WCN-05-1935

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME X, No. 5

MAY, 1935

25 CENTS A COPY
$2.00 PER YEAR

Ingenious Forms and Concrete Placing Equipment Feature the $33,000,000 of Conduit Work on the Colorado River Aqueduct. (See Article Page 124.)

ACHIEVEMENT

Rising above the Bay like giant fingers, the towers of the two great bridges take shape — objects of wonderment — visible evidence of the power of modern engineering skill.

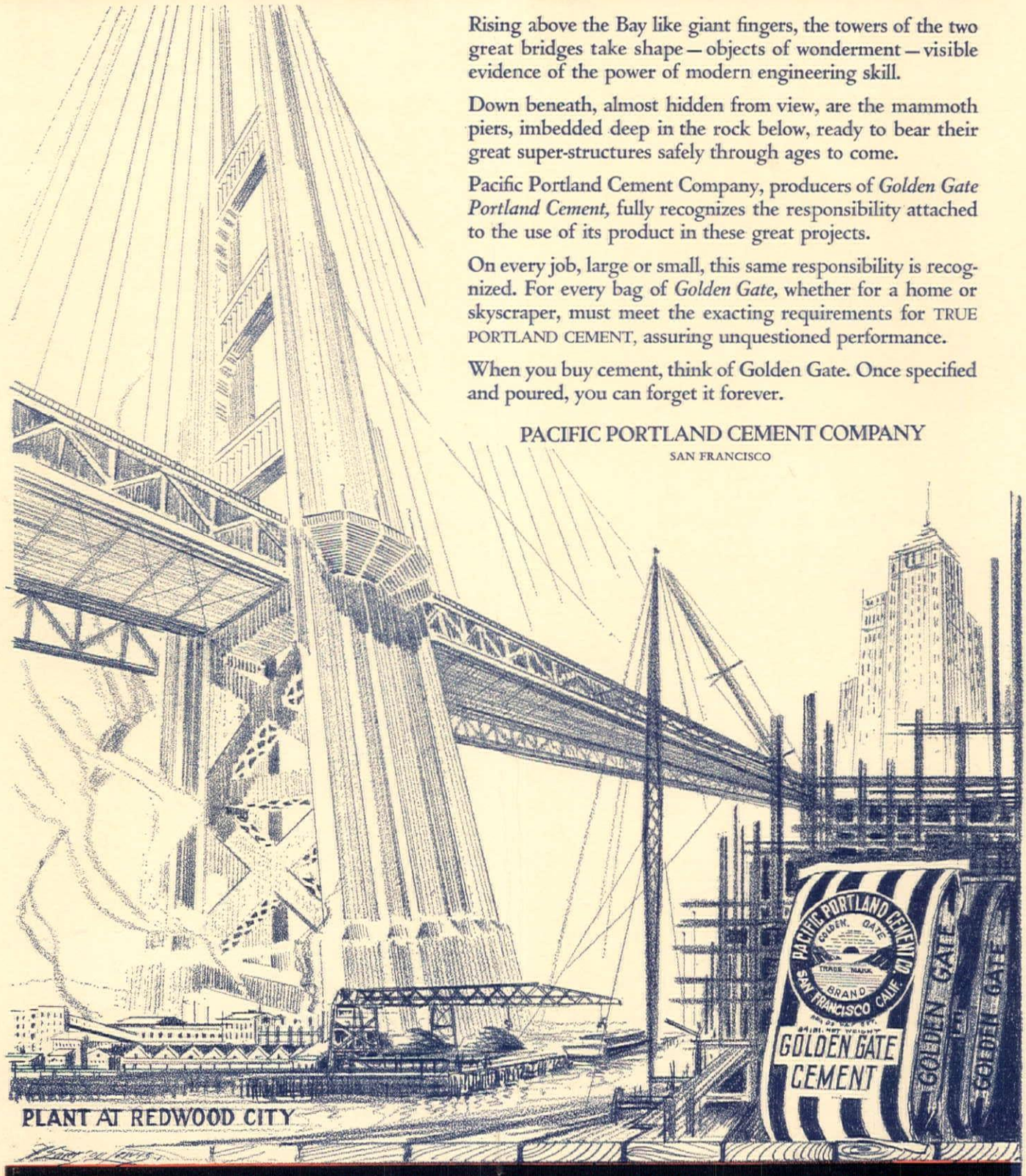
Down beneath, almost hidden from view, are the mammoth piers, imbedded deep in the rock below, ready to bear their great super-structures safely through ages to come.

Pacific Portland Cement Company, producers of *Golden Gate Portland Cement,* fully recognizes the responsibility attached to the use of its product in these great projects.

On every job, large or small, this same responsibility is recognized. For every bag of *Golden Gate,* whether for a home or skyscraper, must meet the exacting requirements for TRUE PORTLAND CEMENT, assuring unquestioned performance.

When you buy cement, think of Golden Gate. Once specified and poured, you can forget it forever.

PACIFIC PORTLAND CEMENT COMPANY
SAN FRANCISCO



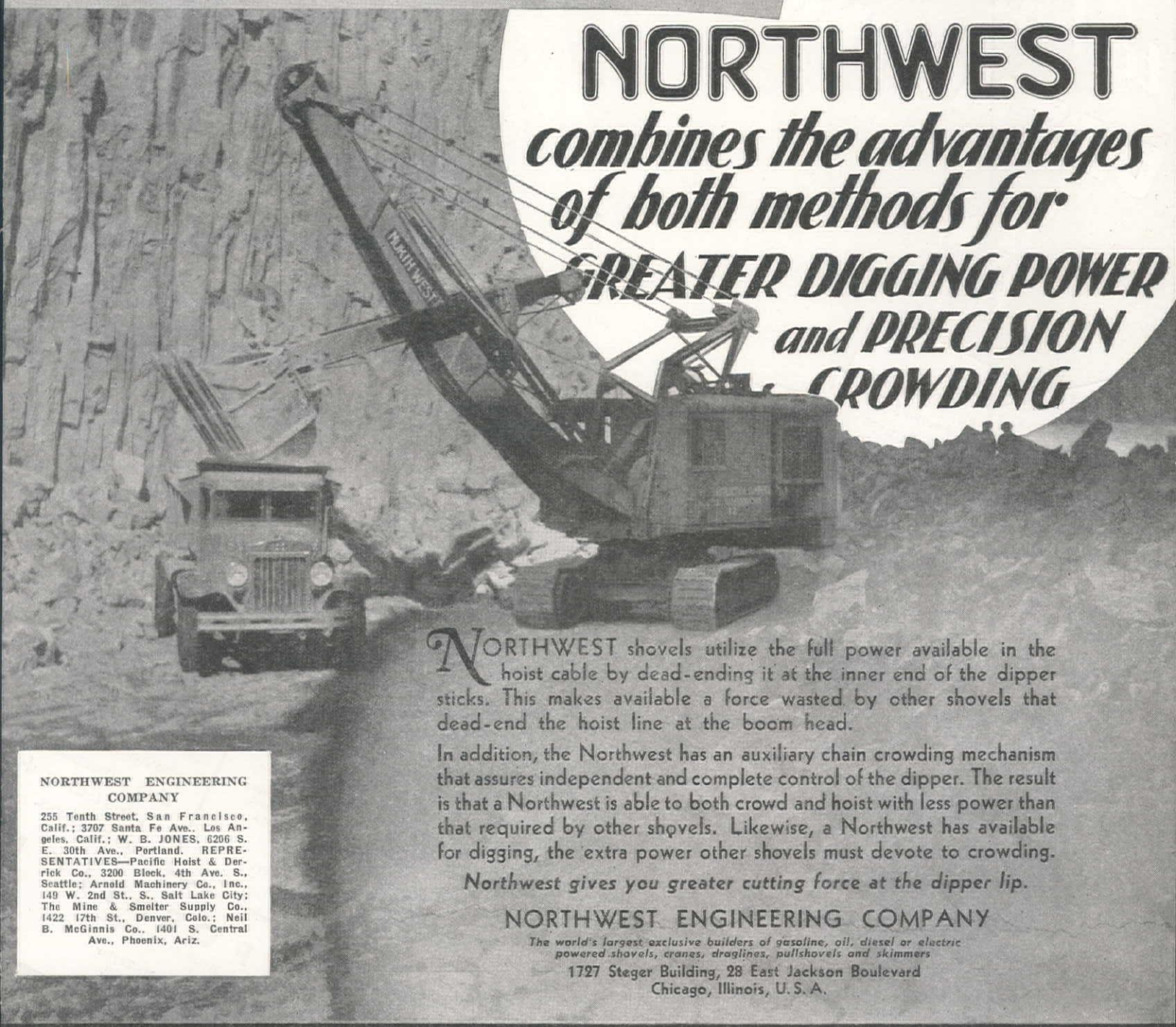
PLANT AT REDWOOD CITY

GOLDEN GATE PORTLAND CEMENT

Some shovels depend entirely on the Hoist Rope for Outward Thrusting—

Other shovels depend on Auxiliary Mechanisms!

ONLY NORTHWEST combines the advantages of both methods for GREATER DIGGING POWER and PRECISION CROWDING



NORTHWEST shovels utilize the full power available in the hoist cable by dead-ending it at the inner end of the dipper sticks. This makes available a force wasted by other shovels that dead-end the hoist line at the boom head.

In addition, the Northwest has an auxiliary chain crowding mechanism that assures independent and complete control of the dipper. The result is that a Northwest is able to both crowd and hoist with less power than that required by other shovels. Likewise, a Northwest has available for digging, the extra power other shovels must devote to crowding.

Northwest gives you greater cutting force at the dipper lip.

NORTHWEST ENGINEERING COMPANY

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

1727 Steger Building, 28 East Jackson Boulevard
Chicago, Illinois, U. S. A.

NORTHWEST ENGINEERING COMPANY

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

SHOVELS, CRANES, DRAGLINES, PULLSHOVELS, SKIMMERS

NORTHWEST

GASOLINE, OIL, DIESEL OR ELECTRIC POWERED

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

THE WALLOP to knock down your DIRT MOVING COSTS!

● It's not how much dirt you move that counts . . . it's *the cost of moving it!* That's where the Bantam Weight steps into the picture . . . digs its way to profits where larger machines can't. It's full revolving and mighty husky all around. Every waste pound is trimmed off to guarantee fastest production at lowest operating costs. As shovel, it weighs only 15,800 pounds. *Fully Convertible at lowest cost ever* for service as shovel, dragline, crane, hoe, skimmer or pile driver. Simplified design of attachments makes converting practical right on the job.

P&H BANTAM WEIGHT (MODEL 100 3/8 YD.)

● With the smooth Ford V-8 power plant, the Bantam Weight gets there in a hurry and works effectively in tight corners. Split Second Power Clutches, P&H Rapid Reversing Chain Crowd and live boom provide easy control for fast digging; with accuracy to within 1 inch of grade.

All Welded Construction and new alloy steels have reduced weight to a new and unbelievable degree . . . at the same time adding strength and controlled balance. Machinery units are placed far behind the center of rotation.

Economical first cost is combined with lower upkeep. First reduction helical gears are heat treated and double cut for long life and operate in an oil bath. Anti-friction bearings are used at all vital points. Rigid frame construction prevents weaving and misalignment. Dependable Ford V-8 may be replaced on Ford replacement plan. . . . Full Vision of 210 degrees is provided in comfortable streamline cab with sliding doors and windows.

BULLETIN No. 100 has complete details. A post card will bring your 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	150 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.
Established 1884

Warehouses and Service Stations:
HARNISCHFEGER SALES CORPORATION, 82 Beale St., San Francisco; R. M. Taylor
WESTERN LOGGERS MACHINERY CO., 302 S. W. Fourth Ave., Portland, Oregon
SEATTLE DALLAS LOS ANGELES SAN FRANCISCO

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

J. I. BALLARD, Editor

Contents for May, 1935

The West's Share in the Works Program

With the administrative machinery being rapidly set up for the handling of the funds from the $4,880,000,000 work-relief act, approved by President Roosevelt April 8, it is of interest to break down the sum into general figures and note the types of work represented.

The total figure is made up of $4,000,000,000 in new appropriation, $380,000,000 from unexpended balances of the PWA, CWA and other emergency appropriations and $500,000,000 from unexpected balances of the RFC. On approving the act, the President alloted $125,000,000 for continuing emergency relief work, and $30,000,000 for the CCC.

Out of the main fund the major allotments are: Public works (PWA type of projects) $900,000,000, highways and grade-crossing work $800,000,000, Civilian Conservation Corps $600,000,000, rural rehabilitation, including water conservation and irrigation $500,000,000, housing $450,000,000, erosion control, flood control and stream sanitation $350,000,000, assistance for professional people (white-collar projects) $300,000,000, rural electrification $100,000,000, and aid to schools $400,000,000.

Out of these classifications, the $800,000,000 fund for highway work and grade separations should move the fastest and be of most immediate benefit to the construction industry. From this sum, if it were all used in accordance with the present plan (the President may vary it 20% either way at his discretion) as regards splitting it on a fixed basis of population and other factors, the Western states could be expected to obtain the following approximate sums, to be split between highway and grade crossing elimination projects:

Arizona	$16,000,000
California	62,000,000
Colorado	25,000,000
Idaho	16,000,000
Montana	26,000,000
Nevada	13,000,000
New Mexico	19,000,000
Oregon	22,000,000
Utah	14,000,000
Washington	25,000,000
Wyoming	15,000,000
Total	**$253,000,000**

In the other classifications, no basis for state allocation has been made and the work volume which will be carried out in the eleven Western states is indefinite. It is a reasonable assumption that a proportion corresponding to the division of the highway fund will be available from the $900,000,000 for public works and an even larger share of the $500,000,000 for water conservation and reclamation.

