAPERS - BULLDOZERS - TRAIL BUILDERS - POWER CONTROL UNITS - BOOSTERS - TAMPERS - RIPPERS

When writing to Wooldridge Mfg. Co., *please mention Western Construction News*

CONSTRUCTION SUMMMARY

NOTE: This summary of construction awards and proposed projects has been changed to present a more readable form in which news of specific projects may be more easily found. The county name leading each item is that in which the project is located.

Large Western Projects...

CONTRACTS AWARDED

Pacific Bridge Co., San Francisco, Calif., $1,649,000 by the U. S. Navy Dept., Washington, D. C., for construction of a steel floating drydock 482-ft. long and 71-ft. beam at Mare Island Navy Yard, Solano County, Calif.

General Construction Co., Seattle, $5,000,000 by the Seattle-Tacoma Shipbuilding Corp., Seattle, Wash., for construction of a shipyard on 25-ac. site on Harbor Island, Seattle, King County, Wash.

Ford J. Twaits Co., Los Angeles, Calif., and **Morrison-Knudsen Co., Inc.,** Los Angeles, Calif., $2,000,000 by the Constructing Quartermaster, Presidio of Monterey, for additional construction of 300 buildings, Monterey County, Calif.

Wm. P. Neil Co., Los Angeles, Calif., $2,146,000 by the Public Works Office, 12th Naval District, San Francisco, Calif., for construction of buildings, roads, sidewalks, railroad tracks, services, street lighting, fire protection system, etc., at the Naval Ammunition Depot, Hawthorne, Mineral County, Nevada.

Utah Construction Co., Ogden, Utah, $2,000,000 by the Utah Power and Light Co., Salt Lake City, and Idaho Power Co., Boise, Idaho, for construction 227 mi. high tension transmission line connecting circuits in Utah, Idaho, and Montana.

Bechtel-McCone-Parsons Corp., Los Angeles, Calif., $1,600,000 by the U. S. War Dept., Washington, D. C., for construction of a power plant at Elmendorf Field, Anchorage, Alaska.

Lindgren & Swinerton, San Francisco, Calif.; **Hegeman-Harris, Inc.,** New York City; and **Tucker-McClure,** Balboa, Canal Zone, $6,420,500 by the U. S. Navy Dept., Washington, D. C., for construction of additional aviation facilities, Canal Zone.

PROPOSED PROJECTS

U. S. DISTRICT ENGINEER Office announces that bids for the proposed Santa Fe Dam will be taken early next spring. The project, estimated at $10,000,000 will be located on the San Gabriel River, near Rio Honde Junction, northwest of Baldwin Park, Los Angeles County, Calif.

PLANS HAVE NOW been completed for the $2,500,000 boulevard through the Santa Monica Mountains by the County of Los Angeles and work is expected to start in the early spring.

THE SALT RIVER Valley Water Users Assn., Phoenix, Ariz., have approved a sum of $2,500,000 for construction of a steam generating plant at Tempe, Maricopa County, Ariz.

THE CONSTRUCTION QUARTERMASTER, Fort Ord, Monterey County, Calif., has announced that construction of housing facilities estimated at $2,400,000 will get under way early this month at San Luis Obispo County, Calif.

Highway and Street...

CONTRACTS AWARDED

Arizona

COCHISE CO.—**Tanner Construction Co.,** P. O. Box 1832, Phoenix—$298,846 for 7 mi. grade, surf., etc., on Benson-Steins Pass Hwy., east of Benson—by Arizona State Highway Commission, Phoenix.

MOJAVE CO.—**J. A. Casson,** Box 2293, Phoenix—$89,836 for const. 5⅔ mi. grade, drain, etc., on Kingman-Boulder Dam Hwy. about 36 mi. north of Kingman—by Arizona State Highway Commission, Phoenix.

NAVAJO CO.—**Warren Southwest, Inc.,** 2145 East 25th St., Los Angeles—$81,835 for 9.4 mi. furnish and place aggreg. base course and plantmix surf. on the Showlow-Springerville Hwy. east of Showlow—by Arizona State Highway Commission, Phoenix.

NAVAJO CO.—**N. G. Hill Co.,** Rt. 6, Box 551, Phoenix—$126,173 for 18.3 mi. aggr. base and plantmix surf. on Showlow-Holbrook Hwy. east of Showlow—by Arizona State Highway Commission, Phoenix.

California

ALAMEDA CO.—**Heafey-Moore Construction Co.,** 344 High St., Oakland—$112,000 for const. approx. 2 mi. of two 4-lane highways to Alameda Naval Air Base, Alameda—by City Council, Alameda.

ALAMEDA CO.—**Heafey-Moore Company,** 344 High St., Oakland—$93,552 for grade and asph. conc. pave. on Main St., NW from Pacific Ave. and Atlantic Ave., betw. Main St. and Naval Air Base, Alameda—by City Council, Alameda.

IMPERIAL CO.—**R. E. Hazard & Sons,** Box 1510, San Diego—$31,204 for 15.4 mi. roadmix surf. betw. Heber and Niland—by California Division of Highways, Los Angeles.

KERN AND INYO COS.—**Brown & Doko,** Pismo Beach—$11,988 for 23 mi. pene. oil treat. and seal coat in the vicinities of Armistead's and Little Lake—by California Division of Highways, Sacramento.

LOS ANGELES CO.—**F. Gunnar Gramatky,** 108 W. Glenarm, Pasadena—$9,950 for improvement of 2,600 lin. ft. of Oakland Ave., betw. Glenarm St. and Los Robles Ave., Pasadena—by City Council, Pasadena.

LOS ANGELES CO.—**J. E. Haddock, Ltd.,** 3578 E. Foothill Blvd., Pasadena—$22,821 for oil macadam pave. on Huntington Drive betw. Granada Ave. and Garfield Aves., San Marino—by City Council, San Marino.

LOS ANGELES CO.—**J. E. Haddock, Ltd.,** 3587 E. Foothill Blvd., Pasadena—$79,700 for 0.7 mi. grade and conc. and asphalt pave. on Arroyo Seco Parkway betw. Grand Ave. and Fair Oaks Ave., Los Angeles—by California Division of Highways, Los Angeles.

MERCED CO.—**J. A. Casson,** 22105 Meekland Ave., Hayward—$48,838 for 3.3 mi. grade, plantmix surf. betw. Merced and Tuttle—by California Division of Highways, Sacramento.

PLACER CO.—**J. B. Covello,** 1510 Sturgis St., Auburn—$23,834 for paving 13 blocks of streets in Auburn—by City Council, Auburn.

PLUMAS AND BUTTE COS.—**Claude C. Wood,** Lodi—$52,793 for 4 mi. highway improvements at various locations betw. Hines Creek and Howells—by California Division of Highways, Sacramento.

SACRAMENTO CO.—**J. R. Reeves,** P. O. Box 1072, Sacramento—$18,564 for asph. conc. pave., etc., on 12th Ave. betw. Franklin Blvd. and Sacramento Blvd., Sacramento—by City Council, Sacramento.

SAN DIEGO CO.—**V. R. Dennis Construction Co.,** P. O. Box F, Hillcrest Sta., San Diego—$29,745 for 0.3 mi. grade and plantmix surf. on cr. run base and conc. pave. on Washington St. betw. 5th and 9th Aves., San Diego—by California Division of Highways, Los Angeles.

SAN FRANCISCO CO.—**Charles L. Harney,** Call Bldg., San Francisco—$17,147 for asph. conc. pave., etc., on Bayshore Blvd. betw. Waterloo St. and Islais Creek Channel—by Department of Public Works, San Francisco.

SAN LUIS OBISPO CO.—**Gibbons & Reed,** 221 E. San Fernando Blvd., Burbank—$149,803 for 1.4 mi. grade and plantmix surf. at Miles Station—by California Division of Highways, Sacramento.

SAN MATEO CO.—**Union Paving Co.,** 212 Babcock Bldg., San Francisco—$38,518 for grade, pave, etc., in Baywood Knolls Subdivision, San Mateo—by City Council, San Mateo.

SANTA CLARA CO.—**A. J. Raisch,** 358 Lincoln St., San Jose—$16,604 for asph., conc. surf. on Second St. from St. John St. to Reed St., and on San Carlos St. from Market St. to 4th St., San Jose—by City Council, San Jose.

SANTA CLARA CO.—**Earl W. Heple,** 494 Delmas Ave., San Jose—$14,430 for const. conc. retaining wall on San Jose-Almaden Road, San Jose—by Board of Supervisors, San Jose.

SANTA CLARA CO.—**A. J. Raisch,** 358 Lincoln Ave., San Jose—$12,985 for grade and surf. on White Road from Cunningham Road to Tully Road, San Jose—by County Board of Supervisors, San Jose.

SANTA CLARA CO.—**A. J. Raisch,** 358 Lincoln Ave., San Jose—$30,785 for improving San Jose-Almaden Road from

Kooser Road to Koch Lane, San Jose—by Board of Supervisors, San Jose.

SOLANO CO.—**A. G. Raisch,** 2048 Market St., San Francisco—$10,242 for grade, pave, etc., on Tennessee St., Vallejo—by City Council, Vallejo.

SOLANO CO.—**A. G. Raisch,** 2048 Market St., San Francisco—$55,119 for grading, paving, etc., in Fleming Subdivision, Vallejo—by City Council, Vallejo.

SONOMA CO.—**Heafey-Moore and Fredrickson and Watson Construction Co.,** 873 81st Ave., Oakland—$72,733 for 0.4 mi. grade and plantmix surf. in the vicinity of Cloverdale—by California Division of Highways, Sacramento.

SUTTER CO.—**Hemstreet & Bell,** P. O. Box 906, Marysville—$10,884 for 0.4 mi. grade and plantmix surf. on cr. run base at Berg and Lomo—by California Division of Highways, Marysville.

TRINITY CO.—**Clifford A. Dunn,** P. O. Box 431, Klamath Falls, Ore.—$72,876 for 3.4 mi. grade, conc. crib, rock slope protection, and drain. facilities at various locations betw. Big Bar and Helena—by California Division of Highways, Sacramento.

TUOLUMNE CO.—**Close Building Supply,** 721 C St., Hayward—$10,955 (recommended) for 1.7 mi. bitu. treat. surf. on Sec. D of Route 38, the Sonora Pass National Forest Hwy., Stanislaus National Forest—by Public Roads Administration, San Francisco.

Colorado

DELTA CO.—**Domenic Leone,** 818 Oak St., Trinidad—$60,132 for 2.9 mi. grav. surf. on St. Hwy. 92, betw. Austin and Hotchkiss—by State Highway Engineer, Denver.

EAGLE CO.—**C. A. Switzer,** 822 University Bldg., Denver—$15,170 for one mi. gravel surf. betw. Gypsum and Dotsero on S.H. 4—by State Highway Engineer, Denver.

EAGLE AND SUMMIT COS.—**Lowdermilk Brothers,** 140 South Elati St., Denver—$91,846 for 19.5 mi. grav. surf. on St. Hwy. 78 betw. Dowd and Wheeler—by State Highway Engineer, Denver.

EL PASO CO.—Ed H. Honnen, Box 92, Colorado Springs—$29,666 for 0.7 mi. grav. surf. on State Hwy. 115, south of Colorado Springs—by State Highway Engineer, Denver.

GILPIN AND CLEAR CREEK COS.—**Northwest Engineering Co.,** Rapid City, S. D.—$154,835 (recommended) for 21.2 mi. grade, surf., etc., on Boulder-Idaho Springs Forest Hwy. Rt., within or partly within the Roosevelt and Arapaho National Forest—by Public Roads Administration, Denver.

