WCN-06-1935

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME X, No. 6

JUNE, 1935

25 CENTS A COPY
$2.00 PER YEAR

A WALL OF STEEL

Cofferdam construction to hold back the Columbia River from the west side of the Grand Coulee dam site.

SUBSTANTIAL

NEW MASONIC TEMPLE AT VISALIA, CALIFORNIA

DRAGON & SCHMIDT, BERKELEY, *Architects*
HARRIS CONSTRUCTION CO., FRESNO, *General Contractors*

In 1814 a Masonic Temple was built in Sacket's Harbor, N.Y. Today, it still stands intact, the oldest Masonic Temple in America... a monument to its builders.

In Visalia, California, there has just been completed another Masonic Temple, likewise built to stand for generations, reflecting the skill and integrity of its own generation.

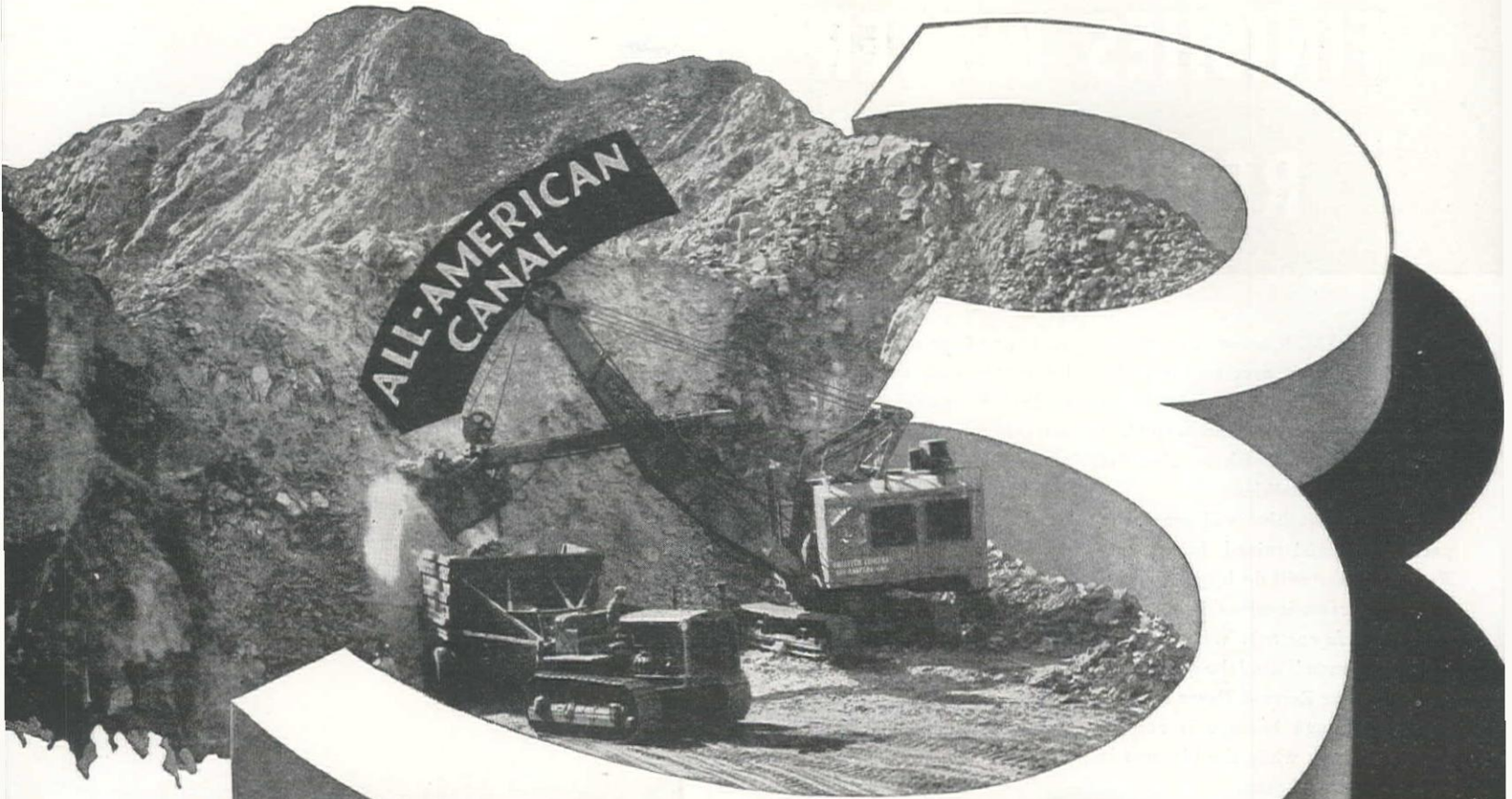
In such a building, a great responsibility is attached to the selection of materials. Pacific Portland Cement Company is proud that its product... Golden Gate TAN PLASTIC...a true Portland Cement...was selected for the concrete work.

On every job specify Golden Gate. You'll find a True Portland Cement under this reliable name for every building need.

Stucco
Foundations
Basements
Furnace Pits
Fountains
Swimming Pools
Mortar
Monolithic Concrete

PACIFIC PORTLAND CEMENT COMPANY
SAN FRANCISCO

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



3 NORTHWESTS for The GRIFFITH CO.

Los Angeles Calif

SHOVELS
CRANES
DRAGLINES
PULLSHOVELS
SKIMMERS

ANOTHER vote for Northwest! The Griffith Company of Los Angeles, California bought a 2 yd. shovel and their third Northwest for work on the world famous All American Canal Project.

Ask yourself again, why *is it* that the country's leading contractors buy Northwests year after year. Ask them! Then ask us! The answer is easy. They secure greater output at lower cost. That's why one out of every three Northwests sold is a repeat order and that's a testimonial you cannot beat any place.

NORTHWEST ENGINEERING COMPANY

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

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

BUILT IN A RANGE OF 10 SIZES, 1/2 YD. CAPACITY AND LARGER

NORTHWEST ENGINEERING COMPANY—255 Tenth Street, San Francisco, Calif.; 3707 Santa Fe Ave., Los Angeles, Calif. REPRESENTATIVES —Pacific Hoist & Derrick Co., 3200 Block, 4th Ave. S., Seattle; Arnold Machinery Co., Inc., 149 W. 2nd St., S., Salt Lake City; The Mine & Smelter Supply Co., 1422 17th St., Denver, Colo.; Neil B. McGinnis Co., 1401 S. Central Ave., Phoenix, Ariz.

MIXES QUICKER
FINISHES BETTER
REDUCES COSTS

TWO THINGS, among others, are very definitely necessary to make a good bituminous "road mix" job—first, a thorough mix and second, a smooth, uniform finish to give the proper riding qualities.

Any blade machine will eventually get the material mixed, but Adams Retread Paver will do it quicker and cheaper because it mixes the material *three times in one trip.* Where quick-setting bitumen is used the quick mixing of Adams Retread Paver is a decided advantage because it accomplishes the mix while the bitumen is in its most liquid state.

As for finishing—no machine without the features of Adams Retread Paver can possibly leave as smooth and clean-cut surface as does this machine. And, after all, a smooth riding surface is one of the major considerations.

Whether you are a highway official or contractor, you should be interested in the possibilities of this machine. It works equally well with stone, slag or gravel—with tar, asphalt or road oil. Also used for mixing on gravel road stabilization. The cost—only half the price of a motor grader. Mail the coupon below for folder completely describing the advantages of Adams Retread Paver as applied to *your work.*

ROAD ADAMS MACHINERY

J. D. ADAMS COMPANY

SAN FRANCISCO—LOS ANGELES—SPOKANE

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

ADAMS RETREAD PAVER No. 2

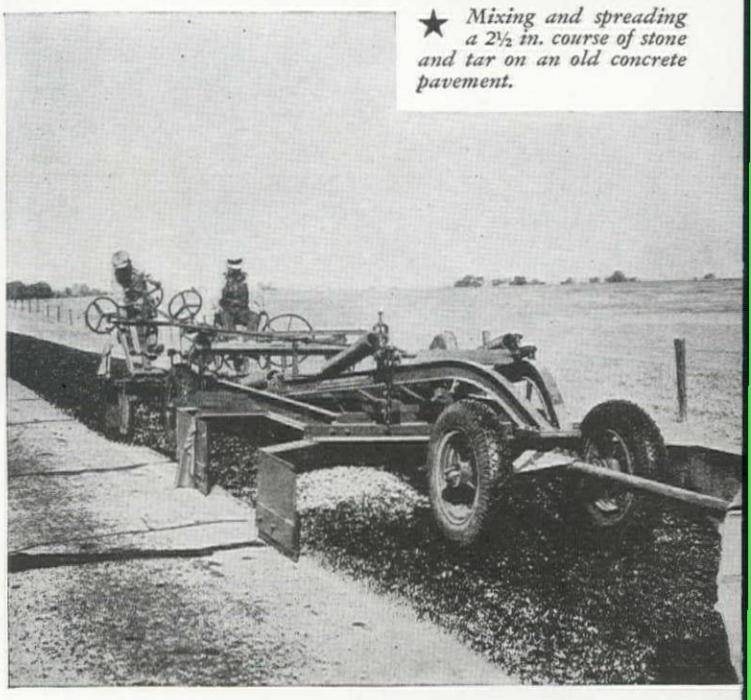
J. D. Adams Company,
Please send me folder describing Adams Retread Paver No. 2.

Name.....

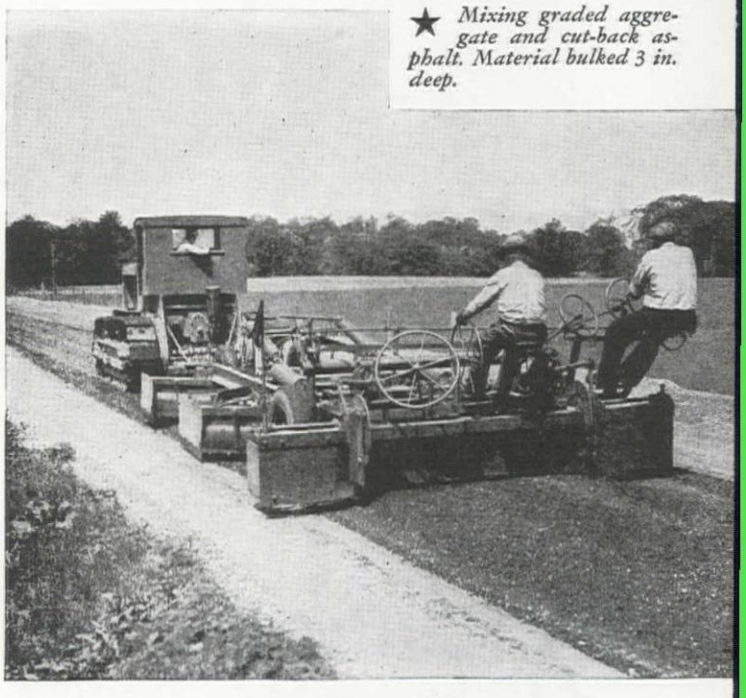
Address.....

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

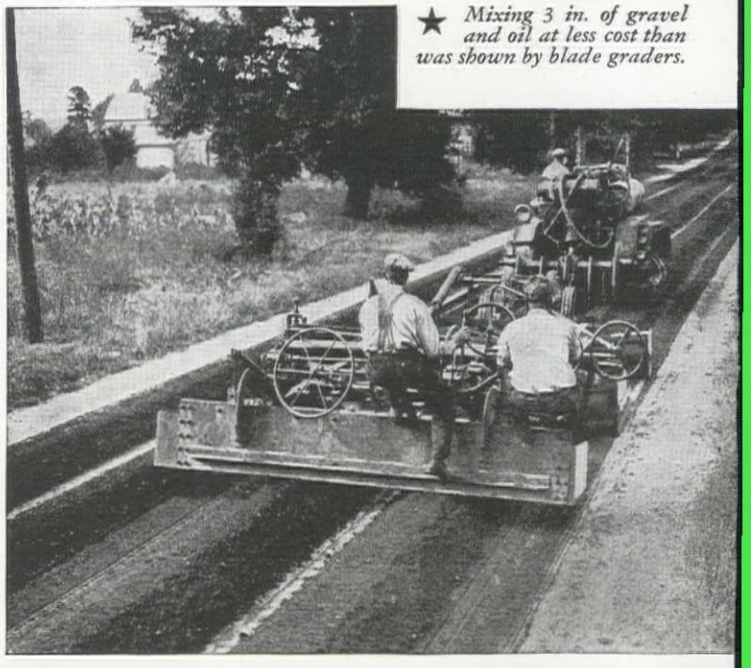
PB&E



★ *Mixing and spreading a 2½ in. course of stone and tar on an old concrete pavement.*



★ *Mixing graded aggregate and cut-back asphalt. Material bulked 3 in. deep.*



★ *Mixing 3 in. of gravel and oil at less cost than was shown by blade graders.*

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

J. I. BALLARD, Editor

Contents for June, 1935

Just how large and how varied is the western market for construction equipment and supplies? We usually think of contractors' purchases in terms of shovels, tractors, compressors, mixers and the like; and indeed, such items continue to be the backbone of construction requirements. Yet, another kind of market exists, which warrants thoughtful consideration by manufacturers. It is a market not generally identified with the construction industries.

In the last issue of Reclamation Era, the official publication of the United States Bureau of Reclamation, is a tabulation of some of the purchases made in connection with the building of Boulder Dam, by the Six Companies Incorporated, up to February 1, 1935. The quantities involved, and the type and variety of items, are as astonishing as the types and quantities of the more standardized equipment items. A partial list of these purchases follows:

Rubber boots	21,144 pr.
Police whistles	588
Compressed air hose	34 mi.
Manila rope	495 mi.
Shovels	13,356
Hard hats	13,046
Lumber crayons	34,992
Dish pans	3,048
Radiator hose	1 mi.
Nails	18,111 kgs.
Telephones	386
Flashlights	7,360
Canvas water bags	32,664
Paint brushes	19,384
Wire rope	363 mi.
Electric tape	50,250 rls.
Safety belts	5,240
Tin cups	9,720
Fuse	173 mi.
Chalk line	148 mi.
Burlap sacks	335,000
Wheelbarrows	168

Among some of the more conventional construction items are:

Autos and trucks	$1,016,000
Tires (truck and car)	$ 280,000
Concrete equipment	$ 256,000
Electrical equipment	$ 293,000
Dynamite	8,551,300 lb.
Exploders	1,139,500
Power shovels, etc.	$ 508,000
Compressor equipment	$ 501,000
Railroad equipment	$ 539,000
Steel wire, pipe, etc.	$1,938,000
Drill steel	1,516,376 lb.
Gasoline	4,643,504 gal.

495 miles of Manila rope is a lot of rope in any man's language; 335,000 burlap sacks are a lot of sacks; and 21,144 pairs of rubber boots are enough to equip every worker in a city as large as Tacoma and Sacramento combined. Yet these items, and the others mentioned, were purchased for just one job.

Other jobs, some of them even larger, are also under way in the west; and are also buying and consuming great quantities of similar supplies. Truly this is a market that challenges the attention of many manufacturers who have not hitherto regarded the construction industries with more than passing interest. It is a market in which alert manufacturers can, and will, develop new volume and additional profits. It is a market which **Western Construction News** covers more completely than any other publication.

Chicago Office:
5737 Kenmore Ave.
Stephen H. Babcock, Manager

Northwest Office:
2937 N. E. 64th Ave.
G. E. Bjork, Manager

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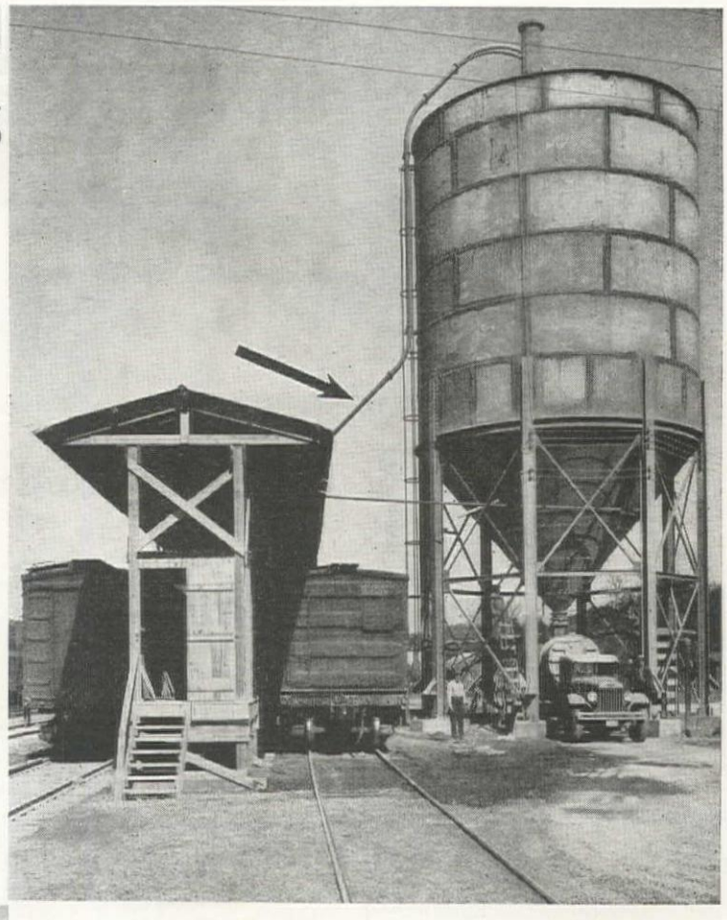
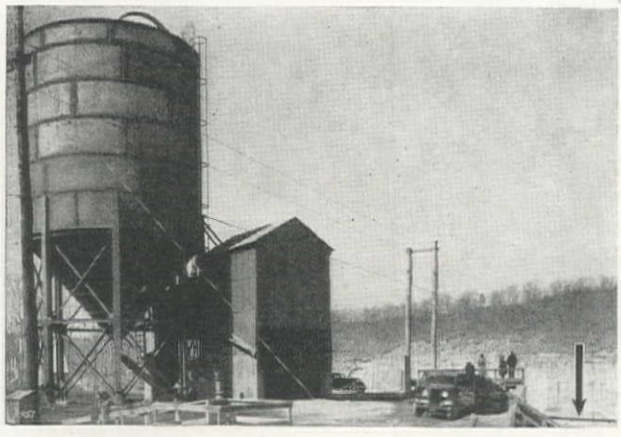
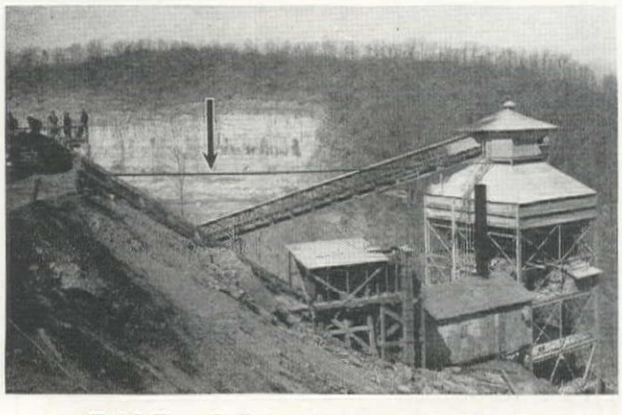
FULLER-KINYON CEMENT PUMPS AT NORRIS DAM



THE BULK CEMENT UNLOADING PLANT



TRUCK-HOPPER AND BIN AT THE DAM



THE CEMENT LINE TO MIXING PLANT

Two types of Fuller-Kinyon Systems handle the cement for this great project. Two portable pumps, unload box-cars and convey through independent pipe-lines to a truck-loading bin at the railroad siding. The arrangement, shown above, provides for the unloading of four cars without shifting. Special trucks transport the cement five miles to the mixing plant where the loads are dumped into a hopper above two stationary pumps. One of these pumps is for stand-by service, but is connected to the pipe-line system for instant use. Cement is conveyed either directly to the mixing plant, or through a branch line to storage. When trucks are not discharging, the cement is spouted to the same hopper for transfer to the mixing plant.

Fuller-Kinyon Pumps offer the contractor speed with reliability, economical long distance conveying and unequalled convenience in plant layout. Our bulletin fully illustrates the use of these interesting conveyors in all classes of concrete construction service. For preliminary, information, write for a copy.

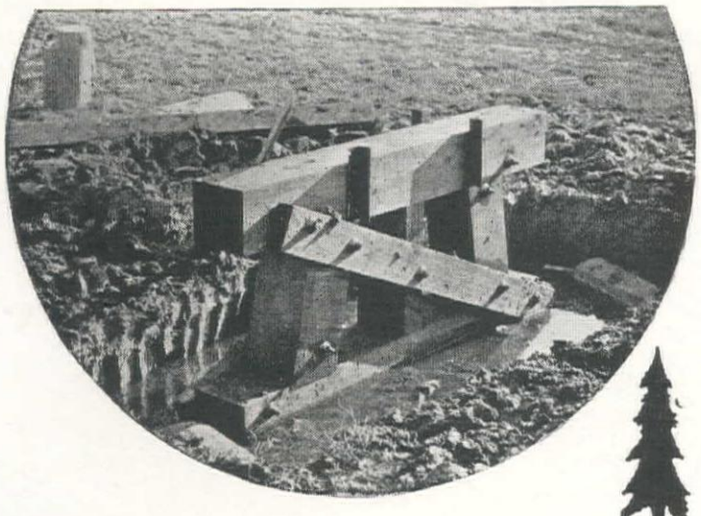
Fuller Company
CATASAUQUA, PENNA. U. S. A.

Pacific Coast Representative:
WILLIAM S. WEAVER

1041 S. Olive St.
Los Angeles

742 Phelan Bldg.
San Francisco

700,000 feet of Select All Heart Structural Redwood was used in the San Francisco Bay Crossing Pipeline No. 2. Above is shown a general view of the trestle, with caps and saddles in place, ready for the pipe. Below is a typical framed timber bent.



from the birth

of the first San Francisco settlement, Redwood has played a part in its construction and growth. Redwood is found in the oldest Mission buildings . . . oldest commercial buildings . . . is buried under the fills where docks and waterfront structures once stood. Each period, down to the present day, is marked with Redwood construction.

The present generation of San Francisco engineers is specifying structural grades of Redwood . . . selected to meet modern engineering requirements. Long life, lasting economy, and adaptability of this material have been proved. Redwood has always met the changes in engineering requirements and continues to hold an important place in the development of the community . . . for now,

in 1935 Redwood

solves the supporting structure problem for the Hetch-Hetchy Bay Crossing Pipeline No. 2, of the San Francisco Water Supply Department. The framed bents, caps, saddles, girts and walkway on the trestles are built entirely of dependable, long lived, California Redwood. Perhaps the record of the Calaveras pipeline trestle which parallels this new line influenced the engineers in their decision . . . it has carried the pipeline for 40 years, and still requires little maintenance, in spite of unfavorable conditions.

CALIFORNIA REDWOOD ASSOCIATION
405 Montgomery Street San Francisco

NATURALLY DURABLE CALIFORNIA REDWOOD

THE P&H BANTAM WEIGHT MODEL 100 3/8 YD

HAS THE PUNCH YOU NEED FOR PROFITS

Watch this new Bantam Weight tear into a job and you'll see the sort of action that turns dirt into dollars. . . . It's full-revolving; weighs only 15,800 pounds in fighting trim — moves fast, climbs easily, turns quickly. And with P&H's Split Second Clutches, Rapid Reversing Chain Crowd and live boom you have a fast digging cycle that can't be beat for accuracy in holding close to grade as demonstrated here. *Powered by Ford V-8 Motor* known for smooth, dependable low cost operation, there's ample reserve for every need. Service is no farther than the nearest Ford dealer; engine can be renewed on Ford Replacement Plan.

A SMALL MACHINE — A BIG PRODUCER

Modern, All Welded Construction has cut off extra weight . . . provided greater strength to take all stresses without faltering. Insures proper permanent alignment of all working parts; lower upkeep expense. High grade alloy steels reduce weight still further. First reduction helical gears, heat-treated and double cut, operate in an oil bath. Anti-friction bearings are used at all vital points. The center of gravity is low with main machinery units mounted behind center pin to eliminate dead counterweight.

Full Convertibility has never before been so simple and economical. The light welded tube boom is strong, easier to handle; makes it practical to convert right on the job for shovel, dragline, crane, hoe, skimmer or pile driver service. Attachments are available at the lowest cost ever known for complete convertibility.

Full Vision Cab has modern streamline design with sliding door and windows; permits unobstructed view of 210 degrees.

BULLETIN No. 100

For complete specifications. Ask us to mail you a copy.

HOW THE BANTAM WEIGHT MEASURES UP:

Capacity	3/8-yard
Engine	Ford V-8 (40 HP)
Weight (as shovel)	15,800 lbs.
Crowding Motion	P&H Rapid Reversing
Clutches	Split Second Control
Swing Clutches	Internal Expanding
Hoist Line Speed	162 F.P.M.
Dragline Speed	162 F. P. M.
Swing Speed	5 RPM
Travel Speed	1½ to 3 MPH
Tail Swing	7 Feet
Height to Top of Cab	10 Feet 4 inches

HARNISCHFEGER CORPORATION

4490 W. NATIONAL AVENUE MILWAUKEE, WIS.

Warehouses and Service Stations:

HARNISCHFEGER SALES CORPORATION, Established 1884

WESTERN LOGGERS MACHINERY CO., 82 Beale St., San Francisco; R. M. Taylor, 302 S. W. Fourth Ave., Portland, Oregon

SEATTLE DALLAS LOS ANGELES SAN FRANCISCO

An effective curing compound that also protects against active waters

PHOTO: UNDERWOOD AND UNDERWOOD.

In construction of this Arizona irrigation canal, Barrett Con crete Curing Compound permitted proper hydration of the cement under extremely arid conditions. It now effectively resists disintegration of the cement from the action of the water in the canal.

The application of Barrett Concrete Curing Compound effectively maintains the moisture content of concrete during the curing period.

Barrett Concrete Curing Compound provides an inexpensive means for minimizing improper curing, excessive shrinkage, internal stresses, cracks, checks and porous concrete. It forms an effective protective coating which guards against abrasion and disintegration by active waters.

Barrett Concrete Cures are specially prepared from coal-tar pitch, which has long been recognized as the most stable of bituminous materials for underground or underwater work. They are economical and easy to apply — by brushing or spraying—and are recommended for concrete dams, flumes, spillways, penstocks, bridge piers, pipe lines, or reservoirs.

Wire or write for full information.

California representatives' addresses on request.

THE BARRETT COMPANY, 40 RECTOR STREET, NEW YORK, N. Y.

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

EXPLOSIVES WON'T SETTLE EVERY HIGHWAY SWAMP FILL

But They Do Furnish the Solution on Many Swamp Roads

Loading Fill Settlement Shot

Wiring up Electric Blasting Caps for Fill Settlement Shot

Different kinds of "mud"—different depths of "mud"! Different water conditions—different widths and kinds of fill! These—and other factors—necessitate careful consideration in the selection of fill settlement methods.

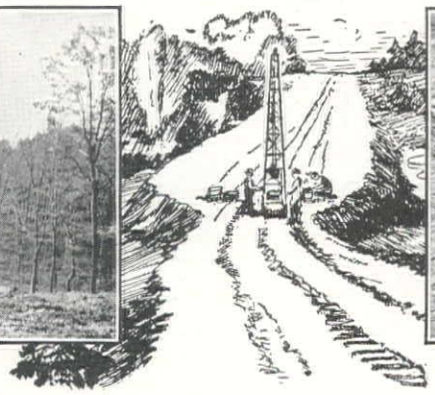
Recently the use of explosives has become more widespread in removing or liquefying swamp "mud" to permit highway fill to settle into stable position on solid bottom. Here's work that demands the proper method and the right explosive—and Atlas offers you real help in selecting both.

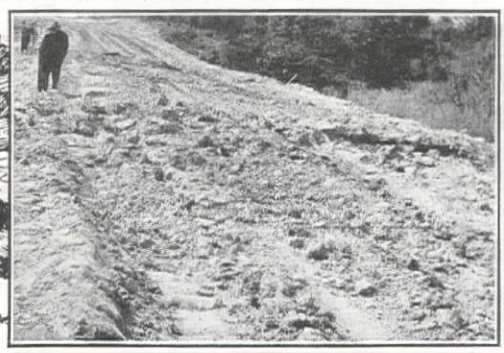
Blasting underneath the fill must be controlled to avoid wasting fill as the tremendous forces of explosive gases push the mud away. A good deep fill shot provides a heavy, bearing action that is not spectacular or noisy.

Atlas has developed a new method of directing the forces of the explosives laterally to get maximum removal of mud from under the fill. It involves the use of the new Atlas Twin Fifty Electric Blasting Machine. Atlas representatives will be glad to discuss this new idea with Highway Engineers—and cooperate, not only before the job is started, but throughout its progress.

These photographs show fill settlement work at Ha Ha, Maryland, under the direction of Mr. E. L. Mustard

The blast. Note absence of Fill throwing. Gases are properly confined to push mud laterally from under Fill





After Fill Settlement Shot

ATLAS POWDER COMPANY

THE DANT DIVISION

Everything for Blasting

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

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

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

Other Offices:

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

ATLAS EXPLOSIVES

ATLAS EXPLOSIVES

THE BIGGEST SHOVEL VALUE TODAY!

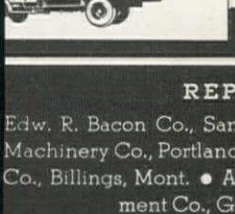
Bear Cat Jr., priced $500 less than other comparable new shovels and cranes, provides the important features of higher priced machines, such as:

Independent crowd—gear driven swing—clutch control—3 travel speeds—variable operating speeds.

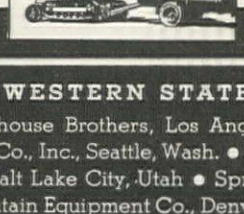
And only the Bear Cat Jr. handles 250 to 300 yds. at daily average cost of $5.18—you can move it from job to job at 30 miles an hour, so as to handle profitably jobs 75 to 100 miles away. ● Mail coupon for "Bear Cat Jr. Facts." Get full details about Today's Biggest Shovel Value!

BEARCAT SHOVEL WORKS
DIVISION OF THE BYERS MACHINE CO.

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



25 MILES PER HOUR BY TRUCK OR TRAILER



YOU CAN'T BEAT IT FOR PORTABILITY

REPRESENTATIVES IN WESTERN STATES

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Sheehan & Company, El Paso, Texas

BEARCAT Jr. SHOVEL CO.
Ravenna, Ohio

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

NAME

ADDRESS

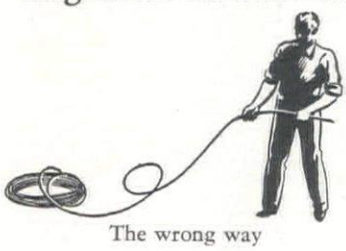
CITY STATE

2-B.C

Keep Kinks out of Wire Rope

In the first three of this series we gave some pointers on the care of new rope and spares, also the installation of rope. In this fourth advertisement we offer a few suggestions on keeping out kinks when handling rope.

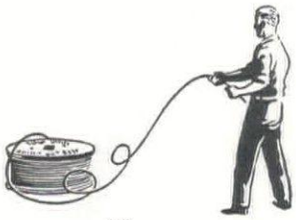
Tiger Brand Wire Rope is carefully manufactured of specially drawn wire; to obtain maximum service, the same careful attention should be given to methods of handling. To avoid kinks the following suggestions are given:



The wrong way

The right way

Wire rope should be uncoiled or unreeled in the same manner as it was coiled or reeled.



The wrong way

The right way

Specify

TIGER BRAND

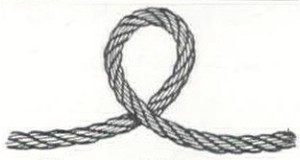
when you need wire rope

Wherever wire rope is used—for lifting, pulling or hauling—there is a specially designed TIGER BRAND rope—either in Excellay (Preformed) or in Standard construction, whichever is best suited for the job.

With its own wire rope plant here on the Pacific Coast—with large stocks of rope wire and wire ropes of all grades—with its own engineering staff—and its modern testing equipment—the Columbia Steel Company has built an enviable reputation for prompt and efficient service.

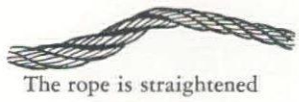
Tiger Brand American Wire Ropes are made on the Pacific Coast by the Columbia Steel Company—in the East, by the American Steel and Wire Company.

When the kink in a wire rope is straightened, the wires may or may not be broken — but the damage is done. The rope has been weakened, and when put to work the wires will soon break. Never use a rope that has been kinked unless you completely cut out the kinked portion.



The way a kink starts

The rope is kinked



The rope is straightened

Our engineers are at your service to give helpful information on any wire rope application. The three previous advertisements offer suggestions on the care of excavator ropes—we will gladly send them upon request.

COLUMBIA STEEL COMPANY

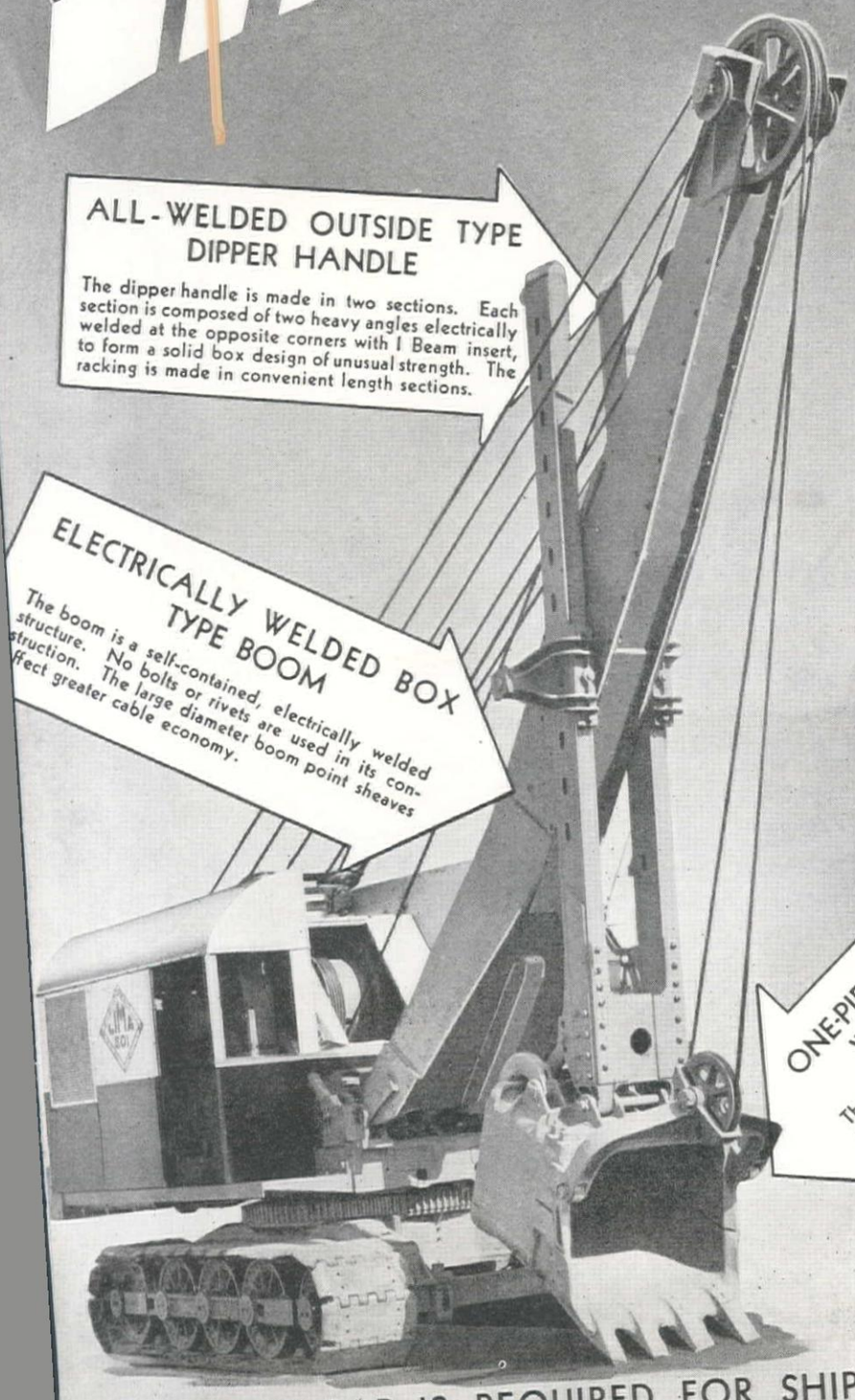
Pacific Coast Distributors for
AMERICAN BRIDGE CO.
AMERICAN SHEET & TIN PLATE CO.
AMERICAN STEEL & WIRE CO.
CARNEGIE STEEL CO.
ILLINOIS STEEL CO.
LORAIN STEEL CO.
NATIONAL TUBE CO.
TENNESSEE COAL, IRON & R. R. CO.

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

United States Steel Corporation Subsidiaries

Export Distributors: United States Steel Products Company, New York

LIMA type 801



ALL-WELDED OUTSIDE TYPE DIPPER HANDLE

The dipper handle is made in two sections. Each section is composed of two heavy angles electrically welded at the opposite corners with I Beam insert, to form a solid box design of unusual strength. The racking is made in convenient length sections.

ELECTRICALLY WELDED BOX TYPE BOOM

The boom is a self-contained, electrically welded structure. No bolts or rivets are used in its construction. The large diameter boom point sheaves effect greater cable economy.

ONE-PIECE MANGANESE DIPPER WITH DETACHABLE LIP

The dipper is one-piece manganese steel with detachable lip. The sheave through which the two-part line passes forms part of the dipper bail, thus permitting maximum digging and dumping heights.

Carefully designed and built from the ground up, a heavy-duty two yard machine, the LIMA Type 801 is meeting the requirements of users whose work demands full two yard capacity from engine to dipper teeth.

The all steel, electrically welded boom with wide flaring base, and the wide-spread dipper handle which holds the dipper squarely against the work is the last word in shovel front ends. Modern heavy-duty construction plus the many advanced and profitable mechanical features offered only by LIMA, is the reason why production records go up and stay up whenever LIMAS are used.

LIMA LOCOMOTIVE WORKS, INCORPORATED

SHOVEL AND CRANE DIVISION

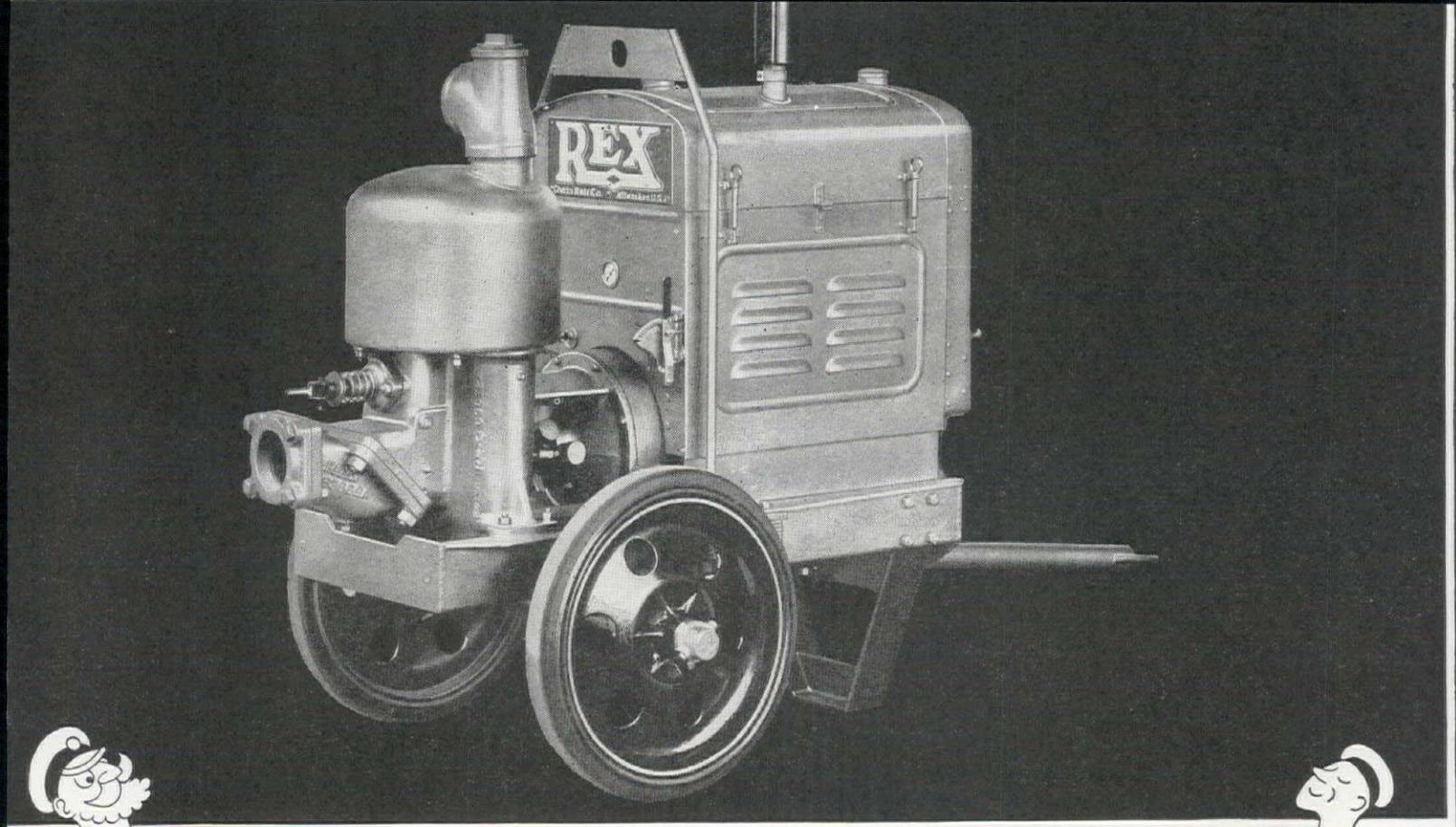
LIMA, OHIO, U. S. A.

Smith-Booth-Usher Co., 2001 Santa Fe Ave., Los Angeles; A. L. Young Machinery Co., 26-28 Fremont St., San Francisco, Calif.; H. J. Armstrong Co., 2244 First Avenue S., Seattle, Wash.; Western Steel & Equipt. Corp., 734 N. E. 55th Avenue, Portland, Ore.; General Machinery Co., E. 3500 Blk. Riverside Ave., Spokane, Wash.; C. H. Jones Co., 134 Pierpont Ave., Salt Lake City, Utah; H. N. Steinbarger Co., 1711 Market St., Denver, Colo.

LIMAS are built in 3/4 YARD CAPACITY and LARGER

ONLY ONE CAR IS REQUIRED FOR SHIPMENT

SHOVELS • DRAGLINES • CRANES



"O. K., tell me how you buy pumps"

"I buy the most water at the lowest cost"

"That means Rex Speed Prime Pumps!"

● That's what you buy—water moved at certain cost for pump, fuel, lubrication, and labor for operation and maintenance.

Every Rex Speed Prime Pump is *sized* and *powered* and *speeded* to give maximum capacity—those extra gallons every hour that cut the cost of every gallon pumped. Rex Speed Prime Pumps require less attention—the only moving pump part requiring lubrication is the impeller that runs in roller bearings. A large grease chamber provides ample lubrication and gives a positive seal against air and water leakage. Once the Rex Prime Control is set and the pump started, Speed Prime Pumps keep on pumping, picking up their prime so long as there is water in the hole—just because the Rex Prime Control is positive and automatic—opening to prime, sealing tightly to stop all recirculation. Even when the water is dirty and full of solids—or the line leaking air—they keep on pumping when others stop.

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

12 MODELS 2"-6" REX SPEED PRIME PUMPS

Get the New Low Prices

CARRIED IN STOCK IN 50 CITIES

Home Office—Central and Northwest Divisions

CHAIN BELT COMPANY

1615 West Bruce Street, Milwaukee, Wis.

West Coast Division: 909 Harrison St., San Francisco, Calif.

A. H. Cox & Co., Inc., 1757 First Ave., South, Seattle, Washington; Construction Equipment Company, 1118 Ide Avenue, Spokane, Washington; Loggers & Contractors Machinery Company, 211 S. E. Madison, Portland, Oregon; Intermountain Equipment Company, Broadway at Myrtle Street, Boise, Idaho; Hall-Perry Machinery Company, 802 E. Iron St., Butte, Montana; Jenison Machinery Company, 20th and Tennesse Sts., San Francisco, California; Industrial Equipment Company, 155 Sansome Street, San Francisco, California; Brown-Bevis Equipment Company, 4900 Santa Fe Ave., Los Angeles, California; R. L. Harrison Co., Inc., 209-214 N. Fourth Street, Albuquerque, N. Mexico; Ray Corson Machinery Company, 1646 Wazee Street, Denver, Colorado; Arnold Machinery Company, 149 W. Second Street, Salt Lake City, Utah.

Cost Less **FOR EVERY GALLON PUMPED**

Triple Protected TRUCK TIRES

SPECIAL JUNE VALUES

AT ALL GOODRICH TRUCK TIRE DEALERS

CASH IN NOW ON SAVINGS OF NEW GOODRICH TIRE INVENTION

This is economy month for truck owners! You can slash your tire costs by buying guaranteed Goodrich Silvertowns now. These tires are Triple Protected in the sidewall—the weak spot in most truck tires. Triple Protection actually checks 80% of premature failures—helps you to reduce delays—avoid accidents—cut costs way down!

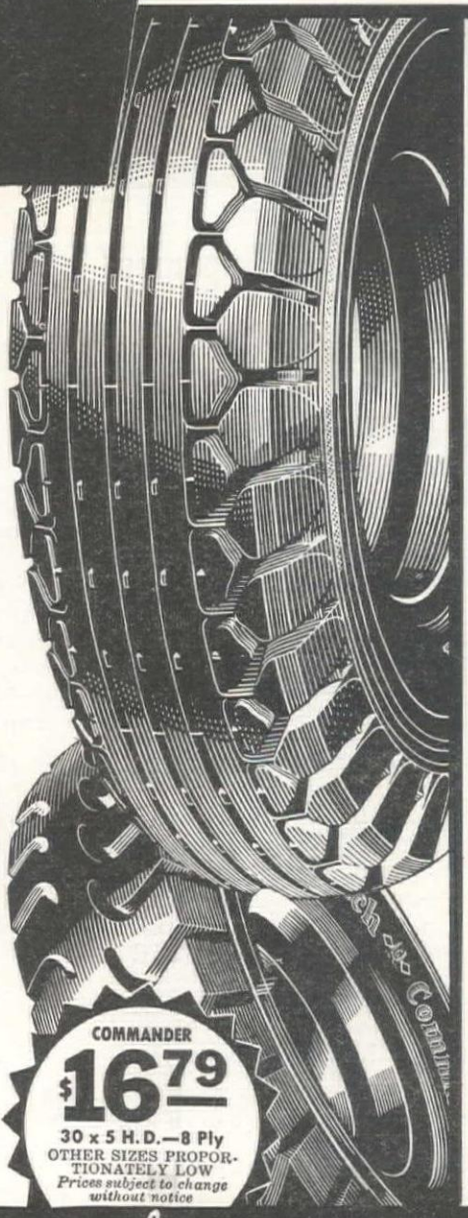
GET THIS PROTECTION FREE!
This month you can get more tire for less money. Every Triple Protected Silvertown costs *more* to manufacture. But you don't have to pay one cent extra for this amazing invention. And it may save you hundreds of dollars!

HOW TRIPLE PROTECTION WORKS

1 A layer of tough **PLY-FLEX** distributes stresses —prevents ply separation —checks local weakness.

2 **PLY-LOCK** is the Goodrich way of anchoring plies around the beads —protects against short plies tearing loose.

3 **100% FULL-FLOATING CORD**—each cord is surrounded by rubber —no cross cords—no cord friction. Longer life.



COMMANDER
$16.79
30 x 5 H.D.—8 Ply
OTHER SIZES PROPORTIONATELY LOW
Prices subject to change without notice

LOOK AT THESE JUNE $$ SAVERS!

NOW SUPER TRACTION FOR TOUGH GOING

Built for mud, clay and gumbo, the Super-Traction Silvertown will always get you out. It's a hard-hitting husky with lug-type, self-cleaning tread. It's Triple Protected! See your Goodrich dealer for low prices.

ROCK-BOTTOM PRICES ON GOODRICH SILVERTOWN TUBES

No more leaks around the valve base with the Goodrich Heavy Duty Black Tube! The valve stem is cured to the pad —the pad to the tube Actually one-piece construction. Priced to save you real money.

WHEELBARROW TIRES

Let your wheelbarrows ride on air. New Goodrich tires make wheelbarrows roll easier —reduce breakage. Will not damage lawns. We furnish wheels and tires. Another June value!

TIRES for EVERY POCKETBOOK

Goodrich has a tire for every hauling need. Tires built and priced to meet and beat all competition. Every one backed by Goodrich —America's oldest tire manufacturer. Get prices now on your summer requirements.

FREE! BIG 44-PAGE TRUCKER'S HANDBOOK

Every trucker, every driver should have a copy of this useful handbook. Gives commodity weights, load schedules, inflation tables, truck and tire data. See your dealer or write Dept. T-64, The B. F. Goodrich Co., Akron, Ohio.

Goodrich *Triple Protected* Silvertowns

SPECIFY THESE NEW SILVERTOWN TIRES FOR TRUCKS AND BUSES

2 YEARS OF SERVICE *prove* THEIR EFFICIENCY!

the FIRST 2-Stage Air-Cooled

PORTABLE COMPRESSORS

TWO years ago, after building and testing six separate, experimental machines we brought out the *Pioneer* 2-Stage Air-Cooled Portable Compressor.

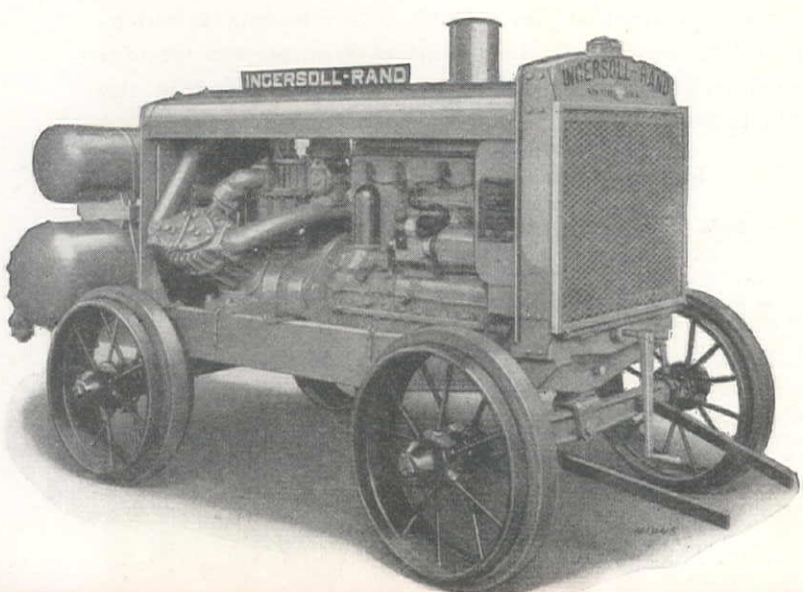
Today, this Compressor, after gruelling tests of actual service on all kinds of work under the most varied conditions, has more than justified every claim we made for it.

It is *time tested and service proved* equipment that embodies every worth while feature essential to economical, efficient and continuous operation.

Service has proved the statements we originally made—that the units use 25% less fuel per foot of air delivered over conventional single-stage water-cooled portables—and deliver 23% more air at 100 lbs. pressure.

The I-R Air-Cooled Intercooler, the Cushioned I-R Plate Valves, the Timken Main Bearings, etc., *made history* in portable compressor construction. The six sizes and six types of mountings permit the selecting of a machine for any set of conditions.

Full details upon request—write for new catalog 1604-E.



Together with these compressors I-R manufactures a complete line of

Air Operated Tools

New Drills . . . Jackbits . . . Jackbit Grinders . . . Hoists . . . Diggers . . . Hammers . . . Rammers . . . Tampers . . . Saws . . . Borers . . . etc.

Write for newest general catalog for complete description.

159-2

San Francisco, Calif., 350 Brannan St.
Los Angeles, Calif., 1460 E. Fourth St.
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Butte, Mont., 820 E. Iron St.
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Denver, Colo., 1637 Blake St.
El Paso, Texas, 1015 Texas St.