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

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

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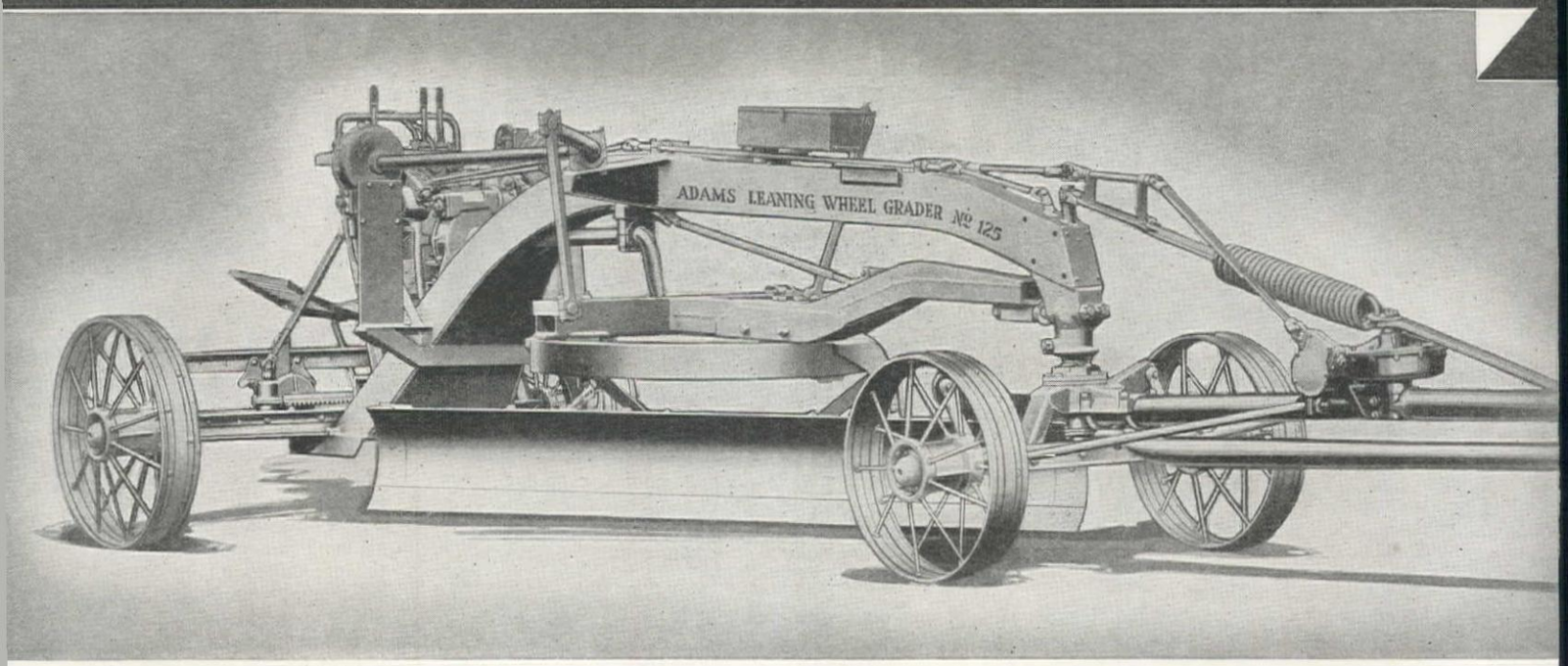
Entered as Second Cass Matter at the Post Office at Los Angeles, California, under the Act of March 3, 1879

ADAMS *Presents*



Fifty years ago J. D. Adams invented the adjustable leaning wheel grader and marketed his first model. That invention, and numerous later ones, have long since established Adams Leaning Wheel Graders in a position of leadership.

Now Adams presents four new graders that set a new high mark in mechanical excellence and operating advantages. A year of severe field tests have conclusively proved their practicability and durability. Their extreme simplicity will impress you—their great strength and rigidity will amaze you—and the things you can do with the blade positively will astound you. Not only can you get new, extreme blade positions for every kind of cut but you get them quickly and with little or no mechanical adjustment.

Never before have so many good features been built into one machine—never before have you been offered such grader value. Here, in fact, is "The Kind of Grader You've Always Wanted."

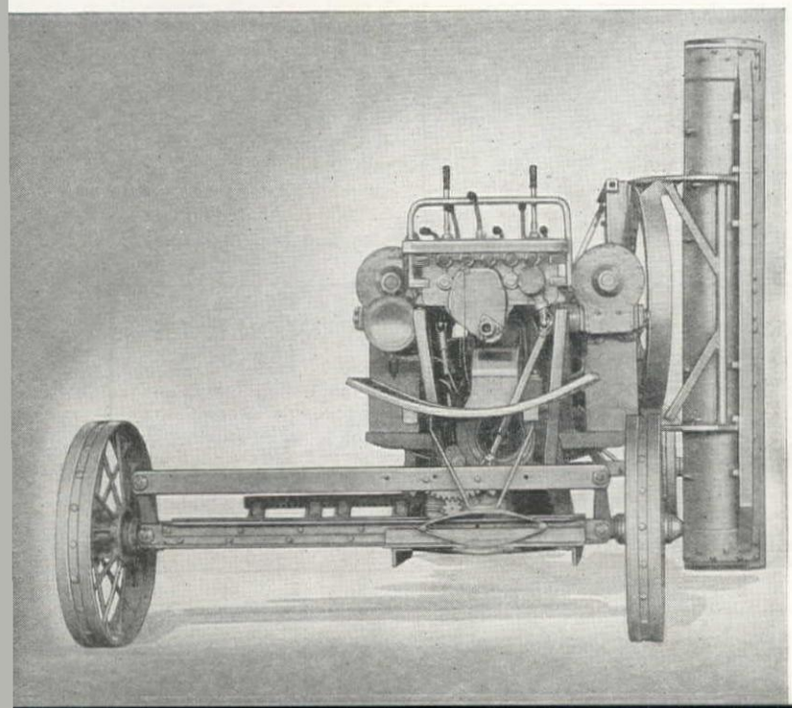
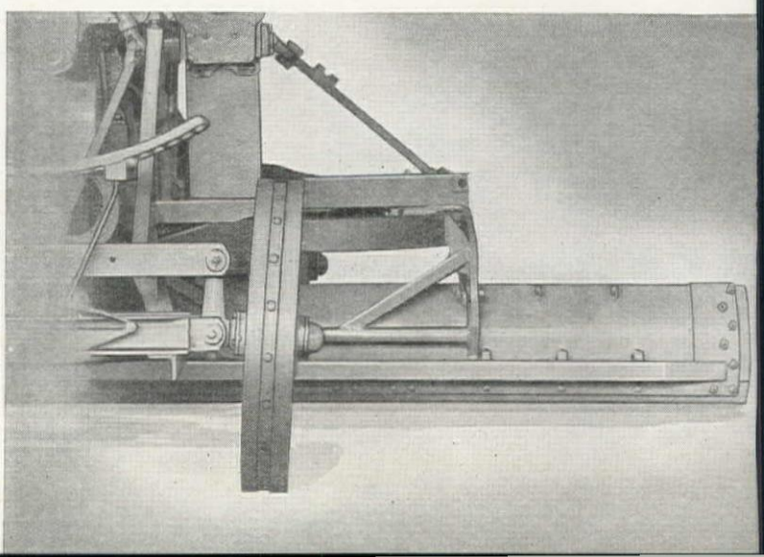


Illustration at left shows extreme blade adjustment possible with new Adams design; this position can be obtained without any readjustment of lift links—a decided advantage as every operator knows . . . Blade can be extended far outside the line of wheels for shoulder cuts—6 feet with 10 foot blade, and 7½ feet with 12 foot blade. Extensions increase reaches to 9 feet and 10½ feet respectively.



4 *New* GRADERS

YOU WILL WANT THESE NEW FEATURES:

New Box-Type Frame — made of heavy ship channels and steel plates, electric-welded full length. Has great strength and rigidity to hold blade firmly to the cut—100% stronger against twist than previous Adams frames and that's plenty strong.

Wide Range of Blade Positions—with no changes in lift link positions or shift of moldboard on 90% of your work. A big operating advantage—ask any operator.

Quick Adjustments — with power-operated controls blade can be raised from plowing position to perpendicular (as shown on opposite page) in *40 seconds.* Frame can be shifted on rear axle (for one way work) in *45 seconds.* Can you do this with your grader?

Extraordinary Visibility — due to narrow frame and simple, clean-cut design throughout, operator can always see full length of blade and observe work being done. Increases operator's efficiency.

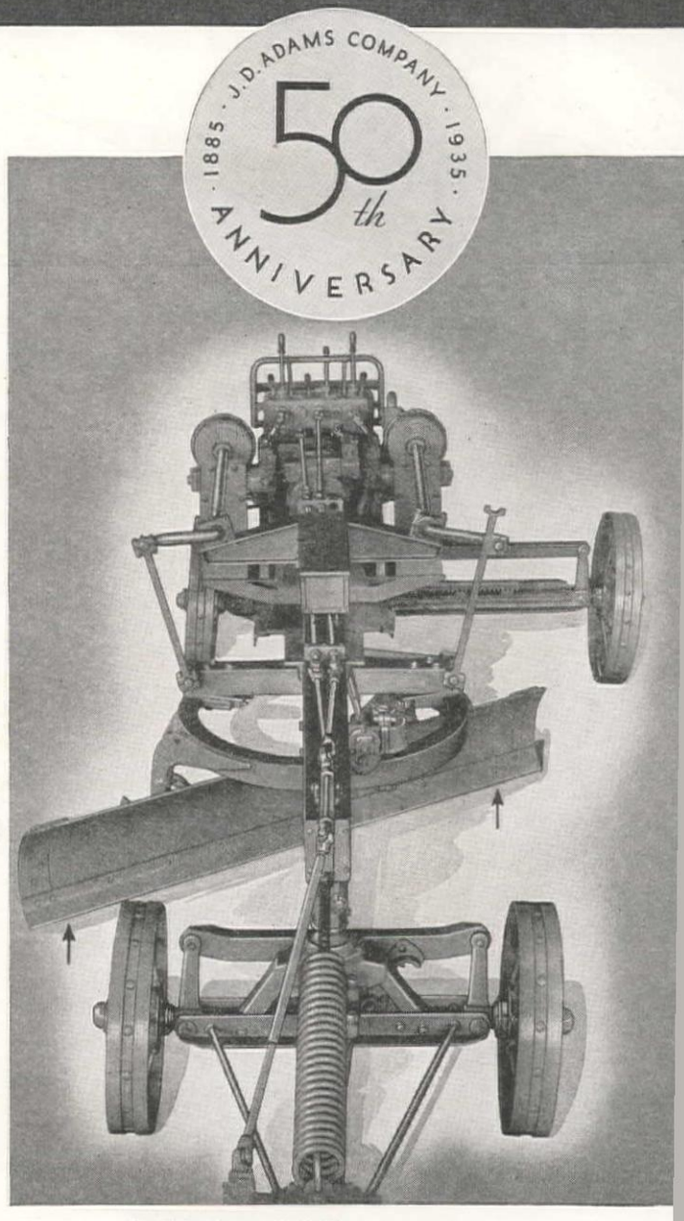
Many Mechanical Features—including exclusive anti-coasting devices on operating adjustments which work automatically and lock adjustments in position until changed by operator . . . Renewable ball and socket connection between frame and front axle . . . Deep curved moldboard for rolling dirt with least friction . . . Low draft connection to frame provides enormous cutting capacity . . . New "T" type drawbar—strong, simple and improves visibility . . . Positive-acting, trouble-free steerable tongue . . . Rigid, all-welded construction throughout which guarantees long life.

Don't buy any grader until you investigate these new machines. Available in 12 foot and 10 foot sizes and with hand or power-operated controls. Ask your local Adams representative for descriptive matter or write directly to

J. D. ADAMS COMPANY

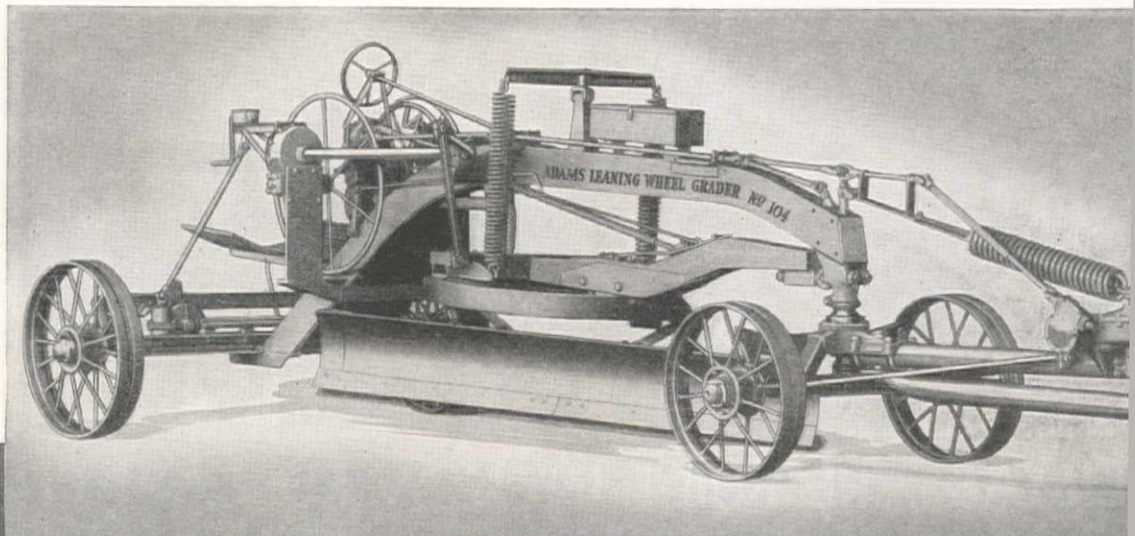
SAN FRANCISCO—LOS ANGELES—SPOKANE

Representatives or Distributors in All Western States



Adams new box-type frame is built of heavy ship channels and steel plates welded their entire length.

Illustrated on opposite page is Grader No. 125 with 12 foot blade and power-operated controls; 10 foot model known as No. 105. Adams power-operated controls afford quick, positive and accurate adjustments with saving of time, energy and money . . . Grader No. 104 (shown at right) has 10 foot blade and hand-operated controls; 12 foot blade model known as No. 124. Hand-operated machines have equalizing lift springs to make blade manipulation easy.



Streamlined PERFORMANCE SPEEDS UP PRODUCTION

STREAMLINING can be had in an excavator. Not in the same sense that we use it in connection with the modern automobile, plane or high speed train. LIMA--the modern excavator--carries the idea beyond the appearance and into the performance of the shovel, dragline or crane.

Roller bearings and helical gears throughout, large diameter drums and clutches, splined shafts and square lever shafts make for smooth, quiet, easy performance. Ample power is always available for hoisting, swinging, propelling, and raising or lowering the boom simultaneously, if necessary.

These advantages, and innumerable others, speed up production and give streamline performance in every kind of digging. The modern excavator in line with the times.

Lima Locomotive Works, Incorporated
SHOVEL AND CRANE DIVISION LIMA, OHIO, U.S.A.

DISTRICT OFFICES

Smith-Booth-Usher Co.
2001 Santa Fe Ave.
LOS ANGELES

A. L. Young Machinery Co.
26-28 Fremont St.
SAN FRANCISCO, CALIF.

H. J. Armstrong Co.
2244 First Avenue S.
SEATTLE, WASH.

Western Steel & Equipt. Corp.
734 N.E. 55th Avenue
PORTLAND, ORE.

General Machinery Co.
E. 3500 Blk. Riverside Ave.
SPOKANE, WASH.