GRAND CO.—**Gerard Knutson Construction Co.,** Kansas City, Mo.—$67,688 (recommended) for const. 2.8 mi. of highway near the west boundary of the Rocky Mountain National Park on the Trail Ridge Road—by Public Roads Administration, Denver.

GRAND CO.—**Larson Construction Co.,** 2811 Walnut St., Denver—$218,780 for 8.5 mi. grav. surf. on St. Hwy. 2, betw. Kremmling and Muddy Pass—by State Highway Engineer, Denver.

LAKE CO.—**C. Ryan & Son,** Lakewood—$31,730 for 11.8 mi. construction or improvement on Loveland-Fremont Pass Forest Highway Route in Cochetopa National Forest—by Public Roads Administration, Denver.

Idaho

BENEWAH, KOOTENAI AND BOUNDARY COS.—**Max J. Kuney Co.,** Hutton Bldg., Spokane, Wash.—$21,875 for furn. crushed rock and gravel surf. in stockpiles—by Commissioner of Public Works, Boise.

BONNEVILLE CO.—**W. C. Burns,** Idaho Falls—$9,546 for oiling 4.4 mi. of various roads in the vicinity of Idaho Falls—by County Commissioners, Idaho Falls.

FRANKLIN CO.—**Hoops Construction Co.,** Twin Falls—$19,431 for 1.4 mi. grade, drain. and cr. grav. surf. on Grace Preston Hwy.—by Commissioner of Public Works, Boise.

LATAH CO.—**Clifton & Applegate,** 227 Hutton Bldg., Spokane, Wash.—$53,772 for 3.3 mi. grade, drain and surf. on Arrow Deary Hwy., Bear Ridge Section, betw. Kendrick and Deary—by Commissioner of Public Works, Boise.

ONEIDA CO.—**Carl E. Nelson,** Logan, Utah—$24,659 for const. 2.2 mi. roadbed, drain. structs., and grav. surf. on Oneida Hwy. betw. Malad and Pleasant View—by Commissioner of Public Works, Boise.

ONEIDA CO.—**J. W. Whiting Construction Co.,** Springville, Utah—$19,198 for const. 3.4 mi. roadbed, drain. structs., cr. grav. surf. betw. Malad and St. John—by Commissioner of Public Works, Boise.

12,800 FEET OF 58" DIAMETER LOCK JOINT REINFORCED CONCRETE CYLINDER PIPE

for **Glendale Feeder—**
Metropolitan Water District of Southern California

(Job now under construction.)

● **LOOKING Westward into City of Glendale. Line traverses such territory as business areas, residential districts and undeveloped hillside property. Operating heads range from 50 to 325 feet. Trenching quickly backfilled after laying of pipes to prevent disturbance of ordinary traffic and local communication.**

PIPE MANUFACTURED AND INSTALLED BY

AMERICAN CONCRETE & STEEL PIPE CO.

P. O. Box 3428, Terminal Annex, Los Angeles, California

LOS ANGELES - OAKLAND - SAN DIEGO - TACOMA

When writing to American Concrete & Steel Pipe Co., *please mention Western Construction News*

TETON CO.—**Carl E. Nelson,** Logan, Utah—$29,386 (official) for 5.4 mi. grade and surf. on the Teton Forest Hwy. in the Targhee National Forest—by Public Roads Administration, Ogden, Utah.

Montana

FALLON CO.—**Albert Lalonde Co.,** Sydney—$64,649 for 8.9 mi. grade, drain. structs., treat. timber stockpass, and 3-panel, 63-ft. tr. timber bridge across Sandstone Creek on Sec. A of Baker-Wibaux Road, Baker—by Montana State Highway Commission, Helena.

GOLDEN VALLEY CO.—**Stanley H. Arkwright, Inc.,** Great Falls—$14,234 for grade, surf., drain structs., tr. timber stockpass on 1.2 mi. of road south from S.H. 6 through Lavina to the Musselshell river bridge—by Montana State Highway Commission, Helena.

PHILLIPS CO.—**Nilson Smith Construction Co.,** Great Falls—$67,164 for 6.4 mi. grade, surf., small drain. structs. on the Grass Range-Malta Road—by Montana State Highway Commission, Helena.

ROSEBUD CO.—**Collison & Dolven, Inc.,** Billings—$48,715 for grade, small drain. structs. on 12.9 mi. of the Roundup-Forsyth Road—by Montana State Highway Commission, Helena.

SANDERS CO.—**Max J. Kuney Co.,** Hutton Bldg., Spokane—$84,596 for grade, surf. with cr. grav., small drain. structs., on 3.8 mi. of the Plains-Elmo Road—by Montana State Highway Commission, Helena.

Nevada

CHURCHILL CO.—**Silver State Construction Co.,** Fallon—$31,227 for 2.1 mi. grade, surf., etc., on various locations in the vicinity of Fallon—by Department of Highways, Carson City.

MINERAL CO.—**Shea & Beebe,** 4134 Eagle Rock Blvd., Los Angeles—$53,500 for widen. and oiling of roads, and extend. exist. culv. and new culverts and guard rails at railroad crossings at Naval Ammunition Depot, Hawthorne—by District Public Works Officer, 12th Naval Dist., San Francisco.

WASHOE CO.—**Isbell Construction Co.,** Reno—$12,430 for improvement work on various streets in the vicinity of Reno—by County Commissioners, Reno.

New Mexico

CATRON CO.—**Martin & Cowart,** Ft. Sumner—$120,702 for 8.1 mi. grade, drain. structs., 7 mult. span conc. box culverts, and misc. const. on U. S. Hwy. 60, betw. Quemado and the New Mexico-Arizona state line—by State Highway Engineer, Santa Fe.

LUNA CO.—**Henry Thygesen & Co., Inc.,** Albuquerque—$96,750 for 8.2 mi. grade, drain. structs., 7 mult. span conc. box culverts, etc., on St. Hwy. 26, betw. Deming and Florida—by State Highway Engineer, Santa Fe.

LUNA CO.—**Henry Thygesen & Co., Inc.,** Albuquerque—$78,146 for 6.9 mi. grade, drain. structs., 7 mult. span conc. box culverts, etc., on State Hwy. 26, betw. Deming and Florida—by State Highway Engineer, Santa Fe.

SAN JUAN CO.—**Sharp & Fellows Contracting Co.,** 108 West 6th St., Los Angeles—$116,507 for 4.9 mi. grade, drain. structs., 4 mult. span conc. box culverts and misc. const. on Farmington-Bloomfield Road—by State Highway Engineer, Santa Fe.

SAN JUAN CO.—**Sharp & Fellows Contracting Co.,** Central Bldg., Los Angeles—$28,819 for 2.3 mi. grade, drain. structs. and misc. const. on St. Hwy. Route 17, betw. Farmington and Bloomfield—by State Highway Engineer, Santa Fe.

SAN MIGUEL CO.—**Sanders Brothers,** Santa Fe—$86,203 for 2.8 mi. grade, drain. structs., conc. and steel overpass of three 50-ft. spans, and misc. const. on U. S. Hwy. 84, betw. Romeroville and Dilia—by State Highway Engineer, Santa Fe.

SAN MIGUEL CO.—**W. T. Bookout,** Las Vegas—$187,258 for 7.7 mi. grade, drain. structs., one quardruple and one triple conc. box culv., one triple 50-ft. span conc. and steel bridge, misc. const. on U. S. Hwy. 85 betw. Romeroville and Tecolete—by State Highway Engineer, Santa Fe.

Oregon

BAKER CO.—**McNutt Brothers, Eugene**—$30,922 for const. 0.7 mi. grade and bitu. macadam surf. on Troy Ranch Section of Old Oregon Trail—by Oregon State Highway Commission, Portland.

JACKSON CO.—**R. I. Stuart,** Medford—$18,940 for furn. approx. 15,100 cu. yd. cr. gravel in stockpiles, Gold Hill Rock Production Project—by Oregon State Highway Commission, Portland.

Utah

CACHE CO.—**Reynolds-Ely Construction Co.,** Springville—$23,720 for const. 5.7 mi. cr. rock or cr. grav. surf. road betw. Mendon and Wellsville—by Utah State Highway Commission, Salt Lake City.

GARFIELD CO.—**Miner Brothers Construction Co.,** Provo—$18,718 (official) for 0.4 mi. grade, surf. and bridge on Panguitch-Tropic Forest Hwy.—by Public Roads Administration, Ogden.

IRON AND KANE COS.—**Wheelwright Construction Co.,** 2434 Monroe Ave., Ogden—$128,730 (recommended) for 5.3 mi. grade, surf., etc., on Sec. C2 Zion-Bryce Canyon National Parks approach road, Dixie National Forest—by Public Roads Administration, Ogden.

IRON CO.—**G. W. Mendenhall & Sons Construction Co.,** Springville—$108,646 (recommended) for 2.3 mi. grade and gravel surf. on Cedar-Long Valley Route, Dixie National Forest—by Public Roads Administration, Ogden.

SALT LAKE CO.—**Christensen-Gardner, Inc.,** Terminal Bldg., Salt Lake City—$101,510 for const. 2.4 mi. conc. pave road betw. 9th West St. and the Airport, Salt Lake City—by Utah State Highway Commission, Salt Lake City.

SUMMIT CO.—**Reynolds-Ely Construction Co.,** Springville—$23,966 for const. of 3.7 mi. cr. rock or cr. grav. surf. road betw. Oakley and Kamas—by Utah State Highway Commission, Salt Lake City.

Washington

COWLITZ CO.—**Max J. Kuney, Hutton Bldg.,** Spokane—$133,497 for 16.2 mi. clear, grade, drain and surf. on Sec. State Hwy. No. 1-R in the vicinity of Coldwater Creek—by Director of Highways, Olympia.

GRANT AND LINCOLN COS.—**Goetz & Brennan,** Seaboard Bldg., Seattle—$44,800 for 1.2 mi. grade, drain and surf. on St. Hwy. 4-C, Coulee Dam east—by Director of Highways, Olympia.

KING CO.—**Elliott & Co., Inc., 2155 Northlake,** Seattle—$144,920 (recommended) for grade, clear, etc., Stevens Pass Highway in Snoqualmie National Forest—by Public Roads Administration, Portland, Ore.

KING CO.—**Northwest Construction Co.,** 3950 6th St., N.W., Seattle—$231,029 for const. 3.4 mi. clear, grade and drain on Primary St. Hwy. 2, Preston to North Bend—by Director of Highways, Olympia.

KING CO.—**Northwest Construction Co.,** 3950 6th Ave., Seattle—$119,526 for 1.4 mi. pave and const. pile and timber trestle and pile and timber undercrossing on State Hwy. 5, Seattle to Renton—by Director of Highways, Olympia.

LINCOLN CO.—**Elliott & Co.,** Exchange Bldg., Seattle—$71,153 for 5.7 mi. of clear, grade, drain, and surf. on primary State Hwy. 22—by Washington Department of Highways, Olympia.

SKAMANIA CO.—**R. O. Dail and Warren Brothers, Inc.,** Aberdeen—$11,297 (recommended) for 9.3 mi. grade, surf., etc., on Wind River Hwy. Proj. in Columbia National Forest; and 1.5 mi. of the Columbia Forest Development Road 41—by Public Roads Administration, Portland.

STEVENS AND FERRY COS.—**Elliott & Co.,** Exchange Bldg., Seattle—$183,702 for 11.5 mi. clear, grade, drain, and surf. on primary state hwy. 3 and 22—by Washington Department of Highways, Olympia.