Ingersoll-Rand

READY! *For the big* U.S. *jobs ahead*

45 WHITES MAKE GREAT RECORD AT FORT PECK DAM

The Ft. Peck Dam, Montana, is the largest earth fill dam in the world—involving an expenditure of $87,000,000 and the hauling of 12,000,000 yards of dirt, most of which is bear paw shale.

A fleet of 45 Whites, operated by Spillway Builders, Inc., is used on this job. The White Model 718, above, operates on a 10-minute cycle from shovel to dump and back, 240 miles a day.

White and Indiana trucks offer most complete line in industry—a capacity and price to meet every requirement better at lower cost

● The new construction projects to be authorized all over the country in the government's $5,000,000,000 program will demand rugged trucks of all capacities that can stay on the job continuously and operate at low cost.

Fleets of White and Indiana trucks at Boulder Dam, Grand Coulee Dam, Fort Peck Dam, Joe Wheeler Dam, Norris Dam, etc., have proved they can haul heavier loads, make more trips and operate for less money than any others.

It takes White's built-in quality—precision manufacturing—finest materials in every part—to stand up under this gruelling work.

The complete White-Indiana line includes:

WHITE TRUCKS starting at $1195 (chassis at factory); ranging from 8,000 to 40,000 lbs. gross and including 4 and 6 wheelers, trucks and tractors.

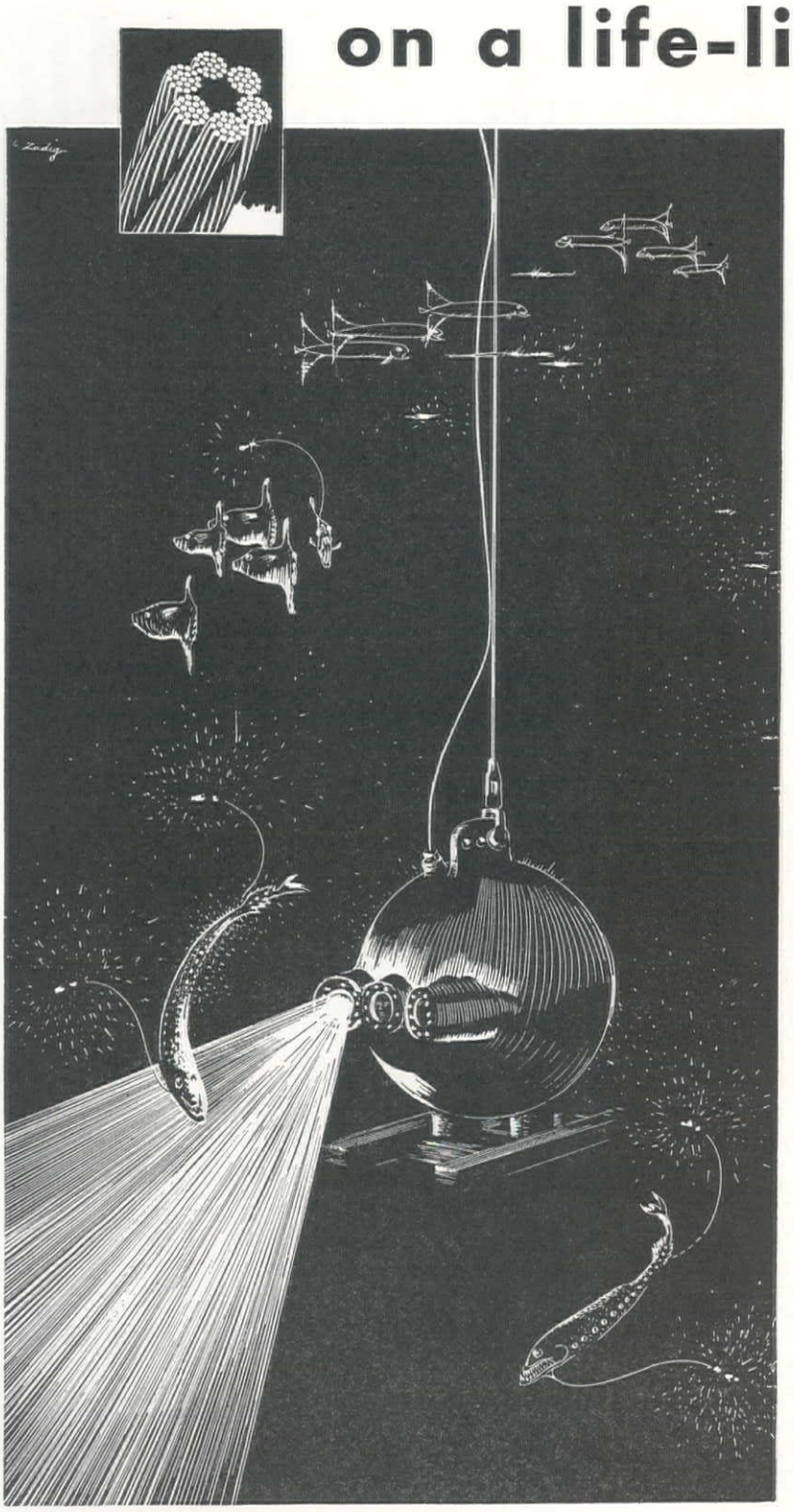
INDIANA TRUCKS at $695 (chassis at factory) 11,000 lbs. gross and $795 (chassis at factory) for tractor, 14,000 lbs. gross. Also 4 and 6-wheel drive Indianas, 10,000 lbs. to 40,000 lbs. gross and 2 Diesel-powered Indianas, 22,000 lbs. and 28,000 lbs. gross.

The White Branch or Dealer in your city will be glad to give you complete specifications. Be sure to see the White-Indiana line before you buy.

THE WHITE MOTOR COMPANY • CLEVELAND

White AND INDIANA TRUCKS

A Half Mile Dive
on a life-line of steel



TO MAKE CERTAIN that Roebling Wire Rope will give the user the highest obtainable degree of safe, economical service, Roebling has enlisted the aid of the finest and most complete research, testing and manufacturing facilities. Roebling Equipment for making acid open-hearth steel wire is an example. John A. Roebling's Sons Company, of California. San Francisco, Los Angeles, Portland, Seattle.

DR. WM. BEEBE'S & MR. OTIS BARTON'S WORLD-RECORD DIVE OF 3,028 FEET

Last August, in a great 2½ ton steel ball, 1½ inches thick... over one-half mile below the surface of the sea, off Bermuda... these famous and courageous naturalists peered through 3 inch thick fused quartz windows at a wonderland of sea-life.

Each window alone held back over 19 tons of water. A terrific total pressure of over 7000 tons strove to make a broken egg-shell of their cast-steel "laboratory." And linking them to the world above was a solitary slender life-line of steel... a Roebling Wire Rope.

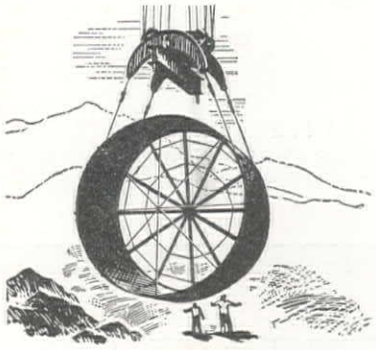
For all three of his great "Bathysphere" oceanic expeditions, Dr. Beebe has staked safety on the strength and stamina of Roebling "Blue Center" Steel Wire Rope.

DRAWING FAMOUS ROEBLING ACID STEEL WIRE

Acid Steel Wire, famous for its uniformity and fatigue-resistance, is the basis of Roebling "Blue Center" Wire Rope.

HOISTING WORLD'S LARGEST PIPE SECTIONS

Roebling "Blue Center" Wire Rope Slings are used for hoisting 90 ton sections of pipe, 30 feet in diameter, at Boulder Dam.



ROEBLING ...THE PACEMAKER IN WIRE ROPE DEVELOPMENT

When writing to JOHN A. ROEBLING'S SONS CO., *please mention Western Construction News*

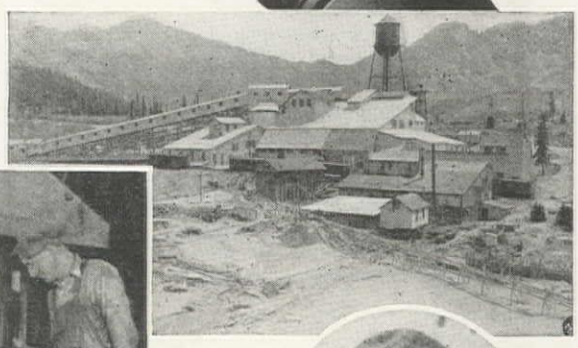
THE CLIMAX MOLYBDENUM CO. CUTS ROCK DRILLING COSTS 40% with TIMKEN BITS

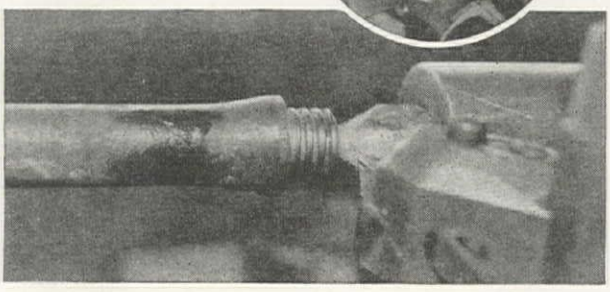
In March 1934 the Climax Molybdenum Company began an exhaustive test of Timken Rock Bits at their mine at Climax, Colorado. The object was to discover what savings could be effected by the use of removable bits as against reforged steels.

The test was continued for a year, and careful records were kept of every item of cost involved in the use of both the Timken Bits and the reforged steels.

On March 8, 1935, Mr. W. E. Romig, Superintendent of the Climax mine, submitted a detailed report of the test. This report shows that a total saving of 40% was made through the use of Timken Bits.

Timken Bits are effecting similar economies in hundreds of other mining, quarrying, and contracting operations all over the country. It will pay you to use them, too. Write for full information.





Complete Stocks Maintained in Principal Distributing Centers

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

When writing to TIMKEN ROLLER BEARING CO., *please mention Western Construction News.*

CAN YOU BET ON WHAT IS IN THE HOLE?

Complete confidence in your own business is affected by the purchased products on which your operations depend. Your buying of such products is influenced by many factors: faith in the manufacturer's product, based on actual use and user recommendations, and on the definite savings which the product accomplishes.

Halafax Explosives Company has informed you of all these factors—requested you to make your demands as to the conditions under which Halafax Explosives were to perform for you.

Now Halafax challenges—asks you to bet on what's in the hole. Halafax takes this step believing that the many advantages* of these explosives will prove to be so definite and so dependable that you will have complete confidence in those phases of your business which Halafax performance will affect.

*HALAFAX ADVANTAGES

WEIGHT:
All Halafax Explosives, being lighter in weight, result in definite savings to users.

ADAPTABILITY:
Adaptable to all explosive operations—industrial, agricultural, construction, mining, quarrying, etc.

CHEMICAL STABILITY:
No leaking fluids, no bleeding or separation of ingredients in storage.

PHYSICAL STABILITY:
No change of consistency or efficiency due to temperature variations. Uniform combustion in every cartridge.

HANDLING:
Halafax does not cause nausea, sickness or other ill effects in handling. Halafax is available in standard sticks, 20 strength up and in free flow form.

Stick for stick, and bulk for bulk, Halafax Explosives are equal in actual work done, with all other commercial explosives, yet the weight of HALAFAX is at least 20% less, while the price per pound is the same. This economy, together with the advantageous characteristics of HALAFAX Explosives in rock-yardage moved, makes the product distinctive in its field.

HALAFAX EXPLOSIVES COMPANY

Executive Offices: 810 South Spring St., Los Angeles, Calif. TRinity 8528

Plant and Magazine: Saugus, Calif.

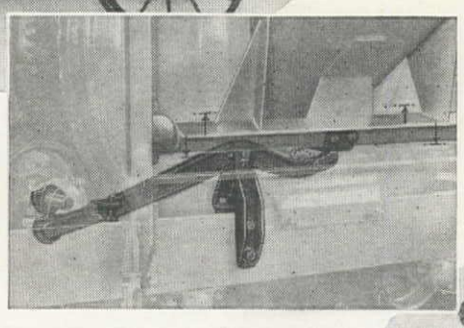
HALAFAX EXPLOSIVES

When writing to HALAFAX EXPLOSIVES COMPANY, *please mention Western Construction News.*

KOEHRING

Dandie Mixers

7-S 2870 lbs.
10-S 3800 lbs.
14-S 4975 lbs.



The Koehring Automatic Skip-Flow Shaker, shakes the skip perpendicularly, without strains to the mixer. The aggregate moves along the natural flow-line of the skip.

KOEHRING HEAVY DUTY

KOEHRING DANDIE MIXERS, designed for light weight, with ample strength, have every modern feature for fast and convenient operation. Full spring mounting, full anti-friction bearings, automatic skip-flow shaker, short wheel base, silent V-belt drive, are important advantages of these modern mixers.

The Dandie Trail-Mix is narrow in width and correctly balanced for hauling or mixing. The obstruction-free charging skip permits fast and easy loading of material.

KOEHRING COMPANY

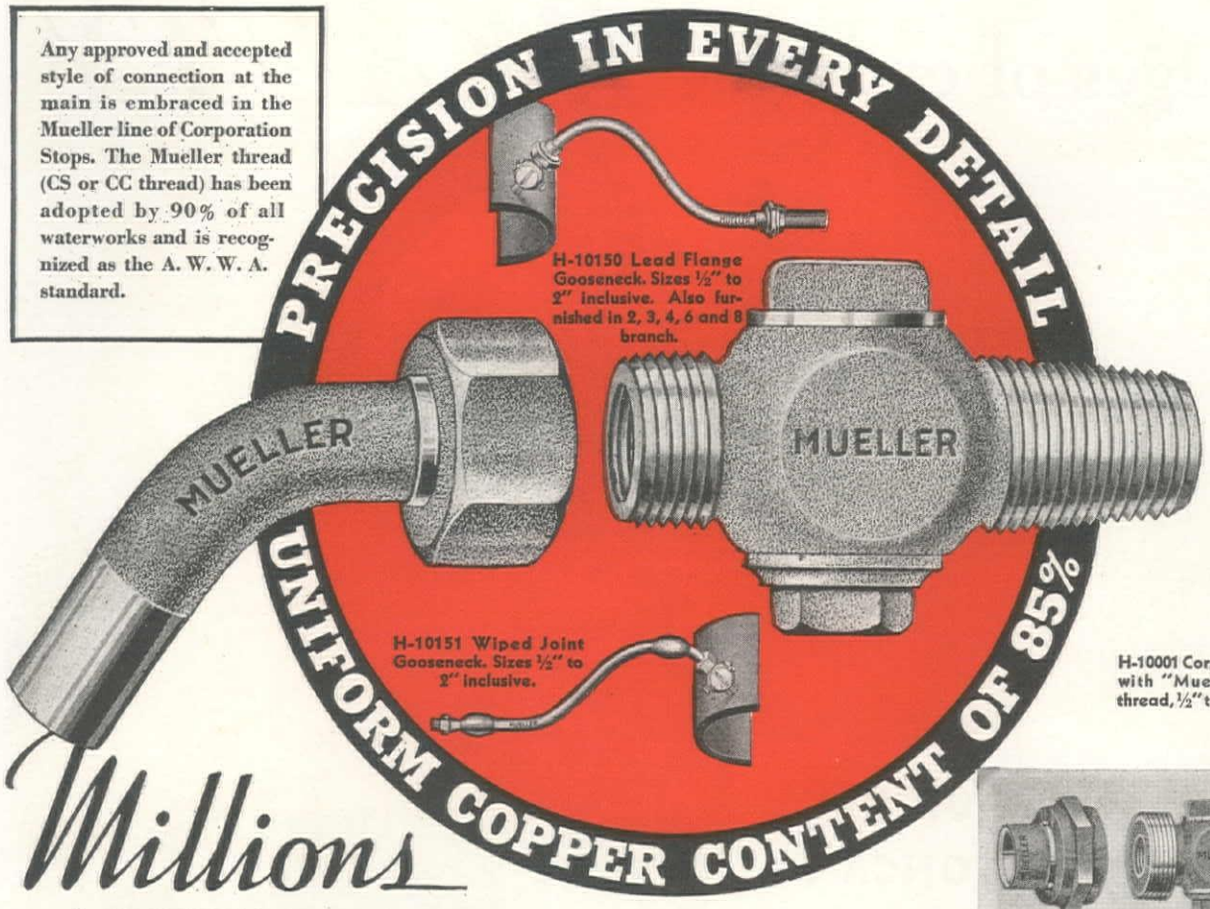
Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

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

In writing to KOEHRING COMPANY, *please mention Western Construction News.*

Any approved and accepted style of connection at the main is embraced in the Mueller line of Corporation Stops. The Mueller thread (CS or CC thread) has been adopted by 90% of all waterworks and is recognized as the A. W. W. A. standard.



H-10001 Corporation Stop with "Mueller" outlet thread, ½" to 2" inclusive.

Millions of SERVICE YEARS—*your guaranty*

Under the high pressure of large scale production there is too often a tendency to sacrifice old-time standards of quality to the modern demand for speed. But this pitfall has been avoided in the production of Mueller Corporation Stops.

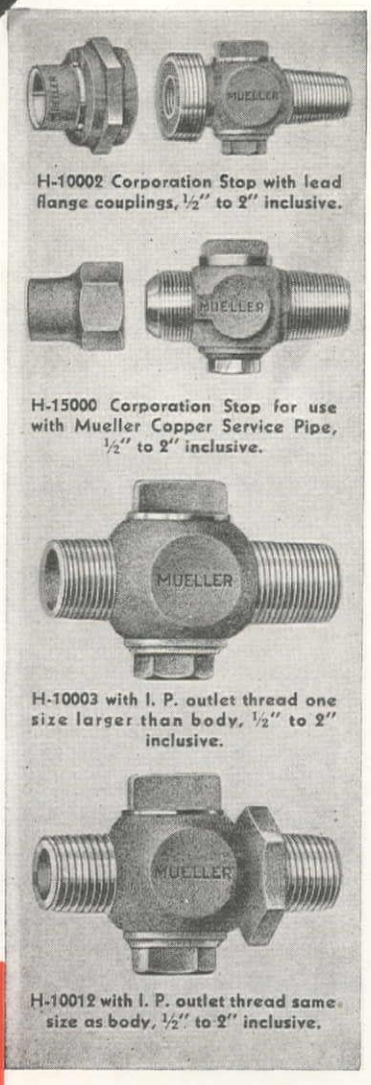
The word "brass" has the same meaning day in and day out at the Mueller plant. It means the ideal mixture, as determined by long experience—a specific structure and strength—an unvarying copper content of 85%. Sample bars are taken from every heat poured by Mueller furnaces—elongation and breaking points are established—grain and fibre are studied.

But this careful control merely starts with the castings. It also follows the product through every stage of production and ends with the final rigid inspection that is your guaranty of Mueller uniformity. While it is true that nothing could be more simple than a Corporation Stop, it is also true that there are few pieces of equipment requiring any greater precision in manufacture.

That is why specially designed machines are used for grinding tapers and polishing the keys into practically no-tolerance fit. Throughout the operations, parts are checked by special gauges. Why accept less than these Corporation Stops that have set the standard of quality for three-quarters of a century?

MUELLER CO., Decatur, Ill.

Factories: Decatur, Ill.; Chattanooga, Tenn.; Los Angeles, Calif.; Sarnia, Ont.
Branches: New York and San Francisco



H-10002 Corporation Stop with lead flange couplings, ½" to 2" inclusive.

H-15000 Corporation Stop for use with Mueller Copper Service Pipe, ½" to 2" inclusive.

H-10003 with I. P. outlet thread one size larger than body, ½" to 2" inclusive.

H-10012 with I. P. outlet thread same size as body, ½" to 2" inclusive.

MUELLER

WATER DISTRIBUTION EQUIPMENT

Bridges of enduring *BEAUTY*

EASILY AND QUICKLY ERECTED WITH TONCAN IRON SECTIONAL PLATE

When bridges have outlived their usefulness and must be replaced, or when drainage structures are needed in connection with current construction, it is well worth while to remember the availability of Toncan Iron Sectional Plates for full circle pipe or arches.

The bridge shown here was erected down in Texas, five miles east of Winters, Runnels County. The Toncan Iron plates, bolts, nuts and washers were shipped complete. Simple hand tools only were required for the erection. Traffic delays were held to a minimum and the whole job easily and quickly done.

This bridge is built to endure—for countless tests and years of service have proved that Toncan Iron brings to Sectional Plate structures a higher degree of rust-resistance than any similar ferrous material in its price class. You'll find our new booklet illustrating and describing Toncan Iron Sectional Plate Pipe and Arches interesting reading. Your copy gladly sent upon request.

REG. U.S. PAT. OFF.
TONCAN
COPPER MO-LYB-DEN-UM IRON

TONCAN CULVERT MANUFACTURERS' ASSOCIATION

REPUBLIC STEEL CORPORATION BLDG. • YOUNGSTOWN, OHIO

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

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

HOW TO *cheat* THE SCRAP PILE...

. . . save thousands of dollars

WORN or broken parts of contractors' equipment can be made as good as new, for a fraction of replacement costs, by welding with a *"Shield-Arc"* welder. With this modern repair tool, worn parts of power shovels, trucks and tractors and other parts can be built up to original size and shape. Parts subject to shock and abrasion can be resurfaced with weld metal which wears better than the original metal. Cracked or broken castings can be welded whole again. Often the savings from a single repair more than pay for a *"Shield-Arc"* welder. And you will find hundreds of other uses, such as piping, piling, steel erection and many other applications where the *"Shield-Arc"* welder can save time and cut costs.

Even the actual welding operation costs less with a *"Shield-Arc"*. It is guaranteed 3-ways to produce more welding per dollar. Find out now how much a *"Shield-Arc"* welder can save you. Write The Lincoln Electric Co., Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

LAD "I see they're tearing down the buildings across the way to save taxes."

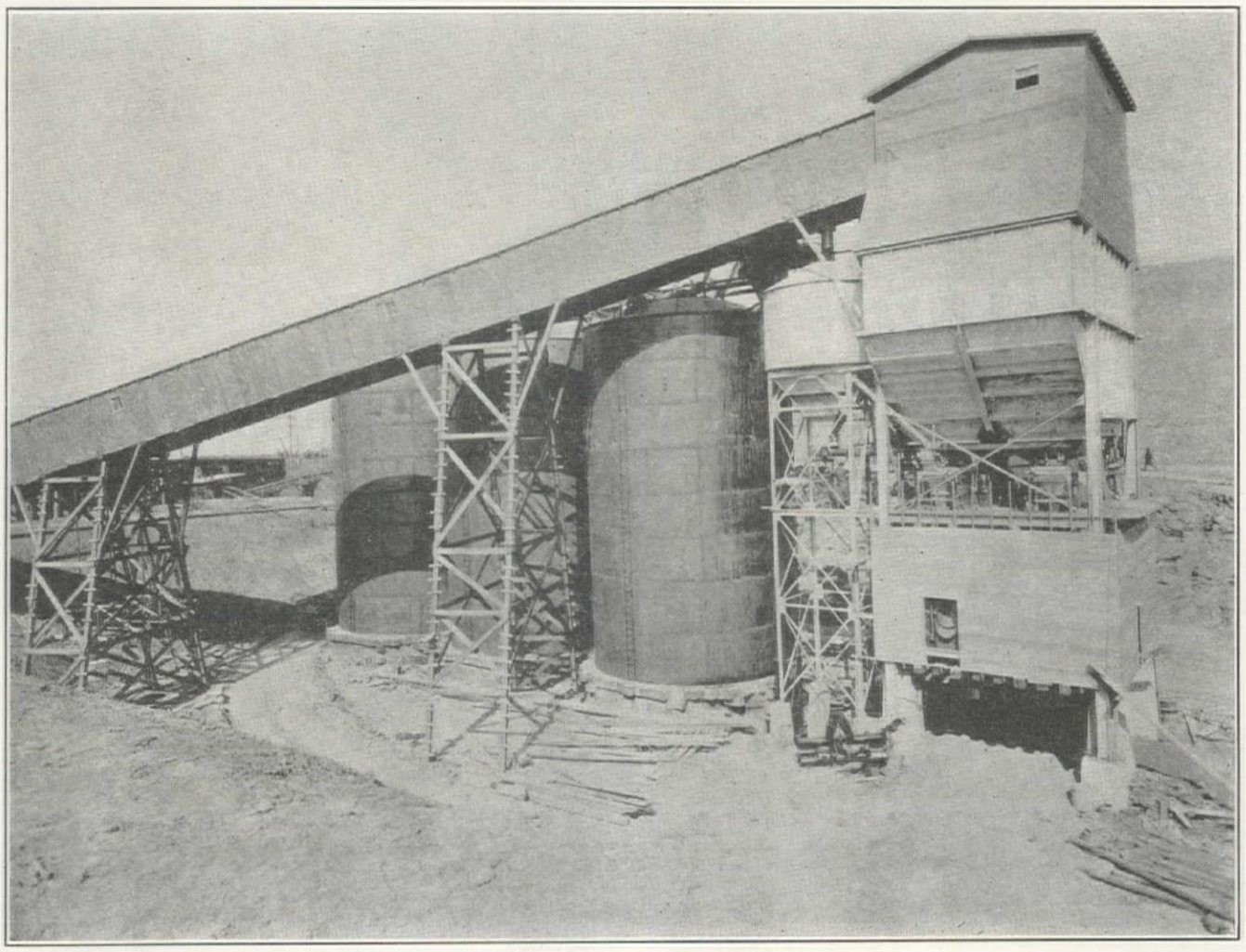
POP "Wrong way round, Lad; someone should be tearing down taxes to save the buildings. Taxes eat up profits almost as fast as breakdowns. Think of the profits we've saved since we bought a *'Shield-Arc'*. Just Lincoln electrodes for hard surfacing alone have saved us twice the price of the *'Shield-Arc'* welder."

W-122

LINCOLN

"SHIELD-ARC" WELDERS

BLAW-KNOX & WESTERN PIPE CORP. SALUTES THE FT. PECK DAM PROJECT



The illustration shows batching plant and bins supplied for U. S. Government Fort Peck project in Eastern Montana, by Blaw-Knox & Western Pipe Corp. This project, to control the flow of the Missouri River, includes the largest earth dam in history, containing 100-million cubic yards of material. The dam rises 230 feet above the flood plain, is 9000 feet across the main river valley, and will be continued as a dike with a maximum height of 130 feet for 11,500 feet on the left bank. The reservoir will form the second largest artificial lake in the world, extending 180 miles upstream.

OTHER BLAW-KNOX CONSTRUCTION EQUIPMENT — Road Forms, Weighing Batcher-plants, Automatic Aggregate Batchers, Bulk Cement Plants, Cement Tanks, Street and Sidewalk Forms, Clamshell Buckets, Dragline Buckets, Concrete Buckets, Truck Turntables, Dirt Movers, Bulldozers, Tamping Rollers, Central Mixing Plants, Truckmixers, Steel Forms for general Concrete Construction, Portable Asphalt Plants, Steel Buildings, Steel Grating

BLAW-KNOX & WESTERN PIPE CORPORATION

5717 SANTA FE AVE., LOS ANGELES — 444 MARKET ST., SAN FRANCISCO

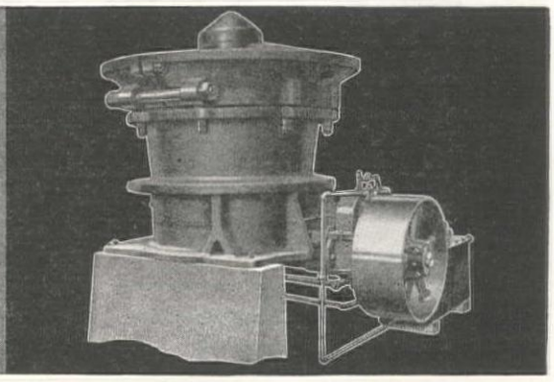
Northwest Representatives: CLYDE EQUIPMENT CO., 3410 First Ave. South, Seattle—555 Thurman St., Portland
Affiliate of WESTERN PIPE & STEEL CO. OF CALIFORNIA
With Which Also Is Affiliated Hardinge-Western Co.

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

DESIGNED TO MEET TODAY'S CONDITIONS—*profitably*

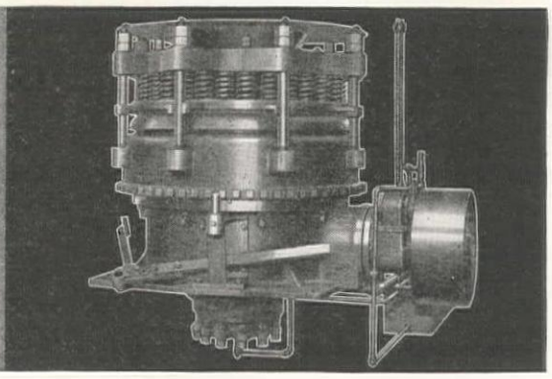
Modern in every sense of the word .... designed to enable you to meet today's conditions and operate at a profit .... this 3-piece combination of Telsmith equipment is a striking example of group efficiency.

PRIMARY BREAKER
FOR COARSE CRUSHING



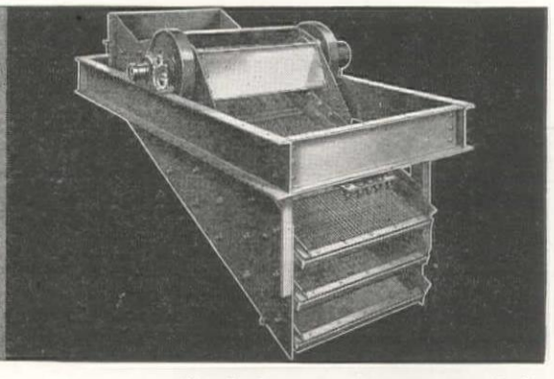
Has a fixed shaft and sleeve eccentric. Short, compact, with steel frame and steel crown, it is the outstanding performer on hard rock. Cut steel drive gears and force feed oiling permit higher eccentric speeds and faster gyration. Larger head and concave diameters, with greater receiving and crushing area, allow faster feeding. Parallel pinch starts immediately, crushes full tilt all way down; guarantees bigger capacity. Write for Bulletin B-30.

GYRASPHERE CRUSHER
FOR FINER CRUSHING



The Telsmith Gyrasphere takes the trouble out of secondary crushing. Working at choke feed, it turns out a bigger tonnage and more cubical product—crushes finer, with low power consumption and up-keep. The reasons—spring relief, rotary head support, spherical head, unit spring design, anti-friction thrust bearings, pressure lubrication, different distribution of crusher pressures. Write for Bulletin Y-30.

PULSATOR
FOR EFFICIENT SCREENING



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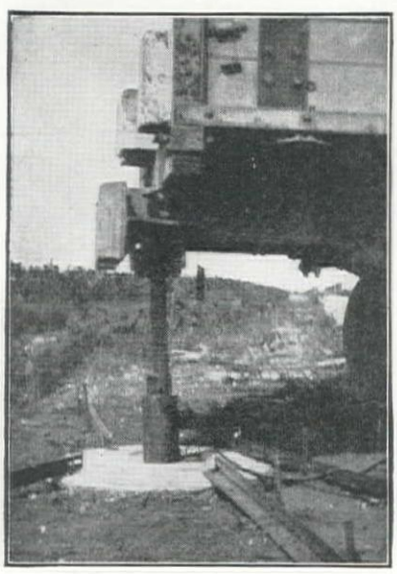

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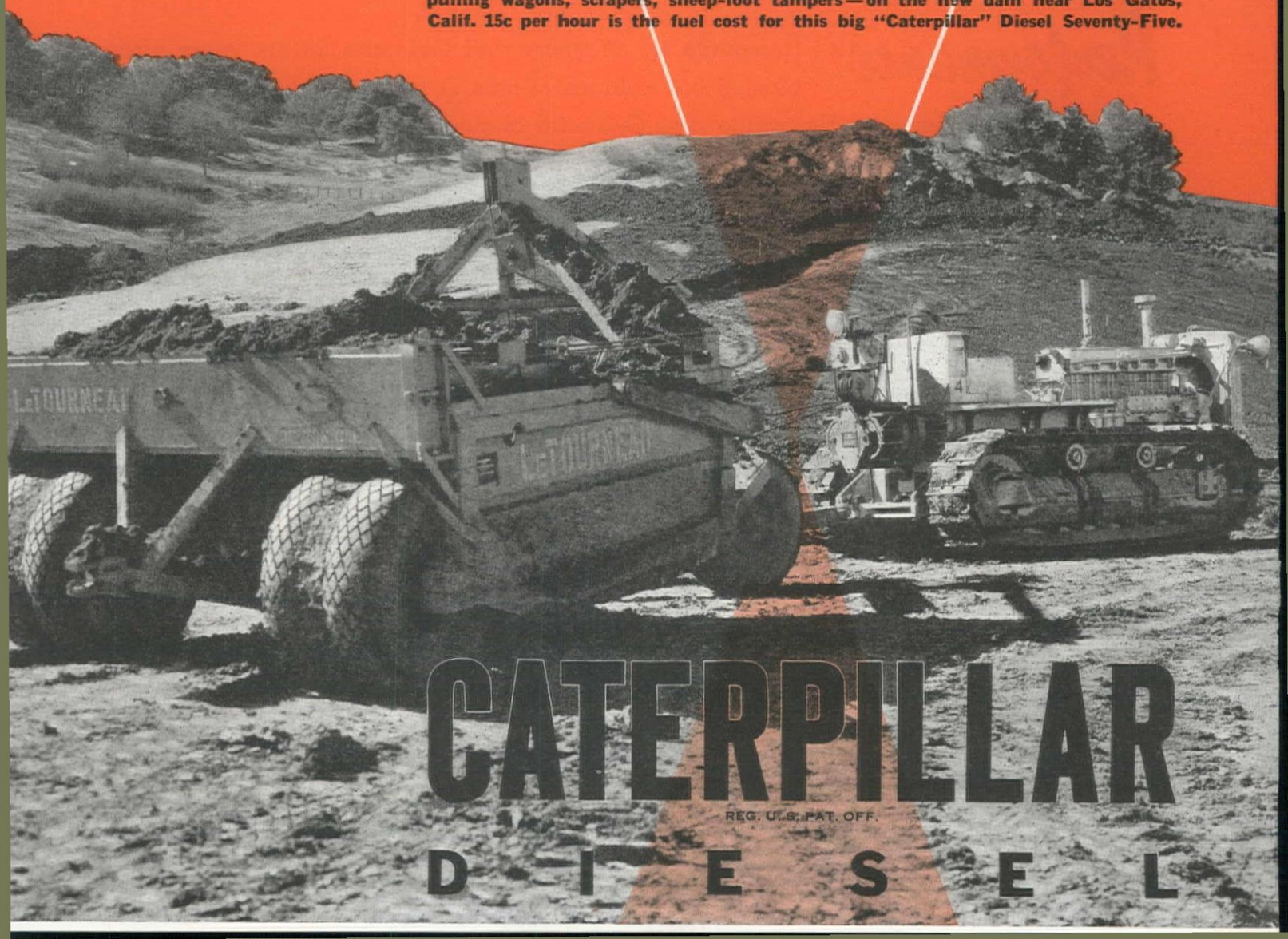

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D I E S E L

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

June, 1935 Vol. 10, No. 6

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

Sewage Works Associations Study Operators' Schools

IN the interest of developing more effective operation of sewage disposal plants, the California Sewage Works Association and the newly formed Northwest Sewage Works Association are studying the possibility of establishing operators schools. Such short courses of from three to five days, consisting of intensive lecture and laboratory work, planned specifically for those in direct charge of operating disposal works, have already been instituted in five Eastern states, closely paralleling the larger number of somewhat similar schools for waterworks operators. The establishing of these schools strikes directly at the heart of the most serious problem in sewage disposal work—for a plant of excellent design can be rendered relatively useless by unintelligent operation and, on the other hand, a simple plant, intelligently operated, can be an important aid in correcting serious stream pollution.

The unquestioned value of such institutions to the field of sanitation should surmount any incidental problems which may develop in their formation. The difficulty most frequently mentioned in this type of school is the fitting of the course of instruction to meet the needs of the operators, balancing lecture with laboratory, and elemental with advanced instruction to serve the needs of men from different types of plants and with varying experience. This or any related problem should be approached with a recognition that the leaders in the field of sanitary engineering have a direct responsibility which extends to the proper education of operators to insure the results planned by the designer.

All interests directly or indirectly concerned with the field of sanitary engineering should take an immediate and active participation in the work of these two associations to promote the widest and most searching study of the feasibility of establishing such schools in the West. Only through proper operation of sewage disposal plants, and the resulting obvious benefits which can be directly appreciated by public officials and citizens, will there be the public recognition which will result in a growing demand for the building of more treatment works.

●

Problems Continue For the San Gabriel Flood Control

A DILEMMA of at least three horns confronts the Los Angeles County Flood Control District with the recent disapproval of the revised plans for San Gabriel No. 1 Dam. In the first place, business principles dictate the maintaining of the existing contract for the construction of a rock fill dam at the site, if at all feasible, even though the present quarry has proved inadequate for a fock fill and the original design must be modified. Second, only a limited amount of funds remain for this work from the 1924 bond issue, and the voting of more bonds by citizens of the district after the history of the past decade is problematical. So, encumbered by an existing contract and limited financing, the engineers of the district approach the matter of redesigning a structure which will be (1) of unprecedented height, for its type, (2) located in an area of known seismic disturbances and (3) situated above an area occupied by several hundred thousand people. There is every justification for the state of California to demand an ultra-conservative design, without regard for any other considerations. With this as an undisputed premise it is rather apparent that one or both of the other limitations cannot hold. If the contemplated storage is necessary at this site, it appears that voiding of the present contract or the raising of additional financing may be necessary —or both.

●

Deferred to the Limit

An excellent example of the piling-up reserve of municipal improvement work which should provide a stabilizing back-log for future construction is the report that Stockton, Calif., finds its street system entirely outgrown and a $4,000,000 program will be required to recondition the city streets and bring them up to modern standards. At the same time, W. B. Hogan, city manager, reports the sewer system is similarly inadequate. The situation is relatively the same in every other Western city. Replacements and improvements to municipal facilities have been deferred and allowed to accumulate for the last four years until conditions are fast becoming impossible and the dam is about to break. The inevitable consequence is the assurance of an expanding amount of street, waterworks and sewer work during the next few years.

●

Lessons From Experience

First reports from the Colorado flood area indicate that again the accepted values for peak flood runoff for this particular region will have to be raised. The heavy loss of bridges in the city of Colorado Springs indicate that either floodway allowances have been inadequate or municipal growth has restricted the channel until it has taken on abnormal characteristics. Each recurrance of record floods forms the basis for valuable engineering information which frequently goes unrecorded because the usual provisions for measurement are destroyed. It is to be hoped that some data will result from the present disaster and so, in some small measure, compensate for the severe losses incurred in the present flood.

●

Patching Never Built Anything

The tendency for state legislatures to allocate more and more state gas tax revenue back to cities and counties—if this procedure is in accord with public preference, and not due to pressure of local political influence—is not seriously to be questioned, *provided*, necessary restrictions are enforced which put this money into worthwhile construction or reconstruction work on essential thoroughfares in accordance with a definite plan. Too often, however, this money is frittered away on ineffectual maintenance work creating no permanent improvement to highway routes.

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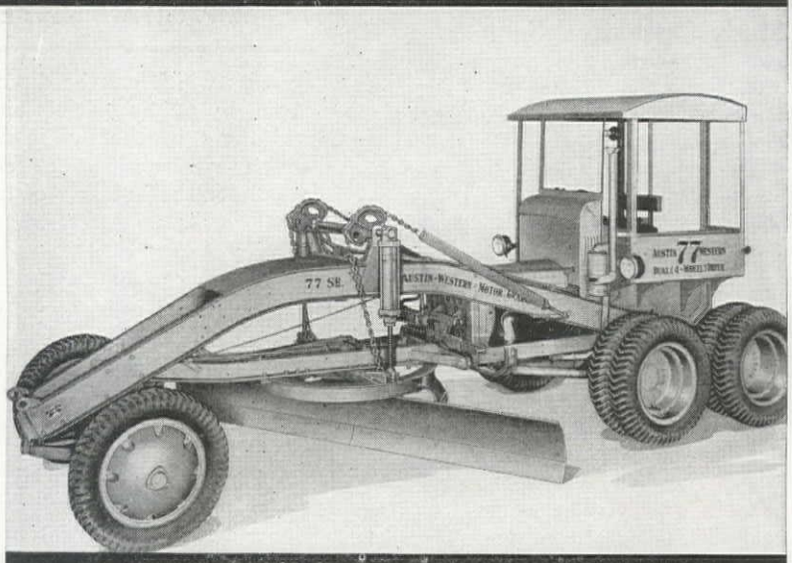
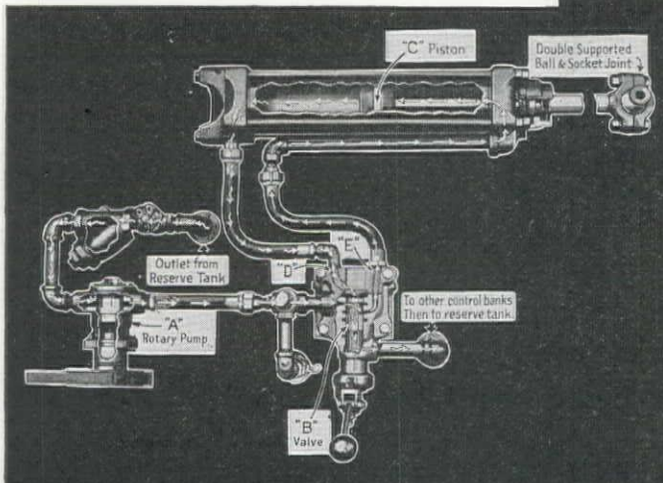
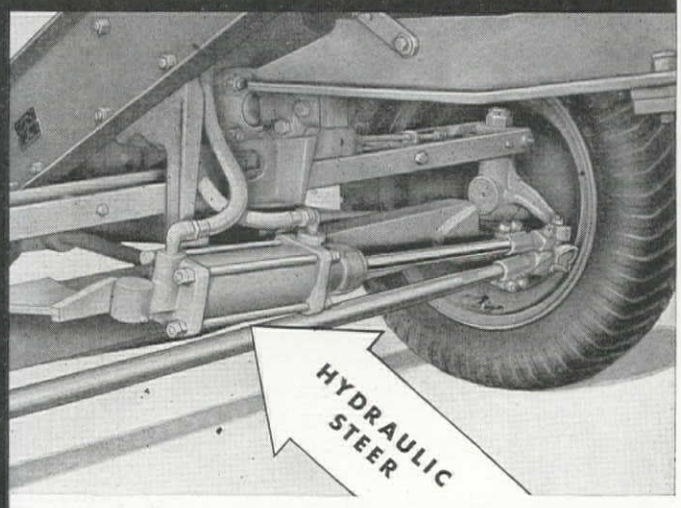


AUSTIN-WESTERN 77 MOTOR GRADER



Oil travels from rotary pump A to sliding shaft B, set to divert the oil into the right hand side of the cylinder, above, causing the piston C to move to the left. Movement forces the oil on left of piston to return to valve B. Valve may be shifted to reverse the flow or placed in neutral, locking the oil on either side of the piston at D and E. When flow is stopped at these points a firm wall of oil holds the piston in a vise-like grip, while oil from pump continues to flow freely through the valve.



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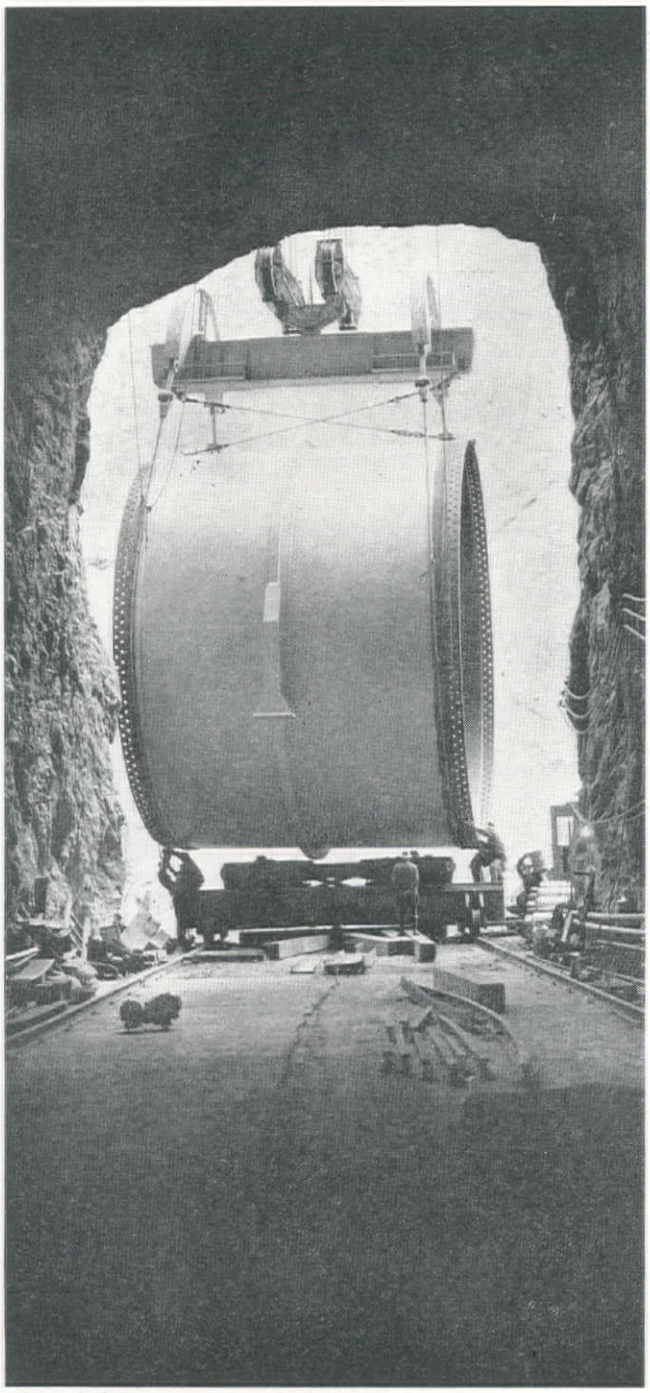
WESTERN CONSTRUCTION NEWS

JUNE, 1935

Erecting The Penstock Pipe Sections at Boulder Dam

Looking out of the construction adit, the 30-ft. diameter section of penstock pipe is shown being lowered onto the car by the 150-ton cableway.



Transporting and jointing the 30-ft. diameter units presents problems which result in developing unusual equipment and new methods—Penstock system and erection operations described

By WESLEY R. NELSON, Associate Engineer
Boulder Canyon Project

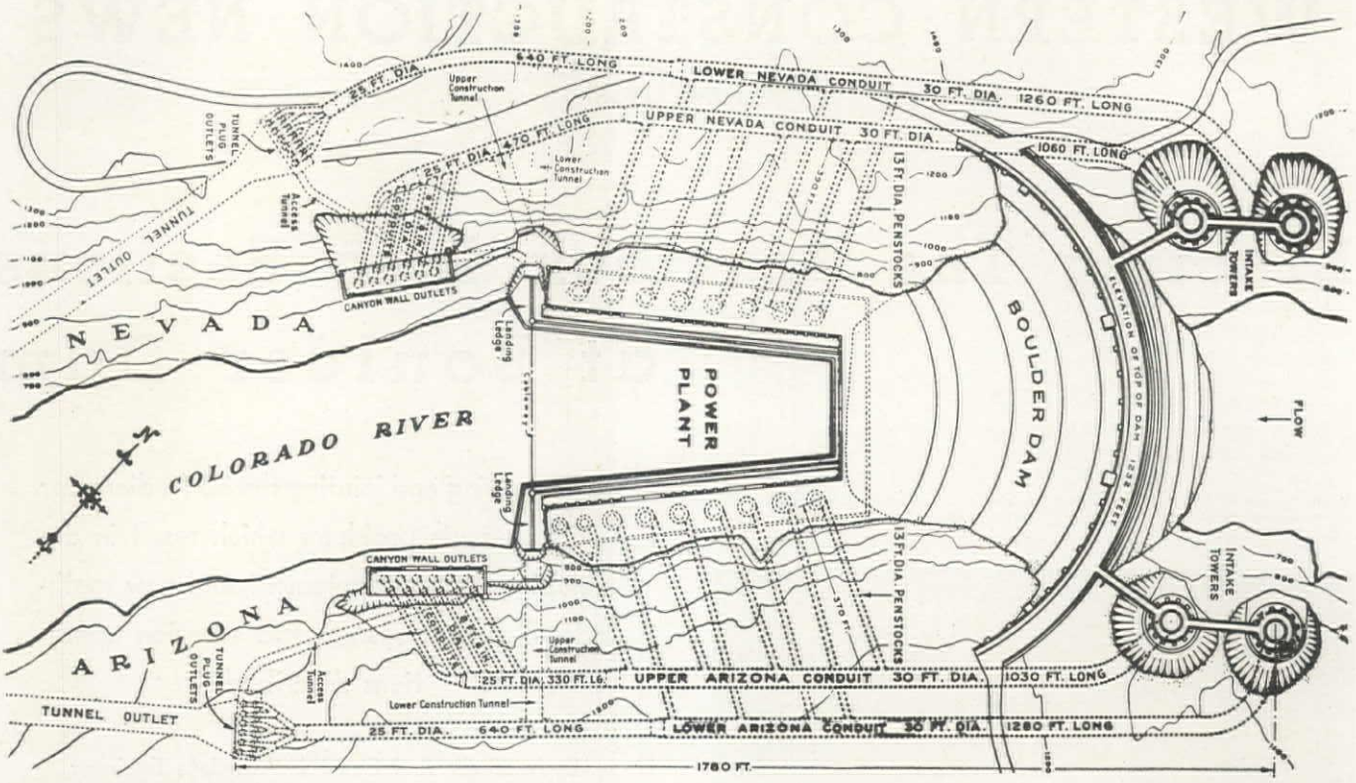
THE transportation and erection of the heavy, unwieldly pipe sections which form the penstock and outlet system at Boulder Dam, presented problems that surpassed even the difficulties encountered in fabricating these 30-ft. diameter units. According to the present program of erection the upper system will be completed late in 1935 and the lower system in 1936. Shop and fabricating procedure have been previously described in **Western Construction News,** March, 1934, p. 79 and the present article will review the work from the finishing of the fabricating process to the completion of the work of erecting the headers and penstocks.

The magnitude of the work and the problems involved can be best appreciated by imagining a cylinder of steel plate 2¾ in. thick, outweighing one or two locomotives and of sufficient size to encompass a dwelling of three comfortable rooms on one floor and an equal number upstairs. This object had to be moved 1½ miles from the plant to the rim of the canyon, lowered to a bench 600 ft. down on the cliff, taken into the rock wall several hundred feet to a tunnel intersection, and then moved through the tunnel as much as a third of a mile. After this work it is necessary to place it in an exact location and complete joints of sufficient strength to withstand the pressure of a 600-ft. head of water. This procedure has to be repeated 222 times for the pipe sections of the 30-ft. diameter size, and more than 400 times for those of smaller dimensions.

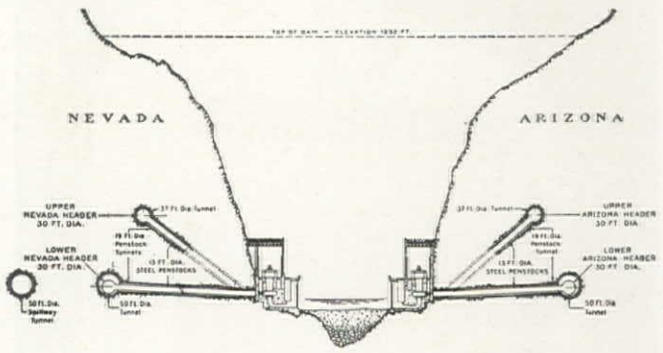
For an understanding of the following description of transportation and erection of the pipe, it is advisable to briefly describe the penstock and outlet system of tunnels and the location of the different sizes of pipe in these bores.