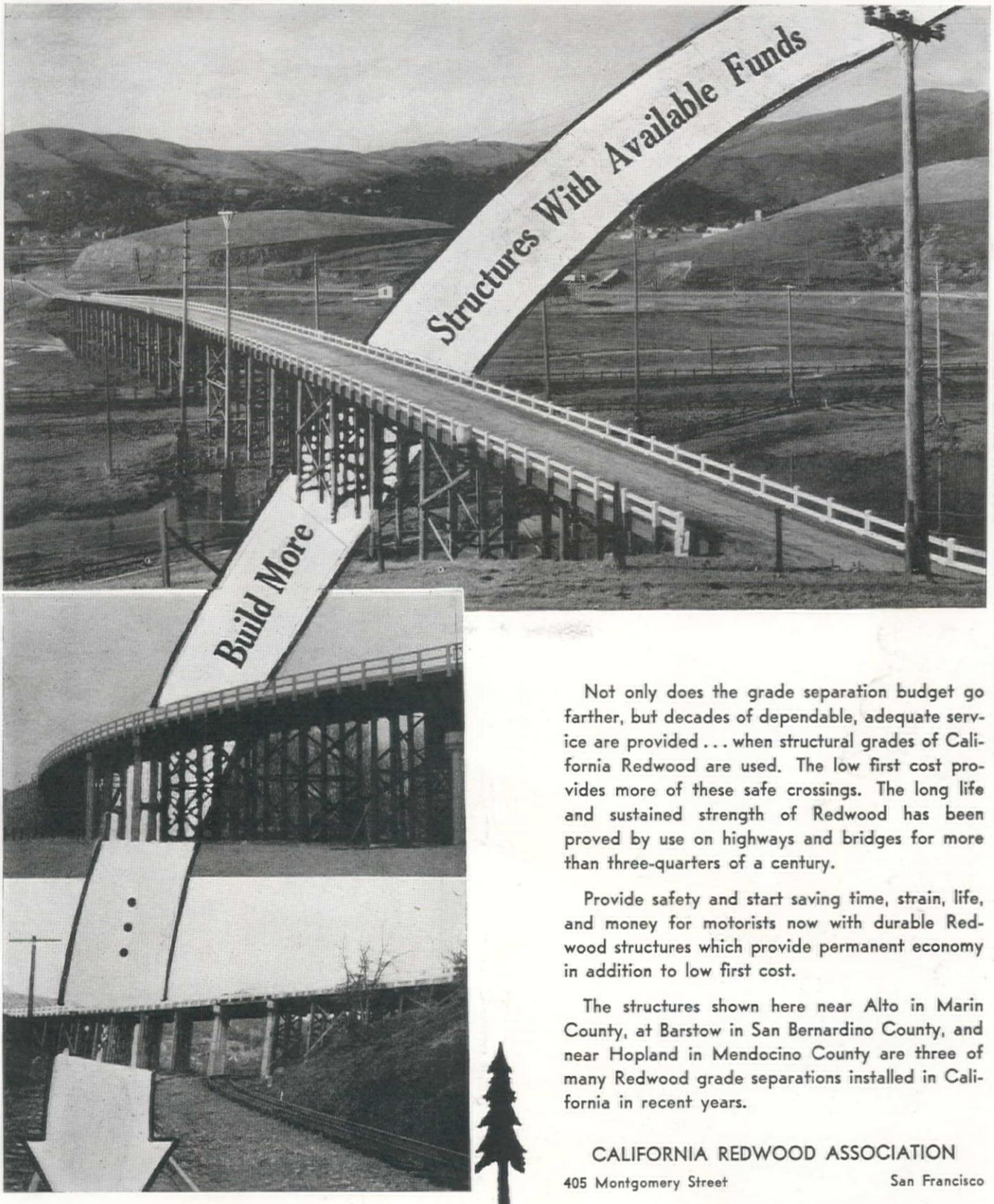
C. H. Jones Co.
134 Pierpont Ave.
SALT LAKE CITY, UTAH

LIMA

LIMAS ARE BUILT IN 3/4 YARD CAPACITY AND LARGER

LIMA Type 601 on levee work. It is one of two LIMA draglines owned by Jones and Rodgers, Memphis Tenn.

ELIMINATE GRADE CROSSINGS



Not only does the grade separation budget go farther, but decades of dependable, adequate service are provided . . . when structural grades of California Redwood are used. The low first cost provides more of these safe crossings. The long life and sustained strength of Redwood has been proved by use on highways and bridges for more than three-quarters of a century.

Provide safety and start saving time, strain, life, and money for motorists now with durable Redwood structures which provide permanent economy in addition to low first cost.

The structures shown here near Alto in Marin County, at Barstow in San Bernardino County, and near Hopland in Mendocino County are three of many Redwood grade separations installed in California in recent years.

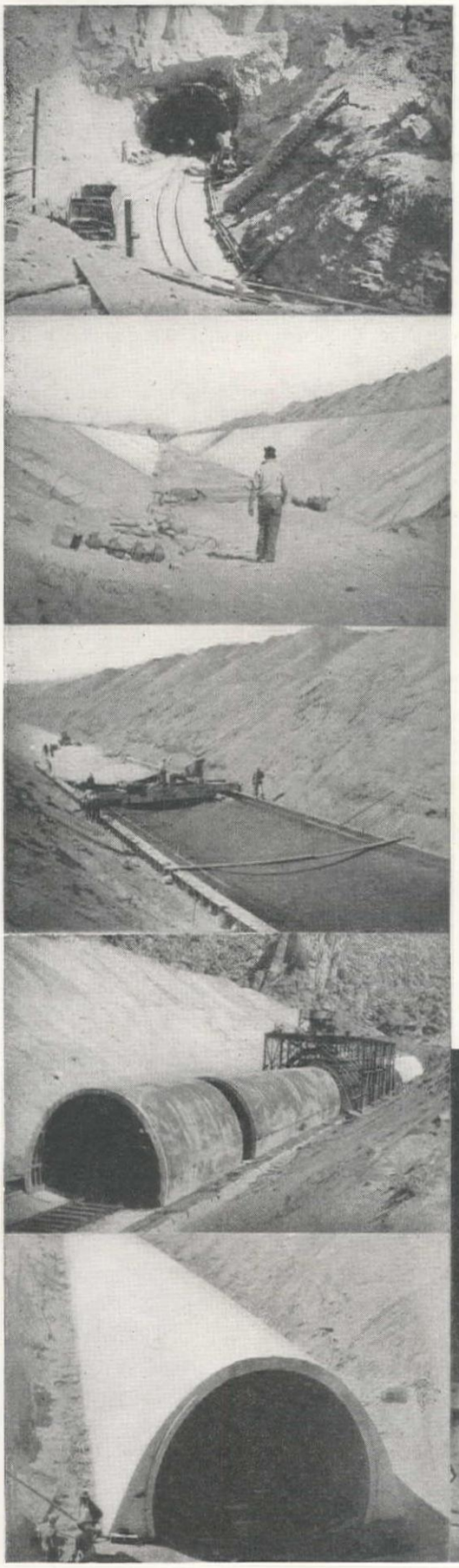
CALIFORNIA REDWOOD ASSOCIATION

405 Montgomery Street San Francisco

NATURALLY DURABLE CALIFORNIA REDWOOD

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

On the METROPOLITAN WATER AQUEDUCT



AIRCO---DB WELDING *and* CUTTING EQUIPMENT *is used....*

Forty-two AIRCO-DB Welding and Cutting Outfits are playing an important part in the construction of this great $220,000,000 project.

The jobs they are doing are many and varied. The welding equipment, for example, is performing a valued service in maintaining and extending the working life of mucking machines, drilling equipment, rock cars, steam shovel buckets, drag line buckets, tractor and truck equipment. Other uses include the installation of water pipe lines, compressed air lines and ventilating systems, the construction and maintenance of narrow gauge rock car tracks, and the fabricating of special rock drilling and mucking machine equipment.

AIRCO-DB Welding and Cutting Equipment is being used on this project by the Metropolitan Water District of Southern California and the following contractors:

Broderick & Gordon	Barrett & Hilp & Macco Const. Corp.	Morrison - Knudsen Co.
Dravo Construction Co.	Wenzel & Henoch Construction Co.	Walsh Construction Co.
J. F. Shea Co., Inc.	Hunkin-Conkey Construction Co.	Shofner & Gordon

Air Reduction Sales Co.

• WESTERN OFFICES AND PLANTS •

Emeryville, Calif. • Los Angeles, Calif. • Portland, Ore. • Seattle, Wash.

PACIFIC COAST HEADQUARTERS FOR ANYTHING AND EVERYTHING NEEDED IN GAS OR ELECTRIC WELDING AND HAND OR MACHINE GAS CUTTING

At Left: Hard facing 9-yard bucket with STOODY Electric Borium. Below: Hard facing a drag line tooth.

When writing to AIR REDUCTION SALES COMPANY, *please mention Western Construction News*

PROTECTING EXCAVATOR ROPES Lengthens their life

Pointers regarding the care of new ropes and spares, also on the installation of new ropes, were given in the first two advertisements of this series. In this advertisement a few suggestions are offered on the need of protecting wire ropes.

1—Protect excavator ropes as much as possible from being cut by falling rocks and gravel.

2—Excavator ropes are subjected to serious overloads, live loads, shocks, vibrations, crushing and frictional wear. Protect your ropes as much as possible against these stresses.

3—Do not use scored, corrugated or worn drums and sheaves, as they will cause excessive wear on wire rope.

4—Cutting a few feet off the drum end will remove the points of crossover when wear at these points is excessive.

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

TIGER BRAND AMERICAN WIRE ROPES

are backed by 104 years of wire making experience

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.

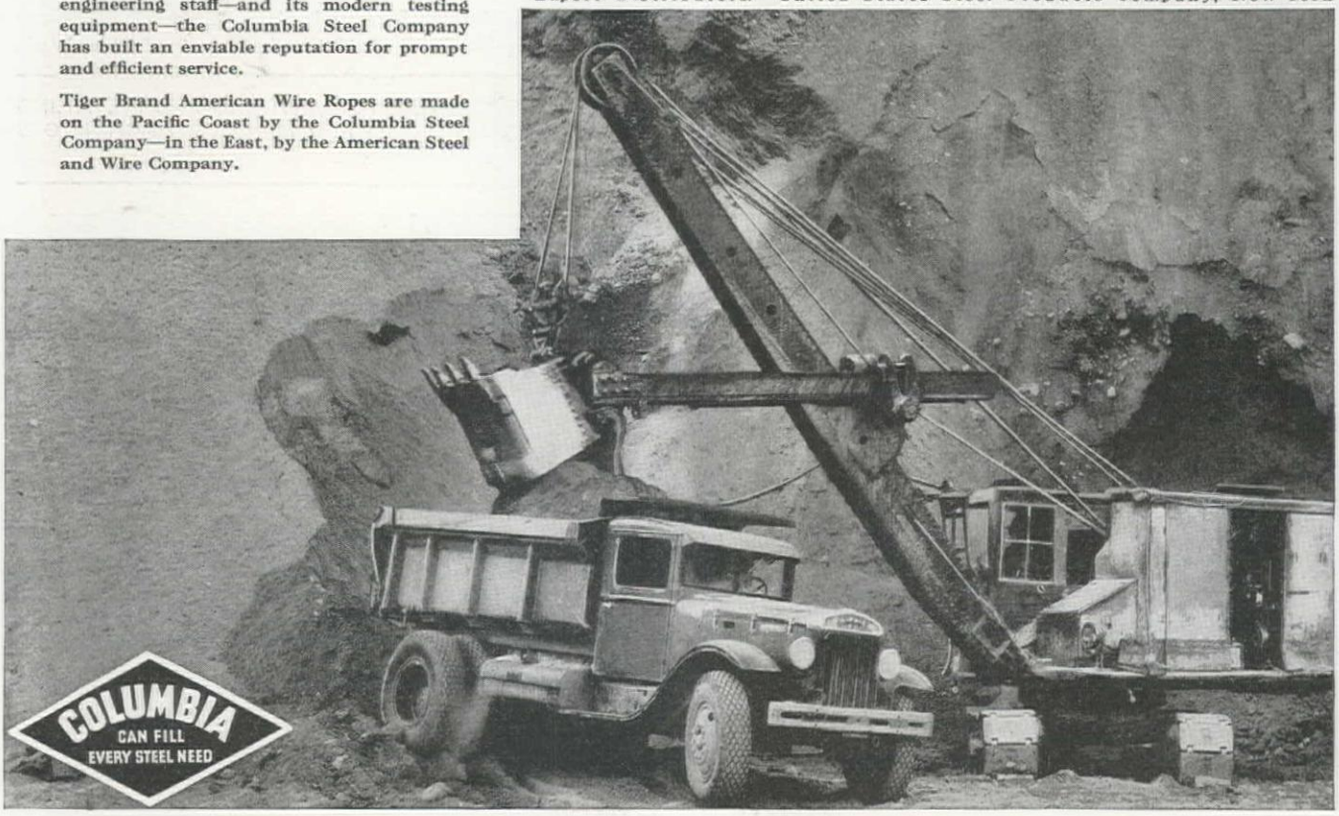
COLUMBIA STEEL COMPANY

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



When writing to COLUMBIA STEEL COMPANY, *please mention Western Construction News.*

FINISH the work as you go! Because of walking traction, Bucyrus-Monighans can excavate widths much greater than boom length—working from one side of the excavation only. After the maximum width from one location has been completed, the Walker backs away at right angles to the line of work, widening as it goes. With these fast-digging, all-weather machines, a section is complete when it has been worked once. No costly waste moving time. If you have a dragline job, consider the speed and economy you get with the Walker. Manufactured by Bucyrus-Monighan Company, Chicago, Ill.

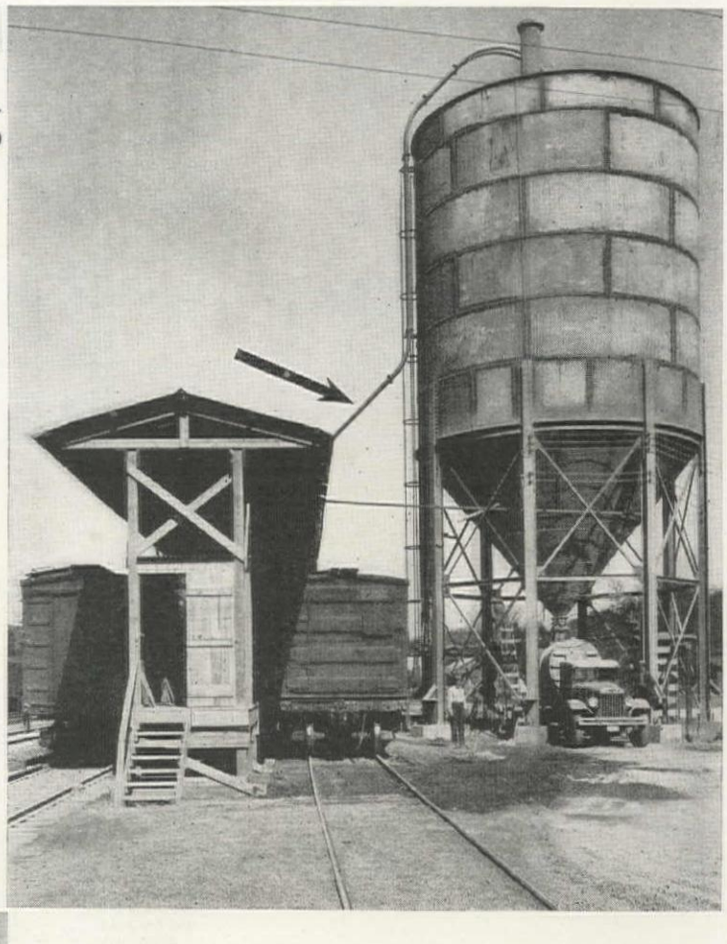
Sold by

BUCYRUS-ERIE

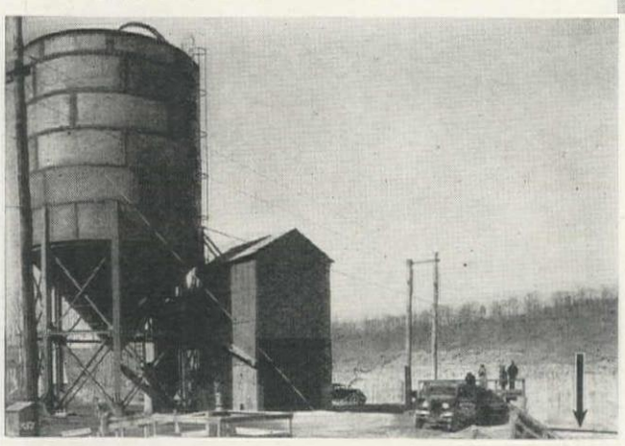
EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

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

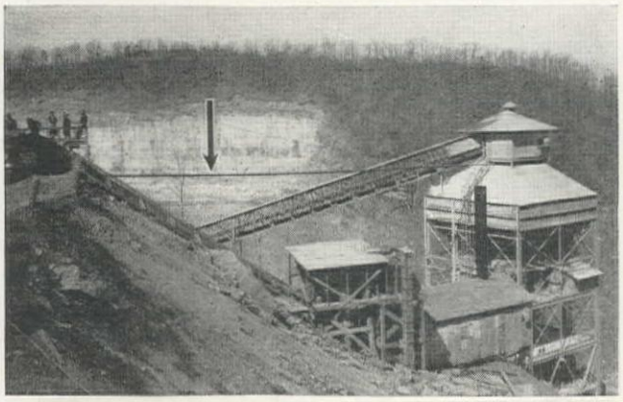
FULLER-KINYON CEMENT PUMPS AT NORRIS DAM



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

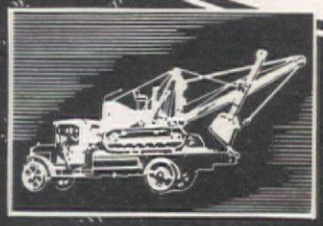
1041 S. Olive St.
Los Angeles

742 Phelan Bldg.
San Francisco

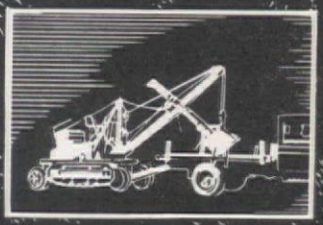
worth investigating

$500 Saved!