WALLA WALLA CO.—**Carbon Brothers,** 3430 N. Cook St., Spokane—$111,598 for 8.3 mi. clear, grade, drain, surf. and const. steel undercrossing on Sec. St. Hwy. 3-E in the vicinity of Berryman—by Director of Highways, Olympia.

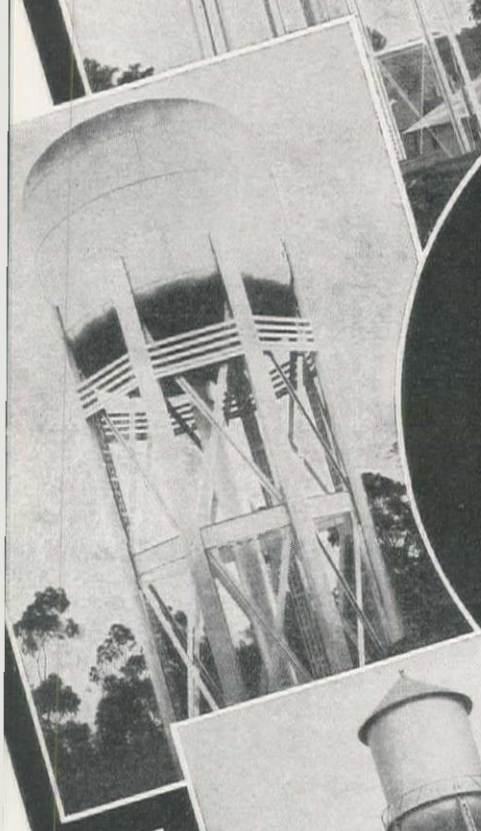
WHITMAN CO.—**George G. Ensminger & Co.,** Colville—$19,709 to relocate and surf. 2.2 mi. of the Palouse Cove road—by Whitman County Commission, Colfax.

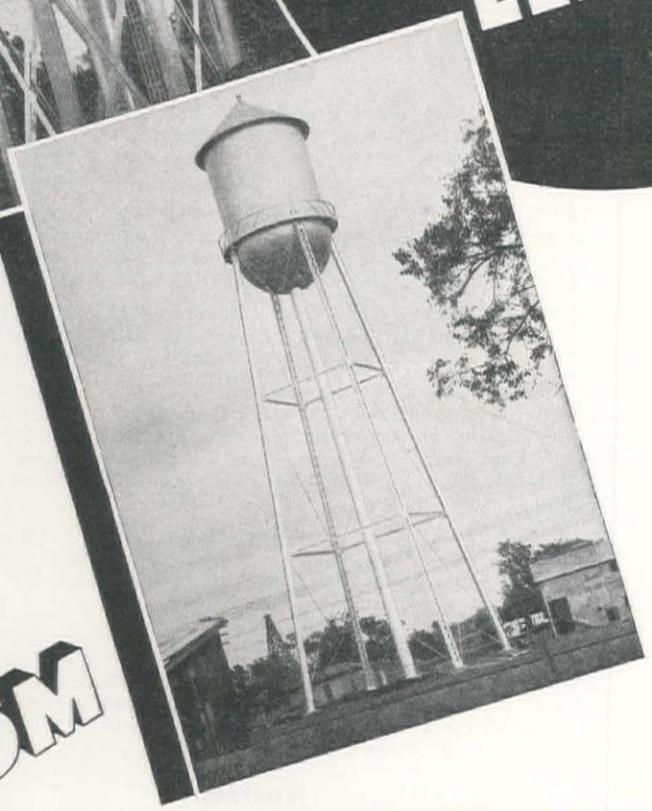
Wyoming

FREMONT CO.—**H. W. Read,** Chyenne—$84,477 for const. 14 mi. base course surf., oil treat. by roadmix method, stone chip sealcoat, and misc. work on the Moran-Dubois Road—by Wyoming State Highway Commission, Cheyenne.

SUBLETTE CO.—**Charles B. Owen,** 1375 Monaco Blvd., Denver, Colo.—$134,770 for const. 21 mi. of grade, drain, and misc. work on the Big Piney-Kemmerer Road—by Wyoming State Highway Commission, Cheyenne.

WESTON CO.—**Teton Construction Co.,** Cheyenne—$28,630





P·DM MUNICIPAL HEADQUARTERS *for* ELEVATED TANKS

·DM Elevated teel Tanks are applied in all izes, from ,000 gals. to ,000,000 gals. apacity.

P·DM

P·DM Products for the American Municipality include: Elevated Steel Tanks . . . Steel Reservoirs . . . Water Treating Plants . . . Refuse Incinerators . . . Steel Swimming Pools . . . Steel Grandstands. *Bulletins gladly sent on request.*

● Pittsburgh-Des Moines' high place in the regard of the many municipalities who have invested in P·DM Elevated Steel Tanks is maintained by the sterling performance and lifetime durability of these famous products. The thousands of P·DM Tanks serving villages, towns and cities throughout America prove to everyone's satisfaction that P·DM's "know how" is unsurpassed in modern tank design, fabrication and erection

If improvement is desirable in your own community's water service, it will cost not a whit to have a skilled Pittsburgh-Des Moines Engineer make a preliminary survey of the problem. His broad experience has been gained in dealing with similar needs in like communities —and he will be glad to detail to you and other interested local authorities how P·DM Elevated Water Storage assures continuous water supply at uniform pressures throughout the day and year . . . how it lowers operating costs, and *betters* service for every consumer.

Let us arrange a consultation for you—and meanwhile, send you our informative 20-page bulletin on "Modern Water Storage in Elevated Steel Tanks." No obligation, of course!

PITTSBURGH • DES MOINES STEEL CO.

PITTSBURGH, PA. 3420 NEVILLE ISLAND—DES MOINES, IOWA, 921 TUTTLE STREET

New York, Room 919-99, 270 Broadway . . . Chicago, 1224 First National Bank Building

Dallas, 1225 Praetorian Building . . . San Francisco, 627 Rialto Building

for const. 10.6 mi. base course surf., base treat., stone chip seal-coat, and misc. work on the Four Corners-South Dakota State Line Road—by Wyoming State Highway Commission, Cheyenne.

PROPOSED PROJECTS

California

LOS ANGELES CO.—Plans have now been completed for the $2,500,000 boulevard through the Santa Monica Mountains by the County of Los Angeles and work is expected to start in the early spring.

LOS ANGELES CO.—The City Council has approved street improvements from Hill Street to a point west of Bixel Street at an estimated cost of $919,680 in Los Angeles, Calif.

LOS ANGELES CO.—Daugherty Field, Municipal Airport, and two east end sections of Long Beach are scheduled for highway improvements after approval by the City Council. Estimated cost of the three is $130,500.

LOS ANGELES CO.—The City Engineer, Long Beach, announces the improvement of various streets in connection with the Navy's new fleet operating base site. Estimated cost of this project is $151,500.

SAN FRANCISCO CO.—The Board of Supervisors will soon render a decision on the city's definite plans for improvements of Third Street from Channel Street.

SAN FRANCISCO CO.—A proposal for street improvements on Third Street from Channel Street to the county line is now in the hands of the Board of Supervisors for approval. Estimated cost of the project will be $668,000.

SANTA CRUZ CO.—Announcement that the new Watsonville-Santa Cruz highway link from Rob Roy junction to Watsonville will be started this fall was made by the District Highway Engineer.

Bridge & Grade Separation...

CONTRACTS AWARDED

California

FRESNO CO.—**Fred Fredenburg,** P. O. Box 373, South San Francisco—$18,373 for const. reinf. conc. bridge and 0.2 mi. grade and plantmix surf. on appr., across 4-Mile Slough, west of Fresno—by California Division of Highways, Sacramento.

MENDOCINO CO.—**Harold Smith,** 1427 Kearny St., St. Helena—$17,841 for const. reinf. conc. bridge and 0.1 mi. grav. and armor coat to appr. across Schoner Gulch south of Point Arena—by California Division of Highways, Sacramento.

SACRAMENTO CO.—**P. F. Bender,** 1012 Del Paso Blvd., North Sacramento—$22,826 for const. of Glanvale Trestle on the Lower Stockton Road, south of Franklin—by County Commissioners, Sacramento.

SAN LUIS OBISPO CO.—**Dan Caputo,** 985 Delmas Ave., San Jose—$68,388 for const. reinf. conc. girder bridge on conc. bents with pile foundations, across San Luis Obispo Creek north of San Luis Obispo—by California Division of Highways, Sacramento.

SANTA BARBARA CO.—**Carl Hallin,** 909 No. Alvarado St., Los Angeles—$22,966 for const. reinf. conc. bridge across Dos Pueblos Creek north of Santa Barbara—by California Division of Highways, Sacramento.

Colorado

MORGAN CO.—**Kerby Construction Co.,** 206 E. Dale St., Colorado Springs—$30,486 for 0.4 mi. bridge and culvert widening project, betw. Wiggins and Brush on State Hwy. 52 and 2—by State Highway Engineer, Denver.

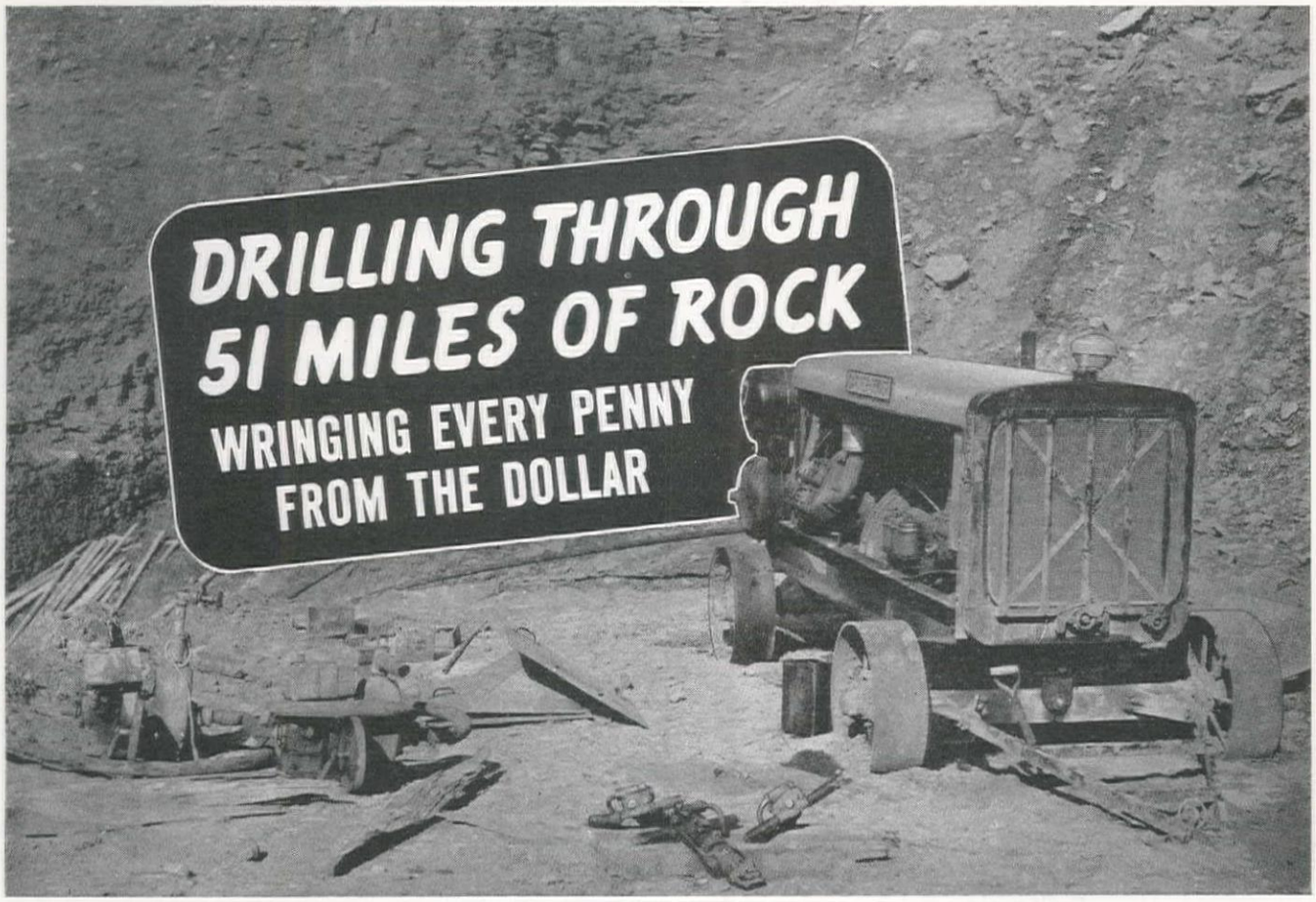
Montana

GLACIER CO.—**W. P. Roscoe Co.,** Billings—$141,175 for const. 9-span, 760-ft. conc. and steel bridge over Two Medicine River N.E. of Glacier Park Sta. on the Browning-Glacier Park Cutoff Road—by Montana State Highway Commission, Helena.