Penstock system

Generally speaking there are four 30-ft. supply headers, each receiving water from the reservoir through the gates of an intake tower (see accompanying drawing). Each



Plan and section of the penstock arrangement showing the location of various sizes of pipe and the position of the outlet valves.



of these supply headers: (1) connects with four 13-ft. penstocks running to turbines in the power plant, (2) terminates in downstream outlet works equipped with six needle valves, and (3) is provided with a construction adit that leads to the canyon wall directly below the track cables of the Government 150-ton cableway and immediately downstream from the power house.

Two of the headers are in the Arizona abutment cliff and two on the Nevada wall. The two diversion tunnels nearer the river are used for the lower headers while the upper ones are 170 ft. above and closer to the canyon wall surface. Outlet works for each of the upper headers consists of six outlet conduits leading to 84-in. needle valves in the canyon-wall valve houses, and for the tower tunnels of six 72-in. needle valve in each of the two downstream plugs. Solid plugs of concrete more than 300 ft. in length fill the two diversion tunnels directly upstream from the risers to intake towers.

Tunnel diameters, after lining with concrete, are: (1) 50 ft. in the diversion tunnels, (2) 37 ft. from intake towers to construction adits in the upper headers and the risers from diversion tunnels, (3) 31 ft. from construction adits to outlet manifolds in the upper headers; and (4) 18 ft. in penstocks, excepting the downstream one that connects with the Arizona upper header which splits into two 12.5-ft. unlined branches at the penstock's lower end. The outlet manifold sections of the upper tunnels downstream from the construction adits are not lined, but the space of about three feet between pipe and tunnel walls will be filled with concrete to form anchors. Similarly, concrete about 18 in. thick will be poured around the outlet conduits that lead to the needle valves, and 21 in. thick around the pipes in the split section of the penstock mentioned above. Construction adits are all excavated to 26 x 43-ft. section and the floors are paved with concrete.

Anchors for the headers will also be formed by filling with concrete between pipe and tunnel lining for the entire length of risers to intake towers and at locations upstream and downstream from penstock intersections. Thrust blocks will also be placed on each side of a penstock opening. Anchors for the 13-ft. penstocks are at the header connections and back of the powerhouse walls.

Pipe diameters are 30 ft. in headers from the towers to the last penstock tunnel, then 25 ft. downstream in the outlet headers to the manifolds connecting with the 8½-ft. diameter outlet conduits, and 13 ft. in penstocks leading to turbines except in the wye section, where they are 9 ft.

Moving sections into position

After a section of pipe has been fabricated (**Western Construction News**, March, 1934, p. 79), it is stored on the south side of the shop, being moved to position on rollers and rails by a 40 h.p. motor-operated winch. When erection in the tunnels has proceeded far enough that the section is needed, it is returned to the shop, and picked up by one or two 75-ton overhead cranes. If it is of 13-ft. diameter or less the section is placed on cradles mounted on a flat car, but the larger sizes are loaded onto a specially designed trailer of 200-ton capacity. The flat car is moved into the canyon by gasoline locomotive or Shay steam locomotive, the maximum grade of the standard gauge tracks being 6.5 per cent; one curve on the line is of 110-ft. radius.

Motive power for the trailer is provided by two 60 h.p. tractors, one hooked on in front, the other behind. The trailer is a heavy structural steel framework 38-ft.

long and 22 ft. wide, having longitudinal steel members of 33-in. I-beams and carried by 16 rubber-tired wheels. These wheels, located at each corner of the frame, two to an axle, are 28-in. in diameter and equipped with solid rubber tires 28 in. wide. Two 10-in. channels are pin connected to the central part of the framework, one extending to each end of the trailer, to act as draw bars. Two power plants are incorporated in the chassis, one to operate the pump serving the air brakes, and the other connected to a compressor to provide air pressure for steering operation. The trailer may be turned in an outer radius of 50 ft.

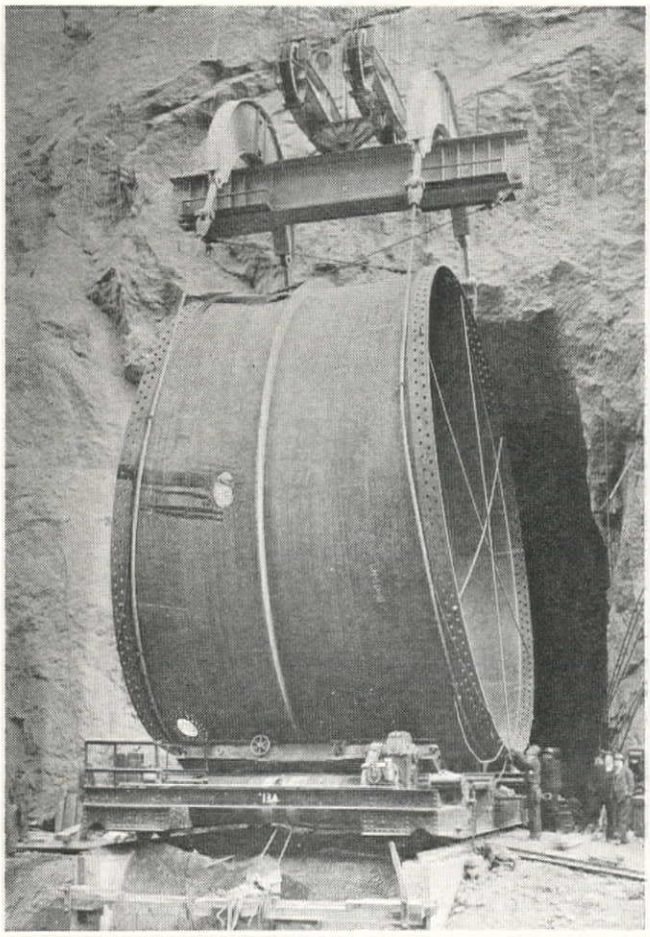
Handling in the tunnels

Arriving at the cableway, the header sections are oriented in the up and downstream direction. The fall block carrying the moon beams—two crescent shaped beams attached by swivel pins to a common girder, which in turn is attached to the fall block—are brought over the pipe and the two 2½-in. slings are swung around the section, one at each end. The pipe is lifted by the cableway, carried out over the canyon and slowly lowered onto a "car-on-a-car", which is stationed on a landing at the portal of the construction adit. The lower division of this double carriage—termed the adit car—is a heavy structural steel framework supporting two rails running transversely across it at 16-ft. centers and carried by two trucks of four wheels each which runs on rails placed 19 ft. apart. The car resting on the upper rails—called the tunnel car—is a structural steel cradle equipped with four pairs of 18-in. diameter wheels that have flat flanges about 6 in. wide.

The pipe resting on the double carriage travels through the adit moved by a 15 h.p. motor operated winch set on the adit car or at the back end of the adit. The tunnel car is then pulled onto the rails running up and down the tunnel and drawn to the point of erection by a 75 or 100 h.p. motor operated hoist located on a platform to the side of the header tunnel in a penstock intersection, or inside the last pipe that has been erected.

If the section is intended for one of the penstocks it is halted opposite the penstock intersection, raised from the car, turned and then lowered or pulled into the penstock tunnel by a hoist of suitable capacity. If the section must be placed in the risers to one of the intake towers the pipe and car are drawn from the end of the track onto the concrete invert of the riser and upward to position by three hoists each of 75 h.p. rating, located on a platform in the tower base.

On a record size trailer of 200-ton capacity the larger sections are hauled by tractor from the fabricating plant to the canyon rim.



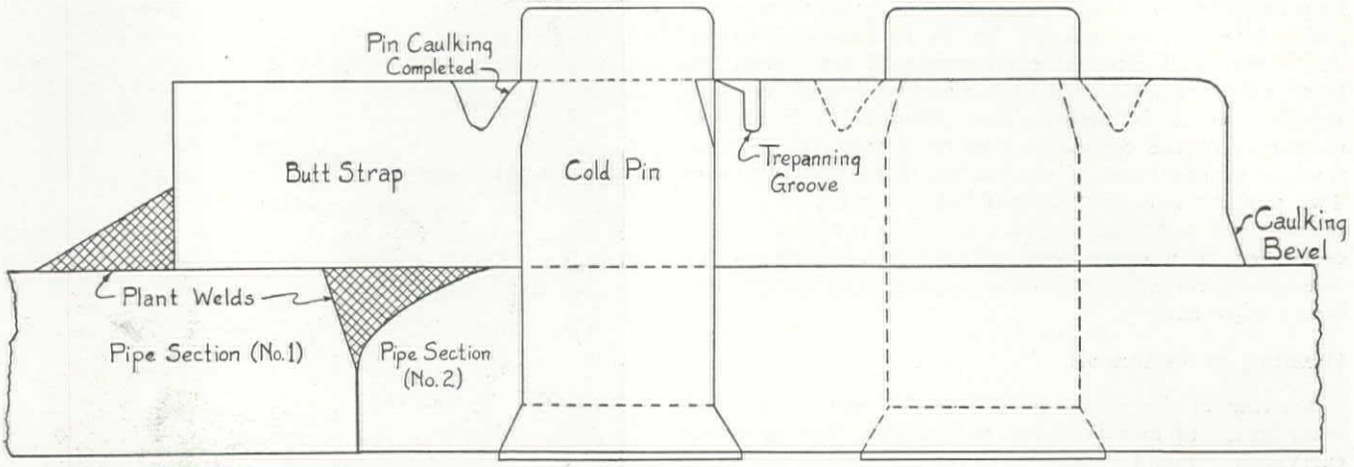
Lowered to the construction adit portals the sections are placed on the tunnel car which, in turn, rests on the adit car.

The first step in erection is the placing of spiders, similar to those used in the fabrication plant, in the two pipe sections to bring them into alignment. The butt strap is then heated by a gas ring to a temperature of about 700° F. when the downstream section can be pulled into position within the strap. As fabricated, the diameter of the butt strap is ⅜ in. less than the pipe which it encircles. The gas ring for the larger sections is made up of two 2-in. diameter pipes about 12 in. apart, set with jets at about 10-in. centers. Butane gas is supplied from a twelve-tank battery of liquid gas and is heated by circulating hot water before entering the rings. The pipe sections are pulled together by hoists or by a special three-ring spider, equipped with 40-ton central hydraulic cylinders. One side of the spider is hooked onto the completed line of pipe and the other to the section that is to be pulled.

Method of making joints.

Holes are next drilled through the butt strap, matching those previously drilled in the encircled pipe at the plant and the inner end countersunk to fit the head of the pin. A broach 30-in. long with cutters 1 in. apart is then pulled through the drilled hole. The next operation is the pushing of cold pins about two or three-thousandths of an inch larger in diameter than the drilled hole, through pipe and strap.

All these operations of drilling, broaching and pinning are accomplished by equipment which is mounted on large structural steel columns that extend across the pipe and that may be rotated around the projecting trunnions of steel spiders. Motors are used for rotating the columns and for driving the drills that are placed at each end. On other columns, 50-ton hydraulic jacks pull the broaches and press the pins into place.



Unique type of cold-pinned connection used on the girth joints of the large sections of pipe. No field welding or riveting was used on the 30-ft. diameter headers.

Each pin has a notch cut out around the periphery about 1 in. below the outer end. The cut is about ¼-in. deep at its outer end and slopes toward the pin head and outward to the pin surface in a distance of about 1 in. The deep part of the cut is directly opposite the outer surface of the butt strap when the pin is in final position (see sketch). After pinning, the outer surface of the pipe around the pin is trepanned, by cutting a grove about ¾ in. deep and ⅜ in. wide, leaving a rim ½ in. wide between the grove and pin. The rim around the hole is then pushed inward into the notch around the pin by a special double caulking hammer, locking the pin in place.

The trepanning machine contains a motor driven trepanning drill which is mounted on a small carriage whose four wheels follow the edges of the butt strap. The carriage is held against the pipe by a chain—resembling a large bicycle chain—which encircles the pipe and contacts two toothed wheels on top of the carriage. A similar arrangement of carriage and chain travel is employed for the pin caulking machine, the carriage being equipped with two compressed air caulking hammers which are mounted one on each side of a cylinder about 4 in. in diameter. The cylinder rests on the pin, and the caulking hammers and cylinder are rotated by hand.

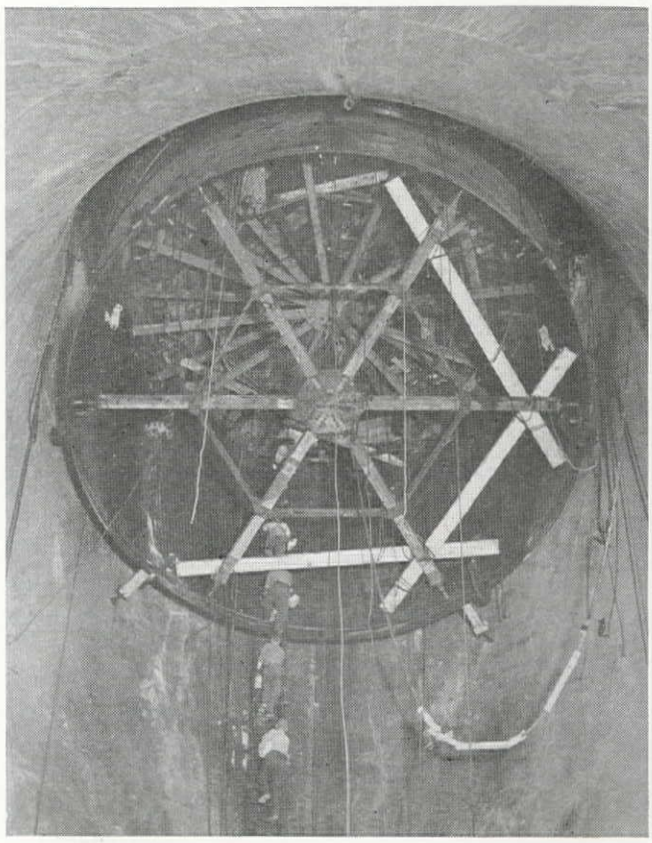
Caulking of the butt strap for water tightness is done with the usual type of compressed air caulking hammer. In this operation, the butt strap edge next to the pipe, which had been cut in fabricating to an outward bevel of about ¼ in., is hammered backward and into the encircled pipe by the caulking machine until the plane of the edge of the strap is normal to the pipe.

The dimensions given in the foregoing are for the heavier sections of 30-ft. penstock headers, 25-ft. outlet headers, 13-ft. penstocks and the connections between these systems. The 8½-ft. canyon wall outlets have hot-riveted field joints with field welded connections to the outlet manifolds. All field welded joints were stress relieved by heating to about 1150° F. by gas rings, and cooling slowly. Radiographs were then made of the welds by placing photographic films around the outside of the welded joint and suspending a capsule of radium in the center of the pipe. The period of exposure was about six hours.

Connections to main headers

Field connection between the 13-ft. penstock and the 30-ft. header is made by a wide outside butt strap that slides back on the penstock section to allow the streamlined connecting part of the header pipe to be brought into correct position with relation to the penstock. The butt strap is then heated on both ends and moved forward to make the double-pinned connection. Two header beams are placed on each side of the penstock entrance for reinforcement purposes. The heaviest pipe sections are these 30-ft. by 13-ft. branch connections, those in the lower tunnels are of 2¾-in. plate weighing 205 tons for a 23-ft. 4-in. length of pipe.

In the risers to intake towers, six 16 x 24-in. manholes are cut in the pipe section directly beneath the intake towers, through which concrete is poured in the anchor between tunnel lining and pipe. The holes are then closed with outside manhole covers which are attached to the pipe by plug welds and made water tight by welding a filler plate in the opening of the pipe shell. The progress of concreting is from the lower end of the plug upstream and the space above the manholes is filled with grout through small holes drilled through the pipe. These



For the vertical curves up to the base of the intake towers the sections of pipe were pulled up by hoists. Note the crew climbing up to work.

openings are closed with pipe plugs which will be screwed in place and seal welded.

Final closure of the girth joints to be left open between anchors is to be made after the pipe has been prestressed by a series of screw jacks to be applied around these joints. The purpose of this pre-stressing is to produce a compressive stress equal to a temperature drop from that prevailing in the pipe down to 50°F. This compressive stress is to counteract the tensional stress due to longitudinal contraction when the pipe is under pressure.

Painting and testing

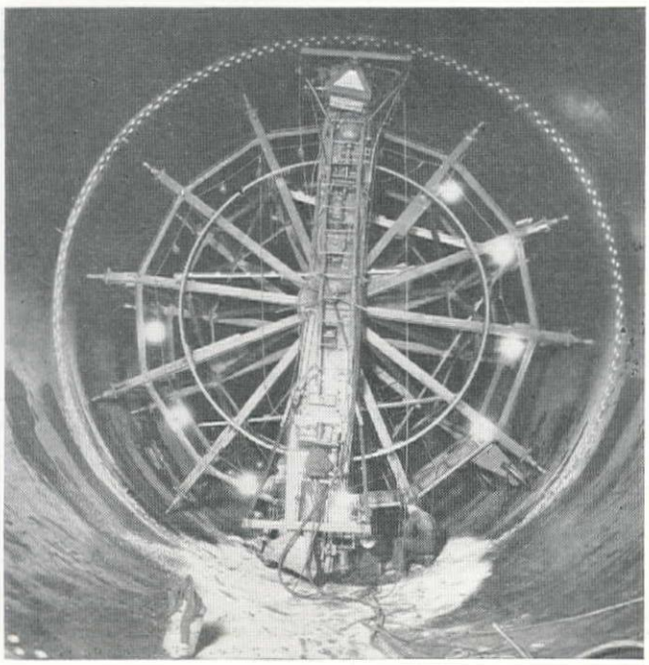
For final painting, the inner surfaces will be coated with bituminous primer and one coat of bituminous enamel, and the outer surfaces of all exposed pipe not in contact with concrete receive one coat of red lead and two coats of aluminum paint. When they left the fabrication plant the inner surfaces of all sections had been shotblasted and coated with bituminous primer. The outer surfaces of the pipe not embedded in concrete had been painted with a primer coat of red lead.

After completion of all mechanical work and final painting, each header system will be tested to an average of 1½ times the maximum working pressure. A 30-ft. diameter cast steel test head, to be supported on a flange and ribs welded inside the header below the base of the intake tower, is being developed for this purpose. This test head will be of semi-elliptical shape, made of eight segments and a circular closing section, to be flanged and bolted together so as to form a continuous surface, carrying about 25 million pounds of hydrostatic load.

Access for inspection of the pipes' outer surfaces will be provided through the construction adits for the headers and through passageways from the powerhouse for the penstocks—walkways and stairs being placed in each side of the headers and on one side of the penstocks. Entrances to the inside of the pipes are through manholes located near the invert of the pipe.

Erection of the 8½-ft. outlet conduits was started in January, 1934, the 30-ft. headers in July of that year, and the penstocks in the following August. The outlet conduits have been installed but concrete has not been poured around them. According to the present program of erection the upper systems will be finished late in 1935, and the lower systems in 1936. Only five turbines are being installed at present, and the outlets of the other penstocks will be closed at their lower ends by steel bulkheads.

Drilling, broaching and pinning equipment was mounted on a heavy structural steel column supported on a spider which maintained the section in circular alignment.



Organization

Fabrication and erection of the penstock and outlet system is being done under contract awarded by the Bureau of Reclamation to the Babcock & Wilcox Co., of New York City, the work on the project being under the supervision of Isaac Harter, vice-president, J. E. Trainer, general superintendent, and B. T. Kehoe, project superintendent. The pipe sections are transported from the plant to the construction adit portals by Six Companies Inc., under provisions in connection with its contract with the Bureau of Reclamation for constructing the dam, power plant and appurtenant works. The railroad equipment, 200-ton trailer, and the 150-ton cableway are the property of the Government. Conveyance of the pipe from construction adit portal to within 2 ft. of a permanent position is handled by the Eichleay Engineering Corp., sub-contractor for the Babcock and Wilcox Co., with John Eichleay Jr., in charge.

The dam, power plant and related features are being built under the direction of the Bureau of Reclamation, of which Elwood Mead is Commissioner, R. F. Walter, chief engineer, and Walker R. Young, construction engineer of the Boulder Canyon project.

Bids Called for 6-mile Sewer Tunnel at Los Angeles

Bids will be opened July 2 for driving and lining 6.10 miles of 8-ft. diameter tunnel to extend the joint outfall sewer of the County Sanitation Districts of Los Angeles County from the existing joint disposal plant near Wilmington to the ocean shore at White Point. Subsequent specifications will cover another unit in the form of an outfall line to extend another 5,000 ft. into the ocean. The entire project is estimated to cost $2,750,000 and will require a two-year construction period.

The tunnel specifications are divided into three schedules (1.72, 2.66 and 1.72 miles), and the combined quantities for all three include: Excavation 112,000 cu. yds., concrete in lining 42,300 cu. yds., reinforcing steel 4,898,000 lbs., grout 1,350 cu. yds. and steel supports 750 tons or permanent timbering 2,325 M ft. b.m. The tunnel is horseshoe shaped, 8-ft. finished diameter, completely concrete lined with a 10-in. minimum thickness on the arch and sides and 11 in. on the floor.

The schedule at the ocean end of the line includes a short section of two 60-in. cast iron pipe and a transition section and valve chamber. Driving of this 8,923-ft. section will be from the ocean portal. The middle section, 14,050 ft. long, is to be driven from a shaft about 150 ft. deep which is located 5,200 ft. from the north end of this schedule. The third, or inshore section, 8,142 ft. long, is accessible from the north portal and a shaft about 50 ft. deep, near the middle of this schedule.

Financing for the work comes from districts bonds recently sold and a grant from the PWA up to a maximum of $872,000. The bonds sold totaled $1,760,000 and the districts have $360,000 more available.

A. K. Warren is chief engineer and general manager of the County Sanitation Districts of Los Angeles and A. M. Rawn is assistant chief engineer.

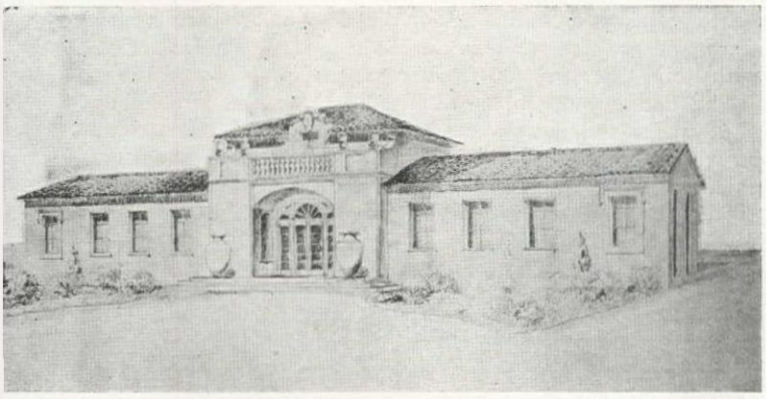
Orinda Filter Plant to of East Bay

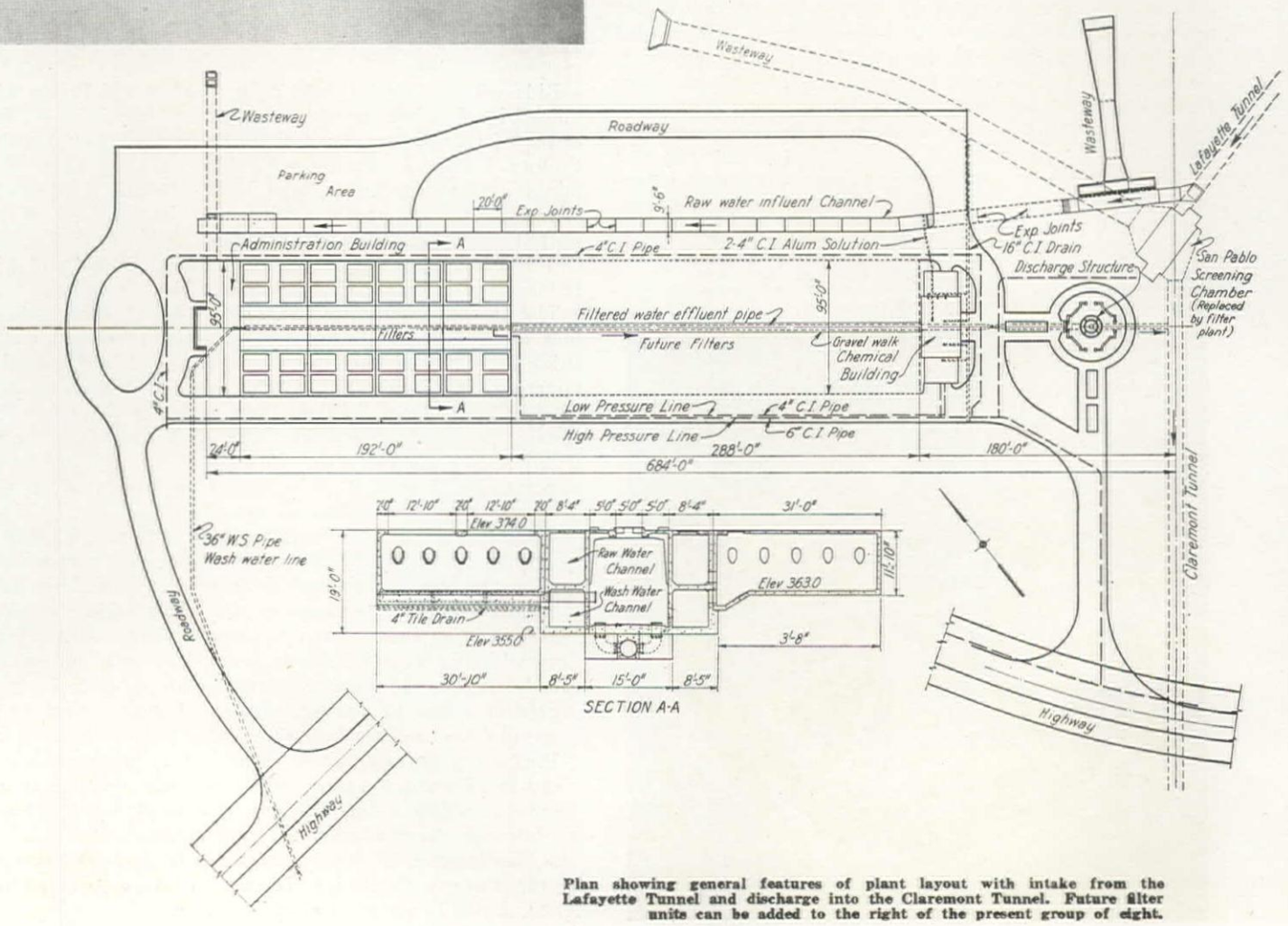
TO improve operating facilities and to eliminate a 150-ft. pumping lift in an extended industrial and residential area, the East Bay Municipal Utility District is building the Orinda filter plant, at the junction point between the Lafayette and Claremont tunnels, near the upper end of San Pablo Reservoir. The filter units of the 36 m.g.d. present plant (90 m.g.d. ultimate capacity) are ready for use and the plan called for operation to start about June 1. Treatment at the plant will normally be rapid-sand filtration, chlorination and pH adjustment with lime without premilinary coagulation or sedimentation, because the supply from the aqueduct coming direct from the 63-billion gallon Pardee Reservoir has a low turbidity.

The mountain water supply for the cities of the district, on the east side of San Francisco Bay, after flowing through about 90 miles of aqueduct arrives at the lower end of the 3.05-mile Lafayette tunnel, on the east side of the hills near the middle of the district territory. From this point, during the past years of operations, the main part of the aqueduct flow has been spilled into San Pablo Reservoir and from there was delivered by tunnel to the San Pablo filter plant. The water from this plant, in general, serves the major portion of the district, including a large residential area in the hills of Berkeley and Oakland. Ahead of the Lafayette tunnel a 4.5-mile pipe line (Moraga aqueduct) permits water by pumping at Lafayette to be delivered from the main aqueduct to the upper San Leandro Reservoir and filter plant at the southern end of the district, supplementing the San Pablo plant.

Near the outlet end of the Lafayette tunnel, the 3.43-mile Claremont tunnel (also part of the district's aqueduct system) pierces the hills near the center of the district and delivers water without the loss of head sustained on the San Pablo Reservoir route. Thus, the new Orinda plant provides the following improvements in the operating plan of the district: (1) Effects a saving in pumping and chemical costs which is estimated to repay the cost of the plant in seven years, (2) supplements the two present filter plants at the ends of the district with one strategically located near the center and (3) permits direct use of Claremont tunnel to deliver filtered water by gravity into major distribution mains at high levels.

Spanish architecture is used for the exterior of the administration building of the Orinda plant

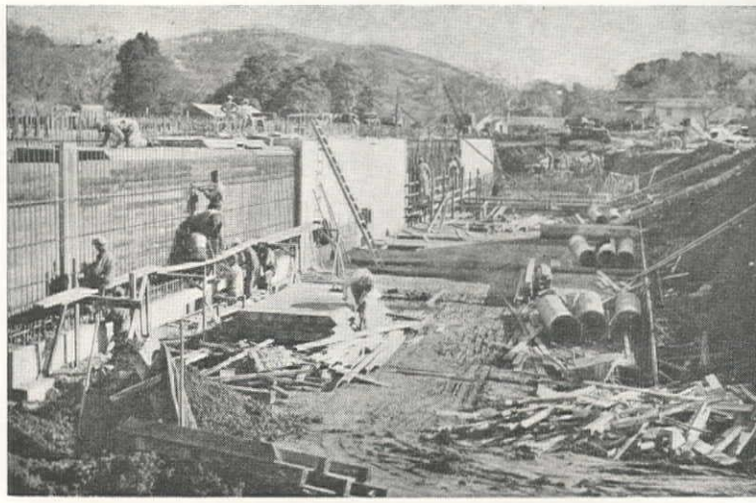




Plan showing general features of plant layout with intake from the Lafayette Tunnel and discharge into the Claremont Tunnel. Future filter units can be added to the right of the present group of eight.

Improve Operations Utility District

New plant near the center of the district territory will save a 150-ft. pumping lift for extended area—Present capacity of 36 m.g.d. can be increased to 90 m.g.d. as required



Excavation for the row of filters, the wall at the left forms the outer wall of the raw-water channel.

General plant arrangement.

The plant occupys an area between the highway and San Pablo Creek, near Orinda and adjacent to the outlet end of Lafayette tunnel and the inlet end of the connecting Claremont tunnel. The present construction operations occupy a length of about 700 ft. The raw water influent channel 685 ft. long is of reinforced concrete flume type of construction 9½ ft. wide by 8 ft. deep. It was built in an excavated trench with the top near ground level. The floor and walls are 8 in. thick with construction joints and steel-sheet water stops every 20 ft.

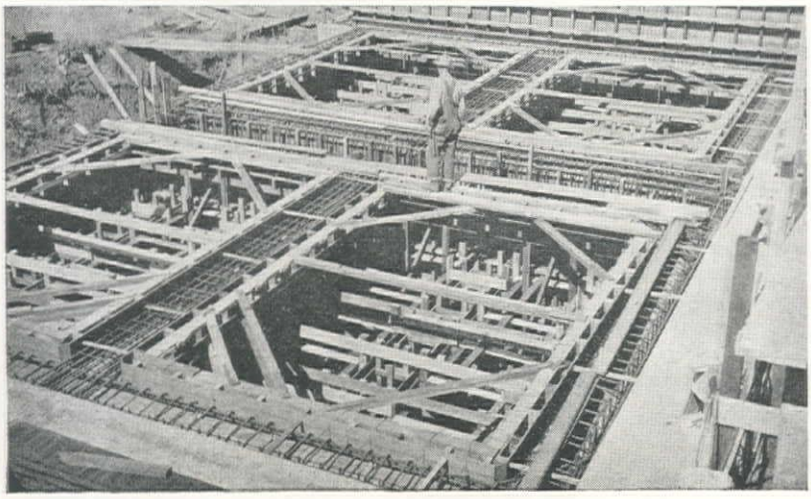
At the upper end a spillway structure, equipped with timber stop logs, provides for discharging overflow (or the entire aqueduct flow if necessary) into San Pablo Creek and reservoir. A secondary spillway similar but smaller in size, is located at the outlet end of the raw water channel to take care of overflow due to variations in flow or plant operation.

Leaving the channel, the raw water flows under the administration building of the plant, completes a 180 deg. turn and is split to feed the two 6 ft. 10 in. x 9 ft. 6 in. raw water channels located on either side of the central pipe gallery.

After filtering, water enters the main effluent line, flows back through the area reserved for future extensions to the plant, under the chemical building, where the chlorinating equipment is located, through a venturi meter and discharges by a vertical drop into the inlet to the Claremont tunnel. This discharge structure has been specially designed to permit visitors to view the water as it leaves the plant.

At the bottom of a 14-ft. diameter shaft about 25 ft. deep, the filtered effluent enters and rises about 10 ft. to overflow a 8-ft. diameter circular weir in the center of the shaft. The discharge drops down this inside shaft and flows into the tunnel. The shaft is lined with green tile and a walk at the top provides for visitors inspecting the plant to see the water cascading down into the central shaft.

Formwork during the building of the filter units. Steel was spaced with special regard to eliminating cracks at the corners of the filter beds.



Architecturally, the plant is of Spanish exterior and the grounds will be provided with roadways and adequately landscaped. Sufficient ground has been reserved at the intake end of the filter building so that coagulation and sedimentation units can be added in the future, if necessary.

Present plant operations are designed primarily to remove the small amount of turbidity and incidental suspended matter, including small crustacean forms, from the flow of the aqueduct. The storage effect of Pardee Reservoir with its long period of retention renders the water practically free from turbidity in the usual sense of the term. However, it is considered important to provide the additional clarifying effect of filtration before introducing this mountain supply into the distribution system.

In the past, this has been accomplished by turning the aqueduct flow into San Pablo Reservoir and through the San Pablo filter plant.

The installation of the Orinda filter plant, as previously outlined, will reduce the load on the San Pablo plant and permit full use of the Claremont tunnel. Further, in this operating procedure, there will be a material reduction in the cost of filtering because the water will not be allowed to mingle with the local runoff into the San Pablo Reservoir which has a tendency to increase the turbidity of the combined supply.

Operation of filters

The raw water channel extending from the connection with the Lafayette tunnel to the filter building passes near the chemical building and here two 4-in. cast iron pipes are provided for the introduction of an alum solution. Although, as stated previously, the usual coagulation and sedimentation basins have not been constructed, provision has been made to take care of a limited amount of turbidity by adding alum thru these pipes to the supply in the raw water channel and coagulation by use of baffles. The downstream end of the 500-ft. raw water channel will be used temporarily for sedimentation. This is possible due to the fact that the intake channel has been constructed to provide for the ultimate plant capacity.

Completed filter units showing wash water troughs in place and ready for placing the filtering material.

The 8 filter units are of bifurcated design, each with a capacity of 3 m.g.d. The present installation is designed for a capacity of 24 m.g.d. at a filtering rate of 125 m.g.d. per acre of filter bed, with an overload estimated at 50% or a maximum capacity of 36 m.g.d. The plant layout provides for an ultimate filter capacity of 60 m.g.d., or 90 m.g.d. with estimated overload capacity. The filters located on either side of the filter building have an area of 1,210 sq. ft. They are 11 ft. deep from the walk ways to the bottom of filter material. The filter material consists of 18 in. of graded gravel above which is 30 in. of filter sand.

The most unusual feature of the filter design is the use of small timber compartments in the bottom of the filter beds for the purpose of keeping the coarse gravel in place during washing. Partitions consist of 1-in. redwood boards which divide the bottom of the filter into compartments about 2½ ft. sq., to a depth of 22 in. above the floor. These compartments have been developed and used with marked success by the district in its other filter plants. Prior to their introduction, it was frequently found in changing filter materials, the gravel had moved considerably by the washing process and was no longer in its original position, with corresponding deduction in filtering efficiency. Results have indicated that the introduction of these compartments in the lower sections of filtering material has greatly reduced this tendency for the coarse material to shift in position and entirely eliminated the problem of sand boils in filter washing.

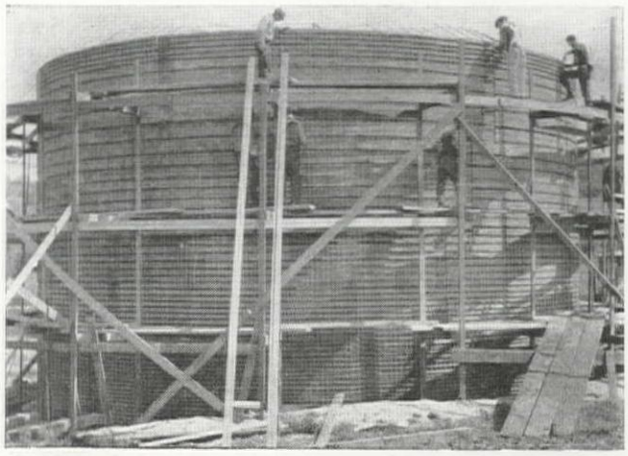
The general filtering procedure and filter washing operations are about standard. The concrete raw water channel feeds into five concrete wash water troughs in each filter bed for introduction of the water to the unit. The collector pipe system at the bottom of the filter connects with a cast iron monitor delivering the filtered water to a 20-in. C. I. main collector pipe under the filter.

From the collector pipe under the filter the filtered water flows to a 36 to 48-in. steel effluent line under the floor of the pipe gallery. This line is encased in concrete and has a ¾-in. troweled Gunite inside lining. The effluent line continues under the chemical building to the discharge shaft as already described. The introduction of additional filter units has been provided for in the design and these can be connected with minimum interference to plant operation.

Filter washing

Wash water, under a head of 50 ft. is provided from a 200,000 gal. Gunite tank built on the hillside about 500 ft. back from the plant. This tank was built with the Hewett method of pre-stressed steel reinforcing and Gunite. Briefly, the method consists of building up a shell of Gunite 4½-in. thick to form a cylindrical tank 40 ft. in diameter and 22 ft. high. This Gunite is shot against plywood forms. After these forms are removed the hoops of reinforcing steel are placed around the tank and placed in tension with the use of a standard wrench which provides the desired stress in the steel. According to the design, this stress in the steel is sufficint to maintain the inside Gunite shell in slight compression after the tank has been filled with water. The final step in this construction procedure is to place a 1½-in. thickness of Gunite on the outside of the reinforcing steel.

From this wash water tank a 36-in. line leads to the 24-in. steel wash water main extending along the length of the pipe gallery. From this main the wash water to each unit is introduced by valves to the floor of the filter bed. The wash water returns to a channel 6 ft. 10 in.

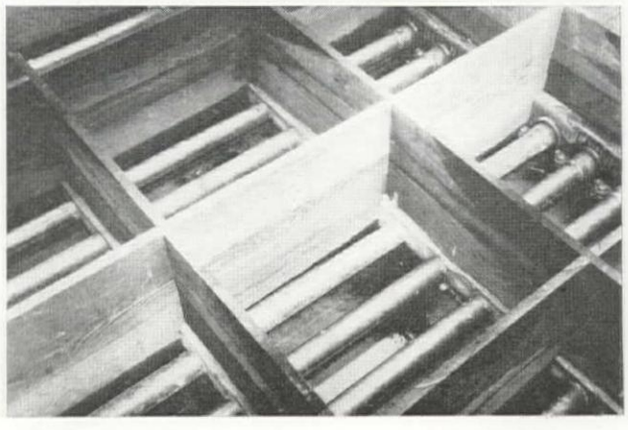


Wash-water tank, of Hewitt pre-stressed design, is located on the hillside near the plant and has a capacity of 200,000 gal.

wide and 7 ft. deep, extending under the raw water channel along the outside of the pipe gallery structure. This used water is washed into San Pablo Creek and becomes part of the San Pablo reservoir supply. The small amount of sediment carried by this wash water has no appreciable effect on the San Pablo filter load after the period of retention in the reservoir.

Construction work has not involved any notable features. It has been carried forward as force account work by the District. Excavation involving some 55,000 cu. yd. has been handled with a 1½ cu. yd. P & H dragline. The concrete plant was located near the highway and the various kinds of aggregate were stored in bins of suitable capacity, all aggregates being purchased from commercial plants. A weigh batcher was used for properly proportioning the sands and gravels and all water was metered.

Timber compartments about 2½ ft. square are used in the bottom of the filters to keep the gravel from moving during the washing operations.



Careful control over the concrete mix was exercised thruout the job. The usual compression tests, etc., were made to check the mix design. From the mixer the concrete was hauled by truck and delivered by gravity or handled by means of buckets and delivered to the forms by use of the P & H excavator operating as a crane. All of the 5,470 cu. yd. of concrete was vibrated with electric and air driven vibrators.

The Orinda Filter Plant has been built by the East Bay Municipal Utility District under the general direction of J. S. Longwell, chief engineer and general manager. The structural design of the plant was under the supervision of R. C. Kennedy, assistant chief engineer and assistant general manager. The general layout, the sanitary features and the construction of the plant were handled by J. D. DeCosta, engineer of distribution. C. R. Marbert is construction engineer, G. A. Hunter, superintendent of construction and W. R. McLean, resident engineer.

Pumping Concrete for Tunnel Lining on the Aqueduct

Unit specially designed to line the 16-ft. tunnel consists of mixer, charging device and pump mounted on 36-in. gage trucks with 24-ft. wheelbase — Continuous output at rate of 30 cu. yd. per hr.

WITH more than 75 per cent of the driving operations completed on the 91.5 miles of tunnels on the Colorado River Aqueduct, placing of the concrete lining becomes the feature of special interest in the underground work on this 241-mile aqueduct being built by the Metropolitan Water District to deliver a supply of water from the Colorado River to the Los Angeles metropolitan area. The general features of this project have been reviewed in detail in previous articles appearing in **Western Construction News** and it will be assumed the reader is acquainted with the essentials of this development. The present article is restricted to a description of the method of pumping concrete for tunnel lining, as this work has been developed and is being carried out on the District's operations in the Coachella Tunnels.

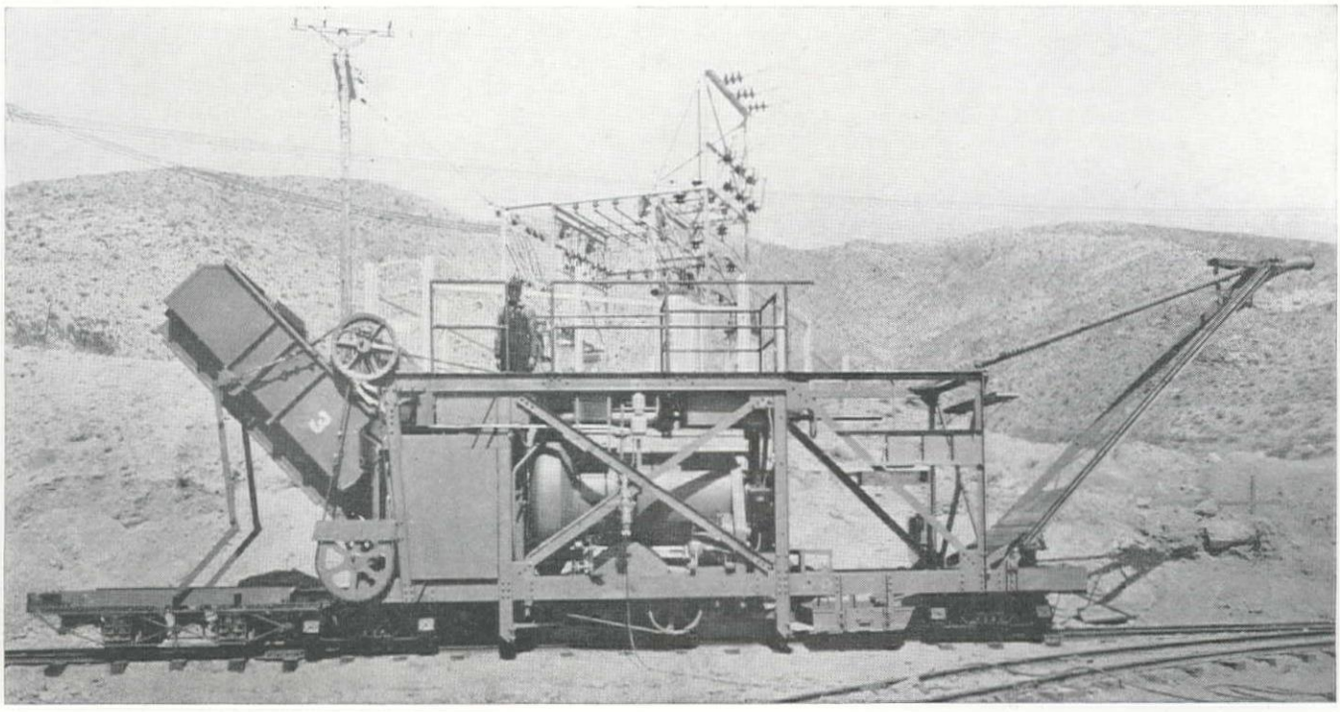
To review briefly the size and characteristics of the tunnel in which the concrete pumping is being done, the bore is horseshoe shaped with a 16-ft. finished diameter. Specifications call for a minimum of 9 in. of unreinforced lining concrete at the crown and 6 in. on the sides and invert. The net volume of concrete per foot of tunnel is:

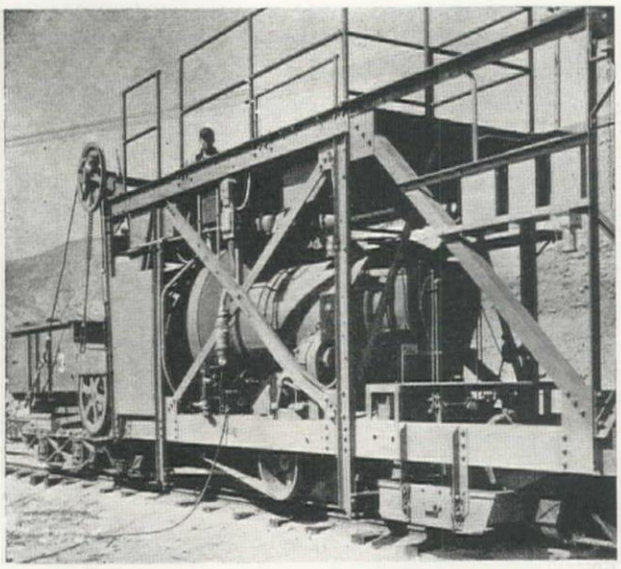
Untimbered section	2.80 cu. yd.
Light timbered section	2.75 cu. yd.
Full timbered section	3.39 cu. yd.
Light steel lining	2.38 cu. yd.
Full steel lining	2.54 cu. yd.

In general, the other specifications as to back packing, providing of drains, grout pipes., etc., are common to usual tunneling requirements.

Forms for the lining are of the collapsible steel type set up in sections for a continuous pour and moved ahead section by section as the work progresses. The curbs or base for side walls of arch are being poured first, thus

Completely assembled unit ready to enter tunnel. Length from aggregate car to end of discharge pipe is about 50 feet.





The mixer at the back of the unit discharges into the agitator feeder, a 1½ cu.yd. rotating steel drum, which is regulated to feed the intake to the pump, located directly below.

establishing to line and grade the foundations upon which the form sections are placed. A 36-in. track with tops of ties at invert grade provides for haulage.

Concrete placing methods

The extent of the lining to be done by the district on its force account work on the 33.72 miles of Coachella tununels resulted in detailed study by the engineering staff on the methods to be used. As a result the method of placement in use is direct pumping with the Pumpcrete unit manufactured by the Chain Belt Co. This type of concrete placing equipment has previously been used in the West on the Boulder Dam and San Francisco Bay Bridge projects and consists of single or dual unit reciprocal pump into which concrete is delivered, to be forced through a pipe to the point of discharge. The units have been used for distances of 1000 ft. horizontally and 100 ft. vertically, handling concrete with 3-in. aggregate and having a slump as low as 1 in.

Plans for a Pumpcrete unit, including the mixer, pump and delivery pipe, were prepared and submitted to the district for its consideration on the force account operations on the Coachella tunnels. After investigation, one complete unit was purchased for the initial lining operations at Wide Canyon Camp. This unit has been in service about two months and recently a similar installation was purchased by the district for use at Fargo Canyon Camp. If the present program is adhered to, each of these machines will pump about 150,000 cu. yd. of concrete in lining 10 miles of tunnel. The operating plan calls for continuous three-shift use for a twelve-day period, with a two-day rest, in accordance with the general two-week schedule maintained on this work.

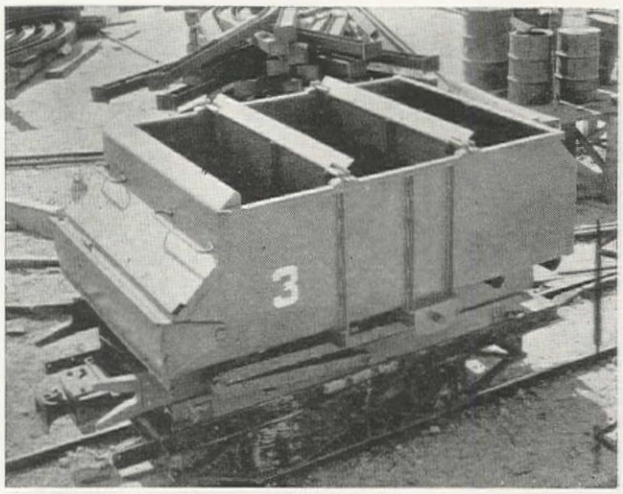
Arrangement of unit

The unit, as designed for the district by the Brown-Bevis Equipment Co., consists of a steel carriage mounted on 36-in. gage railway trucks, free to pivot in running over curves and having a wheel base of 24 ft. The forward truck is provided with a 5 h.p. electric traction motor with chain drive to both axles. The frame is arranged to carry the load of the mixer, charging device, placing equipment and boom for supporting the delivery pipe up to top of the forms. It is a compact, self-contained unit with overall width of 6 ft. 6 in. and maximum height of 10 ft., exclusive of the pipe line boom which is hinged and adjustable for both vertical and lateral motions. When operating, the unit is entirely self-contained and stable without use of jacks or outriggers.

The mixer is a standard 28-S machine with slight external modifications to adapt it to the special purpose. These are: modified charging and discharging chutes, an overhead drive, a completely modified supporting frame and an overhead operator's platform. Power is furnished by a 40 h.p. electric motor. The mixer is equipped with charging device, batch meter, and water tank fitted with a meter calibrated in cubic feet. Under the district specifications it delivers 30 cu. yd. per hour to the agitator.

The agitator feeder is a rotating steel drum of 1½ cu. yd. capacity, embodying the principles of a truck-body agitator. It is mounted on trunnions and has a chain drive to a 10 h.p. electric motor. The charging end is fed directly from the discharge from the mixer and the speed of agitator is synchronized with the pump so that a uniformly steady feed is provided at the discharge end into the intake valve of the pump to insure the machine working at full capacity.

The Pumpcrete is a single cylinder machine having a piston diameter of 8 in. and stroke of 12 in. Its capacity



Dry batches are hauled into the tunnel in bodies holding three 1 cu.yd. charges, which were built to fit the frames of the muck cars.

is 25 cu. yd. per hour at 50 r.p.m. and it is driven through a flexible V-belt drive by a 30 h.p. electric motorized speed reducer. Its position on the carriage is directly below the agitator and concrete feeds into the upper or intake valve which opens to receive the charge. As this valve closes the discharge valve in the delivery line opens and piston moves forward on its stroke. Concrete is delivered through the line at low velocity and with gentle pulsations. The agitator feeds a uniformly mixed concrete, and the character of the material is the same at the end of the discharge pipe.

Dry batches are transported into the tunnel from the central batching plant at the portal. The batch containers are three compartment bodies designed by the Brown-Bevis Equipment Co., to fit the under frames of the district's tunnel muck cars. Each compartment of the body holds 1 cu. yd. of dry batched materials. Train loads up to 10 cars (30 batches) are brought into the tunnel where by means of the "California" switch the loads are quickly spotted, one at a time, behind the mixing and placing unit which rides on the central track. The batch body is then raised on end by a special hydraulic hoist and the mixer operator charges each of the three batches in succession by tripping the compartment gates.

Form handling

The forms consist of segments 24 ft. in length, the outside surface consisting of ¼-in. steel skin plate in the shape of the inside finished surface of the tunnel arch. They weigh 1,200 lb. per foot. The inside of the forms consist of a heavy steel supporting framework, forming eight 4 ft. panels. In alternate panels three 18 x 24-in. doors on either side of the arch are cut thru the skin plate and left open to facilitate observation until the concrete has nearly reached these openings. These doors are 5 ft. and 10 in. above curb and 3 ft. on either side of the top center of form. The forms are hinged at the top and on either side 4 ft. above the curb. This lower segment is designated as the apron.