...AND IT'S ONLY THE BEGINNING



25 MILES PER HOUR BY TRUCK OR TRAILER



YOU CAN'T BEAT IT FOR PORTABILITY

A few minutes in careful investigation of the Bear Cat Jr. may easily prove the most profitable minutes you have ever spent!

For Bear Cat Jr. puts money in your pocket right from the start – it is actually priced $500 lower than any other comparable new shovel or crane.

Here are a few of the many additional *exclusive* features you get in the Bear Cat Jr., features that increase your profits on every shovel and crane job:

1. Bear Cat Jr. can be moved from job to job at truck speeds of 30 miles per hour.
2. It increases your radius of profitable operation from the limits of a city or township to jobs 75 to 100 miles away.
3. It digs 250 to 350 yards per day at an average actual operating cost, excluding operator, of only $5.16.

Think of the *extra* profits you can make because of these important Bear Cat Jr. features! Figure what a $500 cash saving on purchase price will mean in *your* business! Then mail the coupon below for a copy of "Bear Cat Jr. Facts," the book that tells the complete story about the Bear Cat Jr.

BEAR CAT SHOVEL WORKS
DIVISION OF THE BYERS MACHINE CO.
RAVENNA, OHIO

REPRESENTATIVES IN WESTERN STATES

EDW. R. BACON CO., SAN FRANCISCO, CALIF. • GARLINGHOUSE BROTHERS, LOS ANGELES, CALIF. • BALZER MACHINERY CO., PORTLAND, ORE. SERVICE EQUIPMENT CO., INC., SEATTLE, WASH. • CONNELLY MACHINERY CO., BILLINGS, MONT. • ARNOLD MACHINERY CO., SALT LAKE CITY, UTAH SPROTT TRACTOR & EQUIPMENT CO., GRAND JCT., COLO. • ROCKY MOUNTAIN EQUIPMENT CO., DENVER, COLO. • SHEEHAN & CO., EL PASO, TEXAS

BEAR CAT SHOVEL WORKS
Ravenna, Ohio

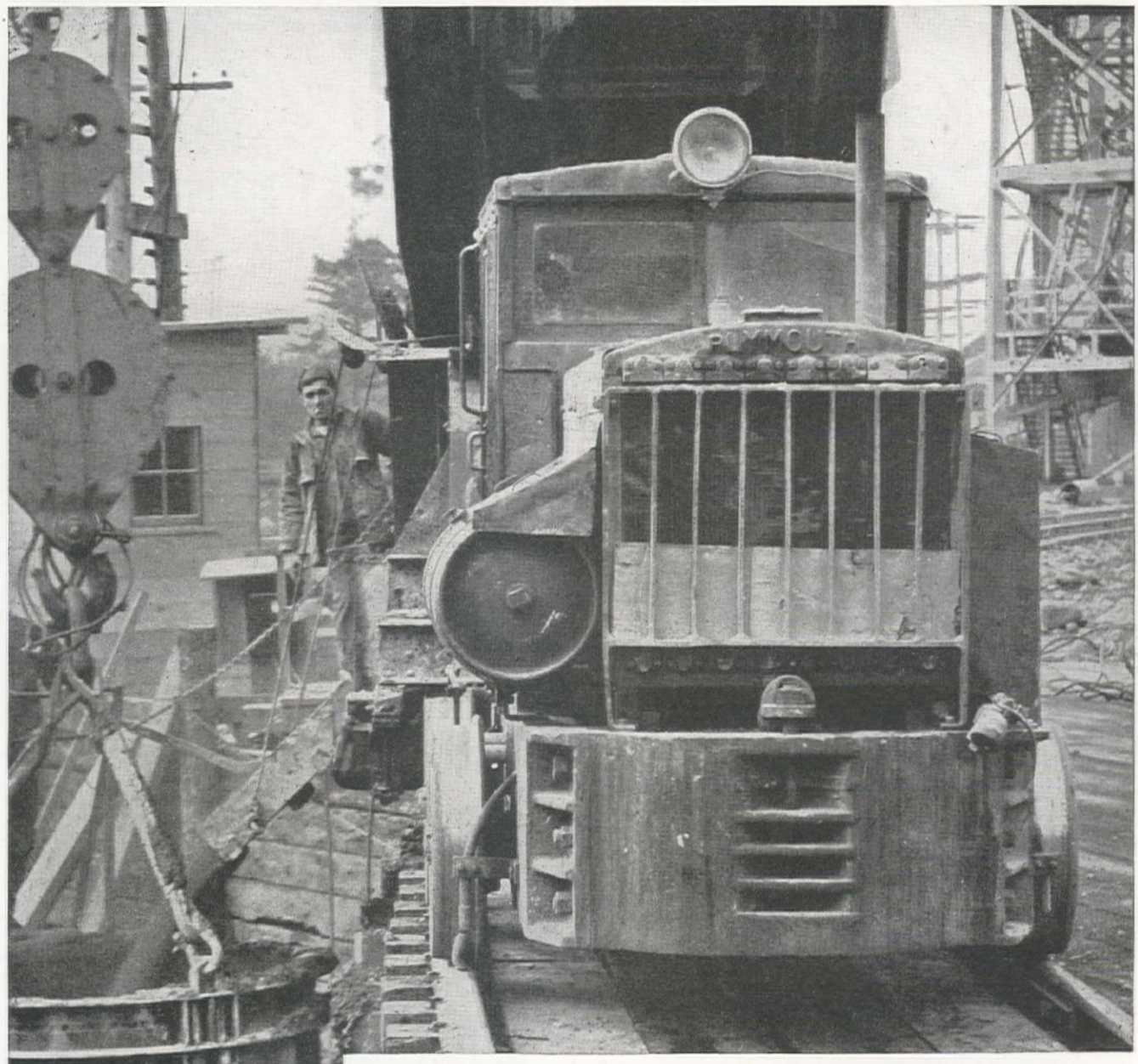
I want to know all about the Bear Cat Jr. Please mail me a copy of "Bear Cat Jr. Facts."

Name _____

Address _____

City _____ State _____

AT THE BONNEVILLE DAM •



IT'S A PLYMOUTH!

In 1928 General Construction Company bought two Plymouth Locomotives for the Owyhee Dam contract. Today these same two Plymouths are being used in the construction of the power house and navigation locks at Bonneville Dam. General Construction Company and J. F. Shea are the contractors. Let Plymouth handle your haulage jobs. They'll do it economically and give you long years of faithful service.

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

HARRY C. COLLINS MACHINERY CO.
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CONSTRUCTION EQUIPMENT CO.
1118-24 Ide Avenue, Spokane

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

Easier Starti

NO TIME LOSS GETTING STARTED . . .

Watch an A-C Oil Tractor start out in the morning! A push on the starter . . . or a couple of turns on the crank . . . and away she goes! How can a tractor operating on diesel fuel be started so easily? Because A-C Oil Tractors employ a new, improved system of engine operation—fuel is injected with a diesel pump and ignited with a spark.

In starting, the A-C Oil Engine fires for the first few revolutions as a gasoline engine. Then it runs on diesel fuel oil, supplied by the injection pump and ignited with a spark. No warming up is necessary for the diesel fuel to fire—gasoline is used for only a few seconds while the engine gets up to speed.

Easier starting is just one of the reasons why buyers who get the FACTS are choosing A-C Oil Tractors. Operating with compression pressures from one-fourth to one-third those of the unimproved type . . . A-C Oil Tractors deliver a smoother flow of power . . . with less vibration and wear . . . and fewer repairs. That is why A-C Oil Tractors are showing up competition—by doing the job at Lowest Final Cost.

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

CLAIMS CAN'T BEAT *facts*

Lowest Final Cost depends on:

LOW FUEL COST
LOWER ORIGINAL COST
LOWER MAINTENANCE
LESS DEPRECIATION

Gives you:

EASIER STARTING
SMOOTHER OPERATION
LESS VIBRATION
FEWER REPAIRS

A-C FOR

OIL TRACTORS

LOWEST FINAL COST

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

WHY THOUSANDS WHO HAVE TRIED ALL THREE LOWEST-PRICED TRUCKS

Are Switching to DODGE!

"Upward of 50,000 miles efficient operation before valve grinding, unusual oil economy, no rear end or clutch troubles whatever, tires last unusually long in our experience. Our drivers, too, like to drive our Dodges. As one man said, 'When I have to stop it's no longer a gamble.'"
ROY S. STUBBS, Pres.
The Only Way Transfer & Warehouse Co., Kansas City, Mo.

"I decided to buy my new truck on the basis of a 'show-down' between the three lowest-priced trucks. Dodge won out because to my mind there was no question about the extra high-priced truck features Dodge gives you, like hydraulic brakes, full-floating rear axle, valve seat inserts and other things that every truck owner knows will cut operating costs and upkeep expense."
C. A. NIVEN
Acme Cartage Co., Seattle, Wash.

"For the past 20 years we have operated a fleet of trucks and have checked operating costs of different makes. We have now decided to standardize on Dodge because we find it is the best built of the three lowest-priced trucks. Our drivers also show a marked preference for Dodge."
FRANK P. RUPRECHT, Secy. & Treas., Ruprecht Building Materials Co., St. Louis, Mo.

"After using each of the other two lowest-priced trucks I recently bought a Dodge. My expenses for gas, oil and upkeep at the end of 8,000 miles is the lowest I have ever heard of. Dodge gives me everything I have always wanted in a truck and now at today's prices if you can buy any truck you can afford a Dodge."
ARSENE TINGAUD, JR.
A. Tingaud & Sons
New York, N. Y.

"IT JUST doesn't belong in the lowest-priced field, but it is"... "Dodge wins over the other two lowest-priced trucks by an amazing margin"... that's what thousands of smart truck buyers everywhere who have tried "all three" are saying.

Dodge leads in value because Dodge has built *extra* value into Dodge trucks from one end to the other. Dodge pioneered full-floating rear axles in lowest-priced trucks, to save you money on upkeep. Dodge pioneered valve seat inserts, to save you gas and valve grinding costs.

Only Dodge Has Hydraulic Brakes

Among the three lowest-priced trucks, Dodge alone gives you safe, sure, dependable, money-saving hydraulic brakes. Dodge perfected hydraulic brakes stay equalized... save tires, brake linings and adjustment expense.

Dodge alone of the three lowest-priced trucks gives you an oil filter. Only Dodge gives you 4 piston rings... the others 3. Dodge gives you 4 main bearings... the others 3.

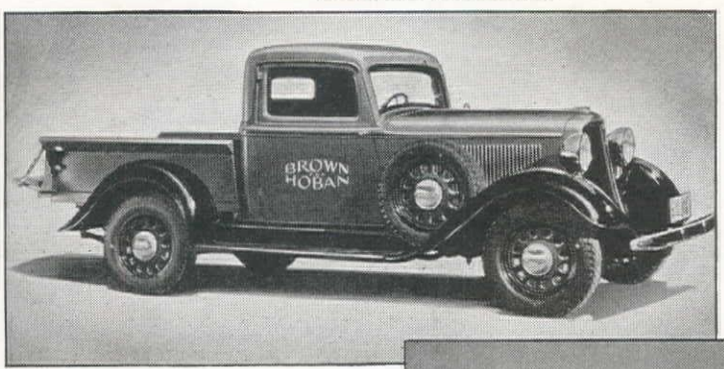
Of the three lowest-priced trucks, Dodge is the only one built in an exclusive truck plant by trained truck craftsmen.

No wonder thousands are switching to Dodge! Check the three lowest-priced trucks for money-saving features... then check the delivered prices. You can see in three minutes why Dodge is the best buy. See your Dodge dealer today.

Dependable
DODGE TRUCKS

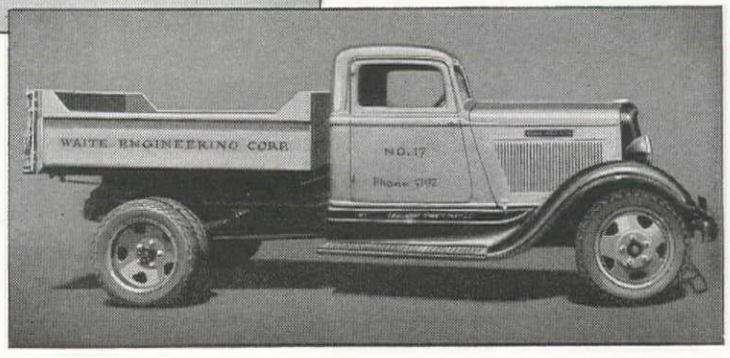
DODGE DIVISION—
CHRYSLER MOTORS

"I have always known that Dodge is a dependable truck, but the economy of operation is what amazed me most. I have owned trucks for 10 years and a careful check on our records shows that our Dodge truck has saved us at least $100.00 in operating expenses the past year. In other words, it hasn't cost us a penny for repairs for the entire year we have had this truck."
SAMUEL GERSHMAN
Western Wet Wash Laundries, Chicago, Ill.



$480*

COMMERCIAL EXPRESS—6-cylinder—111¼" wheelbase. Amazing low price—with 18 high-priced features to save you money every mile it is driven. Fast, dependable, sturdy. Compare it! See your Dodge dealer and ask him for a "show-down" against the other lowest-priced trucks.