PHILLIPS CO.—**L. V. Lockwood Co.,** Glasgow—$16,150 for const. of misc. timber structures on Sec. D of the Grass Range-Malta Road—by Montana State Highway Commission, Helena.

Washington

PIERCE CO.—**Industrial Engineers and Contractors, Inc.,** Ta-



On the Escondido to Lake Henshaw Highway Project in California, a Gardner-Denver Portable Water-Cooled Compressor—supplying air to a wagon drill—was used in drilling 30,000 nine-foot holes, the equivalent of 51 miles, through hard rock. Working for Cannon Brothers of Compton, California, this equipment averaged twenty-one holes per eight-hour shift. The compressor has given low-cost operation in nearly four years of service.

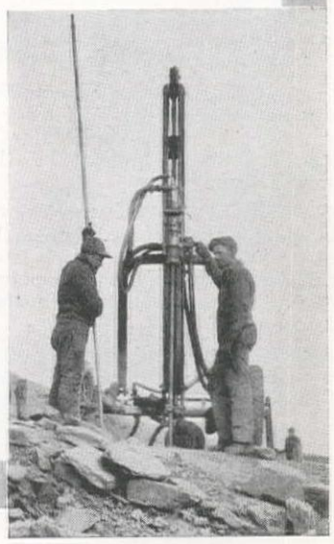
★ ★ ★ ★

When there is much work to be done—*and* little time to do it—choose Gardner-Denver Water-Cooled Portable Compressors for the job. These compressors—with cylinders completely surrounded by water jackets—assure you of a constant supply of air for pneumatic tools—low-cost air in any weather, at any altitude.

The low-cost, dependable performance of Gardner-Denver portables can put profits in your jobs, too—just as it is doing for so many contractors throughout the country. Complete information is yours for the asking. Gardner-Denver Co., Quincy, Illinois.

SPEED YOUR JOBS IN ROUGH COUNTRY with Gardner-Denver Wagon Drills

The Gardner-Denver UM-99 Wagon Drill is an ideal solution where frequent moves in rough country are necessary. Adjustable for down holes, toe holes or line drilling—can be easily moved from one location to another.



WESTERN BRANCH OFFICES: Butte, Mont.; Denver, Colo.; Los Angeles, Calif.; Portland, Ore.; Salt Lake City, Utah; San Francisco, Calif.; Seattle, Wash.; Wallace, Idaho

GARDNER-DENVER SINCE 1859

coma—$9,926 for const. of the Wapato waterway bridge, Tacoma—by Board of Contracts and Awards, Tacoma.

SNOHOMISH CO.—**David Nygren,** Lloyd Bldg., Seattle—$85,360 for 0.8 mi. clear, grade, drain, surf. and const. steel span bridge with conc. appr. spans on St. Hwy. 15 in vicinity of Wallace River Bridge—by Director of Highways, Olympia.

STEVENS CO.—**Norris Brothers,** Burlington—$119,778 for const. superstruct. for county bridge over Kettle River Gorge, and R.R. bridge over Kettle River near Boyds on relocation of G.N. R.R., Columbia River Reservoir, Columbia Basin Project—by Bureau of Reclamation, Coulee Dam.

Wyoming

SUBLETTE CO.—**Inman & Okerberg,** Worland—$44,195 for const. of three I-beam span bridges and six RC culverts on the Big Piney-Kemmerer Road—by Wyoming State Highway Commission, Cheyenne.

PROPOSED PROJECTS

California

LOS ANGELES CO.—An $84,000 concrete bridge across the San Gabriel River on Artesia Avenue south of Bellflower will soon be constructed.

YOLO CO.—The Stephens bridge over Cache Creek, to be built at an estimated cost of $60,000 will not be constructed until next year, according to reports from Yolo County.

Montana

GLACIER CO.—The Montana Highway Department is awaiting approval of the public roads administration for a 760-ft. span across the Two-Medicine River on the 14-mi. Browning-Glacier Park cut-off.

Water Supply . . .

CONTRACTS AWARDED

California

LOS ANGELES CO.—**Contracting Engineers Co.,** 2310½ W. Vernon Ave., Los Angeles—$40,000 for const. of a waste water treatment plant at Santa Fe Spring—by the Santa Fe Springs Waste Water Disposal Co., Santa Fe Springs.

LOS ANGELES CO.—**H. G. Klusman,** 154 N. Archibald Ave., Cucamonga—$17,787 for const. of a 2,000,000-gal. reinf. conc. reservoir at Santa Anita and Orange Grove Aves., Arcadia—by City Council, Arcadia.

LOS ANGELES CO.—**E. W. Brockman,** 918 W. 6th St., Corona—$4,130 for drilling three 36-in. wells, 80 ft. deep, on Dept. transmission line right-of-way along east bank of the Los Angeles River, north of Washington Blvd., Los Angeles—by Los Angeles Water and Power Commission, Los Angeles.

LOS ANGELES CO.—**Myers Brothers,** 3407 San Fernando Road, Los Angeles—$4,672 for const. of conc. salt tanks, small conc. reservoir for cooling water, conc. foundation for water softener and timber flume at the Glendale steam plant—by City Council, Glendale.

LOS ANGELES CO.—**American Concrete and Steel Pipe Co.,** P. O. Box 3428, Terminal Annex, Los Angeles—$85,791 (conc. pipe) for const. of Long Beach lateral for the distribution system of the Colorado River Aqueduct, Long Beach—by Metropolitan Water District, Los Angeles.

ORANGE CO.—**C. G. Willis & Sons,** 2119 E. 25th St., Los Angeles—$108,490 for const. of Orange County reservoir and appurt. works N.E. of Brea—by Metropolitan Water District, Los Angeles.

SAN FRANCISCO CO.—**San Francisco Water Department,** 425 Mason St., San Francisco—$8,324 for laying 4, 6 and 8-in. mains in Quint, Maddux, Topeka and Venus Sts., and in Thornton Ave., San Francisco—by Public Utilities Commission, San Francisco.

SAN FRANCISCO CO.—**Fred T. Fairey,** 1874 25th Ave., San Francisco—$999.00 for laying 8-in. C.I. mains in 37th Ave., betw. Wawona and Yorba Sts., San Francisco—by Public Utilities Commission, San Francisco.

SAN FRANCISCO CO.—**Edwin J. Tobin,** 1032 Longridge Road, Oakland—$3,347 for laying 4 and 6-in. mains in Ledyard and Mercury Sts. and Thornton Ave., San Francisco—by Public Utilities Commission, San Francisco.

SAN FRANCISCO—**W. J. Tobin,** 5708 Glenbrook Drive, Oakland—$2,695 for laying 6 and 8-in. C.I. mains in 24th Ave. and Quintara St., San Francisco—by Public Utility Commission, San Francisco.

SAN FRANCISCO CO.—**Fred T. Fairey,** 1874 25th Ave., San Francisco—$2,805 for laying 6 and 8-in. C.I. mains in 30th, 36th and 37th Aves. and Noriega St., San Francisco—by Public Utilities Commission, San Francisco.

SAN FRANCISCO CO.—**Fred T. Fairey,** 1874 25th Ave., San Francisco—$1,765 for laying 6 and 8-in. C.I. mains in 27th and 36th Aves., Lawton St. and Sloat Blvd., San Francisco—by Public Utility Commission, San Francisco.

SAN FRANCISCO CO.—**San Francisco Water Department,** 425 Mason St., San Francisco—$1,530 for laying 4 and 6-in. C.I. mains in Sweeney and Princeton Sts. San Francisco—by Public Utilities Commission, San Francisco.

SAN JOAQUIN CO.—**Pittsburgh-Des Moines Steel Co.,** Rialto Bldg., San Francisco—$19,975 for furn. and erect. a 150,000-gal. elevated steel tank, piping and accessories at Stockton Airport, Stockton—by Constructing Quartermaster, Fort Mason.

SISKIYOU CO.—**John Bean Mfg. Co.,** 217 W. Julian St., San Jose—$1,875 for const. of a deep well pumping plant for the water system at Tulelake—by City Council, Tulelake.

SISKIYOU CO.—(1) **Harvey E. Conner,** 1222 Whipple Ave., Redwood City—$13,324; (2) **Clifford A. Dunn,** Klamath Falls, Ore.—$9,376; for construction and completion of a water distribution system and elevated steel storage tank, Tulelake—by City Council, Tulelake.

Colorado

EL PASO CO.—**Ed H. Honnen,** Colorado Springs—$31,372 for installation of 9,200 ft. of 30-in. water supply main extending from Mayfair Ave. to the hydro plant in Manitou Springs—by City Council, Manitou Springs.

Montana

VALLEY CO.—(1)**D. M. Manning,** Hysham—$22,973; (2) **Elmer Johnson,** Glasgow—$5,045;—for const. of water distribution system at Fort Peck—by U. S. Army Department, Washington, D. C.

PROPOSED PROJECTS

California

FRESNO CO.—U. S. Engineer Office has recommended an allocation at next session of Congress for the proposed Big Dry Creek and Dog Creek flood control projects in Fresno County, Calif. Estimated cost will be $628,000.

Utah

UINTAH CO.—The voters of Vernal have approved of a $50,000 bond issue to finance construction of a pipeline to improve water conditions for that city.

Washington

KING CO.—At an estimated cost of $74,195, the City Council utilities committee has ordered work on a large West Seattle watermain project.

SPOKANE CO.—Bids for the new $365,000 city reservoir will be called as soon as the plans are completed and the site secured. Due to the delay in securing the site, the reservoir construction may be extended into next year, it was announced by the City Council.

SPOKANE CO.—Bids for the new $365,000 city reservoir will be called as soon as the plans are completed and the site secured. Delay in the selection of the site may cause construction to be delayed.

Sewerage . . .

CONTRACTS AWARDED

California

ALAMEDA CO.—**Thomas Geary,** 3621 Grand Ave., Oakland—$1,257 for const. of a sewer in Redwood Road east of Atlas Ave., Oakland—by City Council, Oakland.

LOS ANGELES CO.—**A. R. Milosevich,** 303 N. Alma St., Los Angeles—$5,283 for const. of sewers in the Placidia Ave. and Moorpark St. sewer district, Los Angeles—by Board of Public Works, Los Angeles.