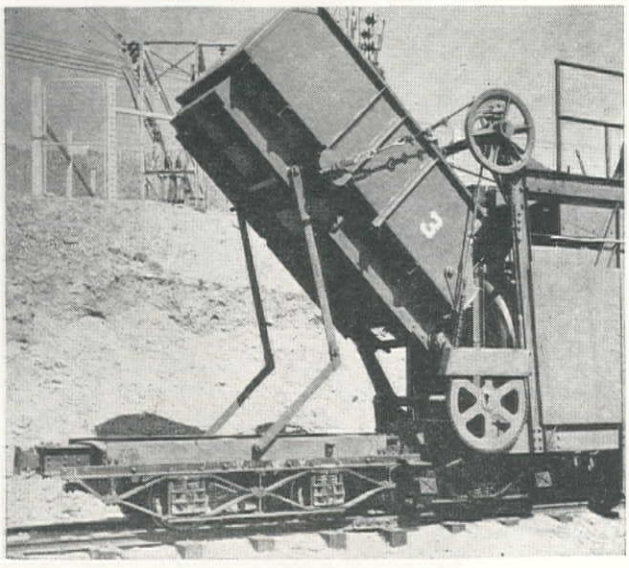
When moving form segments from the finished concrete for replacing them at the other end of the forms in place, the form carriage is run beneath them and the top or "strong back" is raised by hydraulic jacks against the center line of the form. Steamboat jacks are attached to the side whalers at spring line and toggles connected to bottom of either end of aprons. The toggle chains are pulled till the apron is free from the finished concrete and as the apron is raised the hydraulic jacks lower the arch while the steamboat jacks pull on the sides till the segment can be moved through the forms which are still in place.

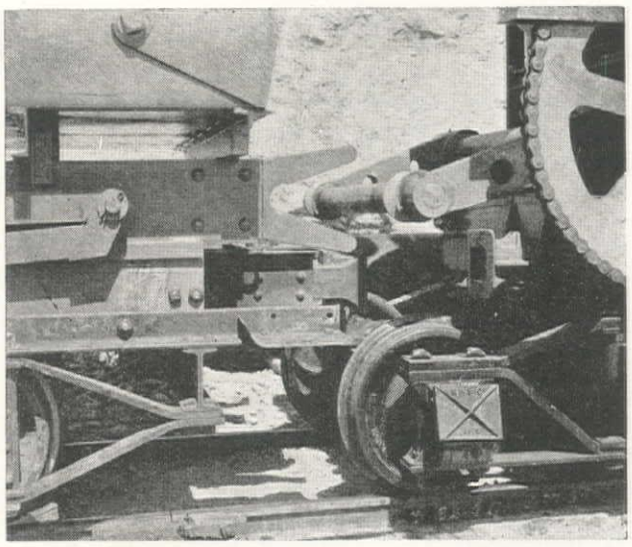
Pumpcreting operations

The pour is continuous except for the two days lay off period each fortnight. Before shut downs the concrete is floated for 6-in. next the skin plate and sloped against the plate. When resuming operations this dry joint is first covered with grout. The concrete is carried above the center of the forms through a 6-in. pipe, the end of which is imbedded 3 to 5 ft. in concrete. No vibrators are used but the concrete is spaded as it flows into place. The delivery pipe is drawn back, as work progresses, by the self propelled carriage which supports the mixer and pump to which it is attached.

The plasticity or consistency, is measured by means of the Burmister flow trough, an average maximum flow of 5 in. being maintained. Crushing tests, after 28 days curing show a strength of over 2,500 lb. per sq. in. The forms are not removed from finished concrete until 12 hr. have elapsed. The concrete is then subjected to a continuous water spray during the 14 days curing period.

Raised by hydraulic jack, the batches are successively dumped into the mixer by tripping the gates.





Switched behind the mixer end of the unit, yokes on the batch car engage a bar to insure proper position for discharge.

Crews required for lining

The organization consists of one superintendent, one night walker and the following shifts:

Shop crew:

1 master mechanic	1 welder
2 mechanics	1 helper
1 helper	

Aggregate Plant crew, 3 shifts, each:

1 crusherman	1 oiler
1 batcherman	1 laborer

Pit crew, 2 shifts, each:

1 motorman	1 shovel operator
1 brakeman	1 oiler

Concrete placement crew, 3 shifts, each:

1 shift boss	1 finisher
6 spaders	3 motormen
1 pumpman	3 brakemen
1 mixerman	1 nozzleman
5 formsetters	1 helper
2 sprinklers	

The invert section will not be poured until the arch section is completed and the tracks, therefore, no longer needed for haulage.

Engineering organization

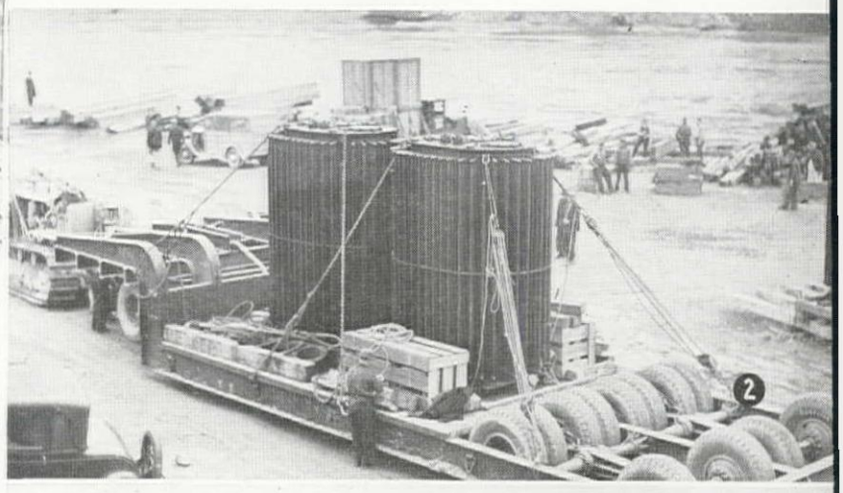
F. E. Weymouth is general manager and chief engineer of the Metropolitan Water District; J. L. Burkholder is assistant general manager and Julian Hinds assistant chief engineer. James Munn is general superintendent and B. C. Leadbetter is general superintendent of the Coachella Division.

Authorization Sought in Congress For Parker Dam Construction

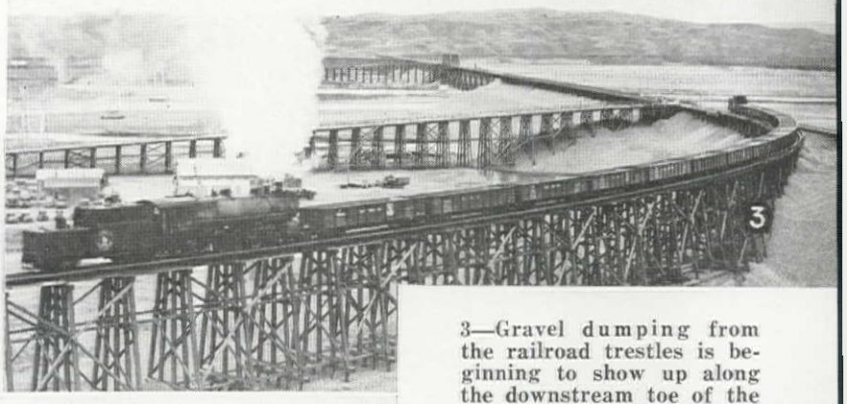
A bill to legalize the construction of Parker Dam and several other PWA projects which have a doubtful legal status, as a result of the U. S. Supreme Court decision which shut down work at the Parker Dam project (**Western Construction News,** May, 1935, p. 138) was introduced in Congress by Senator Johnson of California on May 12. The bill was prepared by the department of Interior and the PWA and would include authorization for the Grand Coulee Dam, Casper-Alcova Dam and the All-American Canal. The measure would grant blanket authority for flood control, navigation improvement and water conservation and land reclamation projects.

On the Western

1—Handling excavated material at Grand Coulee Dam with Athey crawler trailers dumping through a grizzly to feed the conveyor-belt disposal system. The trailers dump without stopping.



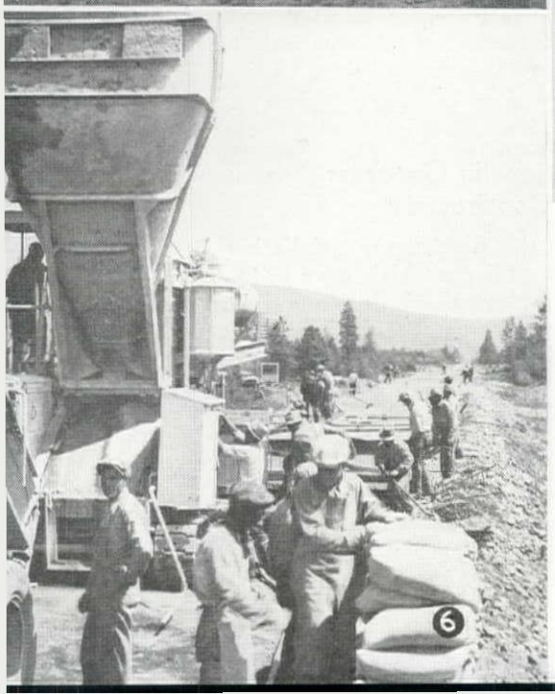
2—Mounted on a 60-ton trailer built by the Mason-Walsh-Atkinson-Kier Co. for moving heavy equipment, these two big transformers are going into position on the Grand Coulee project.



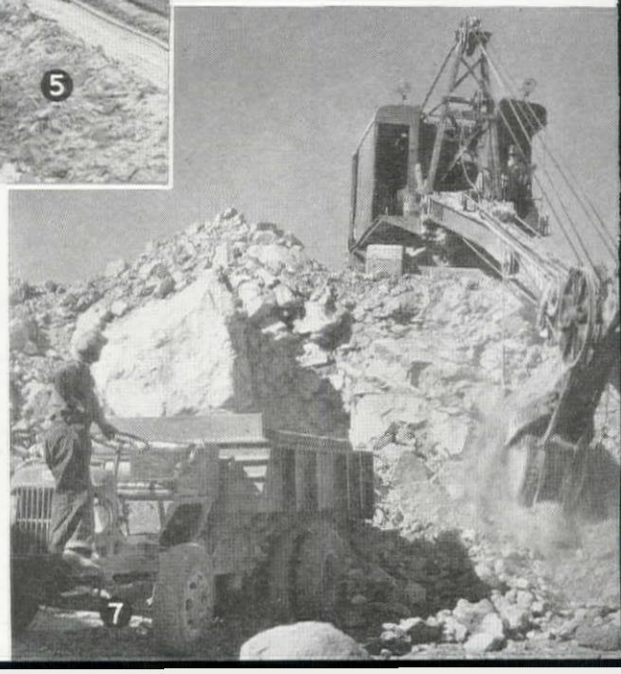
3—Gravel dumping from the railroad trestles is beginning to show up along the downstream toe of the Fort Peck Dam in Montana. The trestle extends across the Missouri River to provide access to the diversion tunnels.

4—Griffith Co. is using this Lima shovel on its contract for a schedule of the Colorado River Aqueduct project.

5—Reconditioning a road in Colorado at the rate of about 3 miles of highway per day with a Caterpillar Diesel 35 pulling a Caterpillar 33 Grader.

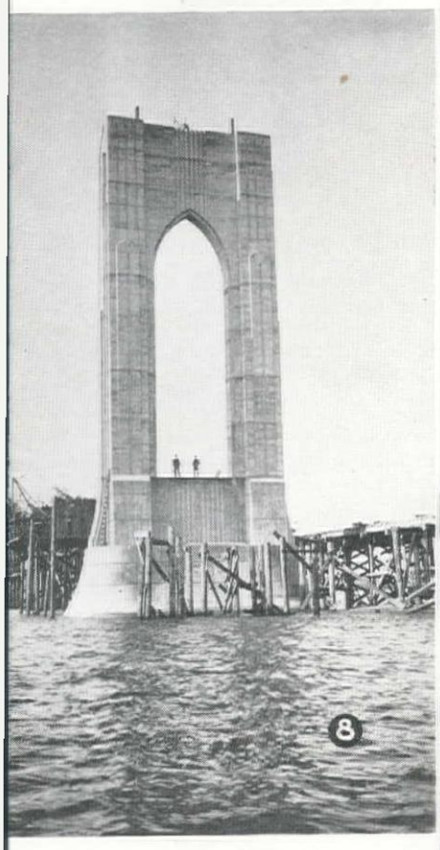


6—In Kittitas County, Washington, Albertson Cornell Bros., contractors, are laying an 8-mile length of 20-ft. portland cement concrete paving on the Sunset Highway.



7—Digging a section of the Colorado River Aqueduct 25 ft. deep and 30 ft. wide at the bottom, this Thew backdigger belongs to Von der Hellen & Pierson near Eagle Mountain.

Construction Front



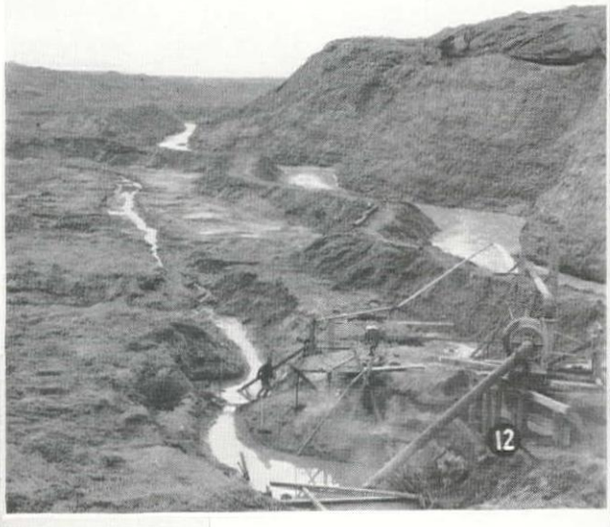
10—In the Yerba Buena tunnel of the San Francisco-Oakland Bay Bridge project, steel trusses are being placed to support steel arch forms for the tunnel lining of concrete.

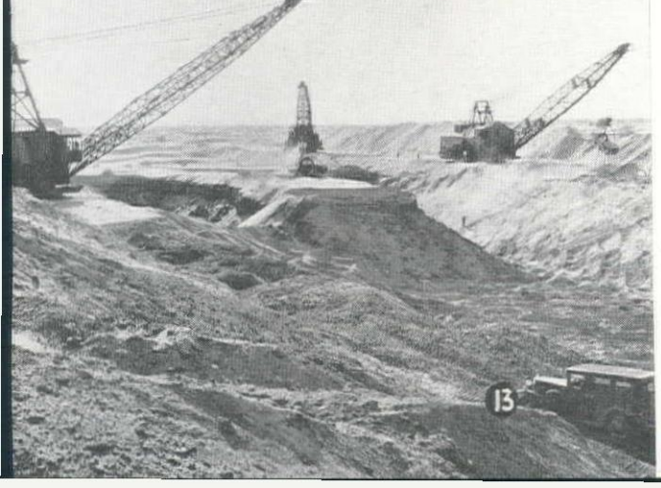
11—Placing concrete for the sloping wall of the reservoir recently completed to improve the water distribution system at Pocatello, Idaho. R. F. Hamilton was construction engineer.

12—Foundation excavation work has been started on the $256,322 contract of J. A. Terteling for the construction of the Rye Patch Dam near Lovelock, Nev. L. J. Foster is construction engineer for the Bureau of Reclamation.

8—A completed pier built by the Henry J. Kaiser Co. for the Coos Bay bridge for the Oregon coast highway route across the entrance of Coos Bay near Marshfield.

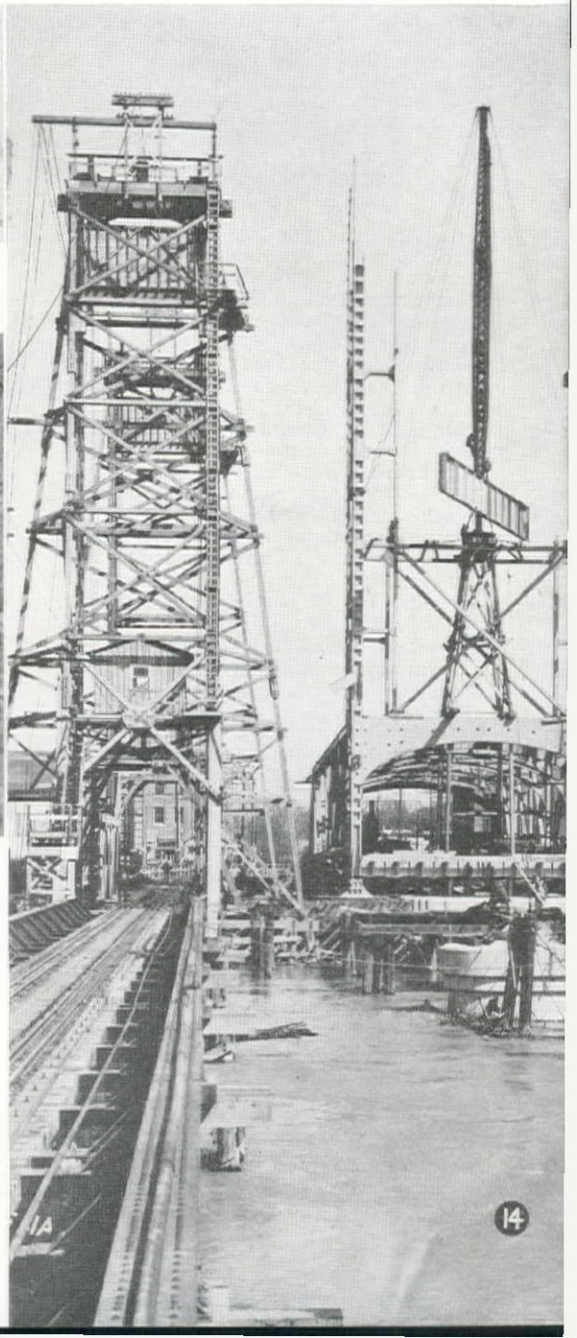
9—Catwalks, preparatory to the start of cable spinning operations, have been strung from the San Francisco anchorage to the central channel anchorage on the Bay Bridge.



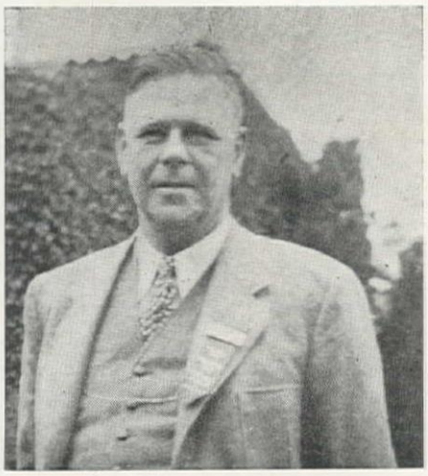


13—Draglines of W. E. Callahan Construction Co. and Gunther and Shirley at work excavating along the All-American Canal project at the eastern edge of the Sand Hill section.

14—Steel erection operations on the M-Street Bridge at Sacramento. George Pollock Co., is the general contractor for the structure.



Pacific Northwest A. W. W. A. Holds Annual Meeting



CHAIRMAN—Cliff C. Casad, commissioner of public works, Bremerton, Wash. elected for the coming year.

Sessions at Lewiston featured by round-table discussions of waterworks operating problems—Section is announced as third largest of A.W.W.A.

AN extended discussion of several specially-selected round table subjects was the feature of the eighth annual meeting of the Pacific Northwest Section of American Water Works Association held at Lewiston, Idaho, May 16-18. Following the registration, a golf tournament was held at the Lewiston Country Club in which H. S. Griggs, sales engineer for Hooker Electrochemical Co., Tacoma, defeated such favorites as Alex Lindsay of Spokane and H. D. Fowler of Seattle for low net score, winning a leather golf bag.

During the business session, which was attended by more than 135 registered delegates, chairman W. P. Hughes introduced the officers for the coming year and also called attention to the fact that the Pacific Northwest section now ranked third in United States in membership, due to an increase of 40 during the year, bringing the total to 93. Officers elected for the following year include: Chairman, Cliff D. Casad, commissioner of public works, Bremerton, Wash.; vice-chairman, A. H. Labsap, water superintendent, Longview, Wash.; secretary, Earnest C. Willard, consulting engineer, Portland, Ore.; trustee, John W. Cunningham, consulting engineer, Portland, Ore.; national director, W. P. Hughes, city engineer, Lewiston, Idaho. J. T. Delaney, Salem, Ore., is a holdover trustee.

A motion, submitted by J. W. Cunningham, was passed which provided that a committee composed of past trustees investigate the possibility of extending the activities of the section such as: awarding a prize for the outstanding papers submitted at the annual meeting; providing an award for the greatest accomplishments and improvements for a northwest waterworks system; or providing funds to insure representation at the national meeting each year.

The round table discussions, presided over by W. A. Kunigk, superintendent of Tacoma water division, covered a variety of subjects and precipitated controversal views as well as bringing out various methods practiced by different municipalities. The first subject, "Methods of Collecting Delinquent Water Accounts," was discussed in detail by David Wallbom of the Seattle water department who suggested that water bills be raised slightly to allow a discount which would encourage payment. The present system employed in Seattle imposes a one dollar penalty for failure to pay three months in arrears.

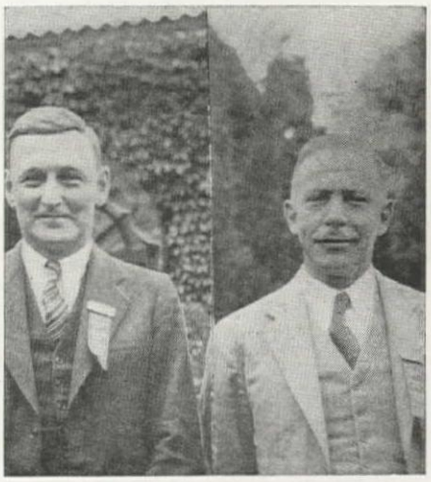
At the present time a questionnaire is being circulated among Washington cities by the University of Washington, the data thus obtained to be used in formulation of standard plans for collection of this type of account. It was the concensus of opinion among the members that water departments are not charitable bureaus and in cases where the user is unable to pay water charges, this money should be supplied by some charitable institution. In several towns, delinquent accounts are paid in day labor, but this too was frowned upon by most of the members as an unsatisfactory method of collecting overdue bills. In a few of the larger cities, the operating and collection and cut-off departments are separate, and this seems to provide the best method of handling delinquent accounts.

Charges to outside consumers

A lively discussion ensued on the subject, "Charges for Service to Consumers Outside of Corporate Limits." Ben C. Morrow, manager of the Portland water bureau, contended that since capital costs are a major part of total water charges, the user outside of the city limits should pay a higher rate, since he was not a city taxpayer and thus did not share in the cost of installation of the water system. In most cases, due to isolation of outside users and greater distance, water has to be piped, pumping is often necessary, and this additional cost should be charged directly to the user outside the city limits.

Mr. Morrow pointed out the best solution to the problem of supplying outlaying users was the formation of a metropolitan water district. In this way each community shares in the cost of the system and has a voice in the administration and an equitable right to the water. F. A. Hoffman of Medford, Ore., and E. Riley, superintendent of the Home Water District near Portland, felt that suburban water users were entitled to a low rate on city water in-as-much as the users patronized the industries of the city.

W. A. Kunigk said water was served to outside users at Tacoma on a basis of cost which is not exhorbitantly high, the users paying a 50% higher service charge than the city user. G. M. Irwin, city engineer of Victoria, B. C., reported that water was delivered at a wholesale rate to the city boundary through 8 and 12-in. meters to two outlying communities; the water is then pumped and handled through the pipelines of the suburban settlement. The rate charged by Spokane to outside users amounts to a $1.00 service charge and ten cents per 100 cu. ft., according to Alex Lindsay. Both Irwin and Kunigk felt that the matter of serving a metropolitan area was a matter of long range planning and both urged members to take an active part in planning conferences to provide facilities when the population becomes denser.



TWO LIEUTENANTS—John W. Cunningham, consulting engineer, Portland, trustee (left) and A. H. Labsap, water superintendent, Longview, Wash., vice-chairman.

Elimination of algae in reservoirs

"The Treatment of Algae Troubles in Reservoirs" was a topic discussed in great detail by representatives from all parts of the Northwest as water from all sections seem to be effected to some degree by this growth. In nearly every instance the use of copper sulfate was used to combat the growth of algae in reservoirs and streams, the amount varying from 1 to 2½ lb. per m. g., depending on the concentration of the algae.

The problem is rather acute in Southern Idaho where Snake River water is used. At Weiser, filters must be backwashed at intervals of 1½ hr. to keep them from being clogged with the stringy material. At Buhl and Twin Falls an objectionable odor was developed in treating algae with copper sulfate. This odor was eliminated by dosing with an undetermined amount of permanganate of potash which left the water slightly pink in color, but which was not objectionable in taste. No definite conclusion was offered on the use

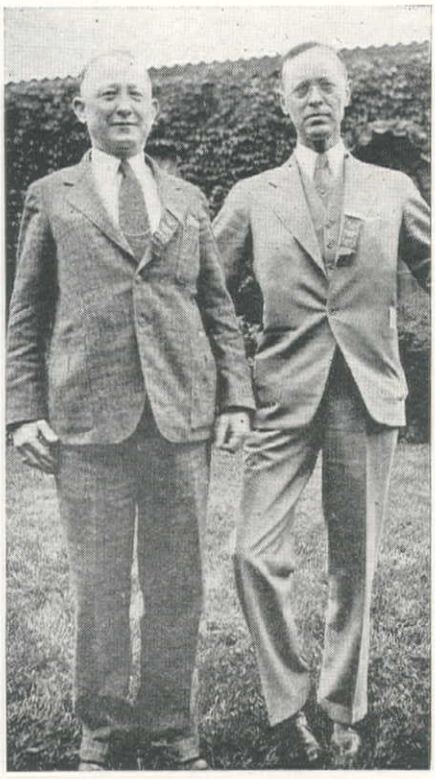
of this chemical in treatment of this type. W. V. Leonard, Idaho state sanitary engineer, discussed the difficulties experienced with Snake River water and reported that although several treatments, including copper sulfate, activated carbon, and chlorine, had been tried, the problem had not yet been solved.

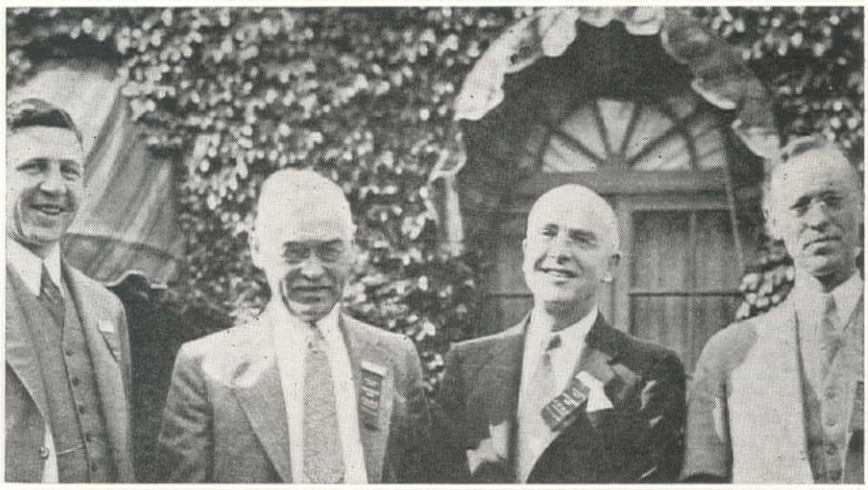
Aided by a number of maps, R. B. Anderson, assistant engineer of Lewiston, discussed the use of maps and described the organization of the city engineering department which administers general engineering, street work, and the water department, under the direction of the city engineer. The maps described included location of all pipe lines, valves, etc., but did not include location of lines, wires, etc., of outside utilities, such as gas lines and telephone cables. Ben Morrow of Portland pointed out the necessity in larger cities of having complete information on all utilities, especially at intersections where a labyrinth of pipes, wires and cables exists. He said it was important that these utilities be plotted on city maps so they may be available on short notice to the city's engineering agencies.

For the small town which has no engineering office B. C. Gosney, water superintendent of Auburn, Wash., told of the method used in which general insurance maps were obtained from a commercial map company on which were plotted the necessary lines and valves.

Several methods of locating leaks in underground pipes were described. Where a leak amounts to less than 20% of the water being pumped through the pipe it was the opinion of several members that it could be neglected due to the excessive cost of finding and repairing the leak. In most cases the delegates agreed that isolating section of pipe a few blocks in length was necessary in locating leaks.

TWO EX-"TRUSTIES"—William P. Hughes, city engineer, Lewiston, Idaho, newly elected national director (left) and Ben S. Morrow, manager, Portland Water Department, outgoing national director "consent" to pose.





FOUR BIG SHOTS—The water department chiefs of the four large cities of the Northwest: Harold D. Fowler, Seattle; W. A. Kunigk, Tacoma; Alex Lindsay, Spokane and Ben S. Morrow, Portland.

Inspection of water plant

A large number of delegates made an inspection of the modern Lewiston filtration plant and the power and sawmill development on Clearwater River. The water plant includes a filtration plant of 6 m.g.d. capacity, low and high service pumps, and four large reservoirs. Water is taken from Clearwater River and pumped into chemical mixing chambers where sulphate of alumina and hydrated lime is added. The water then flows through the sedimentation basin with a retention period of about 3½ hr. when operating at full capacity. The water is then admitted to four 1.5-m.g.d. filters which are of rapid sand type. From the filters the water passes into the clear well, where chlorine is added at the maximum rate of 2 lb. per m. g.

Several of the papers presented during the meeting are outlined briefly in the following abstracts.

City of Seattle water system

An informal talk, illustrated by a large number of slides, was given by Harold D. Fowler, superintendent of Seattle water department, on that city's water system. The talk included a detailed description of several hydraulic turbine-driven pumping stations within the city limits. These stations are unique in that they are operated by water from reservoirs flowing into low pressure service and effect a saving of about $30,000 per annum in power bills for pumping. (**Western Construction News**, January, 1935, p. 21.)

The small town water system

A paper on the subject "The Small Town Water System, Its Problems and Perplexities" was presented by M. H. McGuire, general manager, water and light department, McMinnville, Ore. He stated that in establishing a waterworks system a definite working plan should be adopted with careful study of all available sources for future development. It is economy to employ the best engineer available, preferably one who specializes in waterworks design and operation.

The average small city, in its eagerness to compete with the larger city, has often been led into carrying on ambitious projects, which soon result in approaching the limit of indebtedness fixed by constitution and charter. When nearly all receipts from a water plant must be applied to payment of accrued interest, it is obvious that payment of indebtedness and provision for repairs, extensions, and replacements should be made from new and refunding bond issues if revenues are not sufficient to meet them. City authorities and citizens should have the courage to provide funds by taxation to take care of the earlier bond series and continue this program until the project becomes self-sustaining.

Charters sometimes provide that the council or board responsible for the management of a plant shall annually prescribe a rate for water service sufficient to meet all the expenses of operation, depreciation, interest on its funded debt, and the sum to be collected from plant revenues may also include a sum to be used in accumulation of a fund to anticipate bond maturities, and may also include a further sum for plant extensions and improvements. The minimum charge should not be so high as to take water out of the class of necessities and make it a luxury and the rates should be so adjusted that one class of consumer will not be preferred over another, particularly if the system is being operated without meters. All service rendered the city itself in all its departments should be paid at reasonable rates. Metered service is essential to the success of any water system and the only question upon which an argument might be based is whether or not investment in meters and the cost of reading and billing is more than offset by the added revenue produced. To simplify this work the purchase of one type of meter is recommended.

The water system of McMinnville approaches very closely to the ideal of what a small-town water system should be, according to the paper. It is unique in that is has absolute ownership of 80% of the 5,000 ac. included in the drainage area of the source of supply. It is purely a gravity system and no pumping is required at any stage of distribution. The supply is abundant, storing upwards of 500 ac. ft. for use in low water periods. It is capable of expansion at the same reservoir site so as to increase its capacity many times. The water is clear, palatable and requires no filtration. The system is self supporting and at the rate of retirement now being maintained will be debt free in about 15½ yr.

Domestic water supplies in Idaho

At the present time there are 82 domestic water supplies in Idaho, according to the paper presented by W. V. Leonard, Idaho state sanitary engineer

and chemist, of which 15 are owned and operated by private companies, the remaining 67 being municipally owned and operated. The various sources of supply are:

Type	Number	Number Chlorinated
Surface stream ...	15	11
Surface lake	4	4
Springs	23	none
Wells	40	6

In the lava formation of Southern Idaho wells are constantly being condemned for use as domestic water supply unless sterilized. The fault formation of the lava allows underground pollution from sewers and waste water, and since no filtering is possible in this lava formation, which is full of cavern, flow holes, and direct fissures, it is readily seen that this underground body of water may at any time become laden with undesirable or pathogenic bacteria.

Domestic supplies in general may be classified as medium to soft with a hardness varying from 250 p.p.m. for Snake River water to extreme softness for northern lake water, the average being about 50 p.p.m. In certain sections in southern Idaho deep seated artesian wells carry compounds of flourine in solution. This element in certain concentrations has an injurious effect upon the enamel of the teeth. In certain locations, where practically 100% of the school children using this water have developed this enamel deficiency, the sanitary division has recommended a new water supply to eliminate this dental trouble, since no treatment has been found that will offset the effect of flourine in domestic water.

Safety in chlorine handling

Chlorine, according to Brian L. Shera, service engineer, Pennsylvania Salt Mfg. Co., Tacoma, Wash., is potentially dangerous if carelessly handled, and a few simple rules which help to minimize the dangers may be stated as follows: (1) avoid careless and rough handling; (2) avoid extreme temperatures; (3) prevent moisture from entering any of the chlorine equipment. In the sanitary field chlorine is shipped in two sizes of containers, small cylinders of 100 to 150 lb. capacity and ton containers. These containers are equipped with special type of valves and connections and are designed to withstand a hydrostatic pressure of 500 lb. per sq. in. Filling of cylinders at other than established plants is illegal and dangerous. Dry and ventilated storage space should be provided for cylinders and special arrangements should be made to facilitate movement of cylinders by means of small trucks, skids, and block and tackle to eliminate handling directly by one man.

In connecting chlorine equipment only pure lead or special dry fibre gaskets should be used and containers should never be rigidly connected to pipe lines or metering equipment. Chlorine equipment should be located so an even temperature ranging from 40 to 100 deg. F. may be maintained. The room temperature around the chlorinator should be higher than around the cylinder to prevent reliquification of the chlorine in the gas line.

The greatest enemy to proper operation and maintenance of chlorine equipment is moisture. Chlorine readily reacts with water vapor or ever present moisture in the air forming highly corrosive hydrochloric or muriatic acid. Cleaning of lines and equipment should be done with carbon tetrachloride.

ADVANCE AGENT—P. D. Wilson, water superintendent, Toppenish, Wash. appeared properly adorned to advertise the Pioneer days Celebration at Yakima.

Chloride leaks may be detected by means of ammonia fumes, which upon contacting chloride gas forms dense white clouds. Should a leak develop in pipe lines or metering equipment the flow from the cylinder should be stopped and the gas cleared from the building. All rooms housing chlorine equipment should be provided with both ceiling and floor ventilation, the later due to the weight of chlorine gas which is heavier than air.

The Bremerton Water System

The first water system for Bremerton, as reported in the paper by Cliff C. Casad, commissioner of public works, Bremerton, Wash., was established in 1901, when the village of 300 population was incorporated. Due to the growth in population to the present total of 12,000 constant changes and improvements have been made in the source of supply and the distribution system. At present the system, purchased by the city in 1917, has two supply lines from Anderson and Gorst Creeks and about 32 mi. of wood pipe and 15 mi. of cast iron pipe in the distribution system. The instalation on Anderson Creek, located about 3 mi. from Bremerton, consists of a gravity line and a pump instalation of 2 m.g.d. capacity; the Gorst Creek instalation consists of a pumping unit only, with a capacity of about 5.75 m.g.d.

In 1930 the physical condition of the water system as a whole was such that a program of replacement was necessary and was mapped out to cover a period of 10 yr. The system was entirely of wood pipe and very few replacements had been made since the original construction. A chart was made of the various lines, the dates of the original construction noted, and a schedule of replacements worked out to commence with an allowance of 20-yr. time from the original date of construction, thus automatically placing the date for the replacement. This rehabilitation work also includes installation of necessary valves to facilitate the minimum of isolation of lines in case of breaks and repairs.

Following the installation of a new creosoted supply line from Anderson Creek reservoir complaints were made by consumers regarding the taste of the water. This disagreeable taste resulted from the combination of chlorine-treated water with creosote in the pipe. This trouble was eliminated by the application of ammonia in an amount of about 2 lb. per million gallons, made to the water prior to its treatment with chlorine. The ammonia (2 lb.) was mixed in 10 gal. of water and was fed into the water through a spigot from a barrel at a rate sufficient to empty the keg in 24 hr.

During the replacement operations it became necessary to replace a 12-in. wood line under a paved street; examination showed it to be laid to a good alignment and grade. To avoid breaking the pavement for a distance of 1200 ft., because of cost and inconvenience to traffic, it was decided to lay the 6-in. cast iron line inside of the wood pipe. Openings were made at street intersection and at 300-ft. intervals, cable from a hand hoist was threaded through the main and a special shoe made for the spigot end of the first length of 6-in. pipe. The cable was secured to the hub end of the pipe and the pipe was drawn into the wooden main, spigot end ahead, until room was made to caulk the next length, after which the process was repeated.

Waterworks projects under the PWA.

A paper by Ivan C. Crawford, Idaho state engineer, PWA, and dean, College of Engineering, University of Idaho, discussed waterworks projects under the PWA. In considering loans and grants for non-federal projects the report submitted by the state engineer's office to Washington must present briefly but completely the examiner's analysis of the application with particular reference to: (a) necessity and social desirability of the project and relation to coordinated planning; (b) economic soundness of the project; (c) technical soundness of the project; (d) legal authority of the applicant to construct and operate the project, incur the proposed obligation, and issue the necessary evidence of indebtedness therefor; (e) assurance that the proposed loan is reasonably secured either by pledge of the taxing power of the applicant, by pledge of the net revenues reasonably to be anticipated from the operation of the project, or by such other obligations of the applicant as will be satisfactory to the administration.

In Idaho little trouble has been experienced in determining the necessity and social desirability of waterworks project. In many cases little or no thought was given by communities to coordinated planning and in general the following situations existed: (1) the water supply was insufficient or unsatisfactory from the standpoint of quality; (2) old water mains had deteriorated and needed to be replaced; and (3) the natural growth of municipalities demanded the laying of new lines.

The engineering features of various Idaho projects have been relatively simple except for one question and that is the sufficiency of the water supply when this supply is to be secured from

a well or wells not yet drilled. Satisfactory evidence must be presented that the well or wells in connection with the project when drilled will provide a satisfactory supply of water, unless, in the absence of such evidence, the administrator shall be satisfied that the borrower before undertaking any further construction work in connection with the project will first drill the well or wells and if the same prove unsatisfactory as to quantity or quality of water will not thereafter proceed with the project.

The PWA legal division questioned the constitutionality of, and refused to accept, revenue bonds (to be amortized from revenues derived from a project) as provided by a bill enacted during the 1933 session of the Idaho Legislature. Several projects were held up on this account due to the fact that general obligation bonds were necessary to provide a sinking fund and an annual tax was required to pay the interest on such indebtedness.

Severe Floods in Colorado Cause Highway and Bridge Washouts

Cloudbursts in eastern part of state wreck many bridges in Colorado Springs, cause $1,00,000 damage to state highways and flood miles of lowlands along the Arkansas River

SEVERAL heavy cloudbursts, the worst experienced in eastern Colorado in many years, centering around the Monument Ridge region, mid-way between Denver and Colorado Springs, on June 1, caused a series of three floods that claimed a toll of many lives and damaging property to the extent of several million dollars. The damage in Colorado Springs alone is estimated to approach $2,000,000 and between the Springs and Pueblo, damage is estimated at $1,000,000. The work of rebuilding the Colorado Springs area will require the reconstruction of nearly fifty bridges, a great many of them in the city. A detailed report of highway damage has been sent to Washington, with a request for immediate funds with which to start reconstruction.

Fort Morgan, Brush, and Sterling, all in northeastern Colorado, were swept by the South Platte River which left its banks, damaging paved highways and bridges and inundating large areas.

C. D. Vail, state highway engineer, according to press reports, estimates the damage to state highways and bridges at about $1,000.000. The department announced that never before has so much damage been done in such a short time. It will cost at least $100,000 to replace a bridge and undermined pavement on the Denver-Colorado Springs road (see illustration). Concrete bridges spanning normally dry streams were wrecked and there is not a main highway in the region that has not been damaged.

The floods were the most disasterous experienced in Colorado since the Pueblo deluge of 1921 along the Fountain River. The present floods can be characterized as somewhat freakish, since they originated in an area which is drained in three directions by several creeks and numerous dry gulches. The most severe of the three floods struck Colorado Springs, the well known vacation city of 35,000, and damaged an area of about 100 square blocks. Every bridge in the city, with the exception of one, was either torn out or damaged by the torrential runoff down Fountain, Monument, and Shook's Run Creeks, all of which pass through the city. The entire area from Cheyenne to south of Colorado Springs, and extending east from Denver to Byers (nearly 10,000 sq. mi.) received heavy rains during the previous weeks, and when the cloudburst occurred most of the precipitation ran off the rain-socked ground, turning small streams into torrents, in some places, nearly a mile wide. The state hospital for the insane at Pueblo was reported damaged to the extent of $200,000, with the total damage in the city estimated at around $500,000. The flood stage in the Fountain River was one foot less than the level of the 1921 flood but it did not get out of the channel. About 25,000 sec. ft. of water flowed down the stream at the crest of the flood. Below Pueblo, and when the heavy flow joined the Arkansas River, it overflowed the lowlands, spreading out a mile wide to a depth of 5 ft. No bridges were seriously damaged at Pueblo.

Colorado Springs had virtually no warning when the cloudburst waters arrived in Monument Creek overflowing the banks and inundating the west section of the city. Combined with Shook's Run Creek on the east, the city was caught between two raging streams. The loss in bridges is reported at more than $500,000 and an overpass in the city, which was completed at a cost of $225,000 was completely destroyed.

Another of the floods rushed north from Monument Ridge down Cherry Creek toward Denver. First reports indicated the flood might be worse than that of two years ago when Castlewood Dam, located slightly south of Castle Rock, overtopped and went out. However, most of the cloudburst waters were either carried off by Kiowa Creek

or spread out before it reached Denver, and only a 10-ft. rise of water flowed in Cherry Creek through the city. The retaining walls safely confined the water to the creek bed, although it was washing the underside of bridge decks during the peak of the flood. There was no damage at Sullivan, 6 miles south of Denver, where the Cherry Creek flood control dam is to be built. The only work completed at the site is a railroad spur, and this is on high ground where it escaped the high water. The new Champa Street Bridge in Denver, another that was washed out two years ago, is nearly completed and was not damaged. The flow of water in the South Platte at Denver at the peak of the flood was measured at 9,800 sec. ft. Normally the flow is 800 sec. ft. and the additional 9,000 sec. ft. came down Cherry Creek.

The Denver-Colorado Springs highway was also washed out in several places, and one large bridge, nine miles north of the Springs, was completely demolished. Reports did not indicate damage to any dams. It is estimated that 2½ in. of rain fell on the watershed which sent flood waters on Colorado Springs. In Denver during May 31 and June 1 the weather bureau reported that .47 in. of rain fell and at Pueblo during the same two days no precipitation was recorded.

Northwest Sewage Works Association Formed at Lewiston Meeting

Sanitary engineers from Oregon, Washington and Idaho complete organization at initial meeting and discuss establishing operators school

FORMATION of the Northwest Sewage Works Association was completed at a meeting held in conjunction with the meeting of Pacific Northwest Section, American Water Works Association, at Lewiston, Idaho, on May 15. A constitution was adopted and the following officers elected for the coming year: President, Carl E. Green, state sanitary engineer, Oregon; vice-president, W. V. Leonard, state sanitary engineer, Idaho; second vice-president, Prof. M. K. Snyder, sanitary engineering department, Washington State College; secretary-treasurer, Prof. Fred Merryfield, civil engineering department, Oregon State College.

This marks the entrance of Northwest sanitary engineers in the battle to "keep the Far West clean" which has been carried on by sewage works associations in Arizona, Montana, and California, and in the pages of **Western Construction News.** Initial planning has been carried on for the past year by Carl Green and others since the Northwest Conference on Stream Pollution was held in Eugene, Ore., last May.

Discussions of the value of an operator's school, cooperation with other bodies interested in abolishing stream pollution, and the need and purpose of the Association was entered into by 30 delegates gathered from all parts of the Northwest. At the 1936 meeting plans will undoubtedly be offered to establish an operator's school in connection with the annual meeting and to educate the public to adopt measures to stop stream pollution. R. E. Koon, consulting engineer of Portland, suggested that papers and discussions should be planned to help the operator and that inspection trips be planned when possible.

Mr. Koon gave an interesting and informal talk on an inspection trip he made during the past summer to sewage plants in California. The primary purpose for his inspection was to determine whether it was possible to justify construction of sewage plants in the Northwest for the production of fertilizer. His conclusion was, that despite extravagant claims at several plants he visited, there was no justification for construction if they were to be built from revenues to be derived from the sale of fertilizer at present prices. The plants which were included on his itinery were: the activated sludge plants at Salinas and Golden Gate Park in San Francisco, Pasadena, Laguna Beach, Los Angeles (Harbor City plant), and Whittier. He also inspected plants at Phoenix, Grand Canyon, Ariz., and Boulder City, Nev.

A motion picture, showing the action of chlorine compounds in killing microscopic organisms, was presented by George W. Mitchell, district manager for Wallace & Tiernan Co. at Seattle. This picture showed the process of destruction of organisms under the microscope and was discussed by Carl Green.

Sanitary Conservation of Streams

W. V. Leonard, state sanitary engineer of Idaho, presented an interesting paper in which he discussed the conservation and utilization of water resources. It was his contention that a successful plan for sanitary conservation of water resources must be based upon principles which will insure ample and satisfactory sources for public water supplies, not only for the present, but for the future. Any practical and successful plan must recognize the dominant use of streams either in the state as a whole, or in its various parts. Where streams are extensively used for watering stock, and industry is negligible, obviously the maintenance of streams in a very cleanly state best serves the public. On the other hand, there are rivers not used as a source of public or industrial water supply, having valuable and important industries on their banks, and where it appears that prosperity of these industries justify utilizing the river primarily for disposal of industrial wastes.

Property damage suffered by riparian owners is a matter to be considered by a court of equity rather than by an administrative agent of the state. Legislators and the executives must bear in mind the financial aspect of the problem and adopt policies which at a minimum expenditure of public and private funds will bring about a condition of the streams whereby all interests will be wisely served in the order of their value to the public.

Mr. Leonard felt there can be no question that the use of water as a source of public water supply is the first and highest use. As streams are the natural drainage channels, it fol-

Attendance at the Organization Meeting

L. R. Stockman	Consulting Engineer	Baker, Ore.
W. P. Hughes	City Engineer	Lewiston, Idaho
R. E. Koon	Consulting Engineer	Portland, Ore.
John C. Cunningham	Consulting Engineer	Portland, Ore.
George W. Mitchell	Wallace & Tiernan Co., Inc.	Seattle, Wash.
W. V. Leonard	State Sanitary Engineer	Boise, Idaho
E. French Case	Sanitary Engineer	Seattle, Wash.
A. D. Butler	City Engineer	Spokane, Wash.
Carl Green	State Sanitary Engineer	Portland, Ore.
A. G. Darwin	Civil Engineer	Lewiston, Idaho
T. B. Jackson	Boise Water Corp. (gen. mgr.)	Boise, Idaho
M. R. Hamilton	Water Superintendent	Centralia, Wash.
Hiram C. Green	Public Works Commissioner	Centralia, Wash.
M. K. Snyder	Professor, Sanitary Engineering	Wash. State College
E. C. Knittle	Water Superintendent	Lynden, Wash.
C. J. Phillips	City Engineer	Puyallup, Wash.
A. I. Buckecker	City Sewer Engineer	Spokane, Wash.
H. S. Griggs, Jr.	Hooker Electrochemical Co.	Tacoma, Wash.
James M. Welsh	Sanitary Inspector	Boise, Idaho
Fred H. McConnell	City Engineer	Caldwell, Idaho
Fred Merryfield	Ass't Professor, Civil Engineering	Oregon State College
R. E. McLean	Sewage and Water Superintendent	Walla Walla, Wash.
R. M. Harris	State Sanitary Engineer	Seattle, Wash.
John H. Griffith	Civil Engineer	Boise, Idaho
D. N. Beatty	Waterworks Superintendent	Caldwell, Idaho
C. M. Irwin	City Engineer	Victoria, B. C.
R. Disher	Pacific States C. I. Pipe Co.	Portland, Ore.
Carl Aldrich	Civil Engineer	Lewiston, Idaho
G. E. Bjork	**Western Construction News**	Portland, Ore.

OFFICERS—Carl E. Green, state sanitary engineer of Oregon, president; W. V. Leonard, state sanitary engineer of Idaho, first vice-president; Fred Merryfield, civil engineering department at Oregon State College, secretary-treasurer.

lows therefore that the second highest use, from a sanitary standpoint, is for the conveyance and dilution of sewage of municipalities and industrial wastes, all obviously treated if needful to such a degree as required to maintain the receiving body of water in a condition which best suits the public interest. Thereafter, the order of precedent of use is determined by local circumstances and may be for navigation, manufacturing industry, power, irrigation, fishing, or recreation.

Sewage plant at Baker, Ore.

With the aid of several drawings, L. R. Stockman, consulting engineer of Baker, described the $98,000 Baker sewage plant which was designed and constructed under his direction. This 1.2-m.g.d. capacity plant was built with PWA financing, made possible through a bond election, following a court order in which the City of Baker was forbidden to dump its sewage into Powder River, thereby creating a public nuisance—a vertible 6-mile septic tank immediately below the city. The plant consists of the following: chlorinator, bar screen with an automatic rake, primary and secondary sedimentation tank, wet well, sewage pump house, dosing tank and circular trickling filter, separate sludge digestion tank and sludge pumps, all located upon a 2½-ac. tract, adjoining the north city limits.

The detention period amounts to 2.65 hr. for maximum flow of 1.2 m.g.d. and 3.64 hr. for the present flow of 0.87 m.g.d. The sludge digester, designed for a contributing population of 11,300 at 2 cu. ft. per capita (present connected load about 5,500 population) is provided on the interior with three sets of coils through which hot water is circulated. By utilizing the gas developed in the digester as fuel for the hot water boiler, the circulating water is heated to a temperature of about 120 deg. F. At the present time about 700 cu. ft. of gas is being taken off per day.

Sulphite waste disposal

Fred Merryfield, assistant professor of civil engineering at Oregon State College, presented a paper on the problem of disposal of wastes from sulphite pulp mills in which he sketched briefly the pulp manufacturing process and several possibilities for the alleviation of this waste both from a standpoint of economics for the manufacturer and from stream pollution. An average of 2000 gal. of waste sulphite liquor is wasted per ton of pulp produced, the total solid content varying from 84,000 to 130,000 p.p.m. This sulphite liquor is wasted from digesters in which various kinds of wood chips are dissolved in a solution of sulphurous acid and calcium acid sulphite. The 20-day b.o.d. varies from 16,000 to 25,000 p.p.m., depending upon the dilution with wash water in the plant.

No process at present

At the present time, Professor Merryfield said, there is no known process for the treatment of this type of waste which will produce an effluent comparable to that produced from domestic sewage in modern plants. Ponding and aeration of the waste liquor very materially reduce the oxygen demand but require large storage areas and is not an ultimate solution to the problem. Further, he pointed out that many authorities felt that the ultimate solution of the sulphite waste problem lies in utilization as a fuel or in the manufacture of valuable by-products rather than in treatment. The pulp and paper industry recognizes the tremendous losses daily incurred and to date more than 800 patents have been issued for the recovery and utilization of this liquor waste. The possibilities in recovery of the liquor for profit in the maniufacture of binding materials for road material, gums and adhesive materials, tanning materials, alcohol and yeast, fodder, fertilizer, and fuel were mentioned. In all these materials, the present cost of recovery is excessive, and the best opportunities for disposal of sulphite liquor seems to be its use as cattle fodder, fertilizer, and fuel, due to the possible large market and economy.