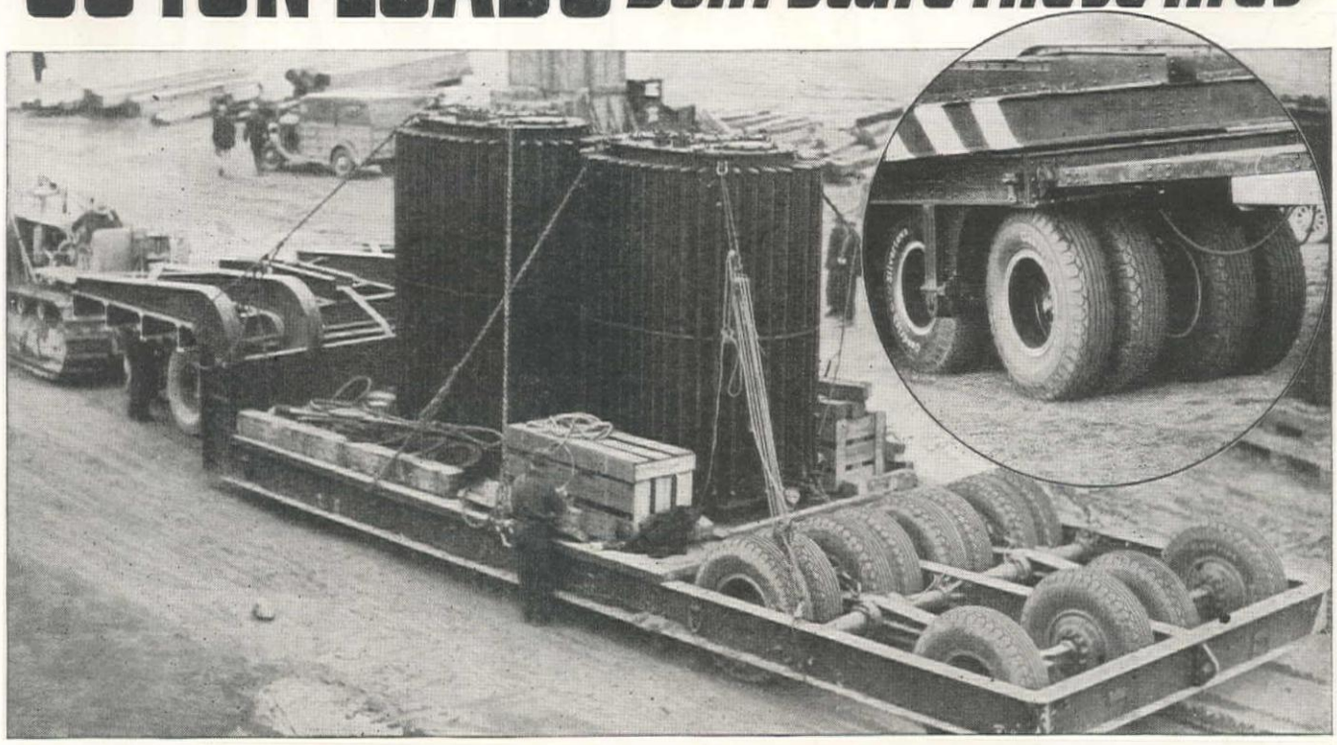


$585*

1½-TON CHASSIS AND CAB—6-cylinder—136" wheelbase—Full-floating rear axle, hydraulic brakes, valve seat inserts, roller-bearing universals—18 recognized, money-saving features. (Body, hoist and special equipment extra).

**All prices f. o. b. factory, Detroit, subject to change without notice. Special equipment, including dual wheels on 1½-ton models, extra. Ask for official Chrysler Motors Commercial Credit Plan.*

80-TON LOADS *Don't Scare These Tires*



NEW TYPE TRUCK TIRES USED ON GIANT 20-WHEEL TRAILER AT GRAND COULEE DAM

They had a tough transportation problem at Grand Coulee Dam. Heavy equipment and materials had to be hauled 30 miles or more over rough roads to the site of the dam. It takes a crawler tractor to supply the power!

So the contractor built what is believed to be the world's largest trailer. Built for loads up to 60 tons. The trailer itself weighs 20 tons.

To carry this gigantic load they use the new Triple Protected Silvertowns—the tires that have proved themselves on the hardest hauling jobs in the country!

These new truck tires have a revolutionary invention incorporated in the sidewall. The invention actually checks 80% of premature failures. It means that tires stand up longer under the battering, bruising punishment of construction work.

Tires that carry 80-ton loads at Grand Coulee will handle *your* job right, too!

One tire failure on an important job may cost you hours of delay—men and equipment idle—a big repair bill. Why not play safe? Get the tire that's just as strong in the sidewall as it is under the tread! Here's how triple protection works:

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

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

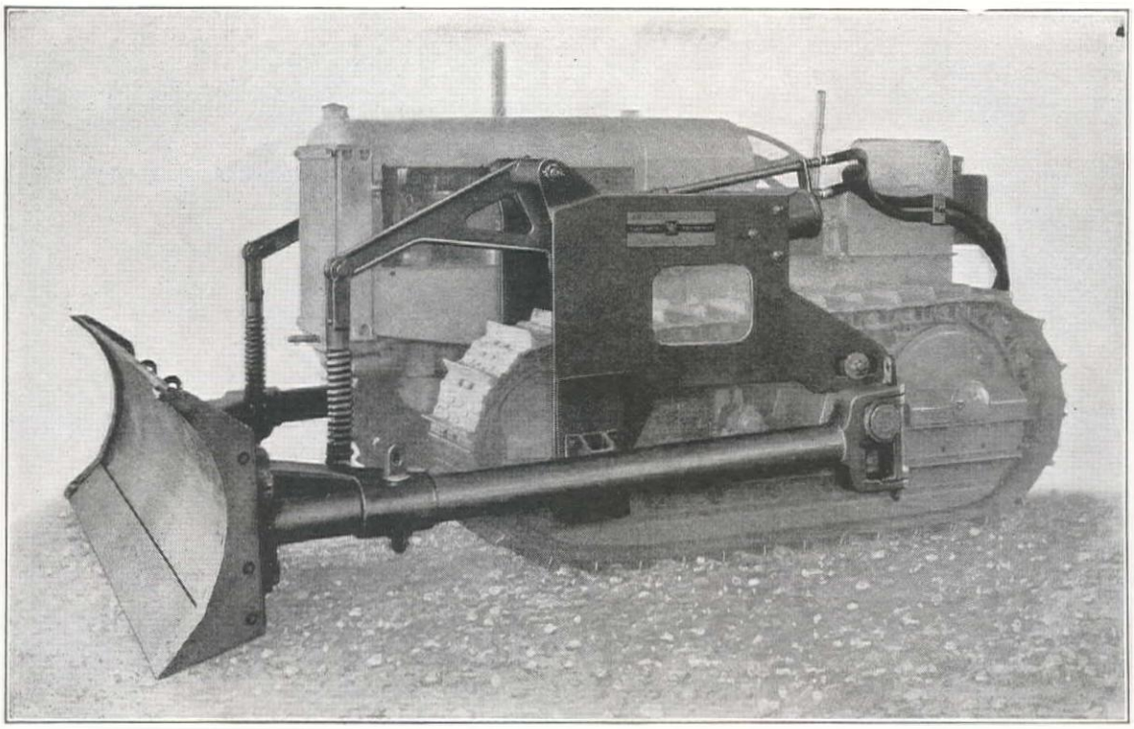
3 **100% FULL-FLOATING CORD**—Each cord is surrounded by rubber. With ordinary cross-woven fabric, when the cords touch each other, they rub—get hot—break. In Silvertowns, there are no cross cords. No friction.

FREE! **44-PAGE HANDBOOK FOR TRUCK OPERATORS**

Every truck owner, every driver should have this big 44-page handbook. Gives commodity weights, tire load capacities, inflation schedules, dual spacing chart, load analysis and other useful information. No obligation. Write for free copy. Dept. T-43, The B. F. Goodrich Company, Akron, Ohio.

Goodrich *Triple Protected* Silvertowns

SPECIFY THESE NEW SILVERTOWN TIRES FOR TRUCKS AND BUSES



The New ATECO Roadbuilder. All weight on tractor frame. Two hydraulic cylinders. Casts left or right, or sets straight for bulldozing.

Here's the ROADBUILDER *you have wanted*

The most economical, versatile earth-mover ever built!

All the ATECO features you've learned to rely on, plus new, lighter, simpler, stronger construction that enables it to dig better, eliminates strains, and leaves back of tractor free to handle other equipment! (Same powerful ATECO pump easily handles both.)

Blade angle changed or frame dropped and tractor left free in only **five minutes!**

Does everything any tractor blade tool can do —pioneers, builds trail, makes firebreak, sidecasts, backfills, trims slopes, shapes shoulders, clears, cleans up brush, bulldozes—**everything!** And keeps on doing it, day after day, at amazingly low costs!

Write today for complete information, prices and location of nearest job where you can see the New Ateco Roadbuilder at work. Remember—if it isn't an ATECO it isn't a **Roadbuilder.**

AMERICAN TRACTOR EQUIPMENT *Corporation*

ROADBUILDERS
SCRAPERS
CARRIER-SCRAPERS

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RIPPERS
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AT DOWN-TO-EARTH COSTS

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CABLE ADDRESS: ATECO

When writing to AMERICAN TRACTOR EQUIPMENT CO., *please mention Western Construction News*

TWO-STAGE, AIR-COOLED PORTABLE AIR COMPRESSOR *and* DEMOLITION TOOLS

TEAM UP

Above . . . a CP Two-Stage, Air-Cooled Portable and a pair of CP-117 Demolition Tools team up to speed up the breaking out of trenches in concrete for the removal of gas mains from the "Century of Progress" grounds at Chicago.

TO SPEED UP DEMOLITION

- Plentiful, reliable air supply from the CP Portable Compressor . . . hard-hitting, work-speeding action from the CP Demolition Tools . . . teamwork that terminates demolition jobs faster, cheaper!
- Two-stage . . . air-cooled . . . with many outstanding features . . . the new and better CP Portable Compressor is unequalled in simplicity, sturdiness, economy. Sizes of 60, 105, 160, 210 and 315 c.f.m. actual capacities. Gasoline, Diesel engine or electric motor-driven. Choice of mountings.
- CP Demolition Tools . . . noted for their ruggedness, rapidity and power of blow, ease of control, economy of operation and maintenance . . . are available in a range of sizes to meet every requirement.
- Complete details available in special bulletins. Send for them!

CHICAGO PNEUMATIC TOOL COMPANY

SALES AND SERVICE BRANCHES ALL OVER THE WORLD

6 EAST 44TH STREET
NEW YORK • N. Y.

Manufacturers of • AIR & GAS COMPRESSORS • ROCK DRILLS • DIAMOND CORE DRILLS • DIESEL ENGINES • ELECTRIC TOOLS • PNEUMATIC TOOLS • VACUUM PUMPS & CONDENSERS

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

Economical and effective concrete cures that provide lasting protection

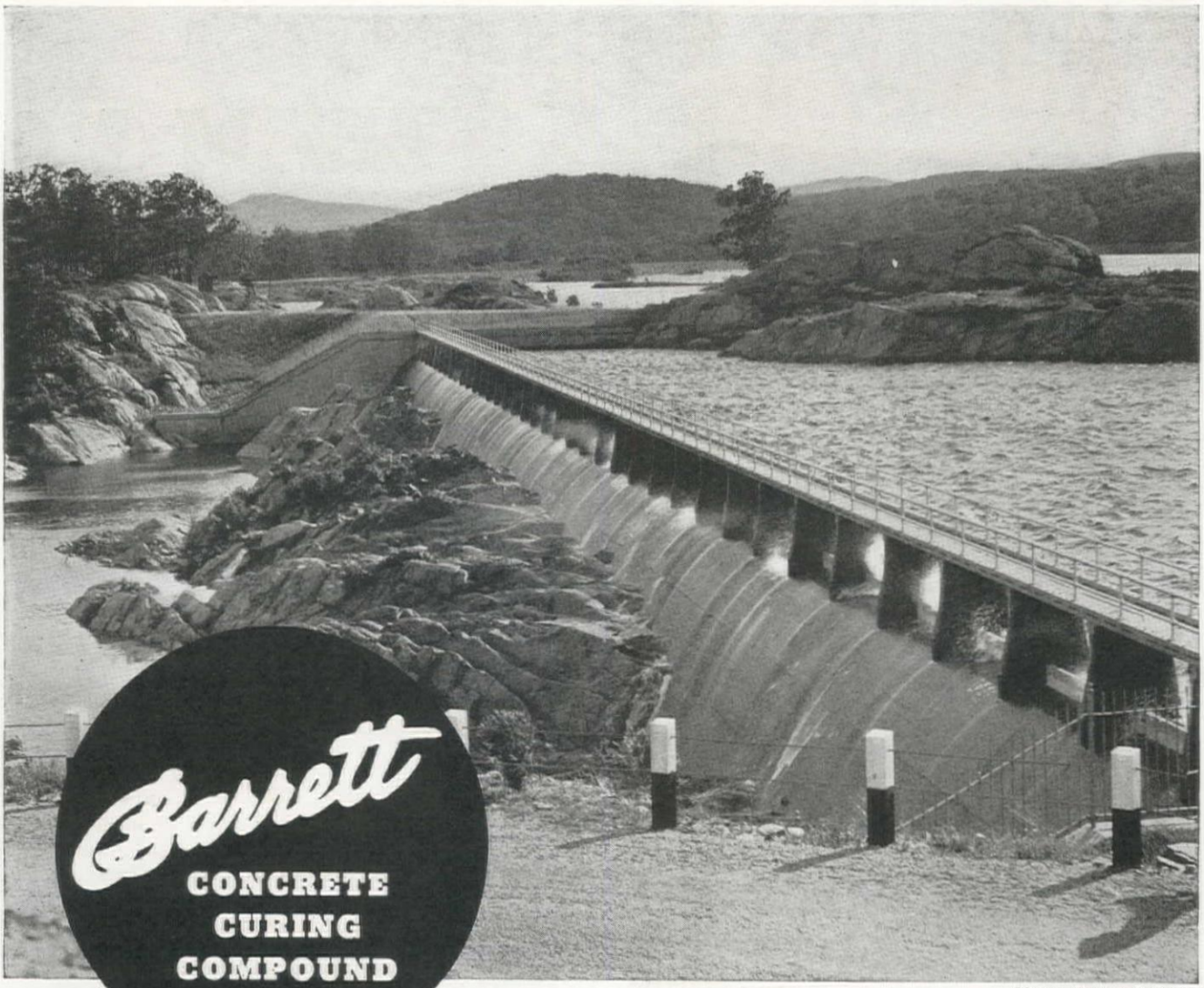


Photo: Ewing Galloway

This dam at the Manaque Reservoir, Wanaque, N. J., is protected against surface disintegration by Barrett Concrete Curing Compound

An application of Barrett Concrete Curing Compound shortly after initial set or immediately after the forms are removed, seals in the moisture and guards against improper curing with resultant excessive shrinkage, destructive internal stresses, surface cracks or porous concrete. It also supplies a surface coating which offers effective resistance to disintegration of concrete by active waters.

This dual function of Barrett Concrete Cures makes them exceptionally suited for use on concrete dams, flumes, penstocks, spillways, bridge piers, etc., for the original curing film remains in place to provide a valuable protective coating.

Barrett Concrete Curing Compound is made by America's oldest and most experienced manufacturer of coal-tar products. A competent technical staff is at your service to help you with your problems. Wire or write for complete information.

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

California representatives' addresses on request.

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

The answer depends upon the loads and the subgrade

FOR a given traffic and subgrade condition, economy demands that all pavements, regardless of type, be designed to have equal load carrying capacity.