LOS ANGELES CO.—**Bebek & Brkich** and **V. C. K. Construction Co.,** 238 W. Florence, Los Angeles—$9,224 for const. of

sewers in the Kelton Ave. and Ayres St. sewer district, Los Angeles—by Board of Public Works, Los Angeles.

LOS ANGELES CO.—**Fairbanks-Morse & Co.,** 2401 Santa Fe Ave., Los Angeles—$1,655 for furn. and inst. sewage pumps and making necessary changes at the sewage plant at Los Angeles Municipal Airport, Los Angeles—by Board of Public Works, Los Angeles.

LOS ANGELES CO.—**Leko & Bosnyak,** 820 N. Coronado, Los Angeles—$5,475 for const. of a sewer in Rayo Ave., South Gate—by City Council, South Gate.

LOS ANGELES CO.—**J. L. Kruly,** 1449 S. Reeves, Los Angeles—$1,526 for const. of sewers in Haas Ave., Los Angeles—by Board of Public Works, Los Angeles.

SAN FRANCISCO CO.—**Eaton & Smith,** 715 Ocean Ave., San Francisco—$1,598 for sewers and asphaltic macadam pave. at intersection of Alemany Blvd. and Justin Drive, San Francisco—by Department of Public Works, San Francisco.

SAN JOAQUIN CO.—**M. J. B. Construction Co.,** Elks Bldg., Stockton—$35,750 for const. sewage system, disposal plant and pumping station at Stockton Airport, Stockton—by Constructing Quartermaster, Fort Mason.

SAN MATEO CO.—**W. J. Tobin,** 5708 Glenbrook Drive, Oakland—$8,947 for const. sanitary sewers in a portion of Oak Park subdivision, San Carlos—by City Council, San Carlos.

SANTA CLARA CO.—**O. G. Ritchie,** 154 No. 11th St., San Jose—$4,668 for const. a sewer line creek crossing, Los Gatos—by City Council, Los Gatos.

Oregon

CROOK CO.—(1) **Benjamin A. Sheldon,** 2202 W. 3rd St., Spokane—$19,700 for const. disposal plant; (2) **Leonard & Slate,** Multnomah—$19,285 for const. of sewer system—at Prineville—by City Recorder, Prineville.

PROPOSED PROJECTS

Washington

KITSAP CO.—Proposals for a renewal and extension of the Park Avenue sewer line was recently placed before the Bremerton City Commission. Estimated cost of the project will be $25,000.

PIERCE CO.—The City Council, Tacoma, passed three ordinances that totaled $55,000 for installation of sanitary sewerage systems in various districts.

WHITMAN CO.—The City of Pullman will probably vote on a $120,000 bond issue at the November election to finance construction of a sewage disposal plant.

Waterway Improvement...

CONTRACTS AWARDED

California

LOS ANGELES CO.—**Warren-Southwest, Inc.,** 2145 E. 25th St., Los Angeles—$382,000 for const. of 1,300 ft. of wharf at the east end of Channel No. 3, Long Beach—by Port Manager, Long Beach.

SAN FRANCISCO CO.—**A. W. Kitchen & Co.,** 110 Market St., San Francisco—$28,557 for const. of mooring dock for school rowing activities at Aquatic Park, foot of Van Ness Ave., San Francisco—by Department of Public Works, San Francisco.

SOLANO CO.—**Pacific Bridge Co.,** 333 Kearny St., San Francisco—$1,649,000 for const. steel floating drydock 482 ft. long and 71-ft. beam at Mare Island Navy Yard—by U. S. Navy Department, Washington, D. C.

SUTTER CO.—**H. Earl Parker,** 1112 G St., Marysville—$248,965 for enlarge, raise, strengthen and set back exist. levees along west levee of Sutter Bypass from Butte Slough Outfall Gates to Long Bridge—by U. S. Engineer Office, Sacramento.

VENTURA CO.—**Mojave Corporation,** Box 174, Los Nietos—$26,725 for const. of pier, dredging, etc., at Hueneme—by Oxnard Harbor District, Hueneme.

Oregon

CLATSOP CO.—**Homer G. Johnson,** Imperial Hotel, Portland—$18,982 (official) for enlarge and strengthen exist. levee; const. drain. ditches; remove tide boxes and const. of new ones, etc., in John Day River Area, Diking Dist. 14—by U. S. Engineer Office, Portland.

MARION CO.—**E. L. Gates,** Trail—$11,900 (official) for excav.

119,000 cu. yd. of material from Whiteman Bar in Willamette River, about 100 mi. above its mouth—by U. S. Engineer Office, Portland.

MULTNOMAH CO.—**Babler Brothers,** 1636 S.E. 6th St., Portland—$20,945 for alteration of Multnomah Drainage Dist. No. 1 pumphouse on Columbia Slough—by U. S. Engineer Office, Portland.

MULTNOMAH CO.—**Parker-Schram Co.,** 515 Couch Bldg., Portland—$70,870 (official for const. new levee; enlarge and strengthen exist. levee and appurt. work in Sandy and Multnomah Drainage Districts, Portland—by U. S. Engineer Office, Portland.

MULTNOMAH CO.—**S. S. Montague,** 115 S.W. 4th Ave., Portland—$32,212 (official) for furn. all matls. except steel sheet piling; const. a steel sheetpile flood wall and appurt., and misc. work in Peninsula Drain. Dist., Portland—by U. S. Engineer Office, Portland.

Washington

KING CO.—**General Construction Co.,** 3804 Iowa, Seattle—$5,000,000 for const. of shipyard on 25-ac. site on Harbor Island, Seattle—by Seattle-Tacoma Shipbuilding Corp., Seattle.

WAHKIAKUM CO.—**Macri Brothers and L. Coluccio,** 1909 Atlantic Ave., Seattle—$81,178 for const. 4.4 mi. of new levee, drainage canals, etc., in the Skamokawa Creek area—by U. S. Army Department, Washington, D. C.

PROPOSED PROJECTS

California

LOS ANGELES CO.—U. S. Engineer Office has issued invitations for bids for the improvement of the Los Angeles River channel. Bids will be advertised from Oct. 1 - Oct. 30.

Oregon

MULTNOMAH CO.—U. S. Engineer Office will receive bids until October 24 for channel clearing at Salmon River between Tawneys and Arrah Wanna. Work involves 30,000 cu. yds. of excavation.

Dam . . .

PROPOSED PROJECTS

California

LOS ANGELES CO.—U. S. District Engineer Office announces that bids for the proposed Santa Fe Dam will be taken early next spring. The project, estimated at $10,000,000 will be located on the San Gabriel River, near Rio Honde Junction, northwest of Balwin Park.

Utah

SANPETE CO.—The Ferren Canal and Reservoir Co. of Mt. Pleasant will construct a $123,000 earthfill dam on Duck Creek at some future date.

Irrigation . . .

CONTRACTS AWARDED

Colorado

LA PLATA CO.—**Wood, Morgan & Burnett Construction Co.,** Durango—$14,953 for relocation of road from Vallecito Reservoir, Pine River Project, north of Bayfield—by Bureau of Reclamation, Vallecito.

New Mexico

QUAY CO.—**Henry Shore,** Grand Junction, Colo.—$23,600 for const. of irrigation outlet at the Conchas Reservoir and a rating section of the Conchas Canal, about 30 mi. N.W. of Tucumcari—by Bureau of Reclamation, Tucumcari.

Oregon

MULTNOMAH CO.—**C. J. Eldon,** 2525 N.E. 15th St., Portland—$22,692 for const. of a pumping plant and tide box with appurt., located in the Sandy Drainage District—by U. S. Engineer Office, Portland.

Washington

YAKIMA CO.—**L. C. Curtis & Sons,** Kettle Falls—$23,520 for

furn. and delivering in stockpiles 7,600 tons of sand and 12,000 tons of gravel for the Yakima Ridge Canal, Roza Division—by Bureau of Reclamation, Yakima.

PROPOSED PROJECTS

Idaho

ADA CO.—A $400,000 allotment has been approved for preliminary work on the proposed $13,000,000 multiple-purpose dam above Arrowrock.

Tunnel . . .

CONTRACTS AWARDED

California

MERCED CO. — **Brown Materials Co., Ltd.**, P. O. Box 86, Huron—$9,565 for excavating and disposing of 56,600 cu. yd. of material from west side of tunnel in Merced Irrigation District Main Canal, north of Merced—by Merced Irrigation District, Merced.

Montana

TETON CO.—**Williams Construction Co.**, Helena—$18,610 for const. conc. lining for tunnel No. 1, Pishkun Canal, Greenfields Division, Sun River Proj.—by Bureau of Reclamation, Fairfield.

Utah

DUCHESNE CO.—**Utah Construction Co.**, Box 187, Ogden—$727,575 for excavation of the Duchesne Tunnel, Provo River Project—by Bureau of Reclamation, Provo.

Buildings . . .

CONTRACTS AWARDED

Arizona

PINAL CO.—**Edmonds Construction Co.**, 300 N. Central Ave., Phoenix—$76,198 for const. of a 60-bed hospital at the Eleven-Mile Corner Project, Coolidge—by U. S. Department of Agriculture, San Francisco, Calif.

California

LOS ANGELES CO.—**R. E. Campbell**, 711 Central Bldg., Los Angeles—$120,000 for const. of a 3-story and basement reinf. conc. garage bldg., and additions and interior alterations to a department store, Long Beach—by A. R. Brandner, architect for Buffum's, Long Beach.

LOS ANGELES CO.—**H. W. Baum**, 232 S. Van Ness Ave., Los Angeles—$111,000 for const. general contract, inc. steel erection for assembly building No. 7 for Lockheed Aircraft Corp., Burbank—by Lockheed Aircraft Corp., Burbank.

LOS ANGELES CO.—**F. H. Strohecker**, 1748 W. 49th St., Los Angeles—$89,975 for const. of bldg. for load dispatchers' headquarters, Los Angeles—by Los Angeles Water and Power, Los Angeles.

LOS ANGELES CO.—**Austin Company**, 777 E. Washington Blvd., Los Angeles—$250,000 for const. of an addition to the plant of North American Aviation Co., Los Angeles—by North American Aviation Co., Los Angeles.

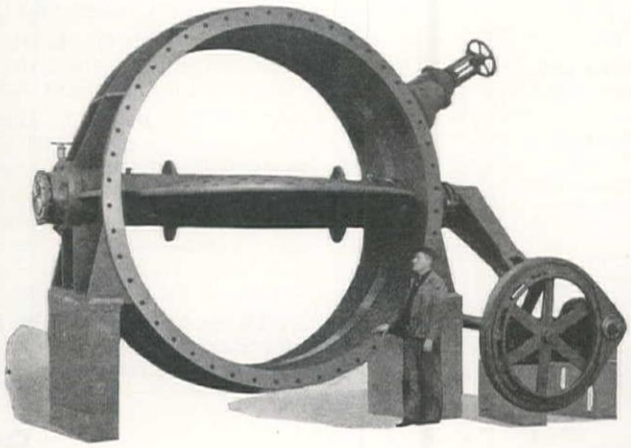
LOS ANGELES CO.—**Wesco Construction Co.**, 2000 Hyperion Ave., Los Angeles—$72,000 for const. of a 2-story reinf. brick health center bldg. on Glendale Ave., Los Angeles—by the Landau Investment Co., Los Angeles.