Because this meeting resulted in the formation of the Northwest Sewage Works Association, a list of those in attendance is given:

Work Starts on Many Jobs In Intermountain States

HIGH ALTITUDE results in a relatively short construction season in many sections of the Intermountain states, but spring and early summer of 1935 finds a surprising number of jobs under way.

Work on laying water mains at Spanis Fork, Utah, was started March 27, financed by PWA loan and grant of $88,000, with E. K. Ferguson Sons, contractor. W. W. Clyde, Springville, is the contractor for the Ogden City, Utah, water works project which was started April 15, under a PWA loan and grant of $750,000. There are five contracts, one for the reservoir, which has been let, two for pipe lines, one for a distribution system, and another for meters.

Work on the Tremonton, Utah, water system project was started April 18. Moses & Hill of Logan are contractors; the PWA loan and grant is $21,000. Mullins & Wheeler of Salt Lake City are contractors for the Wellington, Utah, water mains project, work on which started May 1, with a PWA loan and grant of $26,000.

The loan and grant for the Mountain Home, Idaho, water works project is $34,000 and work was started May 8 by the contractors, H. C. Malott of Seattle, Wash. Work was started April 26 on the Medicine Bow, Wyo., water mains project, by J. S. Schwartz of Colorado Springs, Colo., contractor. The loan and grant amounts to $49,000.

A PWA loan and grant for the new building construction at the University of Wyoming, Laramie, totals $300,000. The Kirchoff Construction Co. of Denver is the contractor, and work started Feb. 5. Work started March 14 on the Fruits, Colo., water works project, financed by a loan and grant of $40,000. J. S. Schwartz of Colorado Springs is the contractor. At Belt, Mont., work on the water works project March 28 under a loan and grant of $10,000; the contractor is Tom Staunton of Great Falls.

Lease & Leigland of Great Falls are contractors on the Bridger, Mont., sewer project, which received a loan and grant of $31,000. Work started May 10, and work on the $52,000 water works project in the same city started about May 18. Work started April 2 on the Havre, Mont., school building, for which a loan and grant of $166,000 was made. Lovering Longbotham Co. and James Leck Co. of Minneapolis, Minn., are contractors. April 1 was the date work started on the new school building at Missoula, Mont., under the contractors, Hendrikson-Alstrom Co. of Seattle and Charles Pew of Missoula.

Lovering-Longbotham Co. of St. Paul, Minn., are the contractors on the Galen, Mont., sanitorium, work on which was started Feb. 28, under a PWA loan and grant of $215,200. The new Kalispell, Mont., school, for which a loan and grant of $210,000 has been made was started April 23; T. G. Rowland of Salt Lake City is the contractor. Frank Jacoby of Billings is the contractor for the Billings, Mont., school, work on which was started May 1. Loan and grant, $250,000. Work started May 6 on the Warm Springs, Mont., hospital, for which a loan and grant of $400,000 has been made. M. D. Cahill of Butte is the contractor.

Cellular cofferdam on the west side of the Grand Coulee dam site.

Cofferdam 3,000 Ft. Long Built at Grand Coulee

Notable steel sheet-pile enclosure to allow unwatering of west side of Columbia River channel completed in 3-month period.

SINCE November, 1934, when work was first started on the general contract for construction of the $63,000,000 Grand Coulee Dam on Columbia River in Washington, several major phases of the project have been completed or well advanced by the Mason-Walsh-Atkinson-Kier Co. (MWAK), general contractors. The outstanding preliminary work includes: building the contractor's town called Mason City at a cost of about $1,000,000; erection of a railroad and vehicular deck truss bridge across the river supported on high steel pile piers; driving of a 20 by 30-ft. railroad tunnel, 300 ft. long; and erection of a temporary construction pile trestle which has already been removed. This is the only trestle ever built across the Columbia River and was used during early cofferdamming operations. Mason City, the chimneyless city, is unique in that electricity is furnished to employees at 0.3 cents per kw.-hr. and is used for heating and other domestic uses.

Spur tracks will be laid soon, extending the recently completed 32-mi. government railroad from Odair on the Northern Pacific main line, to the government warehouse now under construction and to the contractors' headquarters at Mason City, across the river. Finishing touches are also being put on the government townsite consisting of an administration building, school house, shops, a large number of individual and court-type houses, and several dormitories. Streets are being surfaced with oil-mix material both in Mason City and the government townsite.

Slide causes trouble

Considerable difficulty has been experienced with an earth slide at the west side abutment. Approximately 3,000,000 cu. yd. of sand-clay material has been taken out of this area since March, 1934, when the material first showed signs of slipping and becoming unstable. It has been necessary to relocate the highway and railroad, which extend across the slope of the slide face, from the original alignment as a result of the large depression made in the hillside. The present slide area has a face width of about 600 ft., a depth of about 400 ft. and a total height of 600 ft. above the present ground elevation at the toe.

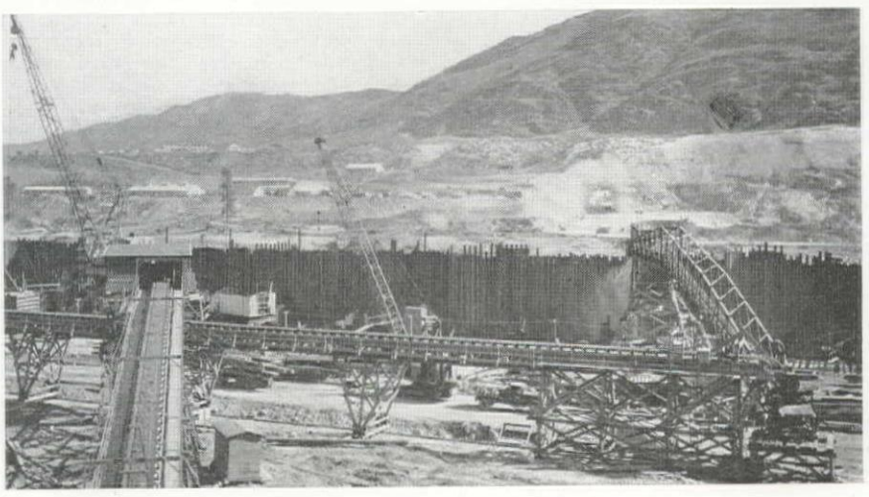
In an effort to stabilize the hillside area, several pump pits have been excavated to bedrock along the toe of the slide to a depth of about 100 ft. Drainage of the slide area will reduce the possibility of further movement of the material. Bureau of Reclamation engineers have determined from drill samples and other studies that the material has been moving on a well lubricated clay slide plane. During preliminary excavation the normal toe of the slide material, which is superimposed on the slide plane, was removed, thereby removing the supporting element for the material above and permitting it to move downward. The face of the slide is being finished at 1½:1 slope above the roadway, with a 2:1 slope below.

Record cofferdam placed

Spectacular progress has been made on the erection of the west side cofferdam which is practically completed and the excavation within the cofferdam area. Nearly half of the total 10,000,000 cu. yd. of overburden in this area has been moved to the disposal dump in Rattlesnake Canyon.

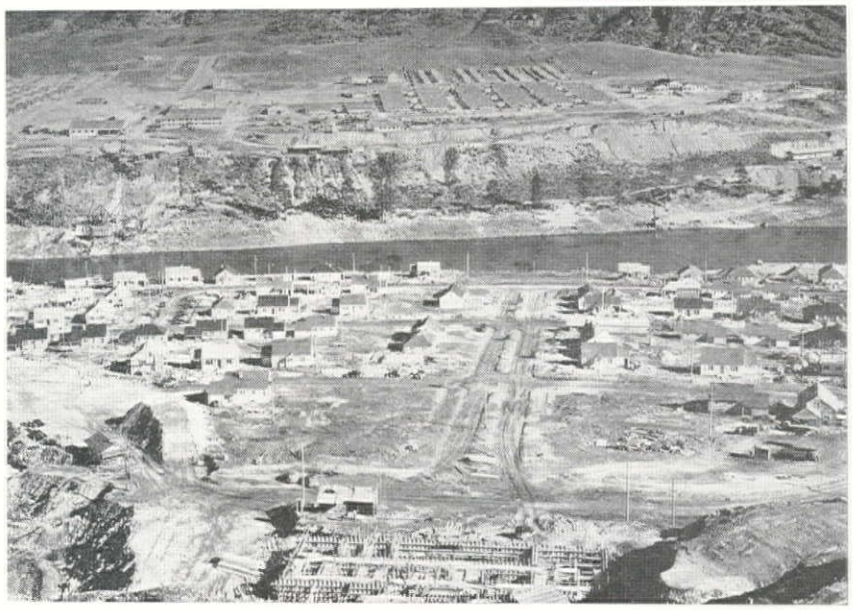
In placing concrete for the 300-ft. high dam (3,400,000 cu. yd. of concrete required for low dam) the plan of operation provides for river diversion in three separate stages by cofferdamming the west side abutment area first, followed by the erection of the east side and

Systems of conveyor belts are used to backfill the cells of the cofferdam and, later, to remove the excavated material.



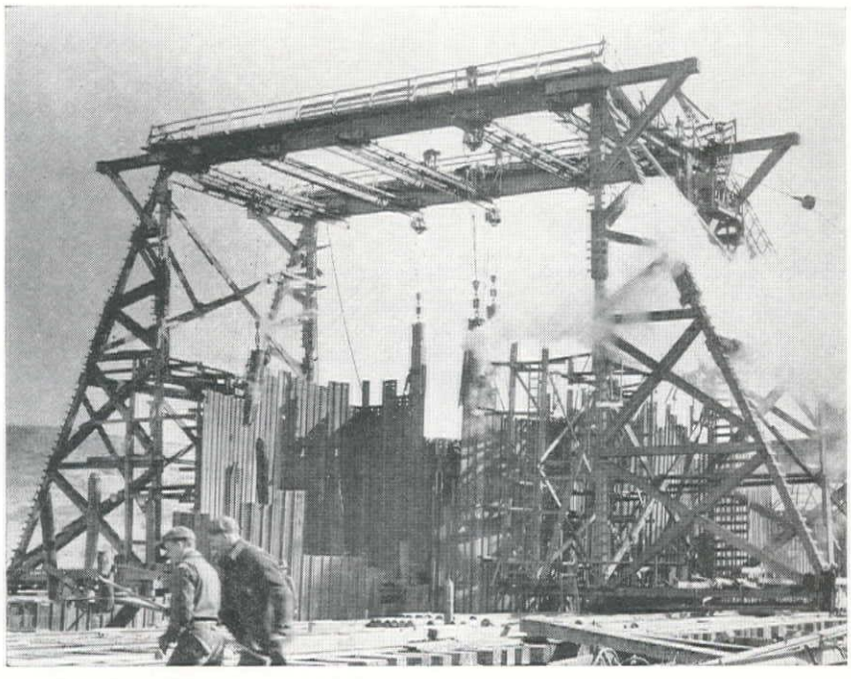
main channel cofferdams. The east cofferdam, with a total length of 1,700 ft., will not be started until the late fall of 1935 and the upper and lower midstream cofferdams across the mid-channel between the east and west cofferdams which are separated by a 700-ft. opening, will not be built until the fall of 1936. The present schedule provides for placing first concrete for the dam, inside the west cofferdam, in September of this year.

The west cofferdam is notable because of (1) its total length of 3,000 ft., (2) the relatively short time of only three months required for its construction, (3) the 110-ft. average length of steel sheet piles, and (4) the average penetration of 65 ft. through hard and nearly impervious clay material resembling shale. The sheet steel pile cofferdam is of cellular type, filled with sand and gravel overburden material, and includes several different types of construction. It extends along the axis of the river a distance of about 1,800 ft. and is provided with upstream and downstream shorelegs, which curve back to higher ground. These shorelegs consist of an outer sheet steel pile wall and an inner timber bulkhead wall made up of 6 by 16-in. timber lagging and 12 by 12-in. timber walers tied to the front steel wall with tie rods and forming a wall 37 ft. thick.



Mason City in the background across the river and the Government town in the foreground.

Gantry frame carrying a battery of McKiernan-Terry steam hammers for driving the sheet piling.



Located equidistance about the axis of the dam and separated 760 ft. are two cell clusters 200 by 150 ft. in area. These clusters of 6 cells each are located at the point where the cross channel cofferdams will later be built and serve as a connection point between the outer cells and a sheet steel piling diaphragm wall located 200 ft. back from and parallel to the front pile wall. The cells upstream from the lower cell cluster are 40 by 50 ft. in area and the downstream cells are 36 by 90 ft. in area with toe fills being provided both inside and outside for necessary stability and to prevent scour by the river.

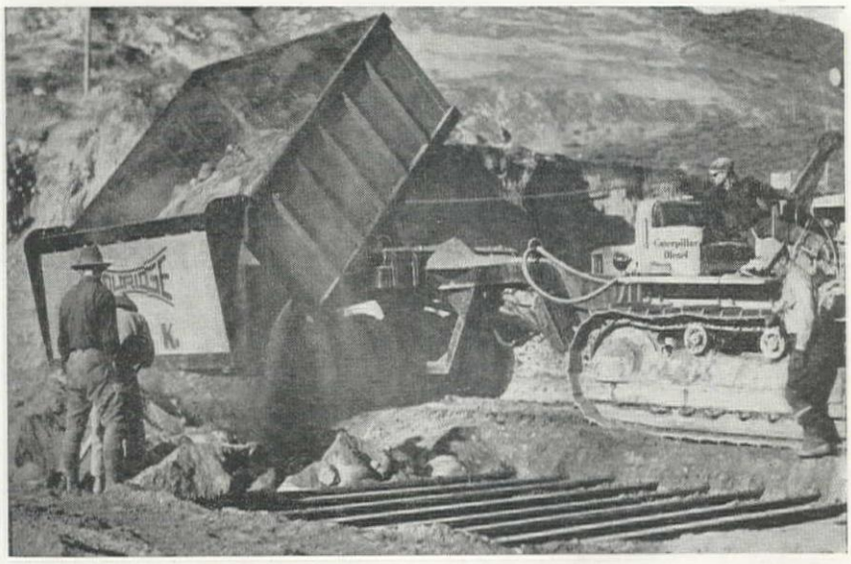
To eliminate the possibility of washing away the inside toe fill in case of extremely high water which could overtop the cofferdam, a 23 by 30-ft. emergency flood gate provided with stop logs has been built into the lower shoreleg, to permit the contractor to flood the workings inside in a controlled manner. The gate is connected to a 400-ft. long concrete lined sluiceway which is located on a 16% grade. The 90-ft. width of cells below the lower cluster is necessary to provide proper stability since the sluiceway for the flood gate is located immediately adjacent to the back wall and eliminates the possibility of providing a toe fill to give the effect of a buttress against the cells.

The first concrete will be placed in the area between the outer cellular cofferdam and the inner steel sheet diaphragm wall connecting the two cell clusters. This area will be excavated to bedrock immediately after high water has receded after the 1935 flood season. To provide necessary stability to both walls, a row of 20-in. I-beams at 10-ft. centers are being driven to bedrock about midway between the diaphragm and the inside cofferdam wall to which "A" type trusses will be connected at frequent intervals along the length of the beam as the excavation proceeds. A deep trench is at present being excavated through a strata of gravel and boulders after which 10-in. diam. holes will be bored through the hard clay into which the steel beams will be driven. A series of pump pits have been excavated along the inner cofferdam wall and inner diaphragm, and seepage water is being pumped out.

The major part of the cofferdam fill, amounting to a total of 275,000 cu. yd., and an additional 50,000 cu. yd. of material used in the toe fill (140,000 cu. yd. total required) was placed by a belt conveyor system. Material was loaded by crawler wagons through a steel apron feeder onto a 48-in. belt, 260 ft. long which in turn fed onto an 860-ft. long traveling shuttle conveyor. A movable 36-in. boom conveyor, 200 ft. long, on a structural steel bridge transported the material from the shuttle conveyor directly into the cells. A road is located on top of the cofferdam and provides a quick means of access from one side of the area to the other.

Erecting the cellular cofferdam

An average of 20 ft. of gravel and boulder overburden was stripped along the location of the cofferdam prior to driving the first pile on January 1, 1935. This was rather a tedious job due to the large boulders and rocks encountered, which in many instances required underwater blasting. A timber and steel deck trestle was built along the cofferdam to carry the gantries and derricks used in the driving operations. For driving the piles, 30 various sized McKiernan-Terry steam hammers were used, being mounted on the following equipment; 4 Clyde-Wiley electric whirlies equipped with 110-ft. booms and mounted on 30-ft. high gantries; 2 American steam whirlies equipped with 85-ft. booms and 3 skid mounted derricks with 130-ft. booms; 3 Lambert stiffleg derricks equipped with 125-ft. booms and Lidgerwood electric hoists; and a special timber gantry which spanned the cofferdam and supported four hammers mounted on electric trolley hoists. Each hammer was



Excavated material, moved by tractor-trailer units, is loaded onto the conveyor belts through steel grizzlies.

fitted with a special 5-ft. long slotted steel guide which was set into place over the end of the pile prior to driving, by a workman suspended in a seat from the end of the booms.

A total of 7,053 separate piles, involving more than 12,500 tons of steel and a total length of about 791,000 ft. were driven in three months. The piles, of interlocking type, are 15 in. wide with a web thickness of ⅜ in. and weigh 38.8 lb. per lin. ft. Piles were driven to refusal when the penetration amounted to 1 in. or less under eighty 3½-ton strokes. Due to the resistance offered by the clay material underlaying the upper overburden an average of 35 strokes was required for a penetration of one inch.

The outer wall of the cofferdam is cut off at Elev. 994 which is considered sufficiently high to prevent overtopping under ordinary flood conditions. On May 21 the river stage was at Elev. 958 and the flow was estimated at about 182,000 sec. ft. The river has been rising at a maximum rate of one foot per day and the maximum flood stage of the Columbia River at Grand Coulee normally occurs about June 10. The highest flood on record occurred in 1894 when the flow at Grand Coulee was estimated at 725,000 sec. ft., and the water surface reached Elev. 1003. During the past 30 years the highest water level was Elev. 965 with a flow of 251,000 sec. ft., occurring in 1926. The bedrock elevation varies from 870 to 875 ft. at the axis of the dam and the spillway of the low dam is at Elev. 1085.

Excavation proceeds rapidly

An average of 43,000 cu. yd. of material per day is being taken out of the west cofferdammed area by means of an elaborate belt conveyor system and about 12,000 cu. yd. of material per day is being moved out of the east side abutment area by Guy F. Atkinson, subcontractor, who is using shovels and trucks exclusively. The lowest level in the west side excavation is at Elev. 940 and on the east side trucks and shovels are working at Elev. 925 or about 35 ft. below river level. The east side working is protected from the river by an earth cofferdam at present.

Material is fed to the 60-in main belt conveyor, the largest ever used in construction work, by means of crawler wagons of 10 and 25-yd. capacities, dumping into steel apron feeders through steel grizzlies having 13-in. wide slots for the clay material to pass through. Several feeder conveyors, varying from 295 to 450 ft. in length, transport the muck to the main conveyor which carries the material to the Rattlesnake Canyon dump, a distance of 6800 ft. (ultimate length of conveyor to be 1⅝-mi.).

Electric shovels, carying in capacity from 2 to 5 yd., are located on different levels and are used for loading the crawler wagons. The heavy clay material is easily loosened by the dipper teeth, no blasting being necessary. The main conveyor is made up of 20 separately powered units ranging in length from 160 to 475 ft. and has a speed of 620 f.p.m. The rated capacity of the conveyor is 52,000 cu. yd. per 21-hr. day. (See **Western Construction News,** March, 1935, p. 80 for complete description of this belt conveyor system.)

Earlier plans provided for handling the material behind the east side cofferdam with a similar belt conveyor system but the material will be handled instead by shovels and trucks which dump directly on the waste dump about ¼ mi. upstream. An excellent haulage road, surfaced with 18 in. of rock, having an easy grade for loaded trucks has been built and the dump is kept in excellent condition for the trucks to move over. Nearly 1,000,000 cu. yd. of material has been taken out of the east side area under a sub-contract.

Gravel and concrete plant

Plans are nearly completed by MWAK for the gravel production, batching, and mixing plants. Aggregate will be taken from Brett pit, located immediately above Mason City and about ¾ m. from the damsite. The material will be taken out with shovels, loaded on belt conveyors and transported to the plant at the pit for grading and washing. It is estimated that about 13,0000,000 cu. yd. of material will be wasted in getting out the required aggregate for the concrete. The aggregate will be transported to the mixing and batching plants, located on both sides of the river, by belt conveyor.

Both concrete plants will consist of Johnson automatically controlled electric batching equipment and four Koehring 4-yd. concentric zone tilting mixers. These mixers are fed and discharge from a single drum opening. Material will be transported across the river to the west side plant on a belt conveyor also. Concrete will be handled in cars drawn by Davenport diesel-electric locomotives and will be placed in the dam with the derrick equipment which was used in driving the west cofferdam.

A total of 3,900 men are now employed on the project of which 266 are connected with the Bureau of Reclamation and 3,634 are on the payroll of MWAK. The field and office personnel of MWAK include the following: H. L. Meyer, general manager; George H. Atkinson, assistant general manager; M. H. Slocum, general superintendent; Francis Donaldson, chief engineer; C. D. Riddle, job engineer; R. L. Telford, cofferdam engineer; J. O. Foster, designing engineer; and G. C. Wilson, cofferdam superintendent.

The Bureau of Reclamation construction staff under whose direction Grand Coulee dam is being built include: Frank A. Banks, construction engineer; A. F. Darland, assistant construction engineer; C. M. Cole, field engineer; and J. A. Miner, office engineer. Elwood Mead is commissioner of reclamation, Washington D. C., and R. F. Walter is chief engineer of the Bureau of Reclamation.

Gas Tax Used for County Overhead

DECISION to use a part of the county allotment of California State gas tax revenue to cover the cost of the engineering department by the supervisors of San Mateo county is planned to result in eliminating the cost of the county engineers department from support by county taxes. On May 22 the Board of Supervisors cut the sum of $33,000 from the county governmental salary budget which is spent for the engineering department, contending that the county's share of the gas tax revenue received annually from the state is adequate for the expenses of this department.

As a result of this action, the county engineering office literally becomes a county highway office because the work done with the county allotment of gas tax money must be confined, according to state law, to highway work. As a result, according to report, the engineering office will not be able to carry on any further work on plans for rapid transit development or harbor work. In the past, these other phases of engineering work have been done by the county engineering office. During the past year San Mateo county received about $235,000 from the state of California as its share of the gas tax funds and the estimate for the coming year, with improved conditions, is placed at almost $250,000. Out of this fund the supervisors intend to take the $33,000, estimated cost of the engineering department salaries, and reduce the county tax assessment accordingly.

Plant-Mix Highway Job in Nevada Uses Machine New in the West

Contractor lays 1,300 tons in 10-hr. day and placing of material is limited by plant capacity

Truck being pushed along by paving machine as it discharges load of bituminous-mix surfacing.

LAYING 1,300 tons of bituminous plant-mix highway surfacing on a 4.73-mi. contract for the Nevada State Highway Department, the plant capacity of Fredrickson & Watson Construction Co., Fredrickson Bros.-Jones and King, contractors for this job, limited the possibility of a greater output. The project was started with the standard method of spreader-box distribution from trucks followed by grader blading and final rolling. After the work had started the contractor introduced an Adnun paving machine—the first to be used in the West—and completed the job with this process. Following an initial day's run of 800 tons in 10 hr. the machine output on the succeeding day was increased to 1300 tons.

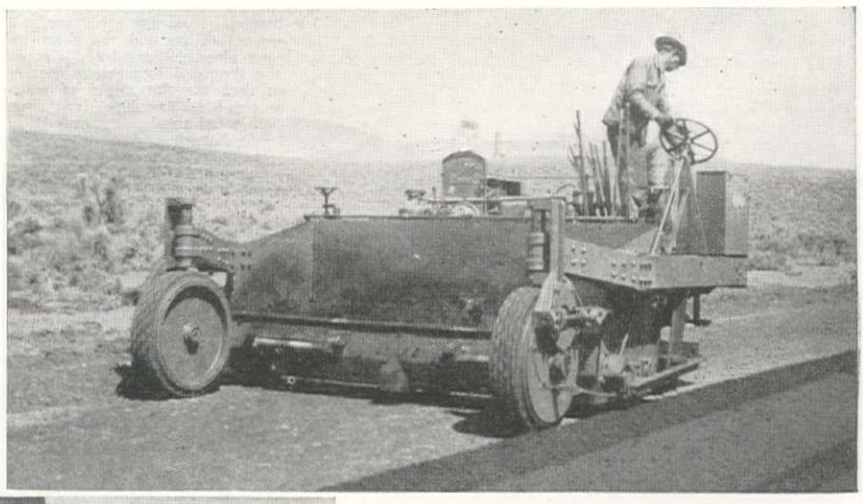
The project is located in Douglas County and consists of grading and surfacing 4.7 mi. of state highway. The width of the highway was 20 ft. and the specifications called for a 2½ in. compacted depth of bituminous surfacing.

The contractor set up a gravel crushing and mixing plant about 2 mi. from the job. The crushing plant delivered material by conveyor built directly into the mixing plant. This plant operated with the usual drying, batching, and mixing units, the graded material being mixed with kerosene cutback (MC 4). The resulting mix is officially designated a "bituminous, plant-mixed dense-graded crushed gravel surfacing." The grading of the aggregate is as follows:

Passing 1 in.	98.8%
Passing No. 3 sieve	52.2%
Passing No. 10 sieve	39.7%
Passing 200 sieve	8.8%

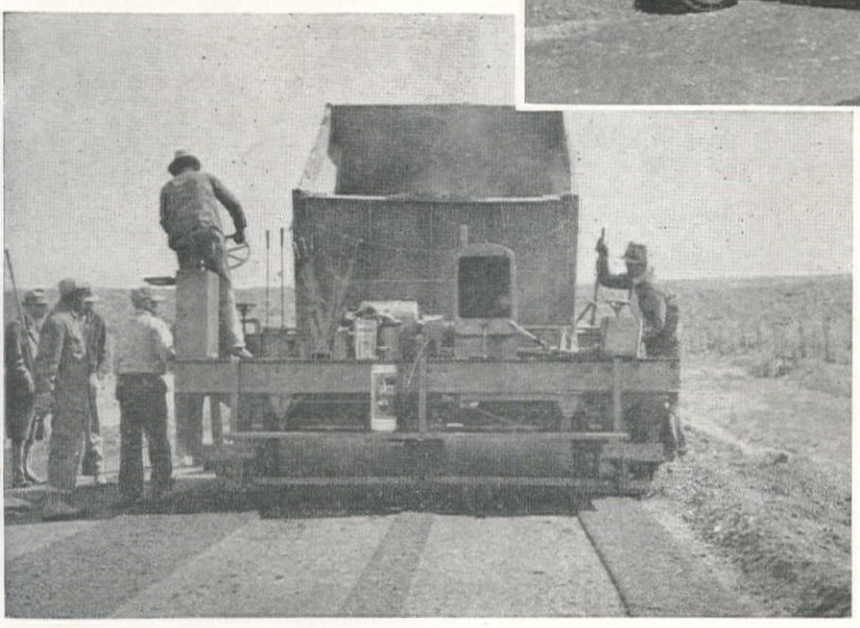
The usual laying procedure for this type of material, as used at the beginning of the work, consisted of placing the mixture on the highway with spreader boxes, followed by blade graders and final rolling. The use of the blade graders is to allow some of the solvent to dry out bringing a faster set to the mixture. With the introduction of the Adnun machine this laying process was modified and the operation of the machine was followed directly by rolling, spreader boxes and the grading operation were eliminated.

Briefly, the machine is a self-propelling unit with a large hopper which takes the material dumped from the trucks. At the bottom of this hopper is a revolving raker bar which agitates the mass and tends to eliminate segregation in the mix. As the machine moves hopper covering a 10-ft. strip and is struck off by a toothed cutter bar act-



Having placed a 10-ft. strip the machine is returning under its own power to lay the other half of the roadway.

Surface left by machine which is ready for rolling without intermediate steps in finishing.



forward the material drops out of the ing as a screed. Following the passage of this machine the usual rolling operation completes the surfacing work.

The machine is self-propelling, operated by a 26 h.p. engine. In addition to propelling itself either forward or backward the machine has sufficient power to push the loaded truck during the time the truck is discharging into the hopper. Loaded trucks are backed up against the front of the machine and dump into the hopper. This is done as the machine moves forward, pushing the truck which is not moved under its own power during the time it is discharging. On this particular job the machine

pushed loaded trucks up a 5.4% grade. On the down grades the general procedure is the same except that the truck driver uses the brakes to maintain the truck in contact with the machine.

After the machine has laid several hundred feet of one-half the roadway width, it is run back under its own power to lay the other half of the roadway. This difference between the length of the two halves of the surface is kept to a minimum because of the necessity for the trucks to back down the 10-ft. lane to the machine. On this job traffic was detoured from the highway under construction so that the laying operations were able to carry forward the two halves of the highway by alternate operations as described in the foregoing.

On May 1, according to reports, the first day of actual operation, the output of the laying machine was 800 tons in a 10-hr. day. On May 2 this was increased to 1,300 tons and on May 3 the output was 1,250 tons. The output on these two days represented the capacity of the mixing plant and reports indicate that the laying operations would have been even faster if the plant capacity had not been the limiting factor.

The contracting firm of Fredrickson & Watson Construction Co., Fredrickson Bros.-Jones and King, was represented on this project by Charles Fredrickson and S. Jones.

Revised Plan for San Gabriel Dam Rejected by State Engineer

THE revised design of San Gabriel Dam No. 1, submitted by the Los County Flood Control District to the state engineers office, has been disapproved, on recommendation of a consulting board consisting of Charles D. Marx, W. L. Huber and F. C. Herrmann. An independent review of the revised design by E. W. Kramer, district engineer, U. S. Forest Service, also failed to approve the modified plan. Since the revised design was rejected, there has been no announcement made by the flood control district as to the next step to be taken.

Changes incorporated in the revised design had included flatter side slopes and the use of quarry waste material from the adjacent quarry (No. 10) already developed. Rock from this vicinity was considered of inferior quality for a strictly rockfill dam.

Available funds from the original 1924 bond issue, according to report, total about $12,000,000 and the need for: (1) staying within this figure, if possible, (2) modifying the design without the need for canceling the existing contract with attendant costs and (3) obtaining state approval of a design with available material represents some phases of the problem involved.

The report of the consulting board to State Engineer Edward Hyatt follows:

San Francisco, Calif.,
May 6, 1935.

Edward Hyatt, Esq.,
State Engineer,
Sacramento, Calif.
Dear Sir:—

We, the undersigned consulting engineers appointed to advise your department in the matter of approval of design for San Gabriel No. 1 Dam as proposed by the Los Angeles County Flood Control District under amended Application No. 32-19, herewith submit our report to you upon the safety of the structure proposed in the amended application filed April 13, 1935, together with our conclusions in connection therewith.

The location of the site and geological conditions affecting the safety of the dam proper located thereon were covered in our report to you bearing date of June 21, 1932, wherein we expresssed our approval of these features. Subsequent explorations and studies by geologists confirm our conclusions. Since no material change in location is proposed in the amended application we adhere to our conclusions regarding these features.

The amended application contemplates a very material departure from the design indicated in the original plans and specifications which was the subject of our report to you of June 21, 1932. We appreciate that the failure of the quarry which was selected to produce rock capable of meeting the requirements of the original specifications at reasonable cost has imposed a financial burden not contemplated by the District's officials when construction was started, and we are in sympathy with any efforts to lessen this burden. However, it must at all times be fully appreciated that the failure of a dam located at this site would constitute a major and appalling disaster involving loss of life and property which would outweigh any financial consideration.

The use of a dumped fill of mixed material, such as it is proposed to utilize for the body of the dam, will not, in our opinion, afford assurance of stability.

We are of the opinion that serious settlements and lateral displacements will occur in the proposed fill, particularly with the application of water pressure due to the high heads involved with the reservoir in service. In this connection we are of the opinion that the impervious section as proposed would be ruptured by such settlements or displacements. It is probable that the passage of any considerable quantity of water into or through the proposed structure would endanger it by saturating and by displacing or removing fine material from the structure.

The thinness of section and the short path of percolation must also be considered elements of weakness of the proposed impervious section. It is our opinion that the flat angle at which the impervious section lies renders it particularly vulnerable if subjected to shaking or quaking effects from seismic disturbances to which this area is subject.

Even if this dumped fill could be considered the equivalent of a thoroughly compacted fill, it is our opinion that the slopes proposed are not in accord with those dictated by conservative engineering practice which is imperative under the conditions existing at this site.

At the time of our previous investigation and report (1932), the plans presented for your approval for a closed spillway similar to that in the plans now before us. The spillway is located in the right abutment of the dam, through which are a number of faults and zones of weakness, as fully described in the report of geologists Ransome and Sedgwick of January 12, 1935. At the time of our previous report careful consideration was given to the geological conditions of the right abutment, the seismic activity of this region, and the hydraulic conditions that would prevail with the spillway in service, and we concluded that any type other than an open type spillway would not be safe. This was discussed at length with the District's representatives who concurred in our views and agreed that further studies would be made and a design of an open type spillway would be submitted for your approval at a later date.

We wish again to impress upon you the unfavorable conditions for a closed spillway in the right abutment and advise against the approval of the design of spillway in the amended plan now before you.

The plans provide for a dam of unprecedented height, considering the character of construction, located in an area subject to seismic disturbances and lying directly above a populous, intensely developed region.

From the standpoint of safety we advise against approval of the plans and specifications which you now have under consideration.

Yours truly,

Chas. D. Marx,
W. L. Huber,
F. C. Herrmann.

Operations of the West Slope Construction Co. have been suspended during the past few months while the change in design has been under study.

Long Valley Dam Started On Mono Basin Project

PRELIMINARY WORK has been started on building Long Valley Dam, a unit in the Mono Basin development being carried out by the construction forces of the Los Angeles department of water, under the general direction of H. A. Van Norman, chief engineer and general manager. In April, road construction was started to the dam site and this will be followed by the work on lining the diversion tunnel at the site. This diversion tunnel was driven several years ago in connection with earlier work on the Los Angeles aqueduct project and the 6,450-ft. bore of 9 ft. diameter was partially lined at that time. The present program calls for this work to be completed in August; it will employ about 100 men.

The Long Valley Dam, on the Owens River, will be about 145 ft. high and store 163,000 ac. ft. The purpose of this storage will be to regulate the Owens River run-off and the additional supply of Mono Basin water which will be diverted into the Owens River with the completion of the Craters Tunnel, now under construction. The dam, according to present reports, will be of the rock fill type with a welded steel facing.

Progress to the middle of April on the Mono Craters Tunnel (February, 1935, p. 33) amounted to 2,273 ft. driven from the west portal, 1,354 from the east portal, and shaft No. 1 (900 ft. deep) has been sunk 314 ft. and shaft No. 2 (300 ft. deep) has been sunk to a depth of 87 ft. Work on the two shafts which are being sunk to provide four more driving faces for the tunnel was slowed up during April for the placing of concrete lining and the erection of permanent headworks.

Force account operations for the bureau are under the direction of H. L. Jacques, engineer of construction who is in charge of both the tunnel work and the present operations in lining the old diversion tunnel at Long Valley.

•

Highway Contract Terminated On Failure to Pay Code Assessment

Acting under instructions from the Bureau of Public Roads, the Colorado State Highway Department has terminated its contract with W. A. Colt and Son, Lyons, Colo., for a 4.78-mile highway project (USPW NRH 243-E, Div. 2) located on the easterly side of Wolf Creek Pass, involving an expenditure of $211,213. This action of the bureau was taken in response to a recommendation of the contract division of the NRA, which had found that under an executive order, the contractor was in violation of the code because of their failure to pay assessments. This was the first instance in the West where positive enforcement was made on code violations, and especially interesting by reason of the fact that the violation involved was merely that of failure to pay code assessments.

Note: This action was taken prior to the U. S. Supreme Court decision on the NRA and no further information has been received on subsequent action.

Mad River Water Supply Project for Eureka, California

CONTRACT has been awarded to T. E. Connolly and Hanrahan Co., San Francisco, on a bid of $503,145, to construct a concrete arch dam and a 2,400-ft. tunnel, the initial unit in a $1,200,000 project to develop a new water supply for Eureka, Calif., from the Mad River. The development will replace the existing local surface and well supply which has been inadequate for about 10 years. Financing will be through public sale of bonds voted by the city Aug. 31, 1934, together with a PWA grant. Present plans call for the new supply to be delivered by the summer of 1936.

History

For many years the City of Eureka, on Humbolt Bay in northern California, has used water from the Elk River, a relatively small local stream. Municipal growth and the cycle of dry years combined to render this source inadequate and a supplemental supply was developed from wells in 1928. This pumped supply was never of good quality and by 1931 the water became extremely hard and the salt content was rapidly increasing.

Preliminary studies were made of possible developments on Jacoby Creek and Little River in 1930 and 1931. In 1932, C. C. Kennedy, consulting engineer, San Francisco, was retained to prepare a detailed report on bringing in a supply from Mad River. The project outlined in the report, in addition to supplying water of excellent quality sufficient for the ultimate growth of Eureka, also presents a plan for a future power development capable of providing up to 40,000,000 k.w.h. per year.

Based on this report, a revenue bond issue to carry out the water supply project was passed by the city in Dec., 1933. After considerable delay this type of bond was objected to by the PWA with a request that general obligation securities be substituted. At a second election in August, 1934, a $959,000 issue of general obligation bonds was passed by a nearly 7 to 1 majority. These bonds were sold in the open market at a substantial premium last December and bids for the work were opened April 23, 1935.

Bidders and the proposals submitted follow:

	Headwks.	Pipeline	Reserv.	Totals
T. E. Connolly & Hanrahan Co., San Francisco	$503,145	$644,083	$73,900	$1,221,128
Mercer-Fraser Co., Bent Bros., & Dixon	550,415	627,686	68,900	1,246,901
American Concrete and Steel Pipe Co.	597,854	621,360	72,070	1,291,184
MacDonald & Kahn Co., Ltd., San Francisco	542,899	654,603	63,240	1,260,742
Teufel & Carlson, Seattle	526,189	608,615	65,340	1,200,144

On May 28, the low bid for the headworks unit was approved by the PWA and bids for the other two units were recommended for rejection, to be readvertised after foundation for the dam is completed. Unit prices contained in these proposals were published in the May issue of **Western Construction News**, p. 50.

Source and Diversion Works

Mad River, a stream about 100 miles long, has its headwaters at about Elev. 3,000 in the Trinity Mountains, which range from 5,000 to 8,000 ft. in height. The watershed area is narrow, but the precipitation averages about 50 in. per year with a maximum recorded flood of 19,000 sec. ft. and an average annual runoff of 700,000 ac. ft. At a point 19 miles from its mouth in the ocean 6 miles northwesterly from Arcata, the river passes about 10 miles east of Eureka and a site suitable for an arch dam at this location provides ample head for a gravity conduit to the city.

The present development calls for a variable-radius concrete arch dam 115 ft. high above stream bed (130 ft. estimated to deepest foundation) which will: (1) serve as the diversion dam, (2) store 19,000 ac. ft. with resulting clarifying action, (3) place 270 ft. of head on parts of the pressure conduit and (4) subsequently may be raised an additional 115 ft. if the ultimate power development is carried out.

The structure will contain about 22,000 cu. yd. of concrete to be placed with the aid of vibrators. Features of design are: special supporting buttresses to add to the stability of the arch when the reservoir is empty, use the Troiel system of grouting and an overfall spillway designed for 70,000 sec. ft.

Conduit System

From the reservoir, the water supply flows directly into a 2,400-ft. length of 9-ft. diameter (finished) concrete lined tunnel. This tunnel size is based on the future power development plan.

The line then continues north down the canyon of the river in 24-in. redwood stave pipe (1½-in. thick staves) placed on redwood blocks and mudsills at 10-ft. spacing. The wood stave line is all above ground with a minimum clearance of 4-in. specified. Total length of the wood stave line is 46,000 ft.

To avoid very rough country for about two miles on the west side of the river, the pipe line is taken across the river on a 392-ft. span suspension bridge with timber stiffening truss and returned to the west side on another similar type bridge of 448-ft. span. Cables for these bridges are 2⅝ and 2¾-in., respectively, supported on structural steel towers resting on concrete piers. Total height of the pier and tower is about 92 ft. at the lower crossing and 57 ft. at the upper crossing.

Across gulches the pipe is supported on a standardized design steel trestle type of construction with a minimum radius vertical curve of 120 ft. for the pipe as the ruling consideration. At locations where highway crossings or private property required the line to be covered, steel pipe was substituted for the wood stave construction.

Near the mouth of the river canyon the conduit passes through a ridge in a small size 775-ft. tunnel and turns southward toward Eureka. At about the northern limit of Arcata, the type of construction changes to steel pipe and is to be placed in trench for the remaining 59,000 ft. of the terminal reservoir. Because of the acid condition of the soil, this pipe is specified to be covered with either a ¾-in. layer of concrete or a similar thickness of Gunite. The pipe is to be either 5-16-in. thick steel with a spun bitumastic lining or 0.135-in. thick with a ¾-in. inner lining of spun concrete. The inside diameter of this pipe is 21-in. for 19,500 ft. and 24-in. in diameter for remaining distance of 39,600 ft. All steel pipe to be electric welded.

Terminal facilities

About 8,000 ft. back from the terminal reservoir is the venturi meter and chlorinator house.

To supplement existing distribution reservoirs, which will continue to be used, a terminal reservoir of 5,000,000 gal. capacity will be built as part of the present project. This structure will be of the Hewitt, prestressed concrete type, 200 ft. in diameter, 22 ft. high, with a redwood roof. The floor and walls will be poured concrete and the upper part of the outside covering will be Gunite.

An existing elevated steel tank and a timber tank supply the higher zone of the distribution system and a special valve arrangement will provide for automatic filling of these high level tanks with the conduit feeding the main 5,000,000 gal. the remainder of the time.

The new system will operate entirely by gravity and is designed to deliver 5 m.g.d., with a full head on the reservoir. The present average consumption of the city is about 1.8 m.g.d. with a peak of 3 m.g.d. With anticipated growth, the system will be adequate until 1958 with gravity delivery, and after that it could be operated by gravity for all but the higher areas where supplemental pumping could be used. The present supply system will be abandoned when the Mad River project is completed.

At present, three old pressure filters are used to treat the surface of the existing supply and these units will be moved, after the new supply is cut-in, and set up near the head of the conduit to filter the new supply. Mad River water has a hardness of about 80 p.p.m. and the load on the filters will be relatively light because of the clarifying action of the storage behind the diversion dam.

An important feature of the specifications provides that the first work to be done on the project is to be the stripping and exposing of the foundation rock at the dam site, to permit inspection by the state engineer, for final approval, and no other work must be done or will be paid for until this approval has been secured.

Plans for the project have been prepared by C. C. Kennedy, consulting engineer, San Francisco, with E. N. Prouty, designing engineer.

●

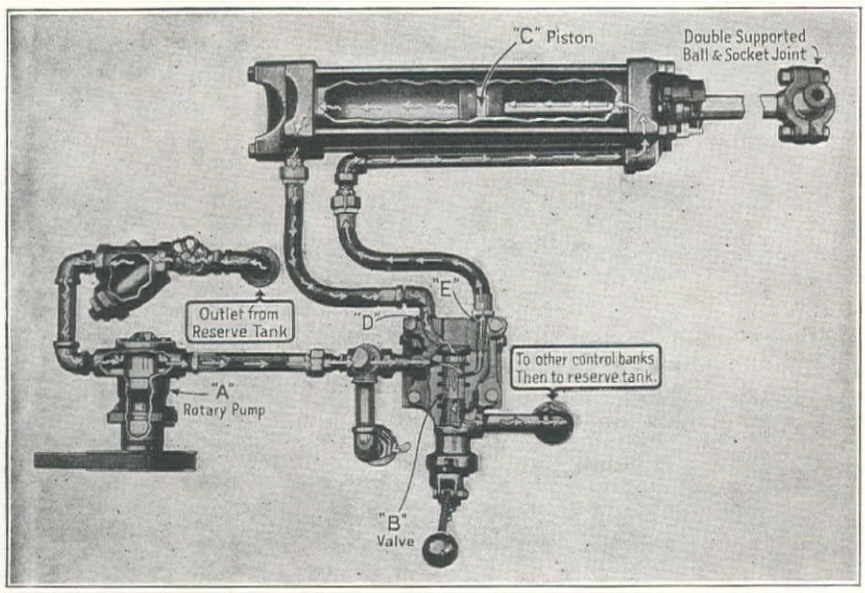
Public Works Office Planned

A Department of Public Works in the Los Angeles county government organization, to be created by consolidating several existing departments, has been recommended in a report submitted to the board of supervisors by a committee studying the problem of simplification in county government. No action by the board on this report has been announced.

Why HYDRAULIC CONTROLS FOR ROAD MACHINERY?

● Hydraulic systems for positive control—on mammoth presses and broaching machines—in automobile brake control—these are familiar to contractors and engineers. They show the trend of recent years in other industries. Austin-Western leads this development in the road machinery field.

In 1932 Austin-Western installed its first hydraulic equipment on the "77" Dual Drive Motor Grader. The success of this equipment as compared to hand or mechanical controls has more than justified its application to practically every machine in the line.



Because

● Work is done faster and better as the operator's efficiency continues to the end of the day.

● Cost of operation is low since only during actual application of power is there any resistance to the free flow of oil in the line.

● Cost of maintenance is negligible when compared to mechanical controls; there are no gears to wear out (only one rotating part is used in the system) and any replacements needed are inexpensive.

● The greenest operator cannot damage the machine since even when the controls are left open, pressure on the piston at the end of its stroke is relieved by a relief valve returning the oil to its reserve tank.

● There is nothing to jam or stick in the entire system; it is built with a reserve strength 24 times greater than the maximum pressure that can be exerted on the line.

● Austin-Western controls operate in any kind of weather; the liquid used is ice machine oil flowing freely at sub-zero temperatures.

How These Controls Work

The oil travels from the rotary pump A (note small straight shaft arrows) to sliding shaft B set to divert the oil into the right hand side of the cylinder above causing the piston C to move to the left. This movement forces the oil on the left hand side of the piston to return (follow the wavy arrows) to valve B. This valve may be shifted to reverse the flow of oil or it may be placed in neutral, locking the oil on either side of the piston at D and E. When the flow is stopped at these points a firm wall of oil is confined on each side of piston C holding the piston in a vise-like grip, while the oil from the pump continues to flow freely through the valve returning eventually to the reserve tank.

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Rolled Earthfill Dam For California Irrigation District

TO SUPPLEMENT the water supply of the South Fork Irrigation District, near Alturas, Calif., obtained from the South Fork of the Pit River, a 65-ft. rolled earthfill dam will be built on West Valley Creek. The 17,000 ac. ft. of storage provided will be used on the 13,000 ac. of land already under irrigation in the district, and will permit the raising of an additional crop of alfalfa per year, an important development for the surrounding cattle raising area.

The dam will have an impervious section on the upstream side with a 2:1 slope on the face and a 12-in. layer of rip rap. Material for this section will be selected from a nearby borrow pit. The main body of the dam will be of semi-pervious fill taken from spillway excavation, and the downstream section will be of pervious material. Slope of the downstream face will be 3:1. All material will be deposited in thin layers and rolled to compaction. Total fill will be about 50,000 cu. yd., with 26,000 cu. yd. taken from the spillway excavation and the remainder from borrow pits.

The spillway will involve 40,000 cu. yd. of excavation and 850 cu. yd. of reinforced concrete lining.

Present water supply of the district is obtained from the flow of the South Fork of the Pit River without storage facilities. The reservoir will provide a supplemental supply obtained from storing flood flow of West Valley Creek, and a supply ditch 2 miles, involving 21,000 cu. yd. of excavation, will be dug as part of the present work to bring into the reservoir available flood waters from the South Fork, insuring the filling of the reservoir during years of low runoff.

Bids for construction of the dam and the supply ditch were opened June 13. The project is being financed by a PWA loan and grant totaling about $150,000. F. C. Herrmann, San Francisco, is consulting engineer for the district.

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Late Season Delays Highway Jobs in Northwest Nat'l Parks

UNUSUAL heavy snows in the mountains of Oregon and Washington have resulted in delaying the resumption of highway construction operations in the national parks of that region. The working season in these higher altitudes is usually short and this year it will be even further reduced, according to a recent report of W. H. Lynch, district engineer, U. S. Bureau of Public Roads, Portland, Oregon.

At Crater Lake National Park the snow has been heavier than for any year of record and maintenance forces are now at work clearing the entrance highways to the park. Bureau engineers estimate that construction operations on the Rim Road cannot be started much before July 1, this year.

In the Mt. Hood area the road to Cloud Gap Inn, a year ago, was in good condition by May 15, but this year the maintenance foreman reports 10 ft. of packed snow on the ground. In the Mt. Rainier National Park only two jobs are under way at the present time. Joplin & Eldon, Portland, have started work on the Laughingwater Creek Bridge, a 3-span reinforced concrete structure, 234 ft. long, on the south park boundary route, and Erickson, Johnson & Smith Bros., of Naches, have started their contract for clearing a section of the Stevens Canyon highway. This contract is for 3.2 mi. to the top of the Cowlitz River Divide.

Sam Orino has a 2.4 mi. grading contract on the east end of the Stevens Canyon Route, and the Colonial Construction Co. has two jobs totaling 4 miles on the west end. All of this work was under snow in May, but was scheduled to be started by June 10.

National Park Service maintenance forces are clearing snow from the White River Road to Sunrise Lodge and Joslin & McAllister, who have a resurfacing and oil rock production contract 85% completed on this highway, are resuming work in June.

●

Funds Released for Starting Work Under Federal Program

THE FIRST MONEY available for construction work under the $4,880,000,000 work-relief act was released on May 28, when President Roosevelt signed the necessary executive order covering more than $500,000,000 in projects, submitted to him by the advisory council on allotments, headed by Secretary Ickes. All of the work to be done with these funds will be federal projects carried out through existing agencies such as the Bureau of Public Roads, Bureau of Reclamation and the Corps of Engineers.

Of most immediate interest, as work which should be out for bidding with least possible delay, is the allocation for highway construction and grade separation work. These allotments for the eleven western states are:

State	Highways, Roads and Streets	Separation	Total	Unappropriated Balance-Hayden-Cartwright Act
Arizona	$ 2,569,841	$ 1,256,099	$ 3,825,940	$ 1,320,967
California	7,747,928	7,486,362	15,234,290	3,966,103
Colorado	3,395,263	2,631,567	6,026,830	1,743,003
Idaho	2,222,747	1,674,479	3,897,226	1,138,743
Montana	3,676,416	2,722,327	6,398,743	1,884,867
Nevada	2,243,074	887,260	3,130,334	1,151,178
New Mexico	2,871,397	1,725,286	4,596,683	1,470,850
Oregon	3,038,642	2,334,204	5,372,846	1,548,907
Utah	2,067,154	1,230,763	3,297,917	1,066,345
Washington	3,026,161	3,095,041	6,121,202	1,553,206
Wyoming	2,219,155	1,360,841	3,579,996	1,143,856
Total	$35,078,000	$26,404,000	$61,482,000	$17,988,000

The largest single allotment for river work in the West was $16,000,000 for continuation of the Fort Peck Dam project (previous allotments $50,000,000, totaled estimated cost $86,000,000). For continuation of the breakwater work at Los Angeles harbor the allotment was $1,000,000 and $410,000 was alloted for work on the Grays Harbor jetties in Washington. Dredging work on the Willapa River and harbor at Raymond, Washington, received $207,000 and at Vancouver, Wash. (Columbia River) $140,000. These projects will be carried out under the direction of the Corps of Engineers.

Navy yard repair and improvement work, approved by the Advisory Committee on Allotments include:

Mare Island, 9 projects	$1,289,000
Puget Sound, 10 projects	747,000
Seattle, 2 projects	198,000
Keyport, Wash., 1 project	56,000
Bremerton, 1 project	96,000

Wage Scales Established for Work-Relief Program

WAGES have been established by President Roosevelt for the work-relief program which are based on a population density and regional basis with scales set for unskilled, intermediate, skilled and professional classifications. All of the eleven Western states fall in the same regional group which also includes the eastern and northern states. Relief work wage scales for these states are listed in the following table:

	Largest Municipality in County				
	Over 100,000	50,000 to 100,000	25,000 to 50,000	5,000 to 25,000	less than 5,000
Unskilled	$55	$52	$48	$44	$40
Intermediate	65	60	55	50	45
Skilled	85	75	70	63	55
Professional	94	83	77	69	61

These wages will apply to the city and all of the county in which the city is located. Payment of work-relief wages is to be on a monthly basis which eliminates loss of pay on account of weather or other conditions.