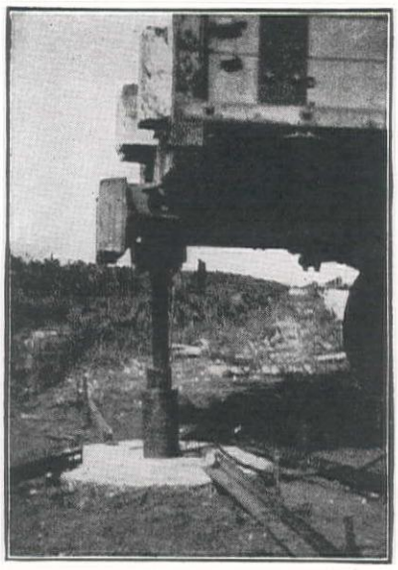
How thick to build depends on three factors:

1. The weight and frequency of vehicles.
2. The supporting power of the subgrade.
3. The type of pavement.

No pavement can stand up unless it distributes wheel loads and keeps subgrade pressures within safe limits.

Motorists want concrete. Reliable design methods and formulas are available for evaluating size and frequency of wheel loads and subgrade support to produce concrete pavements for any given condition, having lower first cost than any other pavement of equal load carrying capacity.

Send for 8-page reprint of *"Rational Road Design"* written by Frank T. Sheets, consulting engineer of the Portland Cement Association, in the annual highway issue of Engineering News-Record, Jan. 17, 1935. This supplements the booklet, *"Concrete Road Design, Simplified and Correlated with Traffic,"* by the same author and presents methods of evaluating subgrade conditions in pavement design.



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IMPORTANT STEP

in Rational Pavement Design

Simple load tests give data on load carrying capacities of subgrades.

•

PORTLAND CEMENT ASSOCIATION
Department 105

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

PORTLAND CEMENT ASSOCIATION
Please send free copy of ☐ *"Rational Road Design"* and ☐ *"Concrete Road Design, Simplified and Correlated with Traffic."*

Name.....*Position*.....

Street Address or P. O. Box.....

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

Illustrated are three Lima shovels, each equipped with AMSCO All-Manganese Steel Renewable Lip Dippers. All of these shovels were used on large contracts on the Pacific Coast. At top, a 1½ yard shovel in Mount Ranier National Park; center, a 2 yard shovel on the Metropolitan Aqueduct near Los Angeles; bottom, a 1¾ yard shovel on the Grand Coulee Dam project.

AMSCO Renewable Lip Dippers are used on almost every prominent contract job—because they are faster filling, quicker dumping and *reduce digging costs! These facts are just as true in heavy digging and loading in mines, quarries and similar production operations, as on construction contracts.*

The AMSCO Renewable Lip Dipper (U. S. patent 1,945,064) consists of a one-piece cast manganese steel body and easily renewable or interchangeable lips. It is furnished with the type of lip best suited the digging conditions; double wall lip with teeth for hard digging and rock handling; single wall lip with teeth for loose material digging, stock piling and re-handling; and a thin, serrated edge cutter lip for mucking and clay digging.

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

The thin cutter edge lips, correct placement of teeth at the lip corners, smooth body interior and correct body taper speed up the digging and greatly increases the daily yardage moved.

It's cheaper to use an AMSCO Renewable Lip Dipper than to repair your old dipper. They are made in all sizes from ¾-yard up. In ⅜, ½ and ⅝ yard sizes without renewable lip.

Get the facts on AMSCO Renewable Lip Dippers from our nearest office or your shovel manufacturer. Do it now—today—don't wait!

AMSCO
TRADE MARK REGISTERED

AMERICAN MANGANESE STEEL COMPANY
Division of American Brake Shoe & Foundry Company
402 East 14th Street, Chicago Heights, Ill.
Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo., Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities.

BREAK UP THE "MAT" FIRST

In Highway Fill Settlement Work

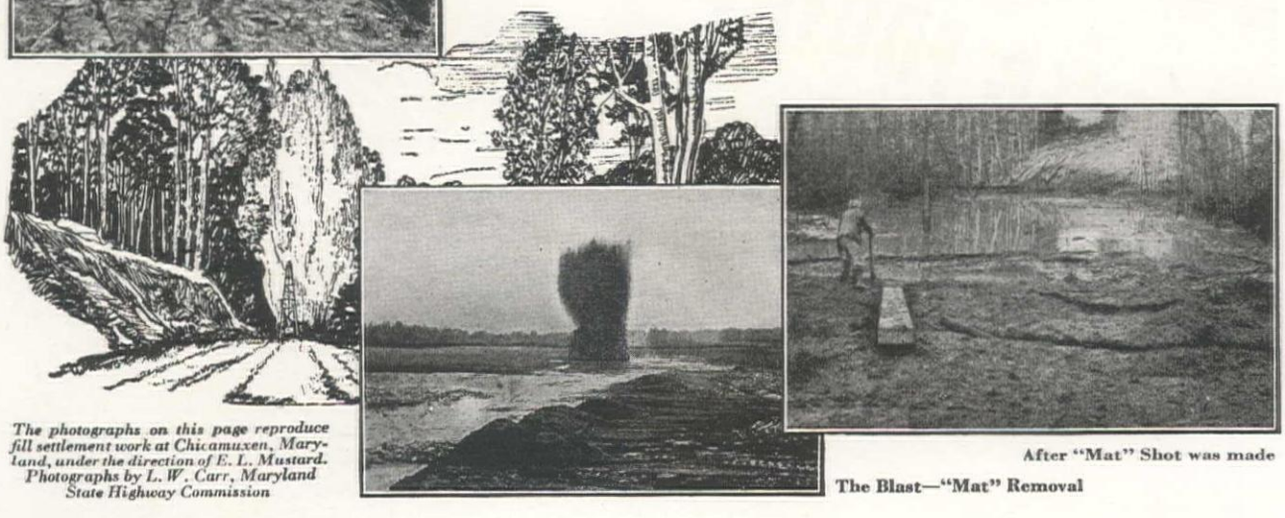
One-half "Mat" removed. Loading other half

The so-called "mat," which covers the surface of most swamps, is a layer of sod, roots, brush, small trees and debris that is troublesome, tough, and tenacious. Fill placed upon it will tend to float or settle unevenly and once underneath the fill it prevents complete and rapid settlement and is difficult to remove.

Break up this "mat" by the use of explosives *before* the fill is started. Facilitate movement of new fill material and provide for complete and rapid settlement. Proper blasting not only breaks up or removes the "mat" itself but actually tends to direct the fill straight downward.

Pre-fill blasting is more spectacular than deep under-fill blasting but it is nevertheless essential. In some cases good preliminary surface blasting permits complete settlement of the fill.

Explosive service on a fill settlement job should come before a yard of fill is placed. See the Atlas representative. Atlas offers the right explosives for all fill settlement work.



The photographs on this page reproduce fill settlement work at Chicamuxen, Maryland, under the direction of E. L. Mustard. Photographs by L. W. Carr, Maryland State Highway Commission

After "Mat" Shot was made

The Blast—"Mat" Removal

ATLAS POWDER COMPANY

THE ATLAS DIVISION

Everything for Blasting

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

San Francisco, California
Cable Address—Atpowco
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New Orleans, La.	Wilmington, Del.

ATLAS EXPLOSIVES

ATLAS EXPLOSIVES

The entrance of Halafax Explosives Co. into the field of manufacture and merchandising of explosives is noteworthy. Halafax desires that every factor about the company be known to both those in the industry and to those who buy from it.

At Halafax we think you appreciate our laying our cards on the table, telling you of our financial integrity, manufacturing facilities, engineers and our products. We ask you, as an individual considering the purchase of explosives, to open—to inform us of your demands and of the conditions under which Halafax Explosives are to perform for you,—and to openmindedly judge their performance on an impartial basis.

Halafax makes no fanciful claims; Halafax believes that in its explosives it offers the most economical disruptive forces of commercial practicability that may be purchased by the pound.

It is on this basic plan, and this one alone, that Halafax solicits a share of your purchases of explosives.

•

HALAFAX EXPLOSIVES

Features of
HALAFAX EXPLOSIVES

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.

HALAFAX EXPLOSIVES COMPANY

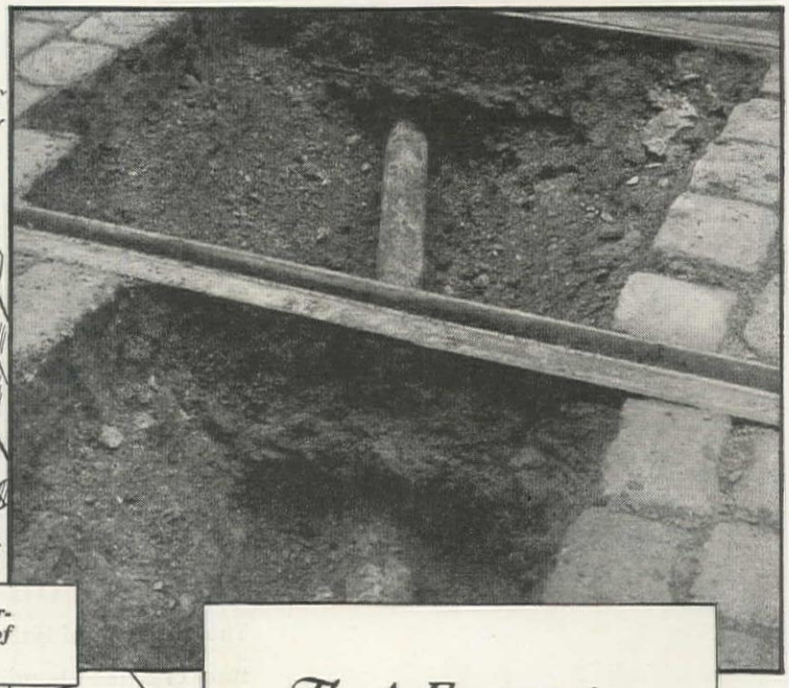
Write or phone today for a copy of this interesting booklet "What is Halafax?" It answers briefly, concisely and frankly the story behind the development and manufacture of Halafax Explosives.

Executive offices: 810 South Spring Street, Los Angeles, California. TRinity 8528 • Plant and magazine: Saugus, California.

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

1726 this pipe was laid -still in service 1935

This pipe was laid in Germany during the reign of Frederick the Great



THE cast iron water main shown above has served the German city of Ehrenbreitstein for more than two centuries. Over his official seal, the Burgomeister recently wrote, "The water main . . . was replaced in 1726 by cast iron pipes... crosses the much-frequented tramway . . . and lies partly under the provincial street to Arenberg with its heavy traffic. On the occasion of an excavation the enclosed photographs have been made . . . these show the position and the good condition of the pipes." Note that this pipe has bell-and-spigot joints. It is but one of many installations which demonstrate that the useful life of cast iron pipe is more than a century.

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

The 4 Economies of Cast Iron Pipe

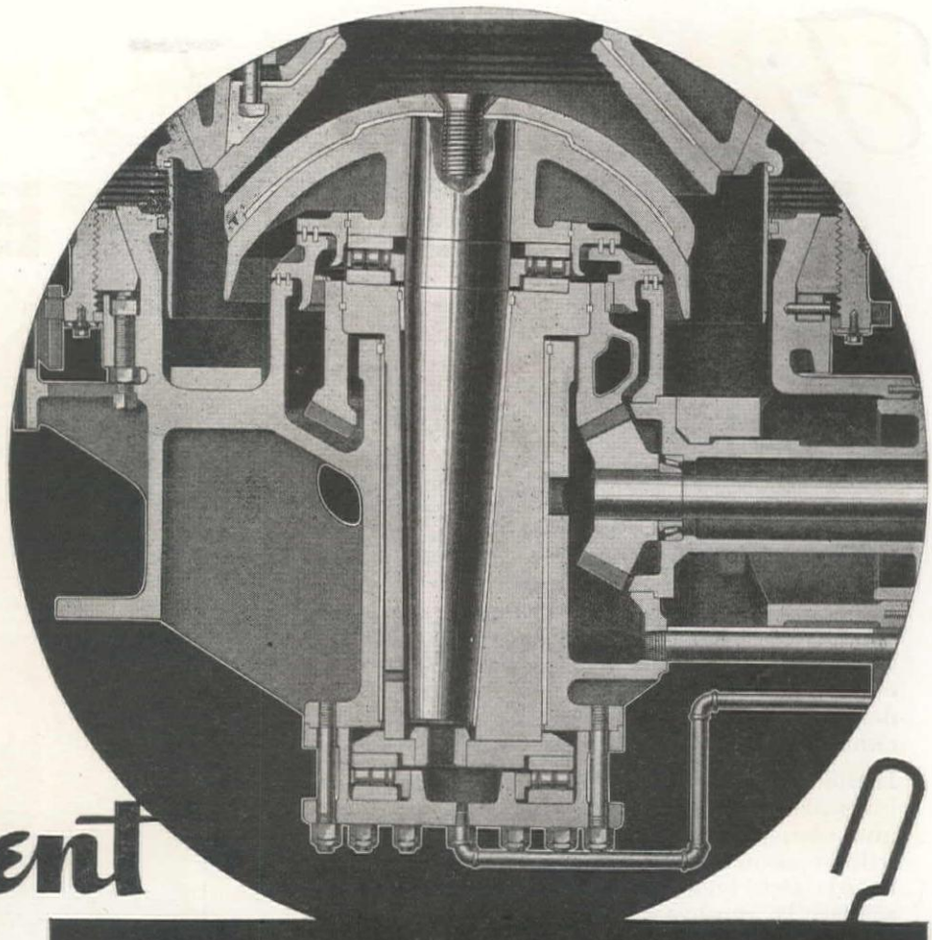
1. Official records of cast iron pipe laid 100 to 200 years ago and still in service, prove that it is *cheapest in the end.*
2. Official reports on file in the office of a prominent technical publication, prove that cast iron pipe is *cheapest to maintain.*
3. Long-lived pipe obviously causes less street-opening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

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

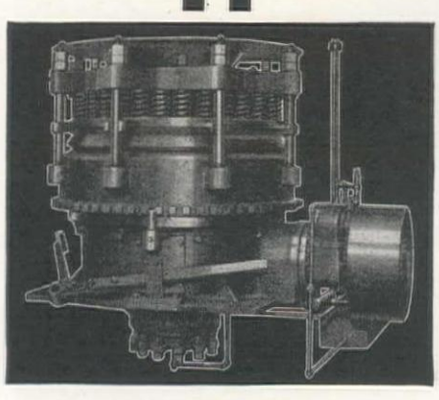
Photo by courtesy Deutscher Gussrohr-Verband G. m. b. H., Cologne

CAST IRON PIPE

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



WHAT'S Different ABOUT THE TELSMITH GYRASPHERE!



The spherical head and corresponding concave (shown above) are adapted from the first crusher devised by primitive man —the mortar and pestle. The parts are inverted to facilitate discharge; but the crushing action is the same. Particles are caught and broken between two multi-curved surfaces, causing an ideal cubing action. The same mechanism that ground corn meal in ancient Egypt now produces an improved cubical aggregate in modern mines and quarries. Write for Bulletin Y-30.

CALIFORNIA EQUIPMENT CO.,
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TELSMITH

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

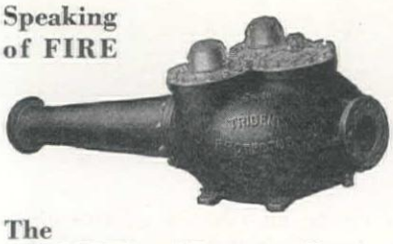
LITTLE LESSONS IN FALSE ECONOMY—No. 4 *Photo: Ewing Galloway*

Beware of FALSE ECONOMY!

you don't save money with cheap Water Meters

You save a few dollars first cost . . . and the price of maintenance, repairs, depreciation and obsolescence soon burn up that small saving. Why not invest *correctly*—in the Water Meters that are *insurance* against these costs—in Trident or Lambert Water Meters? Why not buy Water Meters whose *interchangeability* preserves or renews their original accuracy and life for a generation of low-cost service? Trident and Lambert Meters embody every worthwhile improvement in Water Meter design, in which they have pioneered. We make a type for every service, each a fine and lasting investment, the cheapest in the end. Write for details to the NEPTUNE METER CO. (Thomson Meter Corp.), 50 W. 50th St. (Rockefeller Center), New York City . . . or Neptune-National Meters, Ltd., Toronto, Canada.