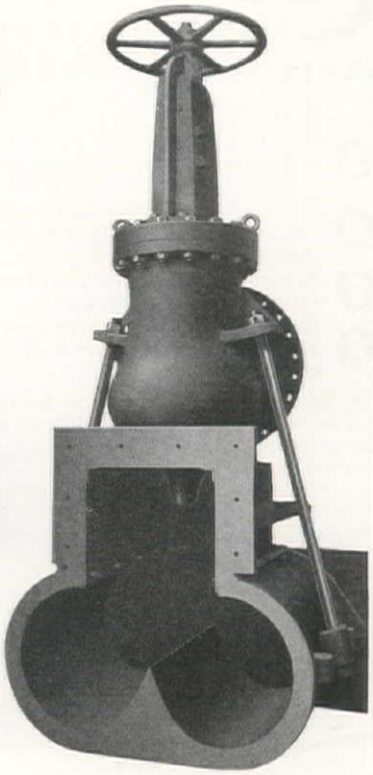
LOS ANGELES CO.—**F. B. Aldous & Son**, 8327½ Wilshire Blvd., Beverly Hills—$80,000 for furn. and erect. structural steel for additions to final assembly bldg. at 1705 Victory Place, Burbank—by the Lockheed Aircraft Corp., Burbank.

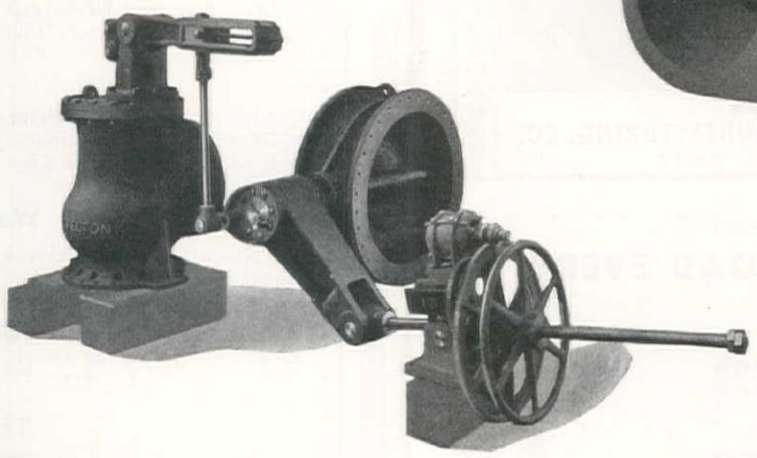
LOS ANGELES CO.—**Ford J. Twaits Co.**, 816 W. 5th St., Los Angeles—$330,000 for const. of a new unit, 195 x 400 ft., on Lakewood Blvd., near Downey—by the Vultee Aircraft Co., Los Angeles.

LOS ANGELES CO.—**Ted R. Cooper Co.**, 323 Western Pacific Bldg., Los Angeles—$75,000 for const. of 120 x 500-ft. one-story factory on Boyle Ave., Vernon—by the Norris Stamping and Manufacturing Co., Vernon.

PELTON Hydraulic Valves for Any Water Handling Problem







Pelton engineers are equipped to design and build practically every type of valve mechanism for handling water in power development, stream regulation, flood control and water supply service. Among these are gate valves, butterfly valves, needle valves, balanced plunger valves and relief valves arranged as desired with mechanical control. Pelton automatic valves, used principally in water works systems, include pressure regulators, surge suppressors, check and throttle valves, altitude valves, and air valves. Literature promptly forwarded upon request.

The Pelton Water Wheel Company

Hydraulic Engineers

120 BROADWAY
NEW YORK

2929 NINETEENTH ST.
SAN FRANCISCO

PASCHALL STATION
PHILADELPHIA

EXCLUSIVE WESTERN REPRESENTATIVES for Baldwin-Southwark Division of Baldwin Locomotive Works, De La Vergne Engine Co., Woodward Governor Co., Cone Valve Division, Chapman Mfg. Co., and Carbondale Division, Worthington Pump & Machinery Corp.

BLW THE BALDWIN GROUP

PELTON

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

When writing to Pelton Water Wheel Company, *please mention Western Construction News*

MARIN CO.—**MacDonald & Kahn, Ltd.,** Financial Center Bldg., San Francisco—$343,000 for const. temporary housing and utilities at Hamilton Field—by Constructing Quartermaster, Fort Mason.

MONTEREY CO.—**Ford J. Twaits Co.,** 816 W. 5th St., Los Angeles, and **Morrison-Knudsen Co., Inc.,** Title Guarantee Bldg., Los Angeles—$3,448,000 for addtl. const. 300 buildings, Monterey—by Constructing Quartermaster, Presidio of Monterey.

SAN DIEGO CO.—**F. E. Young,** 727 W. Ivy St., San Diego—$230,000 for const. of 12 market building for Safeway Stores, San Diego. Each bldg. will be 50 x 130 ft. in area—by Safeway Stores, San Diego.

SAN DIEGO CO.—**Charles Hoskins,** 1764 Kettner Blvd., San Diego—$871,600 for const. barracks, trade school bldgs., auditorium, etc., at the Naval Training Station, San Diego—by 11th Naval District, San Diego.

SAN FRANCISCO CO.—**Cahill Brothers,** 206 Sansome St., San Francisco—$60,000 for const. 2-story reinf. conc. addition to nurses' home at St. Joseph's Hospital, San Francisco—by St. Joseph's Hospital, San Francisco.

SAN FRANCISCO CO.—**Robert McCarthy,** 1363 14th Ave., San Francisco—$89,318 for const. temp. housing and utilities at Letterman General Hospital, Presidio of San Francisco—by Constructing Quartermaster, Ft. Mason.

SAN JOAQUIN CO.—**Meyer Construction Co.,** 735 Portola Drive, San Francisco—$118,836 for const. of temporary housing (hospital buildings) Air Corps Expansion at Stockton Airport, Stockton—by Constructing Quartermaster, Fort Mason.

SAN MATEO CO.—**G. H. Meese,** P. O. Box 548, Redwood City—$65,595 for const. one-story reinf. conc. bank building, Redwood City—by First National Bank, Redwood City.

SANTA CLARA CO.—**Dinwiddie Construction Co.,** Crocker Bldg., San Francisco—$100,000 for const. of a 2-story and basement addition to Sears-Roebuck & Co. bldg., San Jose—by P. C. Hale, Jr., San Francisco.

SANTA CLARA CO.—**Newman & Carlson,** 50 Oak Grove St., San Francisco—$43,157 for const. additions and alterations to hospital at Moffett Field—by Constructing Quartermaster, Ft. Mason.

STANISLAUS CO.—**Palm Iron and Bridge Works,** P. O. Box 746, Sacramento—$150,000 for erection of structural steel on two-story, mezzanine and basement steel and reinf. conc. bank bldg., Modesto—by Anglo California National Bank, Modesto.

Colorado

DENVER CO.—**Joseph A. Bass and W. C. Smith Company,** Minneapolis, Minn.—$523,680 for const. temporary housing facilities (approx. 90 bldgs.) at Lowry Field—by Constructing Quartermaster, Lowry Field.

Utah

SALT LAKE CO.—**Peter Kiewit Sons Co.,** Omaha, Nebr.—$279,603 for const. temporary buildings to be built at the Municipal Airport, Salt Lake City—by War Department, Washington, D. C.

Washington

KING CO.—**J. B. Warrack Construction Co.,** Securities Bldg., Seattle—$151,957 for alterations and additions to Longfellow School, Seattle—by Seattle School District No. 1, Seattle.

PIERCE CO.—**J. W. Bailey Construction Co.,** 228 9th St., Seattle—$92,150 for const. of temp. housing project at Fort Lewis—by U. S. Army, Washington, D. C.

Territories

ALASKA—**L. B. James, Couch Bldg.,** Portland, Ore.—$141,547 for const. of a wing to the U. S. Postoffice and Courthouse at Anchorage—by Public Buildings Administration, Washington, D. C.

CANAL ZONE—**McCarthy Brothers Construction Co.,** Roosevelt Bldg., St. Louis, Missouri—$353,470 for const. hospital and medical detachment barracks at Howard Field, Canal Zone—by Constructing Quartermaster, U. S. Army, New York, N. Y.

CANAL ZONE—**Tucker McClure,** Cristobal, Canal Zone—$56,000 for const. headquarters buildings at Ft. Kobbe and Fort Clayton, Canal Zone—by Constructing Quartermaster, Albrook Field, Canal Zone.

CANAL ZONE—**McDonald Construction Co.,** 3829 W. Pine Blvd., St. Louis, Mo.—$383,549 for const. barracks and officers' quarters at Corozal, Ft. Kobbe, Ft. Clayton, Ft. Amador, Ft. Gulick, Ft. Sherman, and Ft. Randolph, in the Canal Zone—by Constructing Quartermaster, Albrook Field, Canal Zone.

CANAL ZONE—**Fred J. Early, Jr.,** 369 Pine St., San Francisco—$437,707 for const. storehouse, shops, etc., at various points in the Canal Zone—by Constructing Quartermaster, Fort Mason, Calif.

HAWAII—**Robert E. McKee,** 4700 San Fernando Road West, Los Angeles—$330,500 for const. AC engineering shop at Hickam Field—by Constructing Quartermaster, Fort Mason, Calif.

PROPOSED PROJECTS

Arizona

MARICOPA CO.—The Salt River Valley Water Users Assn.,

Phoenix, has approved a sum of $2,500,000 for construction of a steam generating plant at Tempe, Ariz.

California

MARIN CO.—Construction Quartermaster, Fort Mason, San Francisco, for temporary housing facilities to be built at Hamilton Field at an estimated cost of $407,500.

SAN LUIS OBISPO CO.—The Construction Quartermaster, Fort Ord, Monterey County, has announced that construction of housing facilities, estimated at $2,400,000, will get under way early this month.

SANTA CRUZ CO.—Bids will soon be taken by the Constructing Quartermaster, Presidio of Monterey, for a permanent tent camp to be built at Camp McQuaide near Watsonville. Estimated cost is $195,000.

STANISLAUS CO.—A two-story, mezzanine and basement steel and reinforced concrete bank building is to be constructed in Modesto at "I" and Main Sts. by the Anglo California National Bank at an estimated cost of $150,000.

TULARE CO.—The Tulare Union High School District will hold a bond election on Oct. 22 to vote $125,000 for const. of four buildings for industrial department and a 10-classroom building.

Miscellaneous . . .

CONTRACTS AWARDED

California

ALAMEDA CO.—**Bigge Drayage Co.,** 24th and Campbell Sts., Oakland—for erection of 3,700 tons of steel plates for the cyclotron at the University of California, Berkeley—by University of California, Berkeley.

ALAMEDA CO.—**Johnson, Drake and Piper,** Latham Square Bldg., Oakland—$283,950 for seaplane ramp improvement and services for field ordnance facilities at Naval Air Station, Alameda—by U. S. Navy Department, Washington, D. C.

ALAMEDA CO.—**Montgomery Elevator Co.,** Montgomery, Ala.—$129,799 for inst. six electric freight elevators with power operated car gates and hoistway doors at the Naval Supply Depot, Oakland—by U. S. Navy Department, Washington, D. C.

LOS ANGELES CO.—**E. S. McKittrick Co.,** 7839 Santa Fe Ave., Huntington Park—$120,000 for erection of a 264-ft. process stage for RKO Radio Pictures, Culver City—by RKO Radio Pictures, Culver City.

LOS ANGELES CO.—**Fritz Ziebarth,** 1122 Security Bldg., Los Angeles—$13,967 (recommended) for const. of sprinkler system and planting at Hansen Dam—by U. S. Engineer Office, Los Angeles.

RIVERSIDE CO.—**A. D. Schader,** 144 Spear St., San Francisco—$63,400 for const. and completing 14,000 ft. of standard gauge railroad at campsite, Muroc Bombing Range, Muroc Lake—by Constructing Quartermaster, March Field, Riverside.