Wage scales on highway work and grade separation projects will be fixed by the various state highway departments. The CCC is exempt from the new scales. Also, the PWA scales will be fixed by state directors, with a 30-hr. week remaining as the basis.

●

The Colorado State Planning Commission has requested Governor Johnson to seek Federal funds for a unified state program of water development and conservation. A special committee was appointed to map out the water projects and obtain the necessary data which will be taken to Washington with application for funds. The proposed program would cover a 20-year period.

●

By 2-to-1 majorities, taxpayers of Denver, at the recent municipal election, voted approval of a $2,000,000 bond issue for a sewage disposal plant and a bond issue of $750,000 for the purchase of a site and facilities for an army flying school which the government is planning to build in Denver.

●

As a result of an act recently passed by the Colorado legislature the state engineer is authorized to employ such consulting engineers and geologists as may be necessary in studying proposed dams having a maximum height of 50 ft. or more above stream bed. Investigation in each case is to cover the adequacy of plans and specifications, and the characteristics of the foundation, with expenses to be paid by the proposers of the project.

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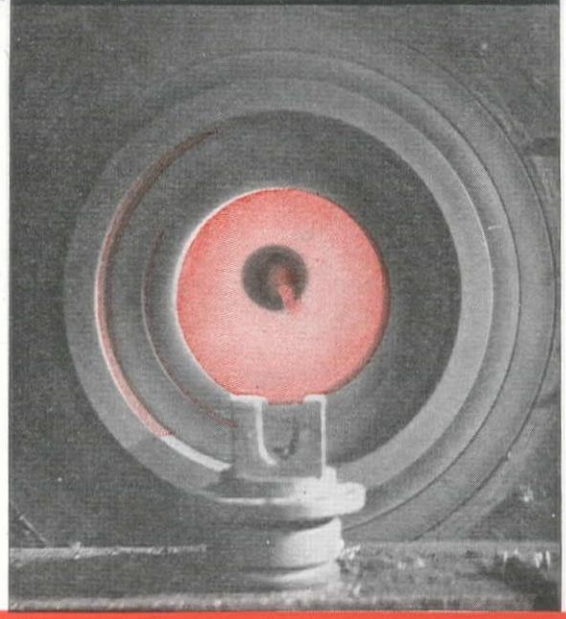

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New Officers for the Montana Section, A.W.W.A.

AT THE tenth annual convention of the Montana Section of the American Water Works Association, the following officers were elected for the ensuing year: C. O. Lauer, president of the Gardiner Light and Power Co., chairman; F. E. Brandis, Whitefish, vice chairman; Herbert S. Foote, (re-elected) secretary-treasurer. Emil Sandquist, Great Falls, was re-elected a director on the national board. Roy M. Arnold, superintendent of the water department, Whitefish, and Kurt Wiel, city engineer, Miles City, were selected as trustees.

Engineering subjects discussed before the April meetings of the Sacramento Section, Am. Soc. C. E. included, Timber Connectors in Wood Construction by H. D. Stover, bridge engineer with the division of highways; Suspension Spans for the San Francisco-Oakland Bay Bridge, by Donald R. Warren, senior bridge field engineer, division of highways; work of the national committee on Aims and Activities by Thomas Stanton, member of the committee.

Officers elected for the Maricopa County (Arizona) A.G.C. are J. B. Matz, president, C. W. Timmons and Harvey Scull vice presidents, V. K. McGinty, treasurer and P. W. Womack, secretary.

Portland Section, Am. Soc. C. E. held a joint meeting with other founder engineering societies at Engineers Day at Oregon State College, May 25, including a joint dinner.

Montana Contractors Association, at at their annual meeting in Helena, May 16, named Fred Birch, chairman, W. P. Roscoe vice-chairman and for directors: H. H. Tomlinson, J. L. McLaughlin, J. C. Boespflug, E. C. Powell and Roy Malser. J. L. Taylor is manager.

●

Construction Operations Start On Cherry Creek Dam at Denver

Actual work has started building a railroad which will carry material to the site of the $794,000 Cherry Creek flood control project, located near Sullivan, Colo., a few miles southeast of Denver. City Engineer A. K. Vickery of Denver announced that rail laying will follow the work of grading which has been completed along the 1,170-ft. right-of-way to the site. Five bidders on steel sheet piling put in indentical bids at $81,285.81. Twelve of thirteen bidders on 11,400 bbl. of cement submitted similar bids of $2.99 a barrel, while the thirteenth submitted a price of $2.87. One bid was received on four tons of reinforcing steel, at a price of $3.108 per 100 lb.

Contract for building the Cherry Creek dam is held by M. E. Carlson, Denver, on a bid of $161,427.

●

Roosevelt Irrigation District Improvements to Be Made

About the latter part of October, when the demand for irrigation water slackens, the Roosevelt Irrigation District will line between 40 and 50 miles of gathering and distribution canals, west of Phoenix and Glendale, Ariz. The lining will consist of 1 in. of Gunite, reinforced with a steel mesh wire. The work will cost approximately $700,000 financed by the PWA. John P. Vandenburg is resident engineer, at Buckeye, Ariz.

Utah Requests Survey For Transmountain Diversion Plan

The Utah Water Storage Commission has requested the Bureau of Reclamation to make a survey of feasibility and costs on the Green River and Bear River diversion projects. The Green River development program would result in furnishing supplemental water for about 150,000 acres of irrigated land in Utah, Wyoming and Idaho and would be in line with the allocation of Colorado River waters under the compact. The commission also favored construction of 120 small reservoirs as part of the new works program in Utah.

●

Henry J. Kaiser Honored At Birthday Dinner

HENRY J. KAISER, nationally known California contractor, and past president of the Associated General Contractors of America, was tendered a dinner by his friends and associates May 9, on the occasion of his 53rd birthday. Among the speakers heard during the evening were: Charles R. Gow, president of the Warren Bros. Construction Co., Boston, Mass., who acted as toastmaster and told of Mr. Kaiser's work on the central Cuban highway project; H. W. Morrison, president of Six Companies, Inc., spoke on Mr. Kaiser's part in the Boulder Dam undertaking; S. D. Bechtel, vice president of Bridge Builders Inc., another organization with which Mr. Kaiser is connected and T. M. Price, for many years engineer with the Kaiser Paving Co., reviewed his work in these projects.

Personally Speaking .....

W. W. Lane, former state highway engineer of Arizona, has been named a member of the Arizona Colorado River Commission.

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A. G. Mosier has been assigned the work of studying the flood control problems in the Snohomish River area in Washington for the state department of conservation and development.

●

Will G. Metz has been appointed state Works Progress Administrator for Wyoming by Harry L. Hopkins, National Works Progress Administrator.

Charles L. Hill, former division engineer of the Nevada state highway department, has been appointed city engineer of Reno.

●

H. C. Sawyer and **F. S. Wilson,** former county surveyor of Lake County, Calif., have opened up engineering offices at Clearlake Highlands (Lake County), Calif.

C. R. Sumner, civil engineer of Los Angeles, has been named city engineer of San Gabriel.

●

Fred Lockwood, assistant city manager of San Diego was appointed acting city manager of that city May 21, following the resignation of George L. Buck.

●

Richard R. Lyman, consulting engineer, Salt Lake City, was recently elected first vice-chairman of the Utah State Water Storage Commission. **T. H. Humphreys,** state engineer of Utah, was reelected secretary of the commission.

●

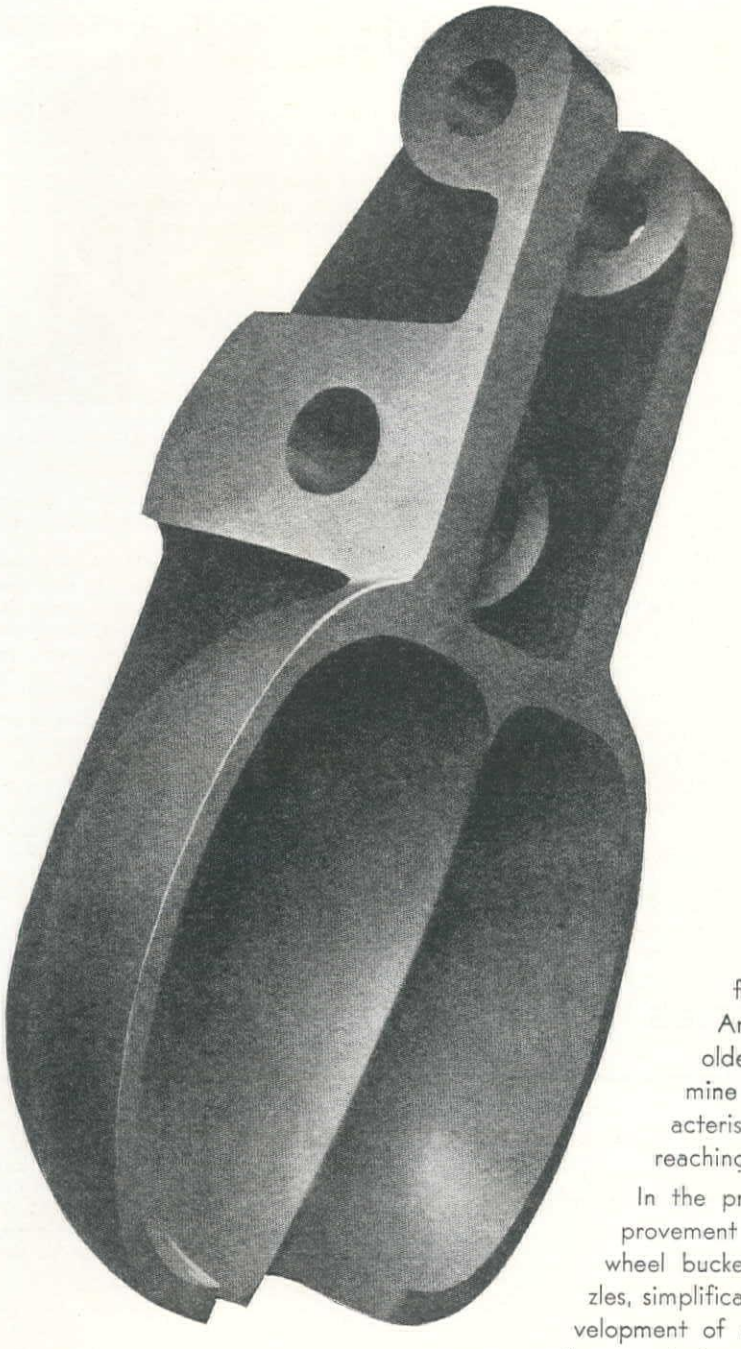
Prof. Thomas C. Adams of the civil engineering department, University of Utah, has been appointed one of a board of four which has authority, created by a recent act of the Utah legislature, to seek federal financing for, and direct the work of, diking off an arm of Great Salt Lake to provide a fresh water reservoir. The project is estimated to cost $3,000,000.

Walker R. Young

Walker R. Young to Receive Doctor of Engineering Degree

Walker R. Young, widely known as the construction engineer in charge of the building of Boulder Dam for the Bureau of Reclamation and a veteran engineer of nearly 25 years service with that organization will receive the honorary degree of Doctor of Engineering at the commencement exercises of the University of Idaho this month.

Mr. Young graduated from the University of Idaho in the College of Engineering in 1908. One of the earlier large projects on which he served was the Arrowrock Dam. Prior to taking charge of the Boulder Dam project he was construction engineer on the extensive construction operations on the Kittitas division of the Yakima project.



A Consistent Effort for . . . .

Higher Efficiency Reduced Maintenance Lower Operating Cost

HYDRO plants yield a return in proportion to their mechanical efficiency, cost of maintenance and cost of operation, whether reservoirs are filled or whether stream flow must be maintained. Any hydraulic power installation—particularly the older units—can well justify an analysis to determine the possibilities of improving operating characteristics. The slightest change may produce far-reaching economies.

In the progress of the hydraulic art marked improvement has been effected in design of water wheel buckets, construction of straight flow nozzles, simplification of operating mechanism and development of automatic devices. Substitution of these parts has already produced remarkable results in many obsolete plants at slight cost, increasing unit capacities, and decreasing unit operating expense and outage time.

Pelton engineers will gladly assist in any plant analysis, offering their long and intimate experience without obligation.

THE PELTON WATER WHEEL COMPANY
HYDRAULIC ENGINEERS

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

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

PELTON

A. R. Thompson has been named second assistant in the Nevada PWA office. Mr. Vandiver has been with the state highway department of Nevada for several years and Mr. Sheehy has recently been head of the FERA engineering staff at Reno.

•

H. W. Reppert has been reappointed assistant state engineer of Nevada and **F. N. Dondero** has been named office engineer by Alfred M. Smith, the new state engineer who took office May 28, succeeding George W. Malone.

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Wendell Bloom, county engineer of Whitman County, Washington for the past six years, has resigned to accept a position in the Washington state highway department. He will be succeeded, according to report, by his assistant, J. H. Redmond.

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George Steele has been named city engineer of San Rafael, Calif. Mr. Steele is a local engineer, and in his new position will also serve as street superintendent and building inspector.

•

T. R. Haseltine, sanitary engineer of San Francisco has left for the East to design an activated sludge sewage disposal plant for the city of Topeka, Kan., working in the office of C. A. Haskins, consulting engineer of Kansas City.

•

George W. Malone has resigned the position of State Engineer of Nevada, effective May 25, and will devote his entire time to consulting practice. He is a member of the firm of King and Malone which has its headquarters in Reno, with recently established offices in San Francisco and Washington, D. C.

•

Clyde L. Seavey, past president and for eleven years a member of the California State Railroad Commission, has been reappointed by President Roosevelt to a five-year term on the Federal Power Commission, at the completion of his one-year's work filling an unexpired term.

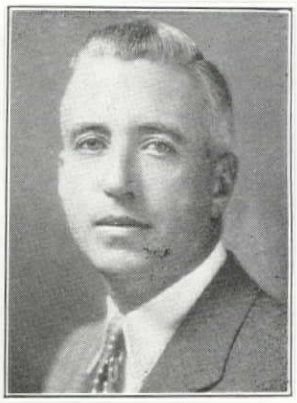
•

J. L. Vandiver has been appointed PWA engineer for the state of Nevada by Administrator Ickes. He succeeds R. A. Allen who was appointed Nevada State Highway Engineer. **R. H. Sheehy** has been named assistant PWA engineer, a position formerly held by A. M. Smith, who has been appointed state engineer of Nevada.

•

Dean Ivan C. Crawford, of the College of Engineering, University of Idaho announced his resignation June 3 as PWA state engineer of Idaho and acting state director of the new federal works administration. J. Vernon Otter, engineer examiner in the Moscow office of the federal works administration has been named acting director.

Alan MacDonald Dies



Alan MacDonald

Alan MacDonald, well known engineering contractor of the West, member of the firm MacDonald & Kahn, San Francisco, and a director of Six Companies Incorporated, died suddenly in Los Angeles June 7 at the age of 53. Mr. MacDonald had also been manager of the Golden Gate Bridge and Highway District. The firm of MacDonald & Kahn was also associated in the organization of the Transbay Construction Co., which built the foundations for the west channel piers of the San Francisco-Oakland Bay Bridge.

Mr. MacDonald was born in Louisville, Kentucky in 1882 and graduated from Cornell University in 1905 with degrees in mechanical and electrical engineering. He came to San Francisco a few years later and joined Felix Kahn in taking over the agency for the Truscon Steel Co. They represented this company for a period of years and then entered the contracting business.

The work which MacDonald & Kahn have done in the West is well known. The firm constructed the Mark Hopkins Hotel and the Financial Center Building in San Francisco among their large building contracts. During the war they constructed the flying field at Sacramento and did work for the government at the shipyard at Alameda. MacDonald & Kahn, and associates, held the contract for the original San Gabriel Dam, which was subsequently abandoned because of poor foundation conditions.

When the Six Companies Incorporated was organized, MacDonald & Kahn were one of the group of large contracting organizations forming this construction company. Mr. MacDonald was on the board of directors and a member of the purchasing committee. The death of Mr. MacDonald follows the death of three other directors of this organization during the Boulder Dam construction period; W. H. Wattis, first president, died several years ago followed by the death of W. A. Bechtel and E. O. Wattis.

Obituaries . . . .

Charles N. Black, former president of the Market Street Railway in San Francisco and nationally known utility executive, died May 15 in San Francisco.

•

Fred A. Fair, consulting engineer for the Colorado State Planning Commission, and formerly county engineer at Boulder, Colo., died recently in Denver at the age of 57.

•

Otto Amberg, prominent in contracting activities in the Pacific Northwest, manager of the Standard Asphalt Paving Co., and a past president of the Pacific Northwest Branch of the A.G.C. died June 4.

•

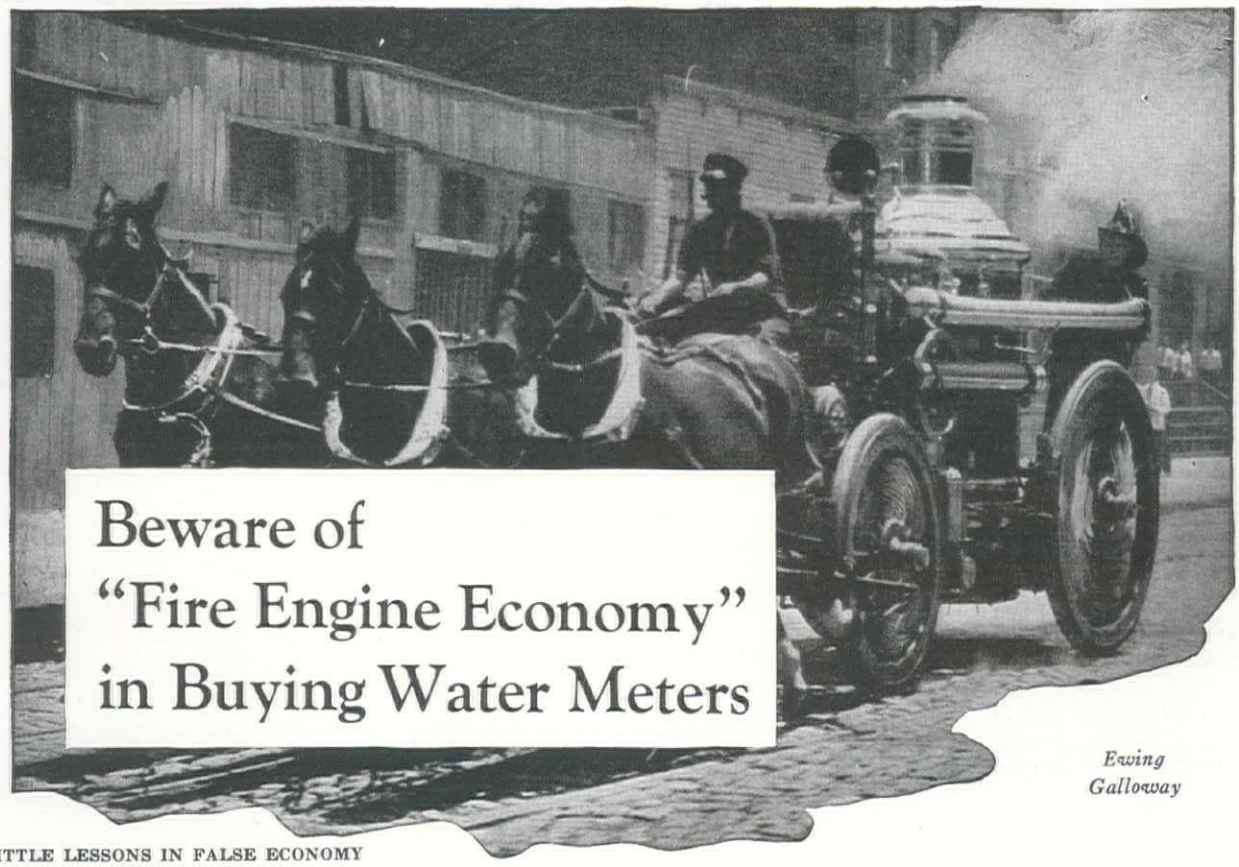
Richard E. Branstad, engineer in the Denver office of the Bureau of Reclamation, died March 5 as a result of injuries he had received in an automobile accident. Born in Wisconsin in 1888, he graduated from the University of Wisconsin in civil engineering and entered the employ of the Bureau as a draftsman in 1920, following service in the war.

George Ullrich, Jr., age 40, drowned May 30 while fishing on the Feather River near Pulga, Calif. At the time of his death he was superintendent of construction for McGowan and Caletti on the Rock Creek bridge job across the Feather River.

•

Arthur J. Crocker, prominent construction engineer of San Francisco, and for a number of years president of the California Construction Co. and the Peninsula Paving Co., died May 31 at the age of 57.

Mr. Crocker was born in Red Bluff, Calif., and was a graduate of the University of California in 1900 in mining and civil engineering. After spending several years in the Tonopah mining region he returned to California and entered contracting, doing a large volume of highway work in the San Joaquin Valley. Among his notable construction accomplishments was the building of the Posey Tube, between Oakland and Alameda, while serving as president of the California Bridge and Tunnel Co. Mr. Crocker was active in A.G.C. affairs. He retired several years ago from active participation in the work of the construction companies with which he was interested.



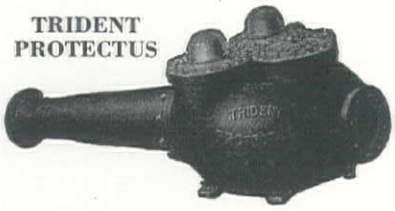
Beware of "Fire Engine Economy" in Buying Water Meters

Ewing Galloway

LITTLE LESSONS IN FALSE ECONOMY

THE SYMBOL OF SUSTAINED ACCURACY

TRIDENT PROTECTUS



THE IDEAL FIRE SERVICE METER

The first fire service water meter to be officially OK'd by the Underwriters' Laboratories, Inc. — the official Testing Laboratory of the National Board of Fire Underwriters. Accurate on all flows. Clear through waterways insures minimum loss of head. Unfailingly reliable in operation.

THINK! Are you buying Water Meters at a "saving" today—that may be as obsolete as the horse-drawn fire engine a few short years from now? That is a *false economy!* And it isn't only obsolescence you have to consider. It is depreciation as well, plus the high upkeep cost and revenue-loss of cheap low-first-cost meters that soon lose their accuracy. Against all these losses you are protected by TRIDENT and LAMBERT Water Meters. They never become obsolete, nor do they depreciate in value to any extent—because the insertion of *new modern interchangeable parts,* at a small cost, even after a generation of service, makes them good as new. And they have pioneered in all the really worthwhile improvements in Water Meter design and construction. A type for every problem—send for catalogs to the NEPTUNE METER CO. (Thomson Meter Corp.), 50 W. 50th St. (Rockefeller Center), New York City . . . or . . . Neptune-National Meters, Ltd., Toronto, Canada.

Trident AND LAMBERT WATER METERS

OVER 6 MILLION MADE AND SOLD

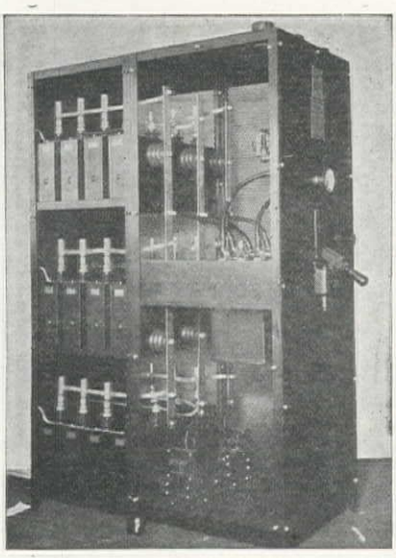
In writing to NEPTUNE METER COMPANY, *please mention Western Construction News.*

NEW Materials and EQUIPMENT

New Hermatically Sealed Capacitors

A new line of hermitically sealed power capacitors about ½ the size and ⅓ the weight of conventional oil filled units is announced by the Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. The individual units are impregnated with new fire-proof impregnating medium inerteen, are housed in welded cases, and equiped with solder seal porcelain terminal bushings.

Because of their compact, leakproof design, the expand the economical use of power factor correction in many industrial plants. Since the engineering design is based on standard component parts, practically any size capacitor is available from 5 kva at 230 volts up to 1200 kva at 6900 volts. The unit illustrated is the 240 kva capacitor complete with breaker with screens removed. Simple connections are possible with the De-ion fuses which screw on top of ½" dia. terminal studs of the units.



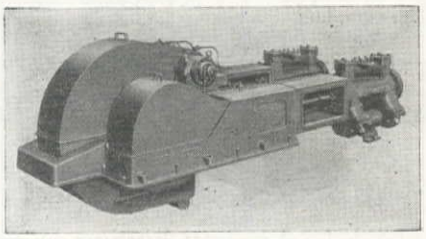
LeTourneau Rooter for 35 and 50 HP. Tractors

To fill the demand for a rooter that may be used with 35 and 50 horse power tractors, R. G. Tourneau, Inc., is now manufacturing the Le Tourneau Type S Rooter.

The same rugged, all-welded, special steel construction that goes into the larger Le Tourneau Rooters is used in this smaller size. In general, it follows the same design, but is lightened somewhat to assure efficient use. It will handle much of the ripping and scarifying usually handled by larger units. Demonstrations on Forestry Service work proved the new unit to be very satisfactory, according to the manufacturers.

Fully Enclosed Power Ends on Worthington Pump

Worthington Pump & Machinery Corp. ,Harrison, N. J., is now manufacturing an 18" stroke totally-enclosed horizontal duplex power pump. The power end is self-contained, is supported on the foundation throughout its length, and designed to reduce the cost of foundations. The complete pump may easily be set up without misalignment and, stays permanently in line. The main gear and pinion are full herringbone and may be of any ratio required up to 9.66 to 1. Its primary service is for use on pipe lines up to 200 hp.



A New Heavy Duty Trailer

The C. R. Jahn Co., 760 Polk St., Chicago, general distributors for the LaCrosse Tu-Way Trailer, announces a new heavy duty conventional "goose neck" type, incorporating advanced features of design and construction. The significant feature lies in the manner of main beam. The beam construction runs through from rear end to front end. The "goose neck" is secured by cutting one flange, bending and taking a triangular piece out of the web and welding it back together again. Thus the beam is never cut through but retains its original strength. Either pneumatic or solid tires can be had, and braking is provided on all four rear wheels, either mechanical, vacuum or air-controlled.

When mounted on pneumatic tires the new heavy duty small diameter tire developed by the Goodyear Co. is used.

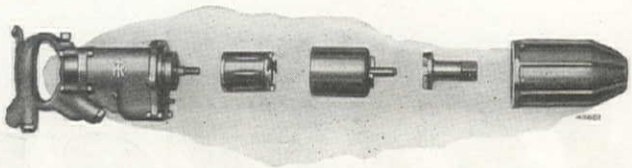
New 50-Amp. Vertical Welder

Answering the need for a low current arc welder capable of handling lighter gauge metals the Harnischfeger Corporation of Milwaukee has just announced a new P&H-Hansen 50-Ampere vertical model.

The new welder, known as the W50-254, is the extremely stable high speed arc which enables it to weld quickly and efficiently down to 26 gauge steels. No external reactors, resistors, or separate stabilizers are used; the self-stabilized arc is achieved through the use of an internal stabilizer winding. Being a motor generator unit with a 3HP squirrel cage motor, it operates on any alternating current power line including 110 volt single phase. With current control simplified to a single adjustment dial at the top of the housing, it is suited for welding of ferrous and non-ferrous metals in general repair work; it requires less than two feet of floor space; supplied with base for stationary mounting; with wheels; or lifting bail.

Increased Efficiency Claimed in New Compressor

Gardner-Denver Co. offers a new two stage water cooled compressor, which, they claim, is a departure from conventional types. It employs four small-diameter low pressure cylinders; lighter than the two formerly used. According to Gardner-Denver, two pairs of low pressure water cooled cylinders provide air at low temperatures, which eliminates distortion of cylinder walls, and the compressor operated independently of atmospheric temperatures. It is powered with electric, gas or diesel engines.

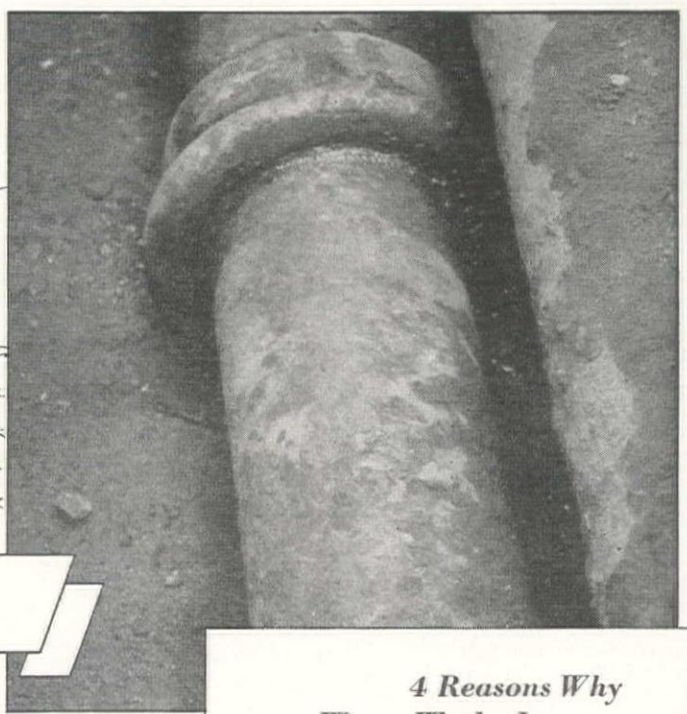


Impact Wrench Offers High Speed

The Ingersoll-Rand Pott Impact wrench is designed for use wherever there are a quantity of nuts to be put into place. This wrench is designed for one man use; weighing 20 lbs. According to the manufacturers, it will spin down a one-inch, or larger, nut at the rate of 700 rpm., and then give it 1,400 torsional blows a minute. The accumulator absorbs the torque and eliminates the danger of shock or injury to the operator. Additional information may be obtained from Ingersoll-Rand Co., 11 Broadway, New York, N. Y.

This 106 year old pipe "has never given any trouble"

It was laid in Lynchburg, Va. the year Robert E. Lee was graduated from West Point.



THIS section of a cast iron main, recently uncovered for inspection by the Water Department of Lynchburg, Virginia, is part of the second oldest existing cast iron water main in America. It went into service on July 18th, 1829. Used as a pumping main until 1882, it was in that year replaced by a larger main shown at the side and above in the photograph. Since then it has been used as part of Lynchburg's distribution system and "has never given any trouble" —a striking testimonial to cast iron pipe with bell-and-spigot joints.

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

4 Reasons Why Water Works Improvements Are Preferred P.W.A. Projects

1. Approximately 75% of the cost of manufacturing, distributing and installing cast iron pipe, including raw materials, goes directly to workmen.
2. Manufacturing and installing one mile of 6-inch cast iron pipe main gives approximately 1000 man-days of employment.
3. For every 100 tons of cast iron pipe manufactured, the railroads handle approximately 1000 tons of raw materials.
4. The direct and indirect employment of thousands of workmen in connection with this type of construction means a wide distribution of wages.

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

CAST IRON PIPE

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

TRADEMARK REG.

DISTRIBUTOR and Manufacturer NEWS

Pacific Portland Cement Buys Fernald Co.—Takes Over Milcor on the Coast

An important step in Pacific Coast building circles was consummated June 6 when Pacific Portland Cement Company, San Francisco, closed negotiations for taking over the distribution for seven Western States of Milcor metal lath and other building products produced by Milcor Steel Company of Milwaukee, Wisc.

Simultaneously, announcement was made by Pacific Portland Cement Company of the purchase of the plant and business of the Fernald Company, San Francisco, manufacturers of corner beads and other metal building specialties widely used on the Pacific Coast.

The products of Pacific Portland Cement Co. are now distributed throughout seven Western States with producing mills in California, Washington, Oregon and Nevada. Headquarters of the company are maintained in San Francisco with branches in Seattle, Portland, Los Angeles and other centers.

●

Republic Establishes Salt Lake City Headquarters

Lee Wright has been appointed sales representative for Republic Steel Corporation, with headquarters at 401 Atlas Bldg., Salt Lake City, Utah, according to N. J. Clarke, Vice-President. Prior to his connection with Republic, Wright had been associated with Zion's Co-operative Mercantile Institution, Salt Lake City, since 1902.

The appointment will enable Republic to serve more efficiently the Salt Lake City territory, which in the past has been handled through Republic's Denver office.

●

Hercules Representative Moves

Hercules Motors Corporation announces the removal of their West Coast representative's office from 613 Russ Building, San Francisco, California, to Room 523 Transamerica Building, 7th and Olive Streets, Los Angeles.

Oliver Kelly, who is the direct factory representative for the Hercules Motors Corporation on the West Coast, is now located at the latter address, from which point he contacts dealers in the Western states.

●

Stevenson Chemical Moves to New Location

Ralph A. Stevenson, President, Stevenson Chemical Company, has just announced the removal of his company to 641 Gibbons St., Los Anglees, Calif. At these new, larger headquarters a complete line of chemicals for water and sewage purification will be carried.

●

Iowa Appoints New Montana Distributor

Iowa Manufacturing Company, Cedar Rapids, Iowa, has recently appointed B. R. Petrie of Billings as their distributor for Montana. Petrie will carry a full line of Cedar Rapids Crushers, gravel plants, washing plants, etc. Included in this line are the three new roll crushers, sizes 16x16, 30x18, and 40x20.

Contractors Machinery Exchange Reorganizes Business

The Contractors Machinery Exchange, Inc., was recently incorporated, and has purchased the business formerly conducted as the Contractors Machinery Exchange at 1135 Fifty-seventh Avenue, Oakland, California.

The officers of the new company are Francis H. (Jesse) James, President; John W. Lyons, Vice-President; and Charles S. Jackson, Secretary-Treasurer. "Jesse" James is well known throughout the construction industry in Northern California and Nevada, having started his selling career in California in 1921. His experience includes the distribution of all classes of construction equipment, and familiarity with the requirements of contracting jobs.

John W. Lyons has been service engineer for Edward R. Bacon Company for over twelve years, and Charles S. Jackson has also been actively engaged in the machinery business since 1915.

This group offers service in renting, repairing, and selling construction and mining machinery. A large stock of machinery is carried in the showroom and yard on Fifty-seventh Avenue.

●

Link-Belt Moves Its Portland Warehouse

Link-Belt Company has recently moved its Portland warehouse away from the congested business district on Front Avenue, where it had been located for approximately twenty years, first in the name of Meese & Gottfried Co. and later Link-Belt Company.

The new warehouse, which is situated at the corner of 14th Ave. and Savier St., provides facilities for carrying a complete line of conveying and power transmitting machinery, and for making shipments by rail or truck.

The new location space is close to the freight sheds, the water front, and the main highway along the Willamette River. The company's sales office will also be located at the new address, 1637 N. W. 14th Avenue. Mr. D. L. Shirley is resident manager.

Swedish Appointed Heil Factory Representative

The Heil Company of Milwaukee, Wisc., announces the appointment of Michael Swedish, hydraulic hoist engineer, as factory representative.

Mr. Swedish has had fifteen years experience in the dump truck equipment field and is well qualified for this responsible position, serving not only in the sales but in manufacturing as well.

Mr. Swedish is associated with the Advance Auto Body Works of Los Angeles, who are the distributors of Heil equipment in Southern California. They will carry a complete line of trucks, tanks, dump bodies and Heil hydraulic, twin cylinder and telescopic hoists.

Trailer Manufacturer Enlarges Factory

Business expansion of the F.A.B. Manufacturing Company of Oakland manifests itself in the building program which this company now has near completion. Needing larger floor space for the manufacture of full and semi-trailers as well as 10 wheel units, this company has built a 65' x 100' addition at the rear of its present factory. The addition is constructed of face brick and the roof is supported by long span trusses. Large steel windows admit adequate illumination.

A show room, 60' x 40', also constructed of face brick, has been added to the front of their factory. Here they will display their own manufactured products as well as the Saint Paul hoist and dump bodies for which this company has recently become distributor.

●

O. S. Stapley Company Celebrates Fortieth Year

The O. S. Stapley Co., Phoenix, Ariz., one of the largest McCormick-Deering and International truck dealers in the West, recently celebrated the birth of the business forty years ago. Incidentally, their anniversary was marked by one of the biggest years since starting in business.

●

Tracy Harron Bows To Dan Cupid

Tracy W. Harron, President of Harron, Rickard & McCone, San Francisco distributors, took a new partner on May 29th. Mrs. Harron was formerly Maxine Watt. Harron has been active in the construction industry for a number of years; and is also the president of Machinery Dealers Association in San Francisco.

●

Feenaughty Represents Gardner-Denver in Northwest

W. O. Feenaughty Machinery Co. announces they have been appointed exclusive agents in Oregon, Washington and Idaho for the Gardner-Denver products. They will carry a complete stock of equipment and supplies, including rock drills, air tools, hoists, drill steel equipment, rock drill accessories, portable air compressors, horizontal compressors, air cooled compressors, duplex pumps and governors.

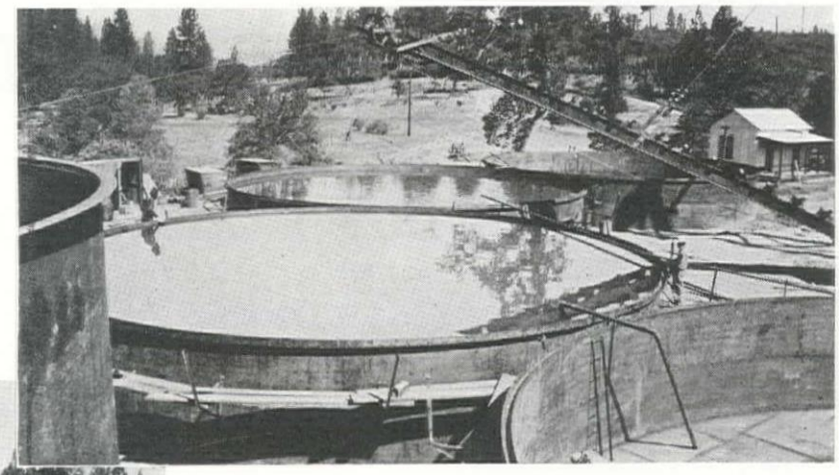
The firm has its headquarters at 112 S. E. Belmont.

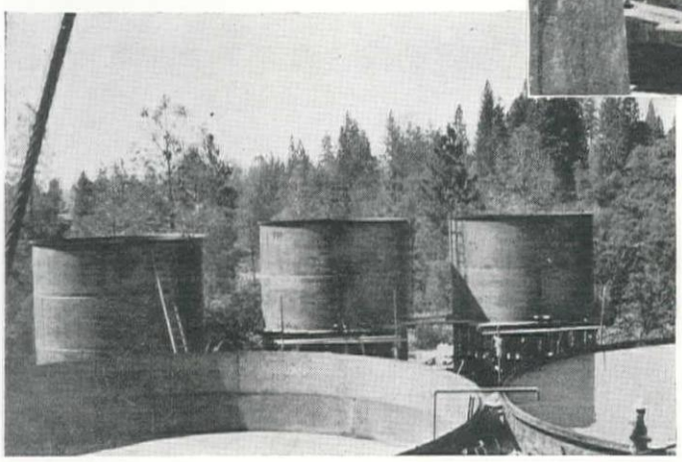
●

Gilmore Steel Appointed Warehouse Distributors

A recent addition to the growing list of warehouse distributors of Enduro Stainless Steel is the Gilmore Steel & Supply Co., 825 Folsom St., San Francisco, Calif., according to an announcement by N. J. Clarke, Vice-President in charge of sales for Republic Steel Corp., Youngstown, Ohio.

Cyanide Tanks *for*



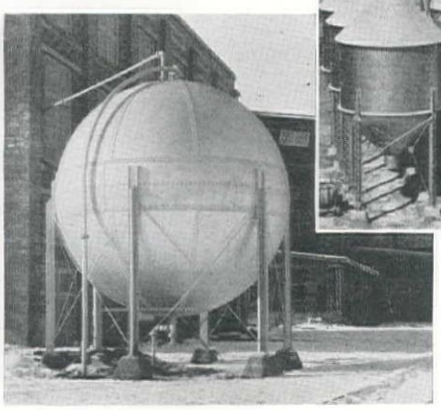


GOLD MINES

—Tanks and Platework for all mining industry uses

Left: 175-ton acid tank installed for the Nichols Copper Co. at El Paso, Texas.

Right: Six conical-bottom ore bins at a California mine.



Left: Hortonsphere for storing acid at a British Columbia mine.

MINING operations cannot be fully standardized, therefore a large part of the tank equipment used is of special design. We have built such special tanks in a wide variety of sizes and types and for many different services in the mining industry.

One installation—for a low-grade gold ore recovery operation—is illustrated above. In this case, nine tanks were required, four for leeching, two for cyanide, one for water and two for solution. These tanks are all of welded steel construction, offering distinct advantages over older types of tank construction.

We are equipped to fabricate and erect tanks and steel plate work for any industrial purpose as well as water tanks for municipalities, institutions, and industries. Ask our nearest office for cost estimates on any tanks or steel plate work you are contemplating.

CHICAGO BRIDGE & IRON WORKS

San Francisco.....1013 Rialto Bldg.	Tulsa .....Thompson Bldg.	Detroit .....Lafayette Bldg.
Los Angeles.....1444 Wm. Fox Bldg.	New York .....165 Broadway	Birmingham.....1500 North Fiftieth Street
Houston.....2919 Main Street	Chicago.....Old Colony Bldg.	Cleveland .....Rockefeller Bldg.

Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PA.

UNIT BID SUMMARY

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

DAM CONSTRUCTION

DENVER, COLO.—CITY—CHERRY CREEK DAM

Contract awarded to M. E. Carlson, 4483 Newton St., Denver, $461,427, by W. B. Lowry, Manager of Improvements and Parks, City-County Bldg., Denver; for constructing the Cherry Creek Retarding dam to be located near Sullivan, Colo., 5 mi. southeast of Denver. Bids from:

(1) M. E. Carlson, Denver $461,427
(2) Kirchhof-Hanes, Inc., Denver 514,839
(3) Seerie Bros., Denver 614,038
(4) C. E. Walker, Denver $618,667
(5) Hinman Bros., Denver 716,176

	(1)	(2)	(3)	(4)	(5)
116,013 cu. yd. dry excavation	.22	.195	.34	.36	.40
46,641 cu. yd. wet excavation	.25	.195	.59	.58	.60
350 cu. yd. rock excavation	2.00	2.00	3.00	2.68	2.00
687,170 cu. yd. earth embankment	.22	.195	.34	.36	.39
1295.6 tons sheet steel piling (driving)	20.00	65.00	20.00	24.55	22.00
1,900 lin. ft. untr. timber piling	.75	1.00	.90	.89	.75
4,680 lin. ft. precast concr. piling, Cl. B	1.55	2.20	3.50	2.75	2.75
1,670 cu. yd. A concrete	22.00	20.40	17.50	15.92	19.75
6,564 cu. yd. C concrete	9.00	11.00	9.50	9.80	12.95
48 cu. yd. D concrete	7.50	20.00	12.00	4.87	14.00
29,752 tons riprap, handlaid	3.25	3.25	4.00	3.50	...
8,710 tons riprap, loose dumped	2.00	2.00	2.75	2.90	2.31
4,324 cu. yd. pit run grav. or cr. rock	1.20	1.50	2.00	1.95	2.20
462.7 tons reinf. steel (placing)	20.00	27.50	21.00	24.60	99.00
25.41 tons structural steel	120.00	167.00	190.00	196.00	190.00
5.398 tons std. steel 7 wire, galv., etc.	575.00	200.00	500.00	507.50	300.00
840 lin. ft. 21" conc. or 12 ga. steel pipe	2.25	2.00	3.10	2.38	3.00
300 lin. ft. 20" Class B cast iron pipe	6.75	6.00	6.00	7.25	6.25
130 lin. ft. 4" vitr. clay pipe	.50	1.00	.40	.43	.50
1 ea. automatic gate	40.00	40.00	50.00	40.00	50.00
4,200 lin. ft. 8" No. 20 copper plate contr. joints	.30	.40	.30	.40	.40
16,100 lin. ft. Redwood filler strips	.10	.05	.10	.07	.07
53,000 sq. yd. concr. slabs precast OR poured	...	...	...	...	2.31

STREET and ROAD WORK

DENVER, COLO.—GOVT.—GRADING—PARK COUNTY

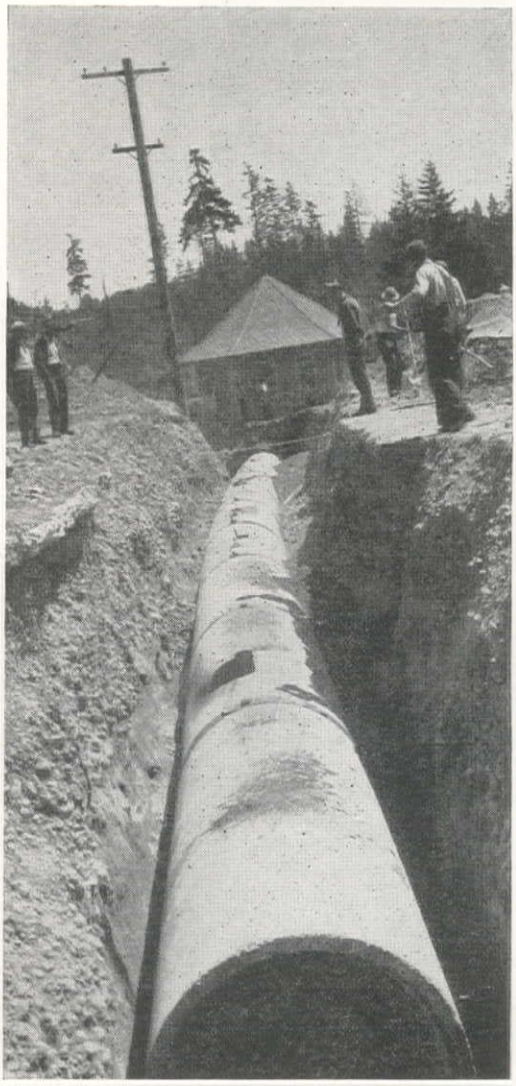
Contract awarded to Tomlinson Arkwright Const. Co., Great Falls, Mont., $204,477, low to Bureau of Public Roads, Denver, Colo., for 12.33 mi. grading East Entrance Approach Road to Yellowstone Natl. Park, Shoshone Natl. Forest, PARK COUNTY, Wyoming. Bids from:

(1) Tomlinson Arkwright Const. $204,477
(2) Stevens Bros., St. Paul, Minn. 213,028
(3) Leach Bros., Denver, Colo. 225,234
(4) McNutt Bros., Eugene, Ore. 227,599
(5) S. J. Groves & Sons, Minneapolis 233,672
(6) Taggart Const. Co., Cody, Wyo. 242,971
(7) Barnard-Curtis Co., Minneapolis $243,535
(8) Morrison-Knudsen Co., Boise 252,955
(9) J. L. McLaughlin, Great Falls 281,180
(10) Olof Nelson, Logan, Utah 288,753
(11) S. Birch & Sons Const. Co. 293,587
(12) Engineer's estimate 282,523

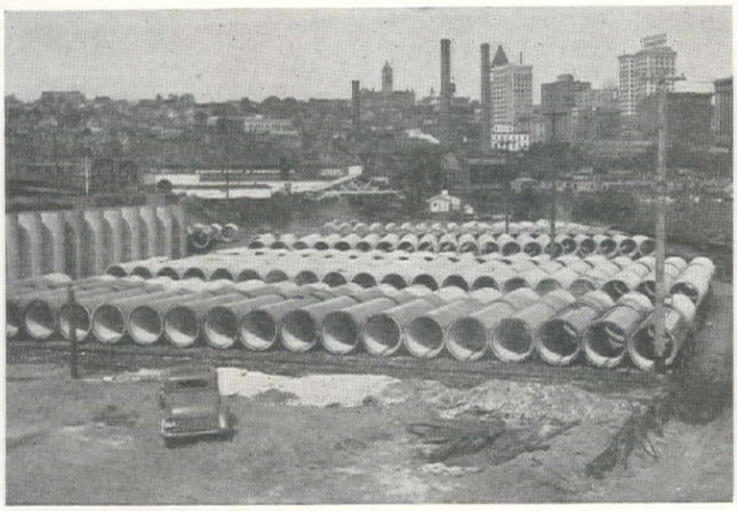
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
26 acres clearing	$175	$300	$200	$200	$250	$150	$250	$200	$200	$300	$200	$250
232,500 cu. yd. unclass. excavation	.37	.40	.46	.44	.48	.55	.53	.54	.55	.60	.48	.65
1,820 cu. yd. uncl. exc. for struc.	1.50	1.50	1.50	1.00	1.50	1.50	1.25	1.50	2.75	2.00	2.00	2.00
381,000 Sta. yd. overhaul	.01	.015	.015	.01	.02	.01	.01	.015	.02	.03	.02	.02
12.33 mi. finishing	$300	$600	$300	$500	$100	$200	$300	$250	$500	$400	$800	$350
430 cu. yd. "A" concrete	25.00	25.00	27.00	30.00	28.00	23.00	27.00	$24	28.00	28.00	40.00	28.00
775 cu. yd. masonry	24.00	23.00	20.00	25.00	24.00	27.00	21.00	26.00	25.00	25.00	30.00	26.00
47,000 lb. reinforcing steel	.07	.065	.07	.07	.075	.06	.08	.07	.07	.08	.10	.07
48 lin. ft. 18" cor. met. pipe culv.	2.00	1.75	1.70	2.50	1.80	1.85	2.00	2.00	2.00	3.00	2.00	1.65
2,500 lin. ft. 24" cor. met. pipe culv.	2.50	2.75	2.55	2.90	2.70	2.90	3.00	2.70	3.50	3.20	3.00	2.35
422 lin. ft. 30" cor. met. pipe culv.	3.50	3.25	3.25	3.75	3.40	3.55	3.50	4.00	6.00	4.00	4.25	3.00
184 lin. ft. 36" cor. met. pipe culv.	5.00	5.00	4.75	5.50	5.10	5.70	5.00	5.50	8.00	6.00	5.50	4.00
34 lin. ft. 48" cor. met. pipe culv.	10.00	7.50	7.00	7.50	6.90	7.35	7.00	8.00	15.00	10.00	8.00	5.50
9,000 cu. yd. handlaid rock emb.	2.50	2.00	2.50	1.50	2.00	2.50	2.80	3.00	3.50	3.00	5.00	2.50
17,000 lin. ft. wood guardrail, Type 7	.90	.65	.80	.90	.90	.75	.65	.80	1.00	.90	1.20	1.00
L. S., maint. of detours (ext. wk.)	$3300	$3300	$3300	$3300	$3300	$3300	$3300	$3300	$3300	$3300	$3300	$3300
23,600 cu. yd. mi. overhaul	.15	.25	.25	.20	.30	.20	.20	.25	.25	.25	.40	.25
10 mi. cut slope treatment	$400	$500	$400	$600	$400	$300	$528	$400	$425	$400	$800	$400
120 acres roadside cleanup	50.00	40.00	40.00	$100	45.00	40.00	45.00	50.00	$100	$100	50.00	50.00
L. S., Misc. for account items (extr. wk)	$6700	$6700	$6700	$6700	$6700	$6700	$6700	$6700	$6700	$6700	$6700	$6700
200 sq. yd. stone paving	3.00	2.50	4.00	5.00	3.00	3.25	2.50	3.00	3.00	4.00	5.00	1.50

Lock Joint Steel Cylinder Reinforced Concrete Pipe

Will Give Tacoma, Wash. Permanent Pipe Line Construction in Section "M" of its Green River Main Water Supply Line



Beginning of the line—54-inch Lock Joint Pipe. Maximum operating head 240 feet.



Pipe yard for fabricating 54-inch Lock Joint Pipe. Downtown Tacoma in background.