Speaking of FIRE



The TRIDENT *"Protectus"* Water Meter was the first Fire Service Meter officially approved by the Underwriters' Laboratories, Inc. It is accurate on all flows. Noted for low loss of head, reliability of operation. Note clear waterway clean through for high pressure service. Widely used.

Trident

& LAMBERT WATER METERS

NEVER BECOME OBSOLETE . . . .

OVER SIX MILLION MADE AND SOLD THE WORLD OVER

THE SYMBOL OF SUSTAINED ACCURACY

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

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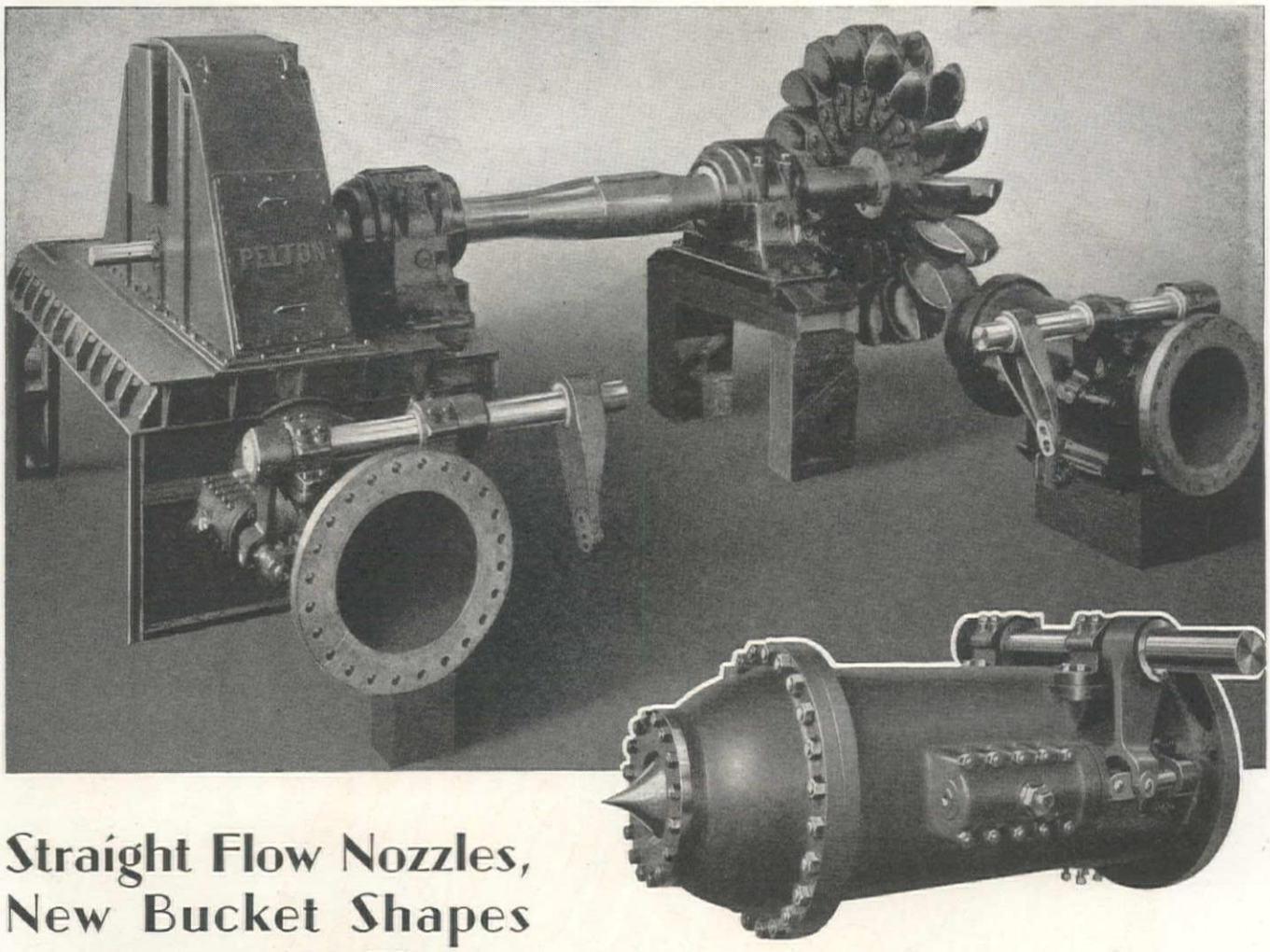
Modern Design In Impulse Wheels



Straight Flow Nozzles, New Bucket Shapes Are Important Changes

A number of important changes in impulse wheel design have been effected within the past few years which have proved of far-reaching economical value. Improvement in nozzle and bucket construction has been most outstanding, these features being incorporated in the new 3,500 Hp. house service units for Boulder Dam and shown in the illustration.

Fortunately the changes are of such character that they may be easily and inexpensively applied to practically any existing impulse turbine, bringing to these older installations the desirable operating characteristics of modern design.

Pelton engineers will gladly assist in the analysis of any plant conditions looking to improvement in efficiency, increased output and reduction in operating cost.

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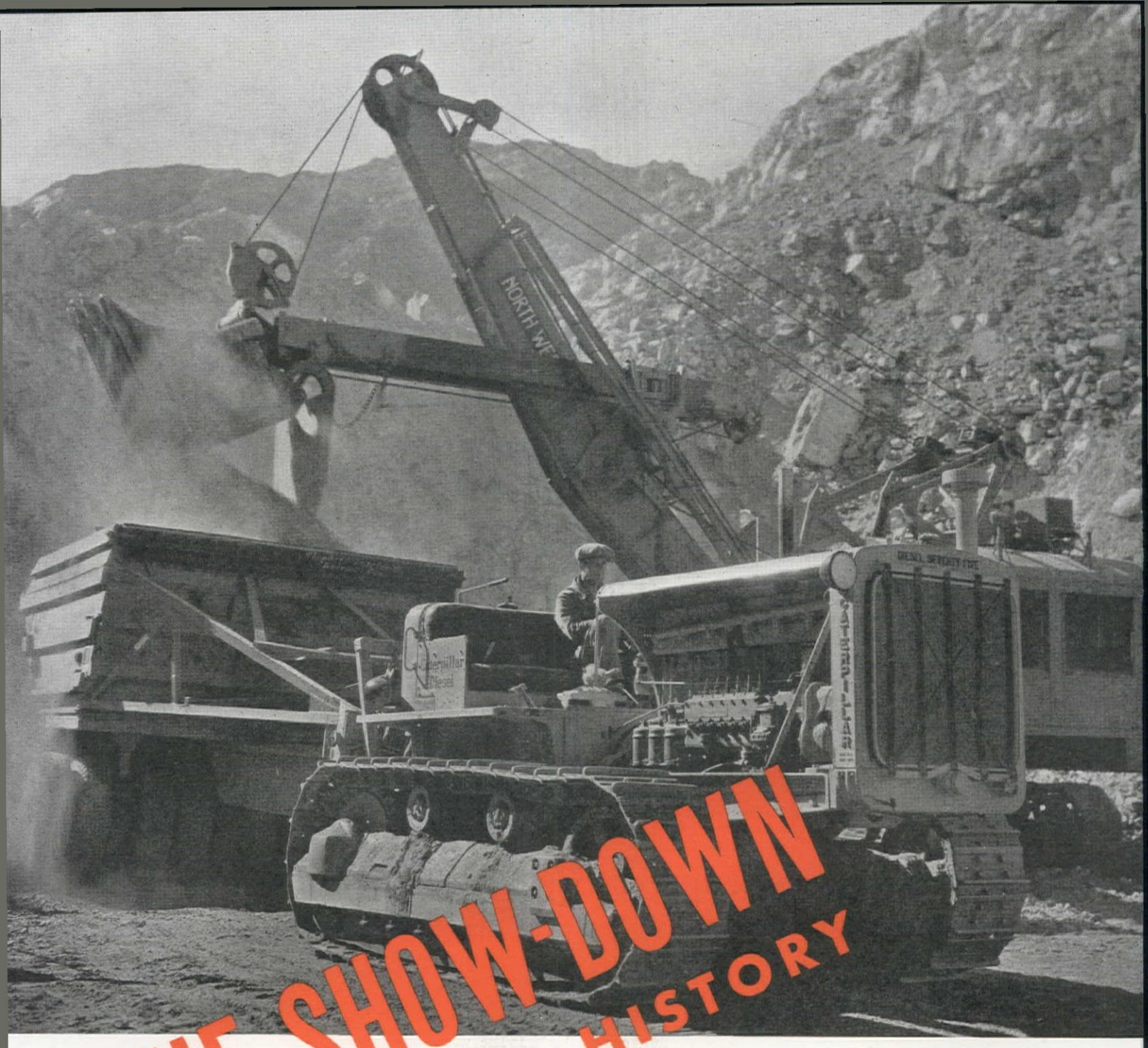

THE SHOW-DOWN IS MAKING HISTORY

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WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

May, 1935 Vol. 10, No. 5

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

A Pledge for More Service To Builders of the West

FOR the past decade there has been an accelerating Westward trend in the volume and magnitude of construction activity, until the unprecedented projects now under way in the eleven western states form the focal point of engineering thought and the proving ground for construction procedure. For the same ten-year period, Western Construction News has been the publication through which Western engineers, contractors and the suppliers of materials and equipment have obtained their complete news and informative data on this ever increasing construction activity. The acceptance of its services as the agency for a complete survey of regional activity is apparent from its steady growth. Today, with the region served by Western Construction News constituting the stage for the largest construction projects of all time it is essential for Western Construction News to be re-dedicated to an even more complete service to those directly or indirectly concerned with construction in the eleven western states.

The Pacific Coast and the Mountain states form a region which is distinct in geographic and climatic characteristics and, as a result, has grown to be distinctly regional in construction activity and, to a large degree, in engineering and contracting personnels. To this group, Western Construction News plans to bring a widening service.

In the first place, there will be no change in the established policy of reporting progress on the major projects. These articles will keep readers informed on the features of design, the methods of construction and the progress. Second there will be an increase in articles of the distinctly informative type planned to provide material and data with a view to making the readers' work more efficient and profitable. Lastly, since the spectacular characteristics of much of the construction work in the west makes pictures of interest and distinct value in presenting a visual appraisal of methods and progress, there will be an increase in the pictorial treatment, without curtailment of reading matter. These major departments of editorial service, when combined with usual small features and the contract and unit bid information, will be designed to maintain a complete and balanced fund of prompt, accurate and useful information on construction in the eleven western states for the engineers and contractors of the west.—J.I.B.

•

Tariff Wall for Contractors Established in San Francisco

RAISING a ten per cent local tariff wall on construction work, San Francisco voters, on May 2, decided to allow local contractors that advantage in the award of future municipal work. The inherent fallacy of such a policy would be amusing if it were not for the possibility of serious consequence if a spirit of reprisal broke out among other cities. The result could definitely raise the cost of construction. For example, if Oakland or Los Angeles should decide to retaliate and keep out 'foreign contractors' by raising the ante to a higher figure. On the other hand, this idea might spread in the reverse direction and result in Precinct 13 voting to patronize only lawyers, doctors or butchers living in the area, regardless of their qualifications or prices. The immediate situation is not particularly serious unless it indicates an unhealthy trend in municipal thinking which might extend to other cities with revengeful intent and into the field of materials and supplies to the immense injury to all phases of the construction industry.

•

Work for the Small Contractor

Indications that a large share of the new works funds is to be concentrated on jobs which can be completed within a year, is welcome news for the large number of smaller contractors who were practically put out of business by the CWA and the subsequent operations of the Emergency Relief Administration. The large number of relief work projects of the $30,000 size or less, which municipalities have carried out by force account in the present emergency program, have practically eliminated the work of these small, efficient contracting units. The program which is now being planned, if it actually carries out the promise to use 'existing agencies,' should return this work to its rightful place in private industry with the small contractor.

•

All Barriers Are Not Dams

Shutting down of construction work on the Parker Dam—laying aside all pros and cons involved in the grievances or rights of Arizona—is an excellent example of a fundamental problem in major water development programs on interstate streams. If the large rivers of the West are to be conserved and utilized for the greatest public good, the planning must not be hampered by the hurdles raised by political boundaries. The waters of the Colorado river belong to the entire region of the Southwest and this essential resource should be considered solely from the approach of securing the greatest benefit for the largest number, with studied foresight into future growth trends and sectional requirements. In the West, water is too vital an asset in future development to become the basis of local controversy; it must be considered a regional resource and its development planned accordingly.

•

"Longest Bidder" to Get Job

Up in Washington contractors on a recent job were asked to bid on the basis of how long a section of highway they would build for $10,000. The Okanogan County commissioners, according to reports, planned to award a contract to the 'longest' bidder based on regular plans and specifications. Ordinarily a highway, or highway improvement, is definitely planned to connect towns or specified points on the existing system. In the present case, what if the successful bidder gets to the end of his contract with some highway left over and has to roll it up and take it home.

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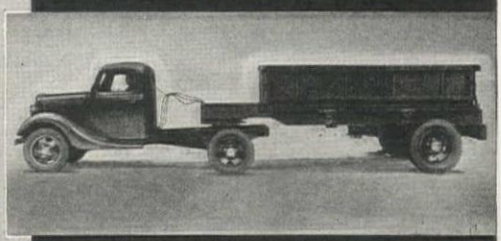

The 6 cubic yard model is illustrated above. Hopper Type (Bottom Discharge) models are also available in capacities of 10, 16, 20 and 25 tons, Side Dump models for 12 and 20 cubic yards.

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for 1½ and 2-ton truck-tractors

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Above illustration shows the Trail Car servicing an Austin-Western Elevating Grader.