SAN BERNARDINO CO.—**Walter S. Leland,** 55 New Montgomery St., San Francisco—$59,395 for furn. and inst. two water tube boilers and equipment for the Power Plant, Maximum Security Group No. 1, Southern California State Prison, Chino.

SAN DIECO CO.—**M. H. Golden,** Bank of America Building, San Diego—$234,000 for const. additional ordnance facilities at Naval Air Station, San Diego—by U. S. Navy Department, Washington, D. C.

SAN FRANCISCO CO.—**Eaton & Smith,** 715 Ocean Ave., San Francisco—$40,765 for reconst. Geary St. car tracks betw. Fillmore and Divisadero Sts., San Francisco—by Public Utilities Commission, San Francisco.

SAN JOAQUIN CO.—**N. M. Ball Sons,** P. O. Box 404, Berkeley—$54,658 for const. pave. and drainage of apron and warming up mat at Stockton Airport, Stockton—by Constructing Quartermaster, Fort Mason.

SAN JOAQUIN CO.—**K. E. Parker,** 135 S. Park Street, San Francisco—$122,734 for const. AC hangar and boiler house at Stockton Airport, Stockton—by Construction Quartermaster, Fort Mason.

SANTA CLARA CO.—**Consolidated Steel Corp., Ltd.,** Slauson and Eastern Ave., Los Angeles—$48,266 for const. model supports for scale equipment for wind tunnel at Moffett Field—by National Advisory Committee for Aeronautics, Moffett Field.

SOLANO CO.—**Cory & Joslin,** 50 Hawthorne St., San Francisco—$44,444 for furn. and inst. extensions to exist. outside lighting, fire alarm and telephone systems on west side of Ammunition Depot, U. S. Navy Yard, Mare Island—by Public Works Officer, U. S. Navy Yard, Mare Island.

Colorado

LA PLATA CO.—**Sandberg & Johnson Construction Co.,** Hampton, Iowa—$116,351 for const. 180 mi. of transmission lines—by La Plata Electrification Assn., Inc., Durango.

Nevada

CLARK CO.—**General Electric Co.,** Schenectady, N. Y.—$700,000 for furn. and inst. generator for Boulder power plant, Boulder Canyon Project—by U. S. Bureau of Reclamation, Denver.

MINERAL CO.—**Wm. P. Neil Co.,** 4814 Loma Vista, Los Angeles—$2,146,000 for const. bldgs., roads, sidewalks, railroad tracks, services, street lighting, fire protection system, etc., at the Naval Ammunition Depot, Hawthorne—by Public Works Office, 12th Naval District, San Francisco.

Utah

SALT LAKE CO.—**Jacobsen Construction Co.,** Salt Lake City—$117,347 for const. of steel frame hangar and boiler house at Municipal Airport, Salt Lake City—by U. S. Army Department, Washington, D. C.

SALT LAKE CO.—**Utah Construction Co.,** Box 187, Ogden—$2,000,000 for const. 227 mi. high tension transmission line connecting circuits in Utah, Idaho and Montana—by Utah Power and Light Co., Salt Lake City, and Idaho Power Co., Boise, Idaho.

Washington

GRANT CO.—**Otis Elevator Co.,** 1 Beach St., San Francisco—$187,352 for furn. and inst. electric elevators and elevator hoistway doors for the Grand Coulee Dam and power plant, Columbia Basin Project—by Bureau of Reclamation, Denver, Colo.

KING CO.—**The Austin Co.,** 16112 Euclid Ave., Cleveland, Ohio—$265,575 on cost-plus-fixed-fee-basis for const. of additional facilities at Naval Air Station, Seattle—by U. S. Navy Department, Washington, D. C.

PIERCE CO.—**Washington Asphalt Co.,** 309 W. 39th, Seattle—$91,500 for const. of Runway No. 1, McChord Field—by U. S. Army Department, Washington, D. C.

YAKIMA CO.—**L. C. Curtis & Sons,** Kettle Falls—$23,500 for furn. and delivering in stockpiles approx. 7,600 tons of sand and 12,000 tons gravel for the Yakima Ridge Canal, Roza Division, Yakima Project—by U. S. Bureau of Reclamation, Denver, Colo.

Territories

ALASKA—**Siems-Spokane Co.,** 412 Realty Bldg., Spokane, Wash.; **Johnson, Drake & Piper,** Latham Square Bldg., Oakland; and **Puget Sound Bridge & Dredging Co.,** 2929 16th Ave., S.W., Seattle, Wash.—$900,000 for addtl. const. at Naval Air Station at Dutch Harbor, Sitka and Kodiak—by U. S. Navy Department, Washington, D. C.

ALASKA—**Bechtel-McCone-Parson Corporation,** 601 W. 5th St., Los Angeles—$1,600,000 for const. power plant at Elmendorf Field, Anchorage—by U. S. War Department, Washington, D. C.

CANAL ZONE—**Lindgren & Swinerton,** Standard Oil Bldg., San Francisco; **Hegeman-Harris, Inc.,** New York City; and **Tucker-McClure, Balboa, Canal Zone**—$6,420,500 for const. of additional aviation facilities, Canal Zone—by U. S. Navy, Washington, D. C.

HAWAII—**Hawaiian-Raymond-Turner,** P. O. Drawer F, Alameda, Calif.—$200,200 on cost-plus-fixed-fee-basis for const. of additional facilities at Naval Air Station, Pearl Harbor—by U. S. Navy Department, Washington, D. C.

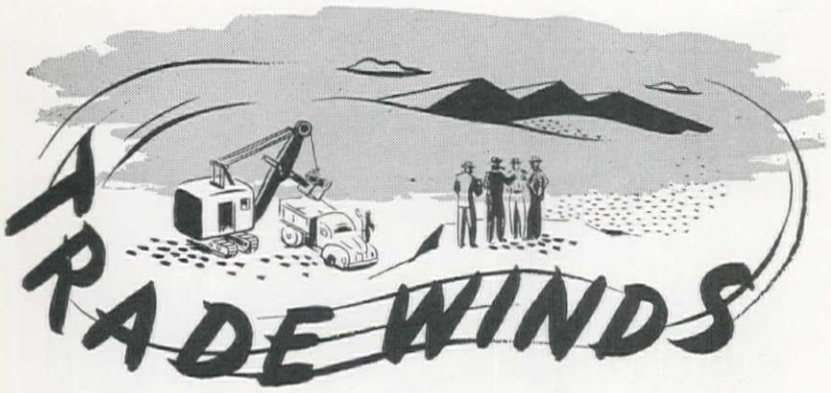
PROPOSED PROJECTS

Oregon

BENTON, LINCOLN AND POLK COS.—The REA, Washington, D. C., has alloted $285,000 to the Benton-Lincoln Coop. Inc., Corvallis, for const. of 260 mi. of transmission lines.

Utah

DUCHESNE CO.—The REA, Washington, D. C., has alloted $128,000 to the Moon Lake Electric Assn., Mount Emmons, for 148 mi. of transmission lines.



News of Men Who Sell to the Construction West

Roy **Thrailkill** has recently joined the staff of the *Western Machinery Co.*, where he will devote his activities principally to the construction trade in the southwest, with headquarters in the office of the company's Los Angeles branch. Thrailkill has a wide experience and acquaintance, and is highly regarded on the Pacific Coast.

* * *

J. E. Freeland, president of the *Freeland Tractor and Equipment Co.,* Riverside, Calif., died suddenly on Sept. 24. The organization which he headed has been distributor for the *Caterpillar Tractor Co.* since 1938, and prior to that time he had been sales manager of the Pierce-Fair Corp. of Los Angeles. He was born in Canada 57 years ago.

* * *

"Highway Equipment Company" is the new title of the former Knox-Hale Machinery Co., 235 Bayshore Blvd., San Francisco, according to an announcement from that organization. The company will retain the same quarters, and continue to sell, rent and service the same lines of construction equipment previously handled. Officers of the organization include **E. F. Hale,** vice president; **J. W. Beatty,** secretary-treasurer; and **S. F. Beatty, Jr.,** general manager.

A change in name and address has recently been made by the **Rojek Machinery Co., which** now becomes the *Ken Royce Construction Equipment Rental Co.* Following the change of Kurt Rojek's name to **Ken Royce,** to facilitate the handling of an increased stock, larger quarters have been acquired at 185 Bayshore Blvd., San Francisco. The business will be continued under the same management, and with the same policy.

* * *

Baxter F. Ball has been named branch manager for the *General Petroleum Corp.* at Tacoma, Wash. He succeeds **J. J. Miller,** who has been transferred to the lubricants department of the company, with headquarters in Los Angeles, Calif.

* * *

A. H. Cox & Co., Seattle, Wash., has assumed the distributorship for *Gar Wood Industries, Inc.,* and the *Diamond Iron Works.* In taking over the Gar Wood Industries line of scrapers, Cox & Co. has relinquished the line of Wooldridge equipment formerly carried.

* * *

Skagit Steel & Iron Works, Sedro Woolley, Wash., has purchased the business of the Moran Manufacturing Co., pump manufacturers of Seattle. **Earl Hoyt,** Seattle manager for the Skagit Steel & Iron Works, has also announced that his company will distribute the Winslow filters for both gas and diesel engines throughout the State of Washington. The Winslow filters are manufactured by the *Winslow Engineering Co.* of Oakland, Calif.

* * *

V. G. Lindenberg, formerly general sales manager in the Seattle office of the Howard-Cooper Corp., recently resigned that position to join the Seattle office force of the *Willamette Hyster Co.*

* * *

B. W. Harberg, formerly northwest factory representative of the Koehring Co., with headquarters in Portland, Ore., and **Burt Danley,** formerly general salesman of the L. A. Snow Co. of Seattle, Wash., have formed the *Rainier Equipment Co.,* with offices in Seattle, and have purchased the business of the *L. A. Snow Co.* The new concern will distribute the *Koehring Co.* line in Oregon and Washington. L. A. Snow, for many years a prominent figure in the equipment field, is retiring and his future plans have not been announced.

* * *

F. B. McBath, president of the *Columbia Equipment Co.,* Portland, Ore., has announced that his organization will represent the *Standard Steel Works* of Kansas City, Mo., in the northwest. The line of equipment includes oil distributors and oil tanks.

* * *

Fern L. Wheeler, 52, branch manager of the *Allis-Chalmers Mfg. Co.* at Billings, Mont., died in Townsend, Mont., last month. He had been made branch manager at Billings when he transferred from Spokane, Wash. in 1936.

* * *

R. D. Holcomb, formerly district manager for the *Harnischfeger Corp.* in Tennessee, has been appointed sales manager of the large excavator division, with headquarters in Mil-

waukee, Wis. Another personnel change in the Harnischfeger organization is that of **G. K. Woodling,** formerly of the sales department, who has been transferred to the engineering division for small excavators.

* * *

James C. Hodge has been elected vice-president and director of *The Wellman Engineering Co.,* Cleveland, Ohio. While serving as a metallurgist with the Babcock & Wilcox Co., he developed and perfected the process of welding used by that organization in the fabrication of the power penstocks for Boulder Dam. In 1938, he was a joint recipient of the J. F. Lincoln Gold Medal Award of the American Welding Society for the best paper representing original contribution to the advance of welding.

New Materials and *Equipment* . . .

Sprocket Rims

Manufacturer: Alloy Steel & Metals Co., Los Angeles, Calif.

Equipment: Renewable tractor drive sprockets.

Features claimed: Designed for prolonging the useful life of tractor drive sprockets, the manufacturer has designed a rim to replace worn rim section of the sprocket by welding to ends of spokes. The rims are made of alloy-manganese steel of suitable strength and toughness for lasting service. They are available at present for Caterpillar RD tractor drive sprockets.