Approximately 33,900 feet of 54-inch diameter Lock Joint (Lead and Steel Expansion Joint) Reinforced Concrete Cylinder Pipe are being manufactured and installed in Section "M" of the Green River Main Water Supply Line.

MR. IRA DAVISSON, Commissioner of the Department of Public Utilities
MR. W. A. KUNIGK, Water Superintendent
City of Tacoma, Washington

●

Pipe Manufactured and Installed By

American Concrete Pipe Co. of Washington

459 East 15th Street Tacoma, Washington

SACRAMENTO, CALIF.—STATE—GRADE & SURF. — MENDOCINO COUNTY

Contract awarded to C. W. Caletti & Co., P. O. Box 243, San Rafael, $148,980, low to Calif. Div. of Highways, Sacramento, for 0.7 mi. grad. and cr. run grav. base and road mix surf. and construc. 2 timb. bridges with concr. decks at Red Mountain Creek and McCoy Creek in MENDOCINO COUNTY, Calif. Bids from:

(1) C. W. Caletti & Co. $148,980
(2) Granfield, Farrar & Carlin 159,371
(3) Hanrahan Wilcox Corp., S. F. $196,009

	(1)	(2)	(3)
1 lot mov. priv. improv.	$692	$250	$500
0.15 mi. mov. and reset fences	$200	$400	$300
1 rem. timber bridge	$850	$300	$700
8.5 ac. clear and grubb	$500	$250	$300
595 M gallons water	1.00	1.25	2.60
96,800 cu. yd. rdw. exc.	.58	.75	1.05
1050 cu. yd. struc. exc.	1.00	2.00	1.70
150 cu. yd. ditch and ch. exc.	1.50	1.00	1.70
196,000 stay. y. overhaul	.01	.01	.01
32 sta. finish roadway	$10	6.00	$10
675 cy. untr. sc. gr. surf.	2.00	1.50	2.20
4400 cy. cr. run gr. base	2.50	1.25	1.50
800 cy. Miner. aggregate	3.00	4.25	3.00
75 tons liq. asph. ROMC4	$23	$26	$33
50 cy. stone screenings	3.00	3.00	4.70
6 tons liq. asph. ROMC4	$23	$30	$38
20 tons liq. asph. SC 2	$20	$20	$28
65,600 lb. reinf. steel	.06	.045	.05
122 cy. A. conc. (ftg. blks)	$10	$15	$20
216 cy. A conc. (struc.)	$10	$20	$23
430 cy. A. conc. (bridge deck)	$20	$15½	$17
173 MFBM Redw. timb. (dense)	$90	$110	$120
151 MFBM Redw. timb. (select)	$90	$100	$100
1486 ft. timb. brdg. rail	1.00	1.05	1.00
700 ft. 36" Virgin logs	5.00	1.30	3.50
2000 ft. 12" Virgin logs	2.00	.50	.60
84,000 lb. struc. metal	.10	.12	.10
1 lot misc. bridge items	$1,000	$300	$1,200
130 ft. 8" cor. met. pipe	1.00	1.00	.90
76 ft. 12" cor. met. pipe	1.50	1.50	1.25
190 ft. 18" cor. met. pipe	2.00	2.00	1.80
5 spillw. assemblies	$25	$15	$14
400 ft. 8" perf. underdr.	1.00	1.10	.93
85 cy. rock backfill	4.00	3.50	2.00
6 culv. markers	5.00	2.00	2.00
24 guide posts	5.00	1.75	1.75
20 monuments	5.00	3.00	3.00

RAILROAD CONSTRUCTION

PORTLAND, ORE.—GOVT.—RAILROAD RELOCATION—BONNEVILLE DAM PROJECT

Sam Orino, E. 3104 Boone Ave., Spokane, Wn., $793,191, low to U. E. Engineer Office, 2nd Portland District, Pittock Block, Portland, for const. of a portion of the relocated line of the O.W.R.R. & N. Co.'s railroad and riprap protection of Ruckel Slide, in connection with the Bonneville Dam Project,, under Bid No. 694-35-1. Bids from:

(1) Sam Orino, Spokane $793,191
(2) Siems-Spokane Co., Spokane 808,889
(3) Paul J. Tyler, Oroville 835,183
(4) Myers & Goulter, Seattle 837,336
(5) Malcom & Bell, Bonneville 840,553
(6) Kern & Kibbe, Portland 867,598
(7) Guy F. Atkinson Co., S. F. 877,651
(8) Columbia Const. Co., Bonneville ..... $ 887,295
(9) Crick & Kuney Co., Spokane 889,462
(10) Geo. Pollock Co., Sacramento 927,024
(11) Guthrie McDougall and A. Guthrie 937,441
(12) Joplin & Eldon and P. L. Crooks & Co. 949,582
(13) S. S. Magoffin Co., Inc., Adrian 1,006,909
(14) Engineer's estimate 1,022,937

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
55 acres clearing	$300	$200	$220	$500	$200	$225	$250	$400	$300	$400	$250	$300	$300	$265
530,000 cu. yd. solid rock exc.	.70	.70	.76	.60	.71	.80	.75	.77	.82	.88	.99	.72	1.03	1.00
280,000 cu. yd. unclass. exc.	.30	.35	.41	.60	.45	.46	.75	.44	.60	.35	.42	.72	.30	.60
1,627,000 sta. yd. A overhaul	.035	.006	.0125	.017	.01	.01	.005	.01	.004	.005	.006	.01	.003	.005
1,808,000 sta. yd. B overhaul	.005	.006	.007	.009	.01	.007	.004	.01	.004	.005	.009	.005	.003	.035
5,665,000 sta. yd. C overhaul	.003	.005	.005	.0025	.005	.005	.003	.005	.004	.005	.004	.005	.003	.025
34,000 lin. ft. lay track	.20	.30	.31	.30	.20	.30	.25	.28	.25	.30	.50	.40	.30	.30
27,000 lin. ft. remove track	.13	.15	.17	.25	.12	.15	.12	.20	.10	.15	.18	.15	.20	.18
25,000 cu. yd. ballast and surface	2.00	2.00	2.00	2.00	2.00	1.80	1.75	1.80	1.60	1.75	2.25	2.00	2.00	2.00
15,000 ea. creosoted cr. ties	1.85	2.00	1.87	2.00	1.90	2.05	1.75	2.20	2.00	1.80	2.00	2.10	2.00	1.80
2,000 ea. untr. cross ties	.80	.75	.79	1.00	.80	.88	.75	.90	1.00	.65	.60	.90	1.00	.80
22 M ft. BM creos. switch ties	$50	$60	44.60	50.02	$50	$50	$50	$72	$70	$45	$47	60.00	$50	$50
13 M ft. BM untr. switch ties	$25	$25	19.00	30.03	$25	$22	$30	$35	$30	$20	$14	25.07	$25	$20
300 cu. yd. "B" concr.	$30	$17	24.00	25.00	$20	$25	$18	$17½	$20	$18	$20	25.00	$20	$15
62 ft. 120" multi-plate pipe	$40	$44	37.00	40.00	$50	$40	$50	$47	$45	$40	$40	40.00	$40	$40
162 ft. 18" 12 ga. corr. iron pipe	2.50	3.00	3.10	3.00	3.70	3.00	4.00	2.80	3.00	2.50	3.00	3.00	3.00	4.00
186 ft. 24" 10 ga. corr. iron pipe	5.00	4.50	4.65	4.50	4.75	4.50	5.00	4.50	5.00	4.00	4.50	5.00	4.50	6.00
36 ft. 30" 10 ga. corr. iron pipe	6.00	6.00	6.00	5.70	6.00	5.80	6.00	5.75	6.00	5.00	5.70	6.00	6.00	8.00
40 ft. 36" 10 ga. corr. iron pipe	6.50	7.00	7.00	7.00	7.00	7.04	8.00	7.00	7.00	6.00	6.75	8.00	7.00	9.00
100 ft. 48" 8 ga. corr. iron pipe	$11	$12	11.15	12.00	$11	$11½	$12	$12	$12	$10	$11	12.00	$11½	$12
475 tons erect Eagle Creek spans	$30	$41½	$30	40.00	$40	$50	$30	$35	$30	$45	$30	40.00	$50	$26
42 M ft. BM timb. deck Eagle Cr. span	$75	$100	77.50	90.00	$85	$85	$75	$110	$90½	$75	$80	90.00	$85	$75
L.S. paint Eagle Creek spans	$2,375	$2,000	$500	$2,375	$2,375	$2,200	$3,000	$2,500	$1,000	$3,500	$2,090	$3,500	$4,200	$1,425
L.S. paint handrail, Tanner Creek span	$400	$390	$400	$600	$1,000	$450	$500	$150	$285½	$500	$210	$500	$600	$139½
L.S. remove bridge	$1,500	$3,000	$2,400	$1,500	$1,000	$2,200	$2,500	$1,800	$1,000	$1,000	$1,000	$2,000	$2,000	$182
1,300 rods fencing	1.69	1.75	2.00	2.00	7.00	1.35	1.60	1.25	1.50	1.00	1.70	2.00	2.59	1.50
180,000 cu. yd. load, haul and place riprap	.60	.75	.60	.65	.70	.56	.55	.70	.60	.90	.50	.80	1.00	.8202
10,000 ft. bulkhead piling below cutoff	.20	.50	.30	.50	.50	.47	.35	.48	.30	.45	.40	..	.55	.70
2,000 ft. bulkhead piling above cutoff	.15	.20	.17	.50	.30	.27	.20	.22	.20	.25	.20	.25	.30	.20
10 M ft. BM bulkhead timber	$20	$110	40.00	50.00	$100	$44	$40	$93	$40	$40	$46	60.00	$50	$60
150 ea. metal pile shoes	.30	2.50	3.00	5.00	3.00	2.30	1.50	6.60	5.00	3.00	1.65	2.00	3.50	2.00
4,000 lb. reinforcing steel	.08	.065	.05	.06	.06	.05	.06	.06	.10	.05	.06	.06	.06	.05

BRIDGES and CULVERTS

SACRAMENTO, CALIF.—STATE—UNDERGRADE CROSSING—ALAMEDA COUNTY

Contract awarded to J. F. Knapp, 1401 Park Avenue, Oakland, $117,478, by California Div. of Highways, Sacramento, for an undergrade crossing under the S. P. tracks at Folger Avenue in Berkeley, ALAMEDA COUNTY, consisting of 2 concrete abutments with wingwalls, a concrete center pier, a concr. sealing slab and base slab; and a deck of precast concrete slabs. Bids from:

(1) J. F. Knapp, Oakland $117,478
(2) Healy Tibbitts Const. Co., S. F. 118,720
(3) E. T. Lesure, Oakland 119,319
(4) Bates & Rogers Const. Co. 120,028
(5) Clinton Const. Co., S. F. 121,628
(6) MacDonald & Kahn Co., Ltd., S. F. 125,493
(7) N. M. Ball & Bodenhamer Const. $126,701
(8) Merritt, Chapman & Scott Co. 130,994
(9) Barrett & Hilp, S. F. 133,899
(10) Frederickson & Watson Const. Co. & Frederickson Bros., Oakland 134,617
(11) A. Teichert & Son, Inc., Sacramento 165,926

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1 lot rem. bdgs. & clear site	$2,500	100.00	$1,000	625.00	100.00	177.00	$1,500	400.00	$2,900	500.00	$1,000
28,000 cu. yd. struc. excavation	1.00	.50	.72	1.00	.80	1.06	.90	.935	.80	1.15	2.00
600 cu. yd. B conc. (deck slabs)	10.50	16.00	11.10	12.70	14.20	12.94	11.00	12.00	14.00	13.00	14.50
4,000 cu. yd. B conc. (walls, etc.)	10.00	15.50	12.40	11.70	13.60	11.35	13.75	12.32	14.00	14.00	14.35
700 bbl. extra cement	2.00	2.00	2.38	2.20	1.50	2.65	2.20	2.50	2.00	2.30	2.50
570,000 lb. reinforcing steel	.035	.03	.037	.0311	.039	.0357	.04	.04	.035	.035	.038
30,000 lb. pipe railing	.10	.10	.114	.115	.12	.12	.10	.15	.12	.11	.12
6,000 lb. pipe & spec. castings	.05	.05	.06	.11	.063	.09	.06	.10	.25	.06	.15
3 ea. brick manholes	125.00	99.00	85.00	75.00	80.00	82.00	100.00	100.00	125.00	100.00	200.00
313 lin. ft. 8-in. vitr. pipe	3.00	2.00	2.35	2.10	1.00	2.35	1.25	2.50	5.00	1.50	1.25
265 lin. ft. 16-in. vitr. pipe	4.50	3.00	3.25	3.15	1.40	3.54	2.20	3.50	7.00	2.15	3.00
313 lin. ft. 21-in. vitr. pipe	5.50	4.00	4.30	4.20	2.00	4.71	3.60	4.50	8.00	3.06	4.25
1 lot waterproofing	$8,500	$6,300	$7,554	$7,800	$5,000	$10,118	$6,000	$11,966	$9,000	$8,000	$8,500
1 lot pumping equipment	800.00	750.00	$2,350	$1,080	800.00	$1,153	$1,000	$1,200	$1,000	$1,100	$1,100
1 lot elec. lighting system	750.00	700.00	$1,472	910.00	400.00	$1,050	800.00	$1,200	850.00	800.00	950.00
1 lot miscellaneous work	$1,750	500.00	800.00	785.00	$1,200	765.00	500.00	500.00	600.00	700.00	$1,250

WATER SUPPLY SYSTEMS

OGDEN, UTAH—GOVT.—WOODSTAVE CONDUIT

Contract awarded to Barnard Curtiss Co., 808 Phoenix Bldg., Minneapolis, Minn., Sched. 2, 1st Alt. $399,554, by Bureau of Reclamation, Federal Bldg., Ogden, Utah, for constructing the Ogden Canyon conduit, Ogden River Project, Utah, under Spec. No. 622. Bids received from:

(1) Barnard Curtiss Co., Minneapolis $211,810
(2) Utah Const. Co. and Morrison-Knudsen Co., Inc., Boise 260,016
(3) Olof Nelson, Logan, Utah 286,201

	Sch. 1	Sch. 2 Alt. 1	Sch. 2 Alt. 2
		$399,554	$426,422
		491,425	520,915
		492,149	520,546
SCHEDULE 1—Sta. 17-60 to Sta. 129-09, etc.		(1)	(2)	(3)
20,700 cu. yd. com. exc. (trench and retain. walls)		.60	1.00	1.20
2,200 cu. yd. rock exc. (trench and retain walls)		1.25	4.00	4.00
1,200 cu. yd. com. exc. (trench and ret. walls, pipe removed)		2.00	.90	1.20
200 cu. yd. rock exc. (trench and ret. walls, pipe removed)		2.00	4.00	5.00
12,200 cu. yd. com. exc. (trench and ret. walls on new alignment)		.80	.75	1.20
200 cu. yd. rock exc. (trench and ret. walls on new alignment)		2.00	4.00	5.00
15,000 sta. yd. overhaul		.10	.10	.10
8,200 cu. yd. compacted backfill		.90	2.00	2.00
32,000 cu. yd. backfill over pipe		.45	1.00	1.20
11,120 lin. ft. rem. old woodstave pipe		1.00	.90	1.00
50 cu. yd. concrete		30.00	25.00	20.00
5,000 lb. place reinforcing steel		.05	.04	.10
225 cu. yd. rubble masonry		15.00	15.00	30.00
15,605 lin. ft. furn. and erect 75" cont. WS pipe and metal tongues		6.40	6.75	7.00
792 lin. ft. furn. 75" cont. WS pipe and metal tongues		4.72	5.19	6.00
30,226 ea. furn. and place metal bands and shoes		1.23	1.35	1.30
1,254 ea. furn, metal bands and metal shoes		.91	1.00	1.30
8 ea. furn. and install 20" manhole saddles		155.00	170.00	200.00
7 ea. furn. and install 8" saddle castings		67.00	74.00	100.00
11 ea. furn. and install 6" saddle castings		47.00	52.00	100.00
SCHEDULE 2—Sta. 17-60 to Sta. 267, etc.				
33,100 cu. yd. com. exc. (trench and retain. walls, old pipe in pl.)		.65	1.10	1.20
3,700 cu. yd. rock exc. (trench and retain. walls, old pipe in pl.)		1.50	4.00	4.00
6,600 cu. yd. com. exc. (trench and retain. walls, old pipe removed)		2.00	1.50	1.20
850 cu. yd. rock exc. (trench and retain. walls, old pipe removed)		2.00	4.50	4.00
7,600 cu. yd. com. exc. (trench and retain. walls on new alignment)		.80	.80	1.20
100 cu. yd. rock exc. (trench and retain. walls on new allignment)		2.00	4.00	5.00
300 cu. yd. excav. (tunnel enlargements)		20.00	25.00	20.00
25,000 sta. yd. overhaul		.10	.10	.10
13,400 cu. yd. compacted backfill		1.10	2.20	2.00
51,300 cu. yd. backfill over pipe		.55	1.25	1.20
17,670 lin. ft. remove old woodstave pipe		1.00	.90	1.00
125 cu. yd. concrete		30.00	25.00	30.00
12,500 lb. place reinforcing steel		.05	.05	.10
500 cu. yd. rubble masonry		15.00	15.00	30.00
27,218 lin. ft. furn. and erect 75" cont. W.S. pipe and met. tongues		6.40	6.75	6.50
792 lin. ft. furn. staves and metal tongues		4.72	5.19	7.00
68,491 ea. furn. and plac. met. bands, incl. met. shoes (1ST ALTERNATE)		1.23	1.35	1.30
90,335 ea. furn. and plac. met. bands, incl. met. shoes (2ND ALTERNATE)		1.23	1.35	1.30
1,254 ea. furnish metal bands and metal shoes		.91	1.00	1.30
140 ea. furn. and place timber cradles		14.50	16.00	15.00
15 ea. furnish and install 20" manhole saddles		155.00	170.00	200.00
19 ea. furnish and install 8" saddle castings		67.00	74.00	100.00
29 ea. furnish and install 6" saddle castings		47.00	52.00	70.00

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

SAN FRANCISCO, CALIF.—CITY—COLLEGE HILL PIPELINE

Contract awarded to Eaton & Smith, 715 Ocean Avenue, San Francisco, $118,967, by Public Utilities Comm., San Francisco, for laying 12,000 lin. ft. 36", 30" and 20" College Hill Pipeline betw. Reservoir and Du Boce Ave., S. F., under SFWD Spec. 73. Bids from:

(1) Eaton & Smith, S. F. $118,967
(2) Charles F. Harney, S. F. 121,686
(3) M. J. Lynch, San Francisco 121,855
(4) Sibley Grading & Teaming, S. F. 126,312
(5) W. J. Tobin, Oakland $134,907
(6) MacDonald & Kahn Co. Ltd. 144,794
(7) Healy Tibbitts Const. Co. 154,303
(8) Peninsula Paving Co., S. F. 163,782

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
7,770 l. ft. rem. and deliv. 36" steel pipe	1.00	.85	1.50	1.17	1.60	1.24	1.25	1.00
7,770 l. ft. rem. lining and coating 36" pipe	.60	.70	.70	.74	1.00	.65	.65	1.40
15 ea. repair holes, 36" pipe	12.00	$12	$12	$10	$10	12.20	$20	$15
7,770 l. ft. reline and recoat 36" steel pipe	2.00	1.84	2.00	2.07	2.10	2.05	2.25	2.50
150 lengths clean 30" cast iron pipe	6.00	5.80	$12.50	$5	8.00	5.80	$10	6.00
1,800 lin. ft. line, coat, etc., 36" C. I. pipe	1.00	1.10	1.00	.666	.56	1.23	.60	2.00
2,610 l. ft. fabric. line and coat 20" steel pipe	5.00	4.00	3.90	4.70	4.30	5.17	5.00	5.50
36 each fabric. bends, 36" steel pipe	$40	$50	$35	$25	$25	31.00	$35	$40
9 each fabric. bends, 20" steel pipe	$25	$40	$25	$20	$20	22.00	$30	$30
7,460 l. ft. exc. and backfill 6' trench, 36" pipe	3.25	3.66	3.00	3.73	3.00	4.96	5.25	2.65
1,760 l. ft. exc. and backfill 5½' trench 30" pipe	3.00	3.25	2.70	3.62	3.00	5.10	4.75	4.65
2,510 l. ft. exc. and backfill 4¾' trench 20" pipe	2.50	2.50	2.00	2.63	2.15	3.05	4.50	4.15
172 cu. yd. exc. and backfill trench up to 8'	8.00	$10	$10	6.00	2.00	20.00	8.00	$10
153 cu. yd. exc. and backfill trench over 8'	10.00	$25	$20	$10	4.00	25.00	$16	$20
68 cu. yd. exc. and backfill for drains	3.00	2.40	5.00	$10	2.00	6.00	$11	2.50
27 cu. yd. exc. and backfill for blowoffs	3.00	2.40	5.00	8.00	2.00	6.00	$10	2.50
1,750 sq. ft. rem. and replace pavement	.40	.34	.40	.31	.50	.44	.22	.35
307 l. ft. install drains	.70	.66	1.00	1.00	.40	1.40	1.75	.50
7,460 l. ft. install 36" steel pipe	1.50	1.60	1.60	1.34	2.80	1.35	1.80	2.00
2,510 l. ft. install 20" steel pipe	1.60	1.55	1.40	1.37	1.80	1.30	1.20	1.50
1,760 l. ft. install 30" cast iron pipe	2.00	1.76	.50	.55	1.00	.95	1.50	1.50
1,730 l. ft. make B & S joints	.50	.60	.60	.785	$1	.50	2.00	1.00
71,400 lb. install fittings	.05	.03	.08	.10	.15	.075	.10	.07
46,970 sq. ft. repavement	.22	.25	.26	.26	.225	.26	.22	.22

SEWER CONSTRUCTION

SAN FRANCISCO, CALIF.—CITY—CONCRETE SEWER—6TH STREET

Healy Tibbitts Const. Co., 64 Pine St., San Francisco, $81,370, low to Dept. of Public Works, City Hall, San Francisco, for constructing sewers in 6th Street from Townsend Street to Channel Street, Sec. "B". Bids received from:

(1) Healy Tibbitts Const. Co. ..... $ 81,370
(2) Peninsula Paving Co., S. F. 98,573
(3) Clinton Const. Co., S. F. 99,594
(4) MacDonald & Kahn Co., Ltd. 111,711
(5) Charles L. Harney, S. F. 113,389
(6) Union Paving Co., S. F. $114,340
(7) Merritt, Chapman & Scott 118,984
(8) M. J. Lynch, San Francisco 128,492
(9) Eaton & Smith, S. F. 133,619
(10) C. C. W. & H. H. Haun, S. F. 139,997

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
947 ft. 6' cir. rein. conc. sewer	$59	$62	$77	88.00	$85	$70	$74½	$120	$100	$71
3 ea. manholes on conc. sewer	$61	$45	$50	65.00	$61	$100	$140	$100	$60	$50
1 ea. manhole on vitr. sewer	$80	$85	$150	93.60	$220	$200	$140	$100	$100	$150
947 ft. 12" vitr. underdrain	2.00	2.00	1.60	1.20	2.10	$10	2.60	1.00	1.00	1.50
73,000 lin. ft. piles below cutoff	.30	.50	.32	.35	.40	.50	.60	.15	.50	.95
450 lin. ft. borings	2.00	2.00	2.50	2.30	2.60	2.00	3.00	5.00	2.00	3.00
35 lin. ft. 10" vitr. culvert	4.00	3.00	5.00	3.00	1.40	8.00	3.50	3.00	1.50	4.00
40 lin. ft. 12" vitr. culvert	$10	6.00	5.00	6.50	2.10	$10	3.50	5.00	6.00	5.00

DAM CONSTRUCTION

GLASGOW, MONTANA—STEEL SHEET PILE WALLS — FORT PECK DAM

Bids received as follows by the U. S. Engineer Office, Kansas City, Mo., for steel sheet pile retaining walls for closure section of Fort Peck Dam. Bids from:

	Sch. 1	Sch. 2	1 and 2 comb.
(1) Spillway Builders, Inc., N. Y. Life Bldg., Kansas City	$464,380	$482,270	$946,650
(2) Siems-Helmers, Inc., Guardian Bldg., St. Paul, Minn.	477,270	469,698	946,968
(3) Frazier-Davis Construction Co. and G. L. Tarlton, Inc., St. Louis	449,275	595,574	1,044,849
(4) Mackie-Thompson-Tamm, Inc., Chicago, Illinois	554,040	514,459	1,068,499
(5) Bilhorn, Bower & Peters, Inc., St. Louis, Missouri	625,525	657,709	1,283,234

SCHEDULE I—Priority 1 (Lower Walls)	(1)	(2)	(3)	(4)	(5)
335,000 sq. ft. furn. and drive steel sheet piling (str. web)	$1.28	$1.322	$1.25	$1.55	$1.69
12,000 sq. ft. furn. and drive steel sheet piling (Arch web)	1.28	1.20	1.25	1.10	1.69
13,000 lb. furn. and drive structural steel beams	.10	.05	.04	.075	.065
7,800 lin. ft. wood piling	.65	.60	.65	.90	3.00
70 M. ft. BM structural timber	100.00	120.00	60.00	95.00	110.00
15 cu. yd. concrete	30.00	10.00	25.00	15.00	10.00
20,000 lb. structural steel	.10	.11	.10	.12	.11
20,000 lb. hardware	.10	.10	.12	.12	.12
24 ea. supports for abutment section, complete	100.00	80.00	40.00	80.00	100.00
SCHEDULE II—Priority 2 (Upper Walls)					
410,000 sq. ft. furn. and drive steel sheet piling (str. web)	1.17	1.143	1.45	1.25	1.60
25,000 lb. furn. and drive structural steel beams	.10	.04	.04	.075	.065
500 lb. structural steel	.10	.10	.10	.12	.12
200 lb. hardware	.10	.09	.12	.12	.12

STIPULATIONS: Bidders 1, 2 and 4 will not accept Schedule II unless awarded Schedule I.

CONSTRUCTION

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

WORK CONTEMPLATED

LOS ANGELES, CALIF.—L. A.-Long Beach breakwater extension for U. S. Engr. Office. Est. cost $1,825,000.

SAN DIEGO, CALIF.—Dredging at San Diego Harbor for U. S. Engr. Office. Est. cost $1,800,000.

YUMA, ARIZ.—FOUR units to be organized for Gila River irrigation project. P.W.A. loan and grant of $24,000,000 has been applied for.

BOISE, IDAHO—Reservoirs and canals on the Snake River for State Reclamation Dist. Est. cost $2,125,000.

BIDS RECEIVED

PORTLAND, ORE.—565,000 bbls. cement for Bonneville Proj. Pacific Portland Cement Co., S. F., $916,522, low to U. S. Engr. Office.

GLASGOW, MONT.—Steel sheet pile retaining wall for closure section of Fort Peck Dam, Frazier-Davis Const. Co. and G. L. Tarlton, St. Louis, $449,275 Sched. 1, and Siems-Helmers, Inc., St. Paul, $469,698 Sched. 2, low bids to U. S. Engr. Office.

LOS ANGELES, CALIF.—Unit No. 1 of Joint outfall sewer for L. A. County Sanitation Dist. Bids to July 2. Est. cost $1,850,000, involving 112,000 cu. yd. tunnel excav., 42,100 cu. yd. tunnel concrete and 4,898,000 lb. reinf. steel.

SACRAMENTO, CALIF.—Drainage pumping plants on Sutter by-pass for U. S. Engr. Office. Bids to June 25. Est. cost $450,000.

PORTLAND, ORE.—Intake gates, stop logs, steel gates, gantry cranes, etc., for Bonneville Proj. Bids to June 25 by U. S. Engr. Office.

DENVER, COLO.—1,000,000 lb. pipe and fittings for Boulder Canyon Proj. Bids to July 8 by Bur. of Reclamation.

SAN FRANCISCO, CALIF.—Electrical work on S. F.-Oakland Bay Bridge, bids to June 26.

DENVER, COLO.—12.33 mi. grading East Entrance approach Road, Yellowstone Natl. Park, for Bur. Public Roads, Denver, to Tomlinson-Arkwright Co., Great Falls, Mont., $204,477.

DENVER, COLO.—Cherry Creek retarding dam, near Sullivan, for City to M. E. Carlson, Denver, $461,427.

PORTLAND, ORE.—Relocate O.W.R.R. & N. Co.'s R.R. and riprap protec. at Ruckel Slide, Bonneville Proj., for U. S. Engr. Office, to Sam Orino, Spokane, $793,191.

PORTLAND, ORE.—Two current generators for Bonneville Project by U. S. Engr. Office to General Electric Co., $1,144,880.

YUMA, ARIZ.—All American Canal earthwork for Bur. of Reclamation to Lewis-Chambers Const. Co., New Orleans, $505,506, Sched. 1, 2 and 3; and Mittry Bros. Const. Co., L. A., $260,400, Sched. 4.

OGDEN, UTAH—Ogden Canyon Conduit for Bur. of Reclamation to Barnard Curtiss Co., Minneapolis, $399,350.

EUREKA, CALIF.—Concrete arch dam and tunnel for City to T. E. Connolly & Hanrahan Co., S. F., $503,145.

STREET and ROAD WORK

CALLS FOR BIDS

PHOENIX, ARIZ.—Bids to 10 A.M., June 25, by Bureau of Public Roads, Phoenix, Ariz., for 15.448 mi. placing seal coat on Sections B and C of Route 4, the Ashfork-Flagstaff-Angell National Forest Highway, Kaibab National Forest, COCONINO COUNTY, Arizona, involving: 180 tons apply asph. mat., 1,500 cu. yd. screenings. 6-4

LOS ANGELES, CALIF.—Bids to 2 P.M., June 17, by County Board of Supervisors, L. A., for improving Mission St. and Pasadena Ave. from Fair Oaks Ave. to west city boundary of South Pasadena at Arroyo Verde Road, a distance of 1.61 miles, under Cash Contract No. 474, involving: 3,847 cu. yd. excavation, 7,947 sq. ft. 3½" concr. curb, 1,140 cu. yd. concrete, 8,810 tons asph. concr. wear. surf., 7,940 tons asph. conc. base, 2,040 tons disintegr. rock base, and various other items. 5-31

LOS ANGELES, CALIF.—Bids to 2 P.M., June 17, by County Board of Supervisors, L. A., for improving Santa Anita Road from Longden Ave. to Huntington Dr., in San Marino and San Gabriel, a distance of 0.71 mi., under Cash Contract No. 478, involving: 10,713 cu. yd. excavation, 153,843 sq. ft. 2" asph. concr. wear. surf., 153,555 sq. ft. 3" asph. concr. base. 5-28

LOS ANGELES, CALIF.—Bids to 2 P.M., June 20, by California Division of Highways, L. A., for 33.5 mi. liquid asph. treatment betw. 6 mi. north of Blythe and Vidal in RIVERSIDE and SAN BERNARDINO COUNTIES, Calif., involving: 1,190 tons liquid asph. SC-2, 625 tons liquid asph. SC-4. 5-28

LOS ANGELES, CALIF.—Bids to 2 P.M., June 24, by County Board of Supervisors, L. A., for improving Highland Drive in vicinity of Devil's Gate Dam from Linda Vista Ave., west 592 ft. under Cash Contract No. 481, involving: 3,650 cu.yd. excav., 22,425 sq. ft. 1½" pre-mix surfacing. 6-5

LOS ANGELES, CALIF.—Bids to 2 P.M., June 27, by Calif. Div. of Highways, L. A., for 2.1 mi. grad. and asph. concr. OR conc. paving on Cerritos Ave., betw. Los Angeles St. and Artesia Ave., LOS ANGELES COUNTY, Calif.; involving: 20,500 cu. yd. excav., 1,066,000 sta. yd. overhaul, 315 tons liq. asph. SC-2 (road mix surf. treatment). ALT. "A" 12,400 tons asph. concr.; ALT. "B," 5,535 cu.yd. "A" concr. pavement. 6-4

PASADENA, CALIF.—Bids to 11 A.M., June 17, by City Clerk, City Hall, Pasadena, for resurf. North Fair Oaks Ave., betw. Colorado and Washington Sts., involv.: 1,000 tons asph. concr. leveling course, 1,500 tons asph. concr. wear. surf. 6-5

REDDING, CALIF.—Bids to 2 P.M., June 17, by Dist. Engr., Calif. Div. of Highways, Redding, Calif., for 0.1 mi. grading, and road mix surfacing on crusher run base betw. Court St. and California St. in Redding, SHASTA COUNTY, Calif. 6-5

SACRAMENTO, CALIF.—Bids to 2 P.M., June 19, by Calif. Div. of Highways, Sacramento, for 4.5 mi. grad. and road mix surf. betw. .8 of a mi. north of Newman and .2 mi. south of Crows Landing in STAN-

NEWS SUMMARY

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ISLAUS COUNTY, Calif., involv.: 37,500 cu. yd. excav., 37,000 cu. yd. imported borrow, 9,210 cu. yd. untr. cr. gr. or stone base, 5,800 cu. yd. min. aggreg. (rd. mix surf.). 5-28

SACRAMENTO, CALIF.—Bids to 2 P.M., June 26, by Calif. Div. of Highways, Sacramento, for 1.2 mi. widen and concr. and asph. concr. pave in Santa Rosa, betw. College Ave. and south city limits in SONOMA COUNTY, Calif., involv.: 13,720 sq. yd. excav., 3,070 cu. yd. crusher run grav. base, 6,460 tons asph. concr. 6-4

SACRAMENTO, CALIF.—Bids to 2 P.M., June 26, by Calif. Div. of Highways, Sacramento, for 8.2 mi. grading betw. Cougar and 4 mi. N.E. of Grass Lake Station, SISKIYOU COUNTY, Calif., involv.: 157,000 cu. yd. excav., 881,000 sta. yd. overhaul, 58,000 cu. yd. imported borrow, 140 cu. yd. "A" concr. (structures), 956 lin. ft. 18-in. corr. metal pipe. 6-4

SAN FRANCISCO, CALIF.—Bids to 2 P.M., June 27, by Bur. of Public Roads, S. F., for 3.661 mi. placing bitum. treated surfacing (road mix) on Section A of Route 11, Mt. Charleston Natl. Forest Highway, Dixie Natl. Forest, CLARK COUNTY, Nevada, involving: 1,500 cu. yd. excav., 6,500 cu. yd. cr. grav. for surf. course. 6-4

SAN FRANCISCO, CALIF.—Bids to 2 P.M., July 2, by Bur. of Public Roads, S. F., for 18.381 mi. bitum. surf. treatment (road mix) on Secs. A and B of Rt. 12, Midland Trail (Current Creek), Natl. Forest Highway, Nevada Natl. Forest and on Sec. C of FLHP No. 1 (part of Midland Trail), Ely-Tonopah Highway, WHITE PINE and NYE COUNTIES, Nevada, involv.: 1,412 tons liq. asph. road matl. SC-2, 18.368 mi. mixing and rolling. 6-5

OLYMPIA, WN.—Bids to 10 A.M., June 25, by Director of Highways, for: (1) WHATCOM COUNTY (PWP 7756)—4.0 mi. concr. paving on St. Road No. 1 (Lake Samish Branch), Lake Samish to Lake Padden Road. (2) CHELAN COUNTY (PWP)—20.4 mi. bitum. macad. Class D Penetration Type surf. on St. Road No. 2, end of pavement at Peshastin Creek to Blewett Pass. (3) WHITMAN, PEN OREILLE and FERRY COUNTIES (PWP)—9.4 mi. bitum. retread surf. treatment on Inland Empire Highway, Eastern Route, Junction of State Rd. No. 3 (south of Rosalia) to Oakesdale, Sec. 1, Whitman County; const. a light bitum. surf. treatm. on about 23.7 mi. of St. Rd. No. 6, Blueslide to Metaline Falls, Sec. 2, in Pend Oreille Co.; 27.7 mi. producing min. aggreg. and const. bitum. retread surf. on St. Rd. No. 3, Kettle Falls to Laurier, Ferry County. (4) CHELAN and OKANOGAN COUNTIES (PWP 7745)—99.5 mi. const. a bitum. retread surf. on St. Rd. No. 10, Chelan to British Columbia Line and Chelan to Chelan Falls, Unit 2. (5) SKAMANIA and KLICKITAT COUNTIES (PWP)—16.3 mi. producing min. aggreg. and constructing a bituminous retread surf. on St. Rd. No. 8, Washougal East, Section 1, Clark and Skamania Counties; 14.4 mi. surf., producing min. aggreg. and constructing a bitum. retread surf. on Sec. 2, Underwood to Lyle, in Skamania and Klickitat Counties. 6-6

OLYMPIA, WN.—Bids to 2 P.M., June 25, by Director of Highways, Olympia, Wn., for: (1) STEVENS, SPOKANE and PEND OREILLE COUNTIES (PWP)—2.8 mi. produc. min. aggreg. and const. light bitum. surf. treatm. and non-skid seal on St. Rd. No. 3,, Addy to Blue Creek, Sec. 1, in Stevens Co.; 4.7 mi. const. bitum. mac. Class D Penetration type on St. Rd. No. 3, Deer Park to Clayton, Sec. 2, Spokane and Stevens Counties; 6.0 mi. construct. bitum. macad. Class D penetr. type; and a non-skid seal on St. Rd. No. 6, Bear Creek to Rogers Pass on 9.7 mi. in Pend Oreille County. (2) PACIFIC and WAHKIAKUM COUNTIES (PWP)—14.2 mi. produc. min. aggreg. and const. a bitum. surf. treatm. on St. Rd. No. 12, Palix River to Johnson's Landing, Sec. 1, Pacific Co.; 17.9 mi. surf. and produc. min. aggreg. and const. bitum. surf. tr. Johnson's Landing to Grays River, Sec. 2, Pacific and Wahkiakum Counties; and 6.6 mi. prod. min. aggreg. and const. bitum. surf. tr. on Sec. 3, Bear River to Illwaco, Pacific County. (3) COWLITZ and WAHKIAKUM COUNTIES (PWP)—19.5 mi. surf., producing min. aggreg. and const. bitum. surf. treatm. on St. Rd. 12, Coal Creek Slough to Cathlamet, Sec. 1, in Cowlitz and Wahkiakum Counties; 7.9 mi. producing min. aggreg. and constr. a bitum. surf. treatment, Cathlamet to Skamokawa, Sec. 2, Wahkiakum County; and 10.7 mi. const. a bitum. surf. treatment on Sec. 3, east side of K.M. Mountain to Grays River, in Wahkiakum County. 6-6

FORT LYON, COLO.—Bids to 2:30 P.M., June 28, by Veterans Administration, Arlington Bldg., Washington, D. C., for resurfacing macadam pavement at Veterans Administration Facility, Fort Lyon, Colo. 6-5

BIDS RECEIVED

PHOENIX, ARIZ.—Bids received as follows by Arizona State Highway Comm., Phoenix, Ariz., for: (1) PIMA COUNTY (NRS 110-B, 1935)—Borderland Const. Co., Tucson, $125,209 and ALT. $125,884 low for ½ mi. grading, dr. roadway and furn. and pl. aggr. base course and road oil plant mix on the Ajo-Tucson Highway. 5-16

LOS ANGELES, CALIF.—J. L. McClain, 5850 Brynhurst Ave., L. A., $24,494 on concr. pavement, and Southwest Paving Co., 712 Lankershim Bldg., L. A., $19,770, on 7" asph. concr. and $22,458 on 7" Warrenite Bitulithic concr. low to Board of Public Works, 153 City Hall, Los Angeles, for improving San Fernando Road west betw. Aviation Drive and Goodwin Avenue. 5-23

LOS ANGELES, CALIF.—Griffith Co., L. A., Railway Bldg., L. A., $39,544 on ALT. "A" and C. O. Sparks, 2309 E. 9th St., L. A., $39,433 on ALT. "B," low to Calif. Div. of Highways, State Bldg., L. A., for 1.4 mi. grading and concr. or asph. concr. paving betw. Anaheim and Mirashores in ORANGE COUNTY, Calif. 5-23

OAKLAND, CALIF.—A. Soda & Son, Inc., 1077 65th St., Oakland, $71,620 low to County Clerk, Oakland, for constructing approaches to Park St. Bridge. 5-28

SACRAMENTO, CALIF.—Kennedy Const. Co., 1140 Chatham Road, Oakland, $36,222 low to Calif. Div. of Highways, Sacramento, for 2.1 mi. grad. and bitum. tr. selected matl. surf. betw. 1 mi. north of Bodie Road and Point Ranch, in MONO COUNTY, Calif. 6-5

SACRAMENTO, CALIF.—Valley Paving & Construction Co., P. O. Box 1349, Fresno, $44,036, low to Calif. Div. of Highways, Sacramento, for 1 mi. grading and asph. concr. paving betw. southerly boundary and "R" Street in Merced, MERCED COUNTY, Calif. 6-5

SAN FRANCISCO, CALIF.—Chas. L. Harney, Call Bldg., San Francisco, $38,207, low to Dept. of Pub. Works, S. F., for realignment of Sloat Blvd. from 39th Ave. to 43rd Ave. 5-29

SOUTH SAN FRANCISCO, CALIF.—Union Paving Co., Call Bldg., San Francisco, $5,971, low on SCHED. 1 to City Clerk, City Hall, South San Francisco, for pavement repairs to various streets.

OGDEN, UTAH—Bids received as follows by Bureau of Public Roads, Ogden, for: (1) CLARK CO. (FHEC 33-A5. B1)—Olof Nelson, Logan, Utah, $79,815, low for 15.184 mi. const. bitum. surf. or improv. the Dubois-Monida Natl. Forest Road Proj. located in Targhee Natl. Forest, Ida. (2) IDAHO CO. (FHEC 21-A2, B2)—H. E. Cornell, Boise, $55,644, low for 3.194 mi. const. or improv. the Warren Wagon Road, located in Idaho Natl. Forest, Idaho. 5-24

RITZVILLE, WN.—Bids received as follows by Board of County Comm., Court House, Ritzville, Wn., for: Johnson & Morach, Ritzville, $21,853 low for 2.4 mi. surf. of Sec. Rd. Proj. 13, involv. 4,300 cu. yd. cr. grav.: and for 11.4 mi. surf. Second. Road Proj. No. 14, involv. 12,512 cu. yd. cr. rock. 5-20

SEATTLE, WN.—Northwest Const. Co., 3950 6th N.W., Seattle, Wn., $25,230, low to County Comm., Seattle, Wn., for 0.98 mi. grad. and surf. Marine View Drive (Zenith-Redondo Sec.), Sec. Rd. Proj. No. 77. 5-31

CONTRACTS AWARDED

JUNEAU, ALASKA—To Pearson & Strom, Seattle, $21,050, to Bureau of Public Roads, Juneau, Alaska, for 3.3 mi. clearing and grubbing right-of-way on Eyak-Lake Highway, Cordova-Three Mile Bay section near Cordova, Alaska, under Proj. No. FHEC 4-D. 5-31

PHOENIX, ARIZ.—To Pearson & Dickerson, 202 N. Central, Phoenix, $119,666 to Arizona State Highway Comm., for 5 mi. grad., drain. and aggregate base course on the Prescott-Jerome Highway in YAVAPAI COUNTY, Ariz., Project NRS 17, 1935. 5-18

PHOENIX, ARIZ.—To R. E. Martin Co., Tucson, Ariz., $24,223 to Arizona State Highway Comm., for 3 mi. grade and dr. roadway and furn. and placing road mix on the Tucson-Florence Highway, in PINAL COUNTY, Ariz. 5-18

EUREKA, CALIF.—To Hemstreet & Bell, 501 11th St., Marysville, $14,054 by Dist. Engineer, Calif. Div. of Highways, Eureka, for 3.7 mi. grad. shoulders, const. selected material borders and super-elevating curves with selected material base and plant mixed surf. (med. curing type), betw. Ferndale and Fernbridge in HUMBOLDT COUNTY, Calif. 5-27

LOS ANGELES, CALIF.—To United Concrete Pipe Corp., Box 1, Sta. H, Los Angeles, $24,911 to Calif. Div. of Highways, Los Angeles, for 0.06 mi. grading and surf. with plant mix surf. (med. curing type) at Harmon Barranca, VENTURA COUNTY, Calif. 5-8

LOS ANGELES, CALIF.—To Oswald Bros., 366 E. 58th St., Los Angeles, $116,509 to Calif. Div. of Highways, Los Angeles, for 40.7 mi. widen existing roadbed and paving portions with asph. concr. and concr. betw. Monterey Park and Mt. View Road, LOS ANGELES COUNTY, Calif. 5-22

LOS ANGELES, CALIF.—To Sharp & Fellows Contr. Co., Central Bldg., L. A., $86,266 by Calif. Div. of Highways, L. A., for 3.6 mi. grad. and road mix surf. tr. betw. Lake Hodges Dam and Rancho Santa Fe. 5-25

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bldg., L. A., $11,875 to County Board of Supervisors, L. A., for improving Sepulveda Blvd. from Venice Blvd. south to Washington Blvd., in Culver City, a length of 0.44 mi. under Cash Contract. 6-5

SACRAMENTO, CALIF.—Awards as follow by Calif. Div. of Highways, Sacramento, for: (1) SAN FRANCISCO CO.—To Charles L. Harney, Call Bldg., S. F., $20,936 for 0.1 mi. widen and concr. asph. concr. pav. on 5th St. betw. Harrison and Bryant St., in San Francisco. (2) ALPINE COUNTY—To Fredrickson & Watson & Fredrickson Bros., 873 81st Ave., Oakland, $35,554 for 2.8 mi. grad. and untr. cr. grav. or stone surf. and road mix surf. treatm. betw. Nevada St. Line and 3.4 mi. N. of Woodford. 6-4

SAN FRANCISCO, CALIF.—To Tiffany Const. Co., 535 N. 7th St., San Jose, $22,070 by Bur. of Pub. Roads, S. F., for 13.157 mi. subgr. reinf. and bitum. tr. (light surf. apply) on Sec. F, Rt. 77, Mt. Shasta-Mt. Lassen Natl. Forest Highway, Lassen Natl. Forest, in SHASTA COUNTY, Calif. 5-20

SAN FRANCISCO, CALIF.—To C. F. Frederickson & Sons, Lower Lake, $8,187, by Bureau of Public Roads, S. F., for 16.208 mi. bitum. tr. (light surf. application) of Secs. A, B, C, D and E, Rt. 21, the Deer Creek Meadows Natl. Forest Highway, Lassen Natl. Forest, TEHAMA COUNTY, Calif. 5-21

SAN FRANCISCO, CALIF.—To M. J. Lynch, Barneveld & Oakdale Sts., S. F., $8,810, by Dept. of Pub. Works, S. F., for widening roadway of Van Ness Ave. South, betw. 21st St. and 24th Sts., S. F. 6-5

SAN JOSE, CALIF.—To Carl N. Swenson Co., 355 Stockton Ave., San Jose, $31,322, by Santa Clara Valley Water Conservation Dist., San Jose, for 1.5 mi. grading and oiling the Almaden Road to replace existing road through the Almaden Reservoir. 5-20

SAN JOSE, CALIF.—Awards as follow by County Clerk, Court House, San Jose, for: (1) To L. F. Piazza, 296 N. 6th St., San Jose, $14,375 for 139,670 sq. ft. oil macad. surf. on Foothill Ave. betw. Middle Ave. and Tenant Rd. in Supv. Dist. No. 1. (2) To A. J. Raisch, 358 Lincoln Ave., San Jose, $13,963 for 276,250 sq. ft. oil macad. surf. on Los Gatos-Almaden Road betw. Lone Hill and Coleman Rds., and on Redmond Rd. betw. Los Gatos-Almaden Rd. and end of present pavement, in Superv. Dists. Nos. 4 and 5. 5-20

DENVER, COLO.—To A. H. Read Co., Cheyenne, Wyoming, $187,530, to Bur. of Pub. Roads, Denver, Colo., for 19.444 mi. bitum. surf. on the Grand Loop Highway, located in Yellowstone Natl. Park, Proj. NR 1-G1, G2, part G3, Wyoming. 5-6

DENVER, COLO.—To Tomlinson Arkwright Const. Co., Great Falls, Montana, $204,477, to Bur. of Pub. Roads, Denver, Colo., for 12.33 mi. grading East Entrance Approach Road to Yellowstone Natl. Park, Shoshone Natl. Forest, PARK COUNTY, Wyoming. 5-9

DENVER, COLO.—Cook & Ransom, Ottawa, Kans., $13,968, to Bur. of Pub. Roads, Denver, for 12.934 mi. oil treatment of base course surf. of the Cedro Canyon Forest Highway, located in the Manzano Natl. Forest, BERNALILLO COUNTY, N. M., Proj. NR 15-A2 to C2, inclusive. 5-16

DENVER, COLO.—To Sacra & Watts, and Lowdermilk Bros., 240 Washington, Denver, Colo., $78,810, by State Highway Dept., Denver, for 0.640 mi. gravel surf. at Starbuck in Bear Creek Canon on State Highway No. 74, Proj. NRS 373-D, JEFFERSON COUNTY, Colo. 5-20

DENVER, COLO.—Award recommended to J. L. McLaughlin, Great Falls, Montana, $10,890, to Bur. of Pub. Roads, Denver, Colo., for drainage improvements on Grand Loop Highway, Yellowstone Natl. Park, Wyoming, PEC 1-H-1. 5-25

BOISE, IDAHO—Awards as follow by Commissioner of Public Works, Boise, for: (1) CARIBOU CO. (SAP 111-A-Misc. Proj. 522) To Allsop & Pond, Grace, Idaho, $13,431 for 5.287 mi. surf. with cr. grav. on the Grays Lake Highway from end of SAP 111-E near E. city limits of Soda Springs to Conda Rd., and 2.013 mi. grad., drain and surf. with cr. grav. on Conda Rd. from Grays Lake Highway to Conda. (2) IDAHO CO. (NRS 168-B) To Tony Marazzo, Spokane, Wn., $55,314 for 7.319 mi. roadbed, dr. struc. and cr. rock surf. on Cottonwood-Winona Road betw. Green Creek and Winona. 5-9

BOISE, IDAHO—To Triangle Const. Co., Boise, Idaho, $18,289, to Comm. of Public Works, Boise, Idaho, for 22.304 mi. furn. cr. gravel surf. material in windrows and stock piles for Yellowstone Park Highway betw. St. Anthony and Warm River, in FREMONT CO., Idaho. 5-29

HELENA, MONT.—Awards as follow by State Highway Comm., Helena, for: (1) HILL CO. (NRM 252 H)—To Tomlinson & Arkwright Const. Co., Great Falls, Mont., $9,021 for 0.369 mi. grad., surf. with cr. grav., the road mix oil treatm. of surf. course, and const. small dr. struc. on Sec. H of the Fort Benton-Havre Road. (2) BLAINE and PHILLIPS CO. (NRH 152 and FLH 5)—To J. L. McLaughlin, Great Falls, Mont., $40,175 for 13.852 mi. road mix oil tr. of cr. grav. surf. course on Sec. A of the Harlem-Dodson Road. (3) GRANITE and POWELL CO. (NRH 184 C & D)—To L. A. Gudgel & Sons, Kalispell, Mont., $41,758 for 13.895 mi. const. bitum. tr. surf. course by rd. mix method on Secs. C and D of Bearmouth-Deed Lodge Rd. (4) DANIELS and SHERIDAN CO. (NRM 193D, NRM 193F, NRM 251D and NRM 266C)—To A. Lalonde, Bainville, Mont., $26,618 for const. bitum. surf. course by road mix method, resurf. in part and const. of small drain. structures on 1.053 mi. on streets in Scobey; and 1.201 mi. on streets in Town of Plentywood. 5-20

HELENA, MONT.—Awards as follow by State Highway Comm., Helena: (1) PETROLEUM CO. (NRS 331 A)—To Callison & Dolvin, Inc., Billings, Mont., $33,682 for 5.221 mi. grad., surf. with grav. subbase matl. and a top course of cr. grav. and const. small drain. struc. on Sec. A of the Winnett South Road. (2) VALLEY CO. (NRS 332 A)—To Inland Const. Co., 3867 Leavenworth St., Omaha, Nebr., $55,045 for 5.426 mi. grad., surf. with cr. grav. and const. small dr. struc. on Sec. A of the Nashua-Fort Peck Road. 5-20

CARSON CITY, NEV.—To W. W. Clyde & Co., Springville, Utah, $62,102, by Nev. State Highway Comm., Carson City, for 11.33 mi. grad. and surf. betw. 25 mi. N. of Currie and 26 mi. S. of Wells, Rt. 13, Sec. B, ELKO COUNTY, Nevada. 5-15

CARSON CITY, NEVADA—To Gibbons & Reed, Salt Lake City, and J. C. Compton, McMinnville, $146,322, by Nev. State Highway Comm., Carson City, for 42.01 mi. grad. and cr. grav. or stone surf. on Secs. H1, K2 and 3, B, A1 and 2, Rts. 5 and 3, betw. Beatty and 3 mi. N. of Springdale and betw. 6 mi. S. of Stonewall Pass and Goldfield, NYE and ESMERALDA COUNTIES, Nevada. 5-15

PORTLAND, ORE.—Award recommended to Coos Bay Construction Co., Portland, Ore., $59,635, to Bur. of Pub. Roads, Portland, for constr. or improv. the John Day-Burns Reconstruction Grading Project NR-35-A3, Natl. Forest Road Project, located within the Malheur Natl. Forest, GRAND COUNTY, Oregon. 5-16

PORTLAND, ORE.—To Kern & Kibbe, 42 E. Salmon St., Portland, $63,964 to Oregon State Highway Comm., Portland, for 1.01 mi. paving on the Foster Road, Flavel Street Section of S.E. 82nd Ave. in MULTNOMAH COUNTY, Oregon. 5-21

PORTLAND, ORE.—Award recommended to Babler Bros., 2407 N.W. 28th, Portland, Ore., $14,868 to Bur. of Pub. Roads, Portland, for 4.412 mi. constr. or improv. the McMinnville-Tillamook bitum. surf. treatment Prop. FHEC 1-A3, B1, located in the Siuslaw Natl. Forest, TILLAMOOK, COUNTY, Oregon. 5-31

SALT LAKE CITY, UTAH—To Strong & Grant, Springville, Utah, $9,469, by State Road Comm. of Utah, Salt Lake City, for 0.78 mi. earth graded road in Payson City, UTAH CO., NRM 50-A-B (1935). 5-15

OGDEN, UTAH—Award recommended to W. C. Burns, Idaho Falls, Idaho, $63,974, by Bur. of Pub. Roads, Ogden, for 6.981 mi. const. or impr. the Victor-Irwin Natl. Forest Road Proj. FHEC 37-A1, B1, St. O-OO to 431-61.2, located in the Targhee Natl. Forest, BONNEVILLE COUNTY, Idaho. 5-20

OGDEN, UTAH—Award recommended to Reynolds-Ely Const. Co., Springville, Utah, $58,475, to Bur. of Pub. Roads, Ogden, for 8.742 mi. bitum. surf. on Rim Road Bryce Canyon, located in Bryce Canyon Natl. Park, PEC 1-B1, B2, KANE and GARFIELD CO., Utah. 5-31

OGDEN, UTAH—Award recommended to B. D. Palfreyman, Provo, Utah, $44,532, by Bur. of Pub. Roads, Ogden, for 2.581 mi. const., surf. or improving the Big Cottonwood-Brighton Highway, located in Wasatch Natl. Forest, Utah. 5-31

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) SPOKANE CO. (NRM 201A and NRM 156-F)—To Chas. A. Power, E. 27 8th Ave., Spokane, Wn., $98,697 for 1.4 mi. grad., drain and concr. pav. on State Roads No. 3 and No. 2 in City of Spokane, on Elm St., betw. 20th Ave. and 7th Ave., and on State Road No. 2, betw. Cannon St. and Oak St., Unit 3. (2) PIERCE CO. (NRH 171-G, 1935—To Joseph Warter, Sr., 631 N. Fife St., Tacoma, Wn., $87,813 for 0.4 of a mi. grading, draining and concr. paving; also const. an undercrossing under Northern Pacific Ry. on State Road No. 1, Lakeview Undercrossing. 5-9

SEATTLE, WN.—To Fiorito Bros., 1100 Leary Bldg., Seattle, Wn., $39,172, to County Comm., Seattle, Wn., for 1.5 mi. concr. paving of North and East 145th Street.