Wheel Mounted Crane

Manufacturer: The General Excavator Co., Marion, Ohio.

Equipment: Wheel mounted crane unit.

Features claimed: Mounted on a specially designed wheel unit, this 15-ton crane can lift and swing a load of 3 tons, in a full circle, 50 ft. from the machine. The carriage is fabricated from 20-in. I-beams, designed to support 100 tons dead weight, with a dual-tire wheel mounting. The crane can handle booms up to 100 ft. in length, and has the ability to hoist and swing at the same time.

Small Trencher

Manufacturer: Cleveland Trencher Co., Cleveland, Ohio.

Equipment: Model 75 tractor mounted trencher.

Features claimed: This unit has an overall width of 45 in. and a length, including wheel, of 14 ft. 10 in. It is equipped with a 27-hp. gasoline engine with four forward speeds and reverse. The trencher has 8 cutting speeds. The entire unit is mounted on crawler tracks with 12 speeds, both forward and reverse. Both crawler drive unit and digging wheel drive reduction are fully enclosed in steel housings, and run in oil. Sixteen special steel buckets are mounted in the digging wheel. It is particularly suitable for work in close quarters in laying water pipes, irrigation lines and underground conduits.

Rock Drill Mounting

Manufacturer: Ingersoll-Rand Co., Phillipsburg, N. J.

Equipment: Air-feed mounting for rock drills.

Features claimed: Known as the Jackleg, this unit is designed for use with Jackhammers. Instead of requiring the operator to hold up the drill by hand by pushing it forward as it drills into the rock, the Jackleg supports the drill and the operator has only to exert a slight downward pull on the handle of the hammer to balance the pneumatic feed of the Jackleg. The unit weighs 35 lb., and is regulated by conveniently located pressure throttle.

Utility Ditcher

Manufacturer: Buckeye Traction Ditcher Co., Findlay, Ohio.

Equipment: Truck-mounted wheel excavator.

Features claimed: The unit is mounted on and powered by a standard 1½-ton truck with dual tandem rear wheels. The rotary wheel excavator trenches to a depth of 5½ ft. and 22 in. width. Spoil can be discharged either side of the machine. Power is delivered through a specially built transmission with a patented constant-center drive to the excavating wheel.

Diesel Electric Sets

Manufacturer: Caterpillar Tractor Co., Peoria, Ill.

Equipment: 34 and 41 kw. diesel driven generators.

Features claimed: These two models round out the Caterpillar line of diesel electric sets. Both units are powered by 4-cylinder diesel engines, developing 41 and 34 kw. at 900 r.p.m., respectively, for polyphase, 60-cycle current. The generators are direct connected, rotating field type, and available either as 3-phase or single phase, 60-cycle or 50-cycle, and with a wide variety of voltages.

Improved Snatch Blocks

Manufacturer: Federal Alloy Block Co., Cincinnati, Ohio.

Equipment: Tackle and snatch blocks for manila and wire rope.

Features claimed: Improvements to the line of tackle and snatch blocks, and accessories, include enlarged safety straps, extra large diameter pin construction at sheave and bucket, improved shell design to afford protection to the line and elimination of rivets. Special durable Aluminum Alloy shells are available from Manila rope, which smooth the surface instead of fraying. Blocks are secured by heavy steel zipper sleeves which grip lugs and members. To meet special requirements, the improved shells can be furnished of any other material which can be cast. Improved roller bearings with large diameter rolls are used for the sheaves of these blocks.

Model C Tournapull

Manufacturer: R. G. LeTourneau, Inc., Peoria, Ill.

Equipment: 8-cu. yd. Tournapull.

Features claimed: The smallest Tournapull, known as Model C, is powered by a caterpillar, 6-cylinder diesel engine, and has a top traveling speed of 13 to 15 mi. per hr. The weight of the engine and half the weight of the scraper are carried on two pneumatic-tired drive wheels. The scraper accompanying the tractor has a struck capacity of 8 cu. yd., and a heaped capacity of 11 cu. yd. Its construction includes the latest LeTourneau features, such as the crescent arch "A" frame, larger apron, and traveling sheaves controlling apron. Two different tire sizes are available to meet job requirements, either 21x24 or 18x24.

Tamper Tips

Manufacturer: Los Angeles Steel Casting Co., Los Angeles, Calif.

Equipment: Two-piece cast steel tip for dirt and rock tampers.

Features claimed: Bases are made of special nickel steel with good welding qualities and strength. Tips are made of chrome molybdenum steel to resist the abrasion. The long tapered shank on the base provides surface contact with the socket of the tip. A flat register in the socket prevents the tip from turning. After bases have been welded on to the tamper drum, no further cutting and welding are necessary. To replace the worn tips, they are simply driven off, and new tips driven on.

Fluid Drive Compressor

Manufacturer: Davey Compressor Co., Kent, Ohio.

Equipment: Portable air compressors operated on the fluid drive principle.

Features claimed: This first application of the fluid drive principle in the manufacture of portable air compressors made possible automatic compressor operation. The Davey Air Aristocrat is a new design in the 105-cu. ft. size. The fluid drive eliminates mechanical strains on both engine and compressor, thus improving economical and efficient operation. The clutch lever is eliminated and the compressor automatically begins to function at an engine speed of 200 r.p.m. In addition to the fluid drive, the entire unit is streamlined. Semi-elliptical spring mountings are provided, and all gauges and controls are synchronized on one instrument panel.

Emergency Jack

Manufacturer: Templeton, Kenly & Co., Chicago, Ill.

Equipment: 20-ton mechanical jack.

Features claimed: Designed for emergency use with heavy machinery, the jack is 30 in. high, has a 17¾-in. lift, and weighs 167 lb. with complete equipment. Besides lifting on cap and toe, it lifts on an auxiliary shoe or on a chain with grab hook end. The jack can be tilted on its base for working at angles, and it can be used horizontally for pushing or pulling.

Literature...Catalogs

The following booklets may be obtained by sending your request directly to the manufacturer or to WESTERN CONSTRUCTION NEWS, 333 Kearny Street, San Francisco.

Pioneer Rubber Mills, San Francisco, Calif.—Catalog 40-H describing a complete line of Pioneer Hose, and including data on the construction and application of many new types.

Hewitt Rubber Corp., Buffalo, N. Y.—A series of four folders describing (1) All-Synthetic curb pump hose; (2) Monarch straight edge transmission belt; (3) Twin-weld hose; and (4) Transmission belts of seven different types.

Chicago Pneumatic Tool Co., New York, N. Y.—Bulletin 758 describing two-stage air-cooled portable compressors available in 60 to 500 cu. ft. sizes.

Macwhyte Co., Kenosha, Wis.—A folder explaining the necessary advantage of Macwhyte internally lubricated wire rope.

Victor Equipment Co., San Francisco, Calif.—A booklet intended to aid the student and beginner with instructions on how to assemble a welding and cutting unit. The booklet includes three pages of safety precautions and three pages of tip selection charts. It will be sent free to any vocational school, or any student or beginner who will write for it. Also, a catalog of welding supplies, including rods, fluxes, electrodes, and accessories.

Pioneer Engineering Works, Minneapolis, Minn.—Folder 536 describing the Pioneer traveling grizzly feeder, designed to improve primary crushing, and including a specification sheet.

The Sisalkraft Co., Chicago, Ill.—A booklet illustrating the job uses of Sisalkraft for curing concrete roads, together with other mention of other uses for Sisalkraft.

R. G. LeTourneau, Inc., Peoria, Ill.—Folder A-014 presenting the factors which determine selection of Carryall Scraper sizes for general construction jobs. Also a folder explaining the uses, savings and specifications of the three Tournapull models now being manufactured, and one devoted exclusively to small carryalls ranging in size from 3 to 11 cu. yd. heaped measure.

The International Nickel Co., Inc., New York, N. Y.—Bulletin T-5, an addition to the technical bulletins and devoted to engineering properties of Monel.

Fairbanks, Morse & Co., Chicago, Ill.—Bulletin 5710 describing the new line of Angleflow pumps in both vertical and horizontal types. Also Bulletin 6930R covering the water turbine pumps with open impellers, and Bulletin 6360, describing a new line of mixed flow vertical propeller pumps.

Bay City Shovels, Inc., Bay City, Mich.—Catalog 25B illustrating the Model 25, a 5-ton crane available with ½-yd. buckets, which can be used as shovel, crane, dragline, clamshell or hoe. Also a similar catalog 18-B covering the ¾-yd. shovel and 16½ to 20-ton crane, and catalog 65C covering the 1¼-yd. shovel and 20-ton crane.

Harnischfeger Corp., Milwaukee, Wis.—Bulletin D-9 illustrating by photographs and diagrams the features of the new "Biglode" dragline bucket recently placed on the market.

J. D. Adams Co., Indianapolis, Ind.—A leaflet devoted to the Adams Motor Grader No. 311, with 50-hp. diesel engine. Similar leaflets are devoted to Motor Graders No. 412 with the 66½-hp. diesel engine, No. 501 with the 66½-hp. gasoline engine, and No. 511 with the 66½-hp. diesel engine.

Hydrauger Corp., Ltd., San Francisco, Calif.—Bulletin 7A devoted to the Hydrauger method of underground pipe installation, and the various sizes and types of equipment.

Garlinghouse Brothers, Los Angeles, Calif.—Bulletin 57 illustrating over 50 models of wheelbarrows from 3 to 12-cu. yd. capacities, including all makes, shapes and varieties.

The General Excavator Co., Marion Ohio—Bulletin 4018 describing the wheel-mounted supercrane, which is further covered in the New Equipment Section.

Alloy Steel & Metals Co., Los Angeles, Calif.—A folder describing the new renewable sprocket rims for tractor drive sprockets.

Hewitt Rubber Corp., Buffalo, N. Y.—A catalog section covering rubber production, intended particularly for the oil industry and general uses in transmitting oil.

West Coast Lumbermen's Association, Seattle, Wash.—A folder on wood sheathing for general construction, and a booklet listing the various types of West Coast woods, together with their respective qualities and uses.

Ransome Concrete Machinery Co., Dunellen, N. J.—Bulletin 167 covering briefly the entire line of mixers, pneumatic placers, buckets, carts, bins, towers, mast plants, etc.

S. Morgan Smith Co., York, Pa.—Bulletin 144 devoted patricularly to the Howell-Bunger valves for balanced free discharge service.

Worthington Pump and Machinery Corp., Harrison, N. J.—Bulletin S-500-B38, describing diesel engines of the 4-cycle direct injection, totally enclosed, Type DD. Also a Bulletin S-500-B 39, covering convertible gas-diesel engines of the Type EEGX and EEX. Also a master manual on the selection of the Multi-V-Drive sheaves.

Armco Drainage Products Association, Middletown, Ohio—A bulletin emphasizing the necessity for efficient and adequate drainage in connection with airport construction; also a reprinted article concerning LaGuardia Field, New York City.

Link-Belt Co., Chicago, Ill.—Folder 1881 describes the bio-filtration sewage treatment system, combining high-rate filtration with recirculation of effluent.

OFFICIAL BIDS

NOTICE OF POSTPONEMENT
Of Opening of Bids Under Specifications Number 8

Slope Protection

Notice is hereby given that the date for the opening of bids covering specification Number 8, Slope Protection, has been postponed from Tuesday, October 8 until Tuesday, October 22, 1940. Addendum Number 3 covering changes in certain quantities is being issued to the holders of the plans and specifications covering Specification Number 8, Slope Protection.

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
By Tom B. Pearce, Chairman.

Attest:
Charles H. Gerald, Secretary.

★ Index to Advertisers ★

OCTOBER • 1940

★

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