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) PIERCE COUNTY (NRM 171-F)—To Paine-Gallucci, Inc., 1521 S. Grant St., Tacoma, $45,425 for 0.7 mi. concr. and asph. concr. paving on State Road No. 1, South Tacoma Way, betw. South 50th and South 38th Streets in City of Tacoma. (2) LINCOLN COUNTY (St. Rd. 2)—To R. O. Dail, 2717 Simpson Ave., Aberdeen, $13,750 for 6,500 cu. yd. stockpile mineral aggreg. (oil rock) matls for St. Rd. No. 2, Wilbur to Telford (FPW Proj.). 5-23

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) FERRY COUNTY (FPW Proj.)—To F. R. Hewitt, 420 W. 22nd Ave., Spokane, $17,015 for 7,960 cu. yd. stockp. min. aggreg. (oil rock) matls and cr. stone surf. matls. for about 2.8 mi. of State Road No. 3, Sec. 1, Addy to Blue Creek, and 27.7 mi. of State Rd. No. 3, Sec. 2, Kettle Falls to Laurier. (2) SPOKANE and PEND OREILLE CO. (FPW Proj.)—To F. R. Hewitt, 420 W. 22nd Ave., Spokane, $19,640 for stockpiling 9,700 cu. yd. min. aggreg. (oil rock) matls for about 15.7 mi. of State Road No. 6, Bear Creek to Rogers Pass. 5-23

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) DOUGLAS CO.—To Lidrall Const. Co., 1006 Securities Bldg., Seattle, Wn., $26,862 for 3.1 mi. grad., surf., const. deflection cribs, deepening and widening channel on St. Rd. No. 2 from Orondo to Pine Canyon. (2) SPOKANE and WHITMAN CO.—To J. H. Collins & Co., Box 56, Spokane, $22,885, for paving 0.5 mi. of gaps on St. Rd. No. 3, from Spokane to Rosalia. (3) WHITMAN CO.—To L. Coluccio & Co., Securities Bldg., Seattle, $88,491 for 5.4 mi. grad. and surf. on Inland Empire Highway eastern route, from Garfield to Oakesdale. (4) CHELAN CO.—To W. T. Butler Const. Co., 3419 13th, S.W., Seattle, $60,560 for grad., surf. and const. reinf. concr. arch bridge 373.3 ft. long over the Wenatchee River on 0.3 mi. of St. Rd. No. 15 near Leavenworth. (5) GRAYS HARBOR CO.—To Diesel Oil Sales Co., 115 Belmont, North, Seattle, $83,926 for 17.4 mi. const. light bit. surf. treatm. on St. Rd. No. 9 from Hoquiam to Humtulips and 13.3 mi. on St. Rd. No. 13 from Cosmopolis to Pacific Co. Line. 5-31

SEATTLE, WN.—To L. J. Dowell, Inc., 1437 Elliott Ave. W., Seattle, Wn., $9,464, to King County Comm., Seattle, Wn., for grading and graveling on Third Ave., N.W., from West 112th to West 120th St., in KING COUNTY, Wn. 5-23

CHEYENNE, WYOMING—Awards as follow by State Highway Comm., Cheyenne, Wyo., for: (1) CROOK CO. (NRH 216)—To Inland Const. Co., Omaha, Nebr., $75,604 (subj. to R/W) for 20.410 mi. grad, drain., etc., on Belle Fourche-Alzada Road. (2) NIOBRARA CO. (NRH 40-C—To R. Spatz, Cheyenne, Wyo., $47,912 for 11.273 mi. oil tr. by road mix method on Lusk-Newcastle road. (3) LARAMIE CO. (NRH 46 and NRS 277)—To Inland Const. Co., Omaha, Nebr., $21,036 for 8.870 mi. oil tr. by road mix method and base course stabilization on Cheyenne-Laramie and Cheyenne-Ft. Collins road. (4) BIG HORN and PARK CO. (NRS 260 and NRS 267)—To Inland Const. Co., Omaha, $13,489 for 9.607 mi. base course stabiliz. on Lovell-Byron and Powell-Willwood roads. (5) SWEETWATER and UINTA CO. (NRS 255 and 269)—To Inland Const. Co., Omaha, $25,550 for 13.516 mi. base course stabiliz. on the Rock Springs-Winton and the Mt. View Roads. (6) HOT SPRINGS and WASHAKIE CO. (NRS 257 and 273)—To Inland Const. Co., Omaha, $13,540 for 8.336 mi. base course stabiliz. on Thermopolis-Owl Creek and Gooseberry Creek Roads. (7) ALBANY CO. (NRS 261)—To W. A. Norris, Inc., Cheyenne, Wyo., $78,484 for 28.603 mi. base course stabiliz. on the Laramie Centennial Road. 5-20

CHEYENNE, WYOMING—Awards as follow by State Highway Comm., Cheyenne, Wyo., for: (1) CONVERSE CO. (NRS 271)—To Central States Co., Cheyenne, Wyo., $5,644 for 3.013 mi. base course stabiliz. on the Glenrock-Box Elder Road. (2) FREMONT CO. (NRS 274)—To Central States Co., Cheyenne, $13,077 for 6.793 mi. base course stabiliz. on the Riverton-Pavaillion Road. (3) SWEETWATER and UINTA CO. (St. Proj. 1127, 1128, 1187, 1188, 1193 comb.)—To Northwest Engineering Co., Rapid City, Ia., $7,780 for placing stone chips seal coat on 24 mi. and seal coat only on 18 mi. of Granger-Evanston and Granger-Kemmerer roads. (4) CAMPBELL and JOHNSON CO. (St. Proj. 1205, 1206, 1207 and 1208 comb.)—To Central States Const. Co., Cheyenne, $7,238 for plac. stone chips seal coat on 10.77 mi. of Midwest-Kaycee road and seal coat only on 49 mi. of Moorcroft-Upcross road, 30 mi. of Buffalo-Ranchester road and 8.2 mi. of Midwest-Kaycee road in Sheridan, Campbell and Johnson Counties. (5) WESTON CO. (St. Proj. 1211 and 1212 comb.)—To Central States Const. Co., Cheyenne, $5,471 for 14.914 mi. plac. stone chips seal coat on the Newcastle-Lusk road and 2.65 mi. on the Newcastle-Four Corners road. 5-20

BRIDGES and CULVERTS

CALLS FOR BIDS

SAN FRANCISCO, CALIF.—Bids to 2 P.M., June 26, by S. F.-Oakland Bay Bridge, 500 Sansome St., S. F., for constr. of the Electrical Work of the San Francisco-Oakland Bay Bridge and its highway approaches under Contracts 11 and 11A. 6-4

BIDS RECEIVED

LOS ANGELES, CALIF.—J. B. McIntosh and Walker Martin, 1842 Gardena Ave., Glendale, $9,105, low to Dist. Engr., Calif. Div. of Highways, Los Angeles, for constr. of reinf. concr. culvert on Foothill Blvd. at Hall Beckley Canyon Wash, in LOS ANGELES COUNTY, Calif. 5-31

SACRAMENTO, CALIF.—Charles Kuppinger, Box 356, Lakeport, $35,458, low to Calif. Div. of Highways, Sacramento, for reinf. concr. bridge across N. Fork of N. Fork of Yuba River at Downieville, consist. of 2 40-ft., 2 31-ft. and 2 9-ft. spans on concr. piers, to be const. and road approaches graded, SIERRA COUNTY. 6-5

SACRAMENTO, CALIF.—E. T. Lesure, 87 Ross Circle, Oakland, $92,728, low to Calif. Div. of Highways, Sacramento, for const. 2 redwood timber bridges—1 across Pfeiffer Canyon, consisting of 1 76-ft. and 1 57-ft. deck truss span and 9 19-ft. trestle spans; and 1 across Torre Canyon, consisting of 1 126-ft. deck truss span and approx. 288 lin. ft. trestle span, in MONTEREY COUNTY, Calif. 6-5

STOCKTON, CALIF.—John Hachman, P. O. Box 206, Stockton, $66,000, low to County Clerk, Stockton, for constructing a 204 lin. ft. steel drawbridge over Honker Cut betw. King Island and the Empire Tract in Road Dist. No. 2. 6-3

CONTRACTS AWARDED

PHOENIX, ARIZ.—To R. C. Tanner & W. E. Hall Co., 312 S. 11th Ave., Phoenix, $89,539, to State Highway Dept., Phoenix, Ariz., for constr. of an underpass at the S. P. and A. T. & S. F. R.R. crossing on 17th Ave., on the Phoenix-Yuma Highway, in the City of Phoenix, MARICOPA COUNTY. 6-1

LOS ANGELES, CALIF.—To R. R. Bishop, 5017 E. Broadway, Long Beach, $13,780, by Calif. Div. of Highways, Los Angeles, for const. reinf. concr. girder bridge across Newhall Creek to Newhall, consisting of 4 30-ft. spans to be widened, in LOS ANGELES CO., Calif. 5-31

OAKLAND, CALIF.—Contract awarded (subject to P.W.A. approval) to MacDonald & Kahn Co., Ltd., Financial Center Bldg., San Francisco, $14,440, by G. E. Wade, County Clerk, Hall of Records Bldg., Oakland, for additional material and work to the struc. steel on the Park Street Bridge on Tidal Canal, betw. Oakland and Alameda. 5-17

LOS ANGELES, CALIF.—Awards as follow by Calif. Div. of Highways, L. A., for: (1) VENTURA CO.—To Silveria & Robbins, P. O. Box 902, Ventura, and J. P. Immel, P. O. Box 192, Ventura, $17,850, for const. concr. girder bridge across Calleguas Creek about 2½ mi. south of Camarillo, consisting of one 40-ft. span and two 35-ft. spans on concr. bents and abutments. (2) LOS ANGELES CO.—To Bodenhamer Const. Co., 354 Hobart St., Oakland, and Silveria & Robbins, P. O. Box 902, Ventura, $72,166 for const. bridge 301 ft. long across Arroyo de las Posas and P. E. R.R. Co. tracks at Morengo St. in Los Angeles, consisting of a reinf. concr. girder span on reinf. concr. abutments and piers, LOS ANGELES COUNTY. 5-15

SACRAMENTO, CALIF.—To J. F. Knapp, 1401 Park Ave., Oakland, $117,478, to Calif. Div. of Highways, Sacramento, for an undergrade crossing under the S. P. tracks at Folger Ave. in Berkeley, ALAMEDA COUNTY, consisting of 2 concr. abutments with wingwalls, a concr. center pier, a concr. sealing slab and base slab; and a deck of precast concr. slabs. (See Unit Bid Summary.)

HELENA, MONT.—Awards as follow by State Highway Dept., Helena, Mont., for: (1) FLATHEAD CO. (NRH 100 B)—To Portland Bridge Co., 833 Yeon Bldg., Portland, $125,154, for const. steel truss span bridge 496 ft., consisting of 3 164-ft. spans over Flathead River on Sec. B of Columbia Falls-Whitefish Road. 5-20

OGDEN, UTAH—To S. G. Morin, 309 S. Bernard St., Spokane, Wn., $23,021 by Bur. of Pub. Roads, Ogden, Utah, for const. or improv. Lewis and Clark Highway, Kooskia Bridge, Proj. FHEC 16-A5, Unit 2, near Selway Natl. Forest, IDAHO COUNTY, Idaho. 5-6

CHEYENNE, WYO.—Contract awarded (subject to R/W) to Treaster & Peterson, Casper, Wyo., $18,246, by State Highway Comm., Cheyenne, Wyo., for const. 4 reinf. concr. culv. and 2 tr. timb. bridges on the Belle Fourche-Alzada road in CROOK COUNTY, Wyoming. 5-20

OLYMPIA, WN.—To Elliott & Co., Inc., Box 323, Mason City, Wn., $39,060, by Director of Highways, Olympia, Wn., for bridge 263.16 ft. long over the Wenatchee River in Tumwater Canyon, Sec. 1; and a steel girder bridge 145 ft. long over Chiwaukum Creek, in Tumwater Canyon, Sc. 2 on St. Rd. No. 15 in CHELAN COUNTY, Wn., Proj. PWP 5926. 5-23

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

INGLEWOOD, CALIF.—City of Inglewood has applied to the Public Works Administration for a grant and loan of $100,000 for replacement of water mains in the northern side of the city, and to construct extensions on the east side. 6-1

LONG BEACH, CALIF.—Board of Water Commissioners, Long Beach, has approved completed plans and specifications and made application to the SERA for funds to erect six 3,500,000-gal. steel water storage tanks at a total of $300,000 in addition to $153,000 which will be spent by the Water Dept. 5-27

SAN DIEGO, CALIF.—City Council, City Hall, San Diego, has asked the Public Works Administration for a two weeks extension of time before withdrawing the loan and grant of $219,000 is withdrawn which was allotted for completion of the El Capitan pipeline. A special election will be held soon to vote bonds as required by the government. The City Manager has also been authorized to negotiate with the La Mesa Irrigation District for an agreement on the method of the District's participation in the pipeline to be used from El Capitan to El Monte pumping station, a distance of 6 miles. The length of the pipeline needed to connect the dam with the city's pipeline to Lakeside is 8 miles. Est. cost of line is $577,000. 5-24

WALNUT CREEK, CALIF.—County Board of Supervisors, Martinez, will hear petition on June 17th for formation of Contra Costa Water Works District No. 2, to serve 40 residents of Walnut Heights, near Walnut Creek, Calif. A bond issue of $30,500 is contemplated to provide 22,000 gallon storage tank and 45,000 lin. ft. of pipe. 5-22

HEBER CITY, UTAH—Bond election will be held July 2 by Heber City, Utah, to vote bonds in amount of $25,000 to finance const. of waterworks improvements, involving: 4,800 lin. ft. 16-in. pipe and castings. 5-29

PRICE, UTAH—Bond election will be held June 15 by Price, Utah, to vote $120,000 in water revenue bonds to finance construction of replacements to present city water distribution system. Work involves: 38,112 ft. 12-in. cast iron pipe, 6,740 ft. 14-in. steel pipe, 5,668 ft. 18-in. steel pipe, valves and fittings. Total est. cost $155,600. 6-4

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 A.M., June 20, by Metropolitan Water District, Los Angeles, for constructing the Copper Basin siphon and surge tank, under Spec. 101, involving: 5,000 cu.yd. excav., 1,350 cu.yd. concr. in siphon barrel, 220 cu.yd. concr. in transition and surge tank, 250,000 lb. place reinf. steel, 25,000 lb. same in transition and surge tank. The site of the work is on the line of the Colorado River Aqueduct, in San Bernardino County, about 11 miles northeast of Earp, Calif., and involves construction of a reinf. concr. siphon 16 ft. in diam. and approximately 450 ft. in length, and appurtenant works. 5-23

LOS ANGELES, CALIF.—Bids to 2:30 P.M., June 25, by Veterans Admins., Arlington Bldg., Washington, D. C., for providing and installing complete deep well pumps at Veterans Administration Facility, Los Angeles, under Proj. No. 906. 5-29

SACRAMENTO, CALIF.—Bids to 2 P. M., June 18, by State Architect, Sacramento, for erection and completion of one 300 H.P. water tube boiler and equipment, Folsom State Prison, Represa, Calif. 5-29

SACRAMENTO, CALIF.—Bids to 2 P.M., June 25, by State Architect, Sacramento, for furnishing and installing water softeners, Boiler Plant Bldg., Camarillo State Hospital, Camarillo, Calif. Water softeners consist of two 108" softeners complete with foundations, piping and other appurtenances required for a complete installation. Boiler Plant Bldg. itself is now under construction. 5-29

SAN FRANCISCO, CALIF.—Bids to 2:30 P.M., June 19, by the Dept. of Public Works, City Hall, San Francisco, for installation of Sec. "A" of Park-Presidio Extension to the Auxiliary Water Supply System under Spec. No. 18,844, involv.: MATERIALS TO BE FURNISHED BY CITY: 1,157 ft. 12" Cl. G B&S C.I.P., plain; 8,016 ft. 12" Cl. F B&S C.I.P., plain; 3,865 ft. 12" Cl. E B&S C.I.P., plain. MATERIALS FURNISHED BY CONTRACTOR: 70,000 lb. pig lead, 80,000 lb. cast iron special castings, 23,330 lb. manhole and valve box C.I. frames, covers and dust pans; 25,500 lb. wr. iron bolts, nuts and washers; 38,400 sq.ft. asph. concr. pavement, and other items. Est. cost $75,000. 6-5

PRAIRIE CITY, ORE.—Bids to 7:30 P.M., June 25, by City Council, Prairie City, Ore., for improvements to waterworks system, involv.: 2¼ mi. 4" pipeline, 217,000 gal. concrete reservoir. 6-4

BIDS RECEIVED

SAN FRANCISCO, CALIF.—MacDonald & Kahn Co., Ltd., Financial Center Bldg., San Francisco, $96,575, low to Dept. of Public Works, S. F. for construction of Sec. "C" of Marina Extension to Auxiliary Water Supply System, under Spec. No. 18,843. 6-5

CONTRACTS AWARDED

EUREKA, CALIF.—To T. E. Connolly, 461 Market St., San Francisco, and Hanrahan Co., 582 Market St., S. F., $503,145 (with P.W.A. approval), by City Clerk, City Hall, Eureka, Calif., for constructing the Head Works Unit, involving a concrete arch dam on the Mad River and two tunnels. The P.W.A. recommended rejection of all other bids, to be readvertised at a later date after the headworks unit has progressed far enough to determine exact requirements. 5-28

FARALLON ISLAND, CALIF.—To Scott Co., 243 Minna St., San Francisco, $4,300 by Public Works Officer, U. S. Navy Dept., Mare Island, for furnishing and installing water distilling plant consisting of boiler, condensing equip., tanks, pumps, piping, comp. for distilling 400 lb. of sea water per hr. at U. S. Naval Direction Finders Station, Farralon Island, under Spec. No. 7886. 5-31

SAN FRANCISCO, CALIF.—To Eaton & Smith, 715 Ocean Avenue, S. F. $118,967, by the Public Utilities Comm., S. F., for laying 12,000 lin. ft. 36", 30", and 20" College Hill Pipeline between Reservoir and Du Boce Avenue, S. F., under SFWD Spec. 73. (See Unit Bid Summary.) 5-14

CONTRACTS AWARDED

SOUTH PASADENA, CALIF.—To Pittsburgh Des Moines Steel Co., 629 Rialto Bldg., San Francisco, $15,400 to City Council, South Pasadena, for furn. and erecting one elevated steel tank, capacity 150,000 gallons for the Municipal Water Dept. 5-23

WHITTIER, CALIF.—To A. J. Fraser, Puente, Calif., $17,869, to Whittier Extension Mutual Water Company, Puente, Calif., for const. of a reinf. concrete storage reservoir (capacity 2,000,000 gallons; diameter 156 ft.) 5-28

BAINVILLE, MONT.—To Huston & Mackley, Minot, North Dakota, $25,994 to Town Clerk, Bainville, Mont., for improvements to water works system. 5-15

PANGUITCH, UTAH—Awards as follow by City Clerk, Panguitch, Utah, for improvements to waterworks system: (1) To Pacific States Cast Iron Pipe Co., Provo, Utah, $26,996 for furnishing pipe. (2) To Enoch Smith, 737 E. 2nd So., Salt Lake City, Utah, $13,642 for labor 5-6

OLYMPIA, WN.—To Pittsburgh-Des Moines Steel Co., Rialto Bldg., San Francisco, $8,895, by Director of Finance, Olympia, Wn., for furn. a 100,000 gal. steel water tank for State Penitentiary at Walla Walla, Wn. 5-15

WALLA WALLA, WN.—To Valley Ir. Works, Yakima, Wn. $6650, by Veterans Admins., Arlington Bldg., Wash. D. C. for furn. labor and matls. for const. and finish. comp. deep well pump and pumphouse at Vet. Admins. Fac., Walla Walla, Wn. 5-6

SEWER CONSTRUCTION

WORK CONTEMPLATED

WICKENBURG, ARIZ.—A special bond election will be held June 17th by the town of Wickenburg, to vote on a proposed sewage disposal system, at estimated cost of $19,000. 6-5

COVINA, CALIF.—City of Covina has applied to the State Board of Health for a permit to construct an activated sludge sewage disposal plant and outfall sewer on a tract of land west of Baldwin Park near the San Gabriel River. The project is being held in abeyance by the SERA until such permit is granted. The outfall sewer involves 7 mi. of 12" and 15" vitrified pipe. The plant includes a pump house, blowers, centrifugal pumps, aerators, screens, chlorinators, drying beds, and slude digester. 5-9

HUNTINGTON BEACH, CALIF.—City Council, Huntington Beach, has under consideration plans prepared by Ormand A. Stone, consulting engineer, for construction of a sewage disposal plant. Est. cost $100,000. It is not yet determined whether to apply to SERA for labor and vote bonds to finance the purchase of material or to use funds for the sewer department and eliminate the necessity of holding a special election to vote bonds. 5-21

LONG BEACH, CALIF.—The Sunset Beach Sanitary District has approved preliminary plans for construction of a sewage treatment plant and a collection system, and will have submitted to them final plans for the above work within the month. Alva J. Smith, 810 Boylston St., Pasadena, is Consulting Engineer, for the sewage treatment plant. Est. cost $15,000. Plans for the collection system, cost $75,000, are being prepared by Duke Hunt, 1551 Ocean Avenue, Sunset Beach. Work involves: 15,000 ft. 8" vitr. sewer pipe, 12,000 ft. 6" vitr. sewer pipe, 8,000 ft. 4" vitr. sewer pipe, 49 standard manholes, 5 flushing tanks. 5-9

WORK CONTEMPLATED

LONG BEACH, CALIF.—City has included $52,000 in the 1935-36 Municipal budget for purchase of materials for use in construction of the 107 units of sanitary sewers in the North Long Beach area, according to R. M. Dorton, City Manager. Labor by SERA. 5-14

RIVERSIDE, CALIF.—Election will be held July 9th for formation of Palm Springs Sanitary District in Riverside County to finance construction of sewage treatment plant, 40-acre site acquirement, and two miles of main, to be located approx. 3 miles east of Palm Springs, off the Edom Road. Main to have a capacity to care for population of 12,000; plant to have a capacity to care for 4000. Est. cost $102,000. 5-29

COLORADO SPRINGS, COLO.—Bonds in amount of $225,000 have been voted by Colorado Springs, Colo., and application has been made for a PWA grant of $67,500 to aid in financing construction of a complete sewage disposal plant for the City. 5-29

DENVER, COLO.—At an election held May 21st the people of Denver, voted in favor of $2,000,000 in bonds to finance construction of a sewage disposal plant. 5-24

POCATELLO, IDAHO—The PWA has made a loan and grant of $43,500 to Pocatello, Ida. for const. of sanitary trunk and storm sewers. 5-21

ROSEBURG, ORE.—The P.W.A. has made an allotment of $35,000 to the Veterans Administration, Roseburg, Ore., for contribution to the City of Roseburg, to pay Government share of sewers and sewage disposal plant to serve Veterans Facility at that place. Loan and grant of $72,000 has already been made to Roseburg for construction of a sewage disposal plant. 5-13

CALL FOR BIDS

LOS ANGELES, CALIF.—Bils to 10 A.. M., June 19th by Board of Public Works, L. A., for furn. and installing pumping plant pumps and piping and sludge piping system for the Terminal Island Sewage Treatment Plant, P.W.A. Proj. 5633, Unit No. 3B. Work involves five units of pumps and motors and installation of suction and discharge manifold piping and pipe line extensions, drains and house connection sewer, together with metal grating walkway. 5-28

LOS ANGELES, CALIF.—Bids to 3:30 P.M., July 2nd by L. A. County Sanitation District, Room 202, Law Bldg., 139 N. Broadway, Los Angeles, for construction of part of Unit No. 1 of Joint Outfall sewer extending from District Joint Disposal Plant near Harbor City to ocean shore near White Point, San Pedro. Bids on: SCHEDULE No. 1 between Station 49 plus 78 to Sta. 140 plus 50 (1.72 mi. in length) 34,000 cu.yd. excav. (tunnel) 120 ft. double line 60" cast iron pipe. Lump sum, construct manholes and transition and valve chamber and install 60" valves and nipples, complete; 13,000 cu. yd. concrete in tunnel; 280 tons steel support in tunnel; 525 M. ft. BM permanent timbers in tunnel; 1,402,000 lb. reinf. steel; 125 cu. yd. gunite coating rock; 5,000 ft. drill grout holes; 600 cu. yd. mix and place grout. SCHEDULE No. 2—Between Sta. 140 plus 50 and Sta. 281 plus 00 (2.66 mi. in length) 50,000 cu.yd. excav (tunnel); 19,100 cu.yd. concrete (tunnel)); 365 tons steel supports; 1,000 M. ft. BM permanent timb.; 2,207,000 lb. steel; 5,000 ft. drill grout holes; 700 cu.yd. mix and place grout. SCHEDULE No. 3—Between Sta. 281 plus 00 to Station 372 plus 02 (1.72 mi. in length) 28,000 cu.yd. excav. (tunnel) 960 ft. reinf. concrete conduit; 10,200 cu.yd. concrete tunnel; 105 tons steel supports; 800 M. ft. BM permanent timbers; 1,289,000 lb. rein. stl.; 500 ft. drill grout holes; 50 cu.yd. mix and place grout. Est. cost is $1,850,000. Horseshoe shape, 8" in dia. approximately 31.115 ft. in length. 5-25

SAN MATEO, CALIF.—Bids to 8 P. M. June 17th by City Mgr. E. P. Wilsey, San Mateo, for const. an outfall sewer to sewer San Mateo and Hillsborough. Work involves: 124 ft. 12-in., 1,158 ft. 21-in., 6,980 ft. 24-in., 2,753 ft. 27-in., and 776 ft. 36-in. vitrified sewer, 2,726 lin. ft. 20" cast ir. force main—or—2,726 ft. 20" woodstave pipe (Alternate), 680 lin. ft. 24" woodstave pipe, 1 ea. timb. bulkhead and tide gate, 24 manholes. 1 pump plant complete, L.S.-Sewage treatment works, 4,755 sq. yd. road oil surfacing, 2,111 sq.yd. oil screenings, 1,400 lin. ft. fences. Est. cost $146,000. 5-29

BIDS RECEIVED

LOS ANGELES, CALIF.—J. L. Kruly, 1759 N. Eastern Ave., Los Angeles, $44,230 low, to City Council, Laguna Beach, for const. sanitary sewer system in Thalia St. and other streets known as Sanitary Lateral Sewer District No. 1, under the 1911 Act. 5-17

SAN FRANCISCO, CALIF.—Union Paving Co., Call Bldg., S. F., $58,893 low to Dept. of Public Works, City Hall, S. F., for const. reinf. concr. sewers in 18th St. and in Folsom St., under Spec. 18,787. 5-29

FARMINGTON, UTAH—Mullins & Wheeler, 22½ E. 1st South, Salt Lake City, Utah, $23,350, low to City Clerk, Farmington, Utah, for improvements to sewer system. 5-31

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To Healy Tibbitts Const. Co., 64 Pine St., San Francisco, $81,370 by Dept. of Public Works, S. F., for constructing sewers in 6th Street from Townsend Street to Channel Street, Sec. "B." 6-5

KAYSVILLE, UTAH—To Lynch-Cannon Engineering Co., Kearns Bldg., Salt Lake City, and Utah Fire Clay Co., 1078 S. 1st W., Salt Lake City, at $45,266. (⅔ labor, ⅓ mat'l.) by City Clerk, Kaysville, Utah, for constructing sewers and furnishing materials for same. 5-10

SEATTLE, WN.—To Dayton-Dowd Co., 94 Columbia St., Seattle, Wn., $6,436 to Board of Public Works, County-City Bldg., Seattle, for furn. & installing sewage pumping units for the Laurelhurst Trunk Sewer. 5-6

RIVER and HARBOR WORK

WORK CONTEMPLATED

LOS ANGELES, CALIF.—Call for bids will be issued shortly by U. S. Engineer Office, Los Angeles, for construction of part of 5100 ft. of the Long Beach-San Pedro Breakwater which remains to be constructed. Est. cost $1,825,000 of which $1,000,000 has been recommended to the President as a P.W.A. allotment. 6-3

NEWPORT BEACH, CALIF.—Call for bids will be issued shortly by U. S. Engr. Office, L. A. for removal of 6400 cu.yd. of ledge rock in the county channel north of Lido Isle in Newport Bay, at Newport Beach, Calif. 5-21

SAN DIEGO, CALIF.—An allotment of $1,800,000 has been recommended by President Roosevelt's Advisory Committee on Allotments for dredging at San Diego Harbor. 5-18

SANTA BARBARA, CALIF.—Tentative plans have been prepared by City Engineer, Santa Barbara, for development of beaches by dredging 400,000 cu.yd. of sand from the 45-acre beach west of the breakwater. Plans also include construction of groins from the breakwater and a permanent pipeline sand distribution system which would act as a permanent pipeline dredge. Est. cost $60,000. 5-28

THE DALLES, ORE.—Plans and specifications are being completed by Col. B. C. Allin, Port Engineer and call for bids will be issued shortly by City Clerk, The Dalles, Oregon, for construction of 2 terminals to provide over 500 ft. of berthing space. Terminals will have Marine elevators. Bonds in amount of $200,000 have been voted and a P.W.A. grant of $74,000 has been made. 5-13

SEATTLE, WN.—Plans and specifications have been completed and call for bids will be issued as soon as federal allotment has been received by U. S. Engr. Office, Seattle, Wn., for construction of a cutoff in the Narrows, near Raymond, Wn. Work involves: 1,103,000 cu.yd. earth dredging, 4,000 cu.yd. rock dredging. Est. cost $207,000. 6-5

CONTRACTS AWARDED

CORONADO, CALIF.—To Sparkes & McClellan, 23rd and Central, Newport Beach, $10,480 to City Council, Coronado, for 60,000 cu.yd. dredging in Glorietta Bay, Coronado. 5-18

LOS ANGELES, CALIF.—Awards as follow by Board of Harbor Commissioners, L. A. for furnishing and delivering creosoted piling and lumber for wharf extension at Berths 145 and 155, under Specification No. 941: (1) To Pan Pacific Piling & Construction Co., 2145 E. 25th St., L. A., for creosoted Doug. Fir piling at $20,949.37. (2) To Consolidated Lumber Co., 122 W. Jefferson, Los Angeles, for creosoted sawn Douglas Fir, $2730. 5-23

LOS ANGELES, CALIF.—Awards as follow by Harbor Dept. L. A. for furn. and driving 15,000 lin. ft. piles for wharf at berth 155, under Spec. 940. (1) To Pan Pacific Piling, 2145 E. 25th St., L. A., $43,200 for impregnating with asph. by vacuum pressure process, reinf. conc. jacketed bearing piles. (2) To Merritt Chapman & Scott, San Pedro, $12,000 for transporting and driving same. 6-1

OAKLAND, CALIF.—To Ben C. Gerwick, Inc., 112 Market Street, San Francisco, $64,515 by Port of Oakland, for rebuilding 720 lin. ft. apron wharf on 7th Street and repairing open wharf north of transit shed, at Outer Harbor Terminal. 6-4

Irrigation and Reclamation

WORK CONTEMPLATED

YUMA, ARIZ.—Organization of an irrigation district is contemplated by landowners near Yuma on the Gila River. It has not yet been determined whether to have one unit comprising 139,000 acres or to organize a district to include the entire four units of the irrigation program including 595,000 acres. Yuma county has applied to the P.W.A. for a loan and grant of $24,000,000 for the first unit. 5-21

BIDS RECEIVED

ONTARIO, ORE.—J. P. Brumbach, Parma, Idaho, $16,550, low to Bureau of Reclamation, Ontario, Oregon, for construction of earthwork, North Canal, Laterals 25.4 to 27.8-0.7, Mitchell Butte Division, Owyhee Project, Oregon-Idaho, located near Dunaway and Nyssa, Oregon, under Spec. No. 679-D. 5-15

CONTRACTS AWARDED

YUMA, ARIZ.—To Lewis-Chambers Const. Co., Inc., 1743 Canal Bank Bldg., New Orleans, $505,506 on Scheds. 1, 2 and 3, and to Mittry Bros. Const. Co., 5531 Downey Road, Los Angeles, $260,400 on Sched. 4, by U. S. Bureau of Reclamation, Yuma, Ariz., for const. earthwork, All-American Canal, Sta. 1860 to Sta. 3090-75, Boulder Canyon Project, Arizona-California-Nevada, under Spec. No. 621. 5-27

MODESTO, CALIF.—To Ed. Erickson, Rt. 4, Box 744, Modesto, $20,663 by Modesto Irrigation Dist., for improvements in District No. 6. 5-13

ONTARIO, ORE.—To Morrison-Knudsen Company, 319 Broadway, Boise, Idaho $127,485 by Bureau of Reclamation, Ontario, Oregon, for constructing earthwork and structures South Canal, Station 736 to Station 1340, and South Canal Lateral 17.7 Succor Creek Division, Owyhee Project, Oregon-Idaho, under Spec. 619. 5-23

ONTARIO, ORE.—To Geo. B. Henly, Nyssa, Oregon, $10,502 to Bureau of Reclamation, Ontario, Oregon, for constructing earthwork and structures, Shepard Gulch Drain, Dead Ox Flat Division, Owyhee Project, Oregon-Idaho, under Spec. 676-D. 5-23

OGDEN, UTAH—To Barnard Curtiss Co., 808 Phoenix Bldg., Minneapolis, Minn. $399,350. Sched. 2, 1st Alt. by Bureau of Reclamation, Ogden, Utah, for const. the Ogden Canyon conduit, Ogden River Proj. Utah, under Spec. No. 622. (See Unit Bid Summary). 5-27

DAM CONSTRUCTION

WORK CONTEMPLATED

CORONA DEL MAR, CALIF.—Construction of an earth fill dam west of Corona Del Mar is contemplated as a joint project by the City of Newport Beach, the Irvine Co. and Orange County. The dam is a flood control project designed to protect the pumping plant of the City of Newport Beach and a channel of the Irvine Co. 5-29

BOISE, IDAHO—Preliminary plans have been approved and formation of the Reclamation District has been completed for a $2,125,000 reservoir and canal project on the Snake River in Idaho. Work involves: North Fork Dam, est. cost $1,050,000. Canal betw. North Fork and Fall River $200,000. Lake of Woods Reservoir $200,000. Grassy Lake Reservoir $600,000. R. W. Faris, is State Commissioner of Reclamation, Boise, Idaho. 5-27

HELENA, MONT.—Bids to 10 A. M., June 15, by R. R. Purcell,, Secretary, State Water Conservation Board, Helena, Montana, for constructing three weirs and an earth dam and appurtenant structures on Red Lodge Creek in Carbon County, Montana, at Rock Creek, Est. cost $826,000. 5-27

BIDS RECEIVED

GLASGOW MONT.—Frazier-Davis Const. Co., 1458 Arcade Bldg. and G. L. Tarlton, 411 N. 7th St., St. Louis, Mo. $449,275. Sch. 1; Siems-Helmar, Inc., Guardian Bldg., St. Paul, $469,698. Sch. 2; and Spillway Builders, Inc. Kansas City and Ft. Peck, Mont., $946,650. Sch. 1 and 2 combined, lowest bids submitted to U. S. Engr. Office, Kansas City, Mo, for steel sheet pile retain. walls for closure section of Fort Peck Dam. 6-3

PRESCOTT, ARIZ.—To Pearson & Dickerson, Prescott, Ariz., $64,898 by Chino Valley Irrigation District, for the construction of a concrete arch dam on Willow Creek near Prescott. 5-16

DENVER, COLO.—To M. E. Carlson, 4483 Newton St., Denver, $461,427 by W. B. Lowry, Manager of Improvements and Parks, Denver, for constructing the Cherry Creek Retarding dam to be located near Sullivan, Colo., 5 mi. southeast of Denver. (See Unit Bid Summary) 5-13

PORTLAND, ORE.—To Columbia Const. Co., Bonneville, Ore., $247,500 by U. S. Engineer Office, 306 Customhouse, Portland, Oregon, for excavating hauling and placing materials, shaping and dressing disposal areas and berms, placing and compacting fishway lining and all incidental work for const. of the lower lock approach canal and fishway at Bonneville, Oregon, located on the Columbia River, 42 mi. east of Portland, Oregon. 5-27

FLOOD CONTROL WORK

WORK CONTEMPLATED

SAN BERNARDINO, CALIF.—California State Assembly has approved a bill providing $400,000 for construction of check dams, silt dams, and catch basins on the Santa Ana River in San Bernardino County, Calif. 6-4

SANTA ANA, CALIF.—Orange County Board of Supervisors, has asked P.W.A. for $11,600,000 to provide carrying out the Elliott Water Conservation plan and flood control on eight streams, and provides for a large dam at Prado to cost approximately $7,215,397 also provides for enlarging the Santiago Dam, creating water spreading grounds below the proposed Prado dam, protection of the Santa Ana River channel, building a reservoir above Fullerton to collect drainage water and flood control dams in San Juan, Trabuco, Aliso, Brae and Carbon Canyons. 5-6

CALLS FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 A. M., June 19th by County Board of Supervisors for the following projects: (1) Constructing concrete conduit in Halls Canyon Channel from Debris Basin to Verdugo Wash. (2) Constructing concrete conduit in Pickens Canyon Channel from Debris Basin to Verdugo Wash. (3) Constructing Hall Beckley Debris Basin near Montrose. (4) Constructing the Pickens Canyon Debris Basin near Montrose. 5-31

LOS ANGELES, CALIF.—Bids to 10 A. M., June 19th by County Board of Supervisors, Los Angeles, for construction of concrete conduit on Verdugo Wash, from Kenilworth Ave., to the Los Angeles River, involving: 37,500 cu.yd. excavation, 1,575 cu.yd. fill in river levee, 11,000 cu.yd. backfill, 8,800 cu.yd. reinf. concrete. 5-31

SACRAMENTO, CALIF.—Bids to 3 P. M. June 25th by U. S. Engineer Office, 208 P. O. Bldg., Sacramento, for furn. and installing 3 drainage pumping plants along the easterly levee of the Sutter By-Pass in Sutter County, Calif. Work involves: Pumping plant No. 1, located 1.5 mi. south and 0.5 mi. west of Marcuse Station involving 3 new pumps, 140 sec. ft. 3 ft. head; 1 sump pump, 3 transformers, 8-ton traveling crane, etc. Pumping Plant No. 2, located 1.5 mi. north and 5.5 mi. west of Tudor Sta. involving 5 pumps, 75 sec. ft.; 3 ft. head, 1 sump pump, 10 ton traveling crane, 3 transformers, etc. Pumping Plant No. 3, located 2 mi. south and 1.5 mi. west of Sutter City Station, involving 4 pumps, 30 to 60 cu.ft. per sec., 3-ft. head, 3 transformers, etc. Est. cost $450,000. Specifications No. 6757. 5-28

Railroad Construction

CALLS FOR BIDS

SAN DIEGO, CALIF.—Bids to June 18th by Public Works Officer, 11th District, U. S. Navy, Ft. of Broadway, San Diego, for repairs to Ways of Marine Railway at San Diego, Calif., under Spec. 7938. Est. cost $18,000. 5-31

CONTRACTS AWARDED

PORTLAND, ORE.—To Sam Orino, E. 3104 Boone Ave., Spokane, Wn., $793,191 by U. S. Engineer Office, Portland, for constructing a portion of the relocated line of the O.W.R.R.&N. Co.'s railroad and riprap protection of Ruckel Slide, in connection with the Bonneville Dam Project, under Bid No. 694-35-1. (See Unit Bid Summary) 6-5

TUNNEL CONSTRUCTION

CONTRACTS AWARDED

OGDEN, UTAH—To Union Const. Co., Ogden, Utah, $77,737. Sched. 1—by Bureau of Reclamation, Ogden, Utah, for constructing the Ogden Brigham Tunnel, Ogden-Brigham Canal, Station 127 plus 10 to Station 168 plus 96, Ogden River Project, under Spec. No. 618. 5-27

POWER DEVELOPMENT

WORK CONTEMPLATED

LOS ANGELES, CALIF.—Plans and spec. have been completed and call for bids will be issued shortly by Metropolitan Water Dist., L. A., for const. of a 237 mi. transmission line to carry elec. energy from Boulder Dam to pumping stations of Colorado River Aqueduct. The line is designed to carry ultimately 36% of all electricity generated at Boulder Dam and will furn. the energy needed to lift aqueduct water over mountain ranges lying betw. the Colorado River and the Pacific Coast. Boulder Dam power will be used to lift water from Colorado River and into the aqueduct and at four other pumping stations along the project. The proposed transmission system of the Metropolitan Water Dist. will extend west to the last of these pumping stations, approx. 200 mi. east of Los Angeles. From that point aqueduct water will flow by gravity. The eventual capacity of the Metropolitan Water District's generating plants at Boulder Dam will be 330,000 k.w. equivalent to 440,000 H.P.

CALLS FOR BIDS

PORTLAND, ORE.—Bids to 3 P. M., June 18th by U. S. Engineer Office, Portland, for the design, manufacture, and installation in complete operating condition of one 4,000 kw alternating current generator with auxiliaries and spare parts; generator to have 2400 volts, 60 cycles, 257 r.p.m., under Spec. 694-35-20. 5-20

PORTLAND, ORE.—Bids to 3 P. M., June 25th by U. S. Engineer Office, Portland, for furnishing, erecting, and putting in an operating condition, seven steel intake gates for the powerhouse, nine sections of steel draft tube stop-logs, nineteen steel gates for the spillway dam, one 130-ton gantry crane for powerhouse intake, one 30-ton gantry crane for the powerhouse draft tubes, two 350-ton gantry cranes for spillway dam, lifting beams for use with the cranes, and accessories, FOB either Bonneville, Oregon, or North Bonneville, Wn. Work involves: SCHEDULE I—Gantry Cranes for Powerhouse—1 furn. and erect 30-ton draft tube gantry crane. 1 furn. and erect 130-ton intake gantry crane. Lifting beams for powerhouse cranes—27,000 lb. struc. carbon steel. SCHEDULE II—7 Steel Intake Gates for Powerhouse—830,000 lb. steel, 56,000 lb. steel castings, 40,000 lb. Chrome nickel steel for axles, 65,000 lb. rolled carbon steel wheels. 9 Steel draft Tube Stop Log Sections for Powerhouse—370,000 lb. structural steel, 10,700 lb. steel castings, 2,800 lb. Tobin bronze bolts. SCHEDULE III—Gantrry Cranes for Spillway Dam—2 furn. and erect all mechanical and electric apparatus for 350-ton gantry cranes, 450,000 lbs. struc. carbon steel. 19 Steel Gates for Spillway Dam—8,375,000 lb. structural steel, 590,000 lb. steel castings, 515,000 lb. rolled carbon steel wheels, 75,000 lb. rolled nickel steel, 118,000 lb. chrome nickel steel, 33,000 lb. machine steel, 20,000 lb. iron castings, 27,000 lb. bolt steel, nickel, 3,150 lb. pipe, galv. wrought iron, 44,000 lb. phosphor bronze, 23,000 lb. rubber seals and cushions. 5-31

CONTRACTS AWARDED

PASADENA, CALIF.—To General Electric Co., 5201 Santa Fe Ave., Los Angeles, $12,910 to City Clerk, Pasadena, for supervisory control for Municipal Light Dept. 5-29

MISCELLANEOUS

BIDS RECEIVED

SAN FRANCISCO, CALIF.—Steel Tank & Pipe Co. of Calif., 1100 4th St., Berkeley, $65,345 low to National Park Service, S. F., for furn. and laying in a trench furn. by Natl. Park Service, elec. arc-welded, soil-proofed steel pipe, penstock anchorages, and dresser type couplings; also remove and relay present 26" penstock for use in connec. with const. of the hydro-elec. power plant to be installed at Mammoth, Yellowstone Natl. Park. 5-24
Natl. Park. 5-24

SAN FRANCISCO, CALIF.—Piombo Bros. & Co., 1571 Turk St., San Francisco, $123,880 low to Public Utilities Comm., for constructing field fill for extension of Landing Field at San Francisco Airport, under Contract No. 34. 6-5

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To L. A. Rock & Gravel Co., 1735 N. Main St., L. A., $10,000 for removal from 35,000 to 40,000 cu.yd. earth from two adjacent lots at the northwest corner of Hill and Second Streets. The site adjoins the ramp extending from Hill St. to the top of the hill, next to the 2nd St. Tunnel. 5-24

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OPPORTUNITY SECTION

UNITED STATES DEPARTMENT
OF THE INTERIOR

Bureau of Reclamation

(Federal Emergency Administration of Public Works Project)

Pipes, Valves, Fittings For Boulder Power Plant

Washington, D. C., May 28, 1935.

Sealed bids (Specifications No. 627) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 2 p.m., July 8, 1935, and will at that hour be opened, for furnishing and deliveries f.o.b. cars at the shipping point or f.o.b. cars at Boulder City, Nevada; approximately 1,000,000 pounds of pipe, fittings, and valves for the Boulder Power Plant, Boulder Canyon Project, Arizona-California-Nevada. The materials will be installed by the Government. The charge for copies of the specifications and drawings is $5.00 each, not returnable. For particulars, address the Bureau of Reclamation, Denver, Colorado, or Washington, D. C.

ELWOOD MEAD, Commissioner.

NOTICE TO CONTRACTORS

Sealed proopsals will be received at the office of the East Bay Municipal Utility District, until 5:30 P.M. June 19, 1935, and will at that hour be opened for furnishing 50 tons pig lead, in 100-pound bars.

Proposal No. 640 may be obtained upon application at Room 1427 Latham Square Bldg., Oakland, California.

JOHN H. KIMBALL,
Secretary.

Oakland, Calif., June 5th, 1935

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF
AGRICULTURE

Bureau of Public Roads

Placing Bituminous Treated Surfacing on Section of Highway

San Francisco, California, June 4, 1935.

Sealed Bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p. m. on June 27, 1935. for placing bituminous treated surfacing (Road Mix) on Section A of Route 11, the Mt. Charleston National Forest Highway, Dixie National Forest, Clark County, Nevada. The length of the project is 3.661 miles and it involves major items of approximately 1,500 cu.yds. unclassified excavation, 75 cu.yds. unclassified excavation for structures; 500 cu.yd. miles hauling unclassified excavation; 235 lin. ft. 8-inch perforated C.M. Pipe; 75 cu.yds. crushed rock or gravel for backfill; 6,500 cu.yds. crushed gravel for surface course; 50 cu.yds. stock-piling bituminous treated crushed gravel; 300 tons Liquid asphaltic road material type M.C.-2; 3.661 miles mixing and rolling. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is 90 cents per hour for skilled labor, 70 cents per hour for intermediate labor and 62½ cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the **subletting** and **assignment** of the contract; and to the **alternate** bids which must be submitted in case the bidder desires to offer any **foreign** articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

UNITED STATES DEPARTMENT
OF AGRICULTURE

Bureau of Public Roads

Grading and Placing Subgrade Reinforcement on Portion of Mt. Shasta-Lassen Highway.

San Francisco, California, June 6, 1935.

Sealed Bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p.m. on June 27, 1935, for grading and placing subgrade reinforcement on a portion of Section D, and bituminous treatment (light surface application) on the portion of Section D, and on a portion of Section E, Route 77, the Mt. Shasta-Mt. Lassen National Forest Highway, Shasta National Forest, Siskiyou and Shasta Counties, California. The length of the portion of Section D is 0.718 miles. The length of the portion of Section E is 3.180 miles. The principal items of work are approximately as follows: 5.5 acres clearing, 38,400 cubic yards unclassified excavation, 670 cubic yards unclassified excavation for structures, 118,000 station yards overhaul, 680 lineal feet corrugated metal pipe, 2 each Type A spillway inlets, 321 cubic yards concrete, 38,000 pounds reinforcing steel, 200 cubic yards crushed rock or gravel for backfill, 6 each right of way monuments, 110 lineal feet 6-inch cast iron water pipe, 1,500 cubic yards placing stockpiled subgrade reinforcement, 160 tons liquid asphaltic road material—Type S.C.-2. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for intermediate labor and 60 cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the **subletting** and **assignment** of the contract; and to the **alternate** bids which must be submitted in case the bidder desires to offer any **foreign** articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California.

C. H. SWEETSER,
District Engineer.

POSITION WANTED

ESTIMATOR on Grading and Highway Work; experienced in accounting, office management and highway construction supervision. Wants permanent connection. Address: Box 410, Western Construction News, 114 Sansome St., San Francisco.

OPPORTUNITY SECTION

Advertising Rates, Effective July 1, 1935

Less than 24", within one year.....$4.00 per in.
24" to 59", within one year..... 3.75 per in.
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180" or more, within one year..... 3.00 per in.
(Fractional inches count as one inch)
Official Bids, 35 cents per line, per insertion.
(Fractional lines count as one line)

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