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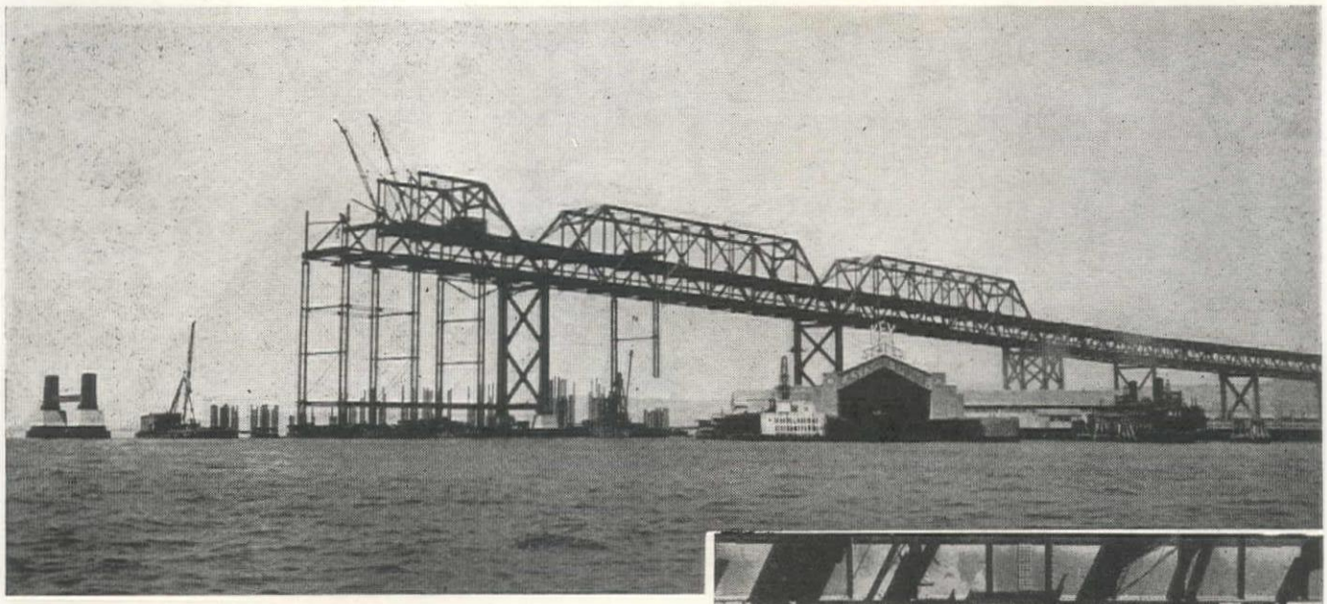
WESTERN CONSTRUCTION NEWS

MAY, 1935



Six lanes for fast moving traffic are provided on the upper deck, with three trunk lanes and two rapid transit tracks on the lower deck.

Double-Deck Paving on East Approach of San Francisco-Oakland Bay Bridge

Light-weight aggregate saving 33,000,000 lb. of dead load and difficult formwork are notable features of the concrete slab design and construction

AMONG the many new and interesting features in the design and construction of the San Francisco-Oakland Bay bridge is the use of light weight aggregates in the upper concrete floor deck and the methods employed in placing both upper and lower deck floors. This structure, being built by the California Toll Bridge Authority at a cost of about $78,000,000, is outstanding because of its length of nearly 4½ mi. and its two decks, which will accommodate 16,000 vehicles per hour and facilitate movement of 40,000,000 interurban train passengers per year (estimate for 1950).

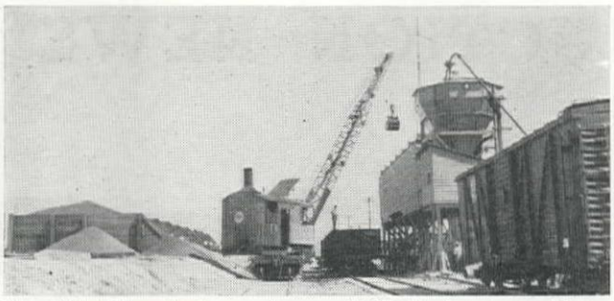
Loading and Design Data

The upper deck is 58 ft. wide, providing for six lanes of fast moving traffic, and the lower deck is designed for a 31 ft. roadway for three lanes of heavy truck traffic and two tracks for electric trains. The area for the tracks is unpaved. Loading for the upper floor slab provides for 10-ton light trucks in the two outside lanes and 7½-ton vehicles in the four inside lanes. The lower deck is designed for 30-ton trucks at 44-ft. centers. Both decks have a 1/3 impact allowance.

The concrete slab is supported directly on the longitudinal stringers of the floor system which are spaced at 4 ft. 8 in. in the upper deck and 4 ft. 10 in. in the lower deck. Reinforcing steel truss-bars weighing 3.3 lb. per ft., are spaced at 7½-in. centers in the lower deck and 10-in. centers in the upper deck. These reinforcing steel trusses, which are 4½ in. deep and composed of ½-in. round bars, are electrically welded to the upper flange of each floor beam and are tied together with ½ in. round spacing bars.

The allowable units stress in the ordinary concrete in the lower deck is 1,050 lb. per sq. in. and the ultimate strength of the lightweight concrete is 3,000 lb. per sq. in. The working stress of about 500 lb. per sq. in. in the concrete of the upper deck is governed by the required depth of slab of 6 in. which consists of a base course 5¾ in. deep and ¼ in. of topping of ordinary concrete. The lower deck slab, with depth of 6½ in. is ordinary concrete due to the heavy live load requirements.

Concrete is designed with a water-cement ratio of about .68 and by per cent of absolute volume of the aggregates. A typical mix for light weight concrete using 7 sk. of



View of batching plant on east approach fill showing storage bins on left. Note pipe leading into cement storage bin from pumping unit inside of railroad car.

cement per cu. yd. of concrete, which has a compressive strength of 3,000 lb. per sq. in. at 28 days, is as follows:

Aggregate	Per cent
Antioch sand, — 10 mesh	9.0
Niles sand, — 8 mesh	3.0
Gravelite sand, — 3 mesh	28.0
Gravelite, ¼ — ¾ in.	26.0
Gravelite, ¾ — 1¼ in.	34.0
TOTAL	100.0

The porous lightweight aggregates are completely saturated prior to mixing, by sprinkling the material in the stock piles or railroad cars at the batching plant each morning.

Light Weight Aggregate Used

By using the lightweight aggregate known as 'Gravelite' a saving of about 33,000,000 lb. in the weight of the upper deck slab has been possible. This material is manufactured from clay and shale at Point Richmond, located on the Bay a few miles from the bridge site, by Gravelite, Inc. The shale and clay, which is mixed in an open pit quarry, is screened into various sizes and burned at a temperature of 1800° F. in a rotating kiln for one hour. The material is then conveyed by a bucket elevator to steel bins for cooling. The finished aggregate is then placed in open storage piles for shipment by rail to the batching plant.

This aggregate has a texture similar to ordinary coal cinders and weighs from 39 lb. per cu. ft. for the larger aggregate to 65 lb. per cu. ft. sand passing a No. 3 mesh screen. The finished light weight concrete weighs from 98 to 105 lb. per cu. ft. as compared to an average of 155 lb. per cu ft. for ordinary concrete. In addition to 'Gravelite' two sizes of ordinary sand are used in lightweight concrete. This sand and ordinary aggregates for the lower deck slab are furnished by Bechtel-Kaiser Rock Co. of Oakland.

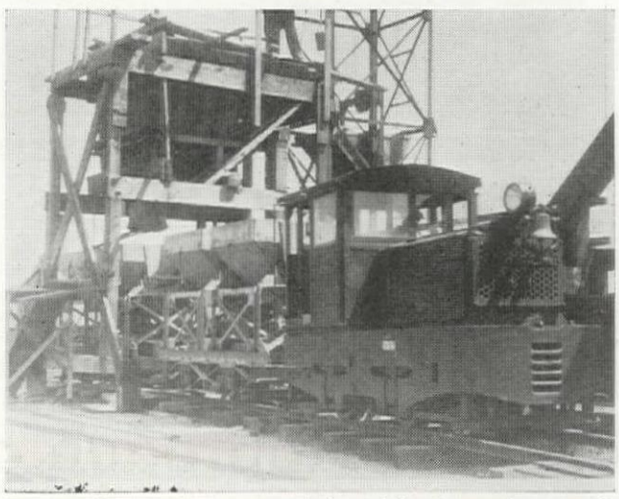
Reinforcing steel bars and trusses are delivered to the site on barges. A stiffleg derrick hoists the steel to the top deck and it is distributed along the top deck on a railroad car and unloaded to both decks by a portable derrick located on the top deck. After forms are in place, steel is placed by hand and the truss bars are electrically welded to the floor beam flanges by J. K. Welding Co., subcontractor, using four 300-amp stable arc gas engine-driven Lincoln welders.

Batching Procedure and Mixing

Cement, which is delivered to the batching plant in bulk in box cars, is unloaded directly into a 450-bbl. capacity bin by a portable Fuller-Kinyon pump. A 6-in. diam. rubber-discharge pipe connects the pumping unit, operating inside of the boxcar, to the top of the bin, which is located directly over the batching hopper.

Concrete is dry-batched at the batching plant, located on the east approach fill about 2,000 ft. from the mixing plant which is set up at the easterly terminus of the main bridge structure.

Both heavy and lightweight aggregates are unloaded from railroad gondolas directly into the batching bins or into stock piles on the opposite side of the track by an American Locomotive clamshell crane. The lightweight aggregates are thoroughly sprinkled during the unloading operation in the railroad car or in the stock piles later. The Johnson batching plant, which has a normal capacity of about 250 cu. yd. per 8 hr., is similar to the Boulder dam plants of Six Companies Inc. Electrically controlled bins and weighing hoppers, which are centered over a 24-in. belt conveyor, that feeds into a hopper located under the cement bin. This hopper discharges into the 1-yd. side dump railroad cars which are hauled to the mixing plant. The entire plant is controlled from a manually operated switch board through separate switches for each scale-hopper. Radial gates, controlled by solenoids, feed the material from the storage bins above into the hopper and electrically controlled gates feed the aggregates onto the belt at a constant rate. In charging the hopper, the gates open to full width and close gradually to allow a trickle of material to balance the scale beam. The batching cycle is controlled entirely by the operator and depends on the speed of placing the concrete in the slab.



Hopper cars on upper deck used for transporting concrete to forms from hopper above concrete mixer.

The Smith 1-yd. tilting mixer discharges directly into a skip for hoisting the concrete to a hopper on the top deck. Specially designed two-compartment hopper cars, operating on upper deck tracks and drawn by 7½-ton gas locomotives are used for transporting the concrete to both upper and lower floor slabs. The cars are designed to facilitate unloading into buggies on the top deck and into a hopper discharging into buggies on the lower deck. The car hopper is mounted on sheaved rollers which are supported by a structural steel frame over the wheel truck. These rollers allow the hopper to be manually moved out about 2 ft. over the side of the car frame to permit dumping into a buggy or to the lower deck. The hoppers, which have a capacity of 0.75 cu. yd. each, can be reversed on the steel frame for opposite side dumping.

Forms and Form Handling

A unique method of erecting forms for both the top and bottom decks was developed to suit the peculiar conditions encountered on this double-decked structure. In both slabs the form panels are ¾-in. plywood throughout. This material was sawed to exact measurement at the manufacturers plant at Tacoma, Wash., in 2-ft. widths and in lengths to suit the beam spans for each respective deck.

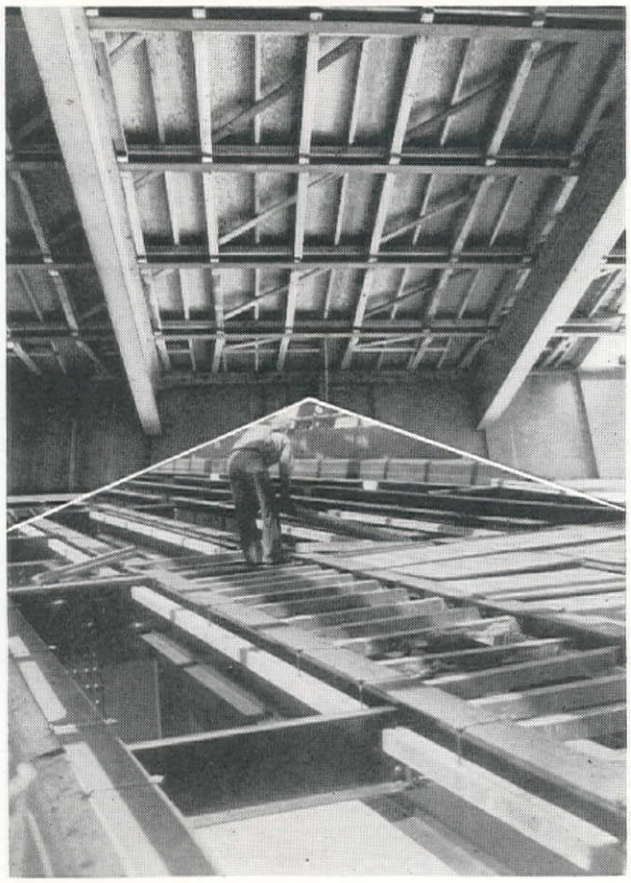
On the upper deck the plywood is supported on a timber frame consisting of 2 x 4-in. beams spaced at 2-ft. centers.

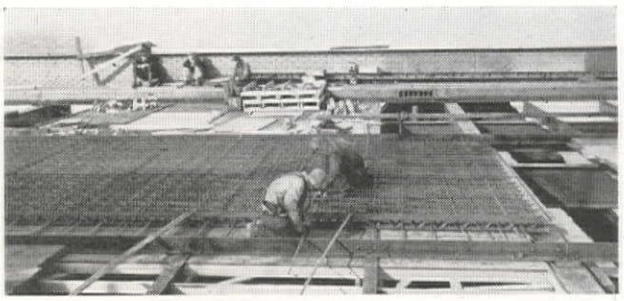
This frame, made up in 8-ft. sections, is supported on wooden wedges on the lower flanges of the 10-in. steel floor beams. These wedges, driven under the 2 x 4-in. cross member of the frame, determine the height of the plywood panel, which extends about ¾ in. under each flange. A thin wooden strip, sawed to match the chamfer of the inside flange of the beam, is driven between the flange and the upper surface of the panel to provide a completely tight form. Linseed oil is then applied with a brush and the form is ready for steel placement.

On the lower deck, a different method of supporting the forms was necessary due to the larger floor beams and the difficult problem of stripping the forms from the lower side at a maximum height of 216 ft. above the water. In place of the fabricated frame as used in the upper deck, the lower deck form panels are directly supported on 4 x 4-in. timber beams spaced at 2 ft. centers. These beams rest on double 2 x 4-in. timber supports which are hung parallel to the floor beam near the edge of the flange by means of ¼-in. diam. bolts and square plate washers on which the timber has a direct bearing. These bolts are hung from the floor beams by ¼ in. diam. eyebars which straddle the upper beam flanges at intervals of about 4 ft., thus holding the bolts which support the forms.

In pouring the slab, the eye bar and nut at the top of the bolt are necessarily incased in concrete. To prevent concrete from incasing the thread adjacent to the nut, a special nut with a ¾-in. long collar extending down to the bottom surface of the floor slab is used. This permits the bolt to be easily removed when forms are being stripped and allows the bolt to be used again. After the plywood panel has been set in place on the timber beams, a thin wooden strip is driven between the panel and the upper floor beam flange as was done on the upper deck to provide a tight joint.

Underside of top deck forms (upper) showing plywood panels and supporting frames wedged into place against beam flanges. Lower deck forms in various stages of completion showing method of supporting plywood panels by means of bolts, eye-bars over the top of steel stringers, and timber beams.





Placing reinforcing steel for upper deck floor. Steel angles forming longitudinal expansion joint and plywood forms are shown in foreground.

Placing the Slab Concrete

The upper deck roadway, which is 54 ft. wide, is placed in three sections, an 18 ft. 10-in. section in the center of the floor slab and side strips each 19 ft. 7 in. wide. These strips are separated by an expansion joint consisting of two 6-in. angles back to back (¼-in. space between) which extends the full length of the bridge. Concrete for the lower deck is placed in one section, the full roadway width of 31 ft.

The work is classified into four general operations: form work, reinforcing steel placement, pouring and curing, and form stripping. All operations have been carefully coordinated by the contractors making it possible to carry on one or more operations in each section at the same time.

In pouring the upper deck, concrete is taken from the hopper cars in buggies that operate on a wheel mounted platform, which spans the reinforcing steel previously placed. This hand-propelled platform is supported on the expansion joint angles and the steel curbing of the main bridge trusses. A self-propelled Lakewood finished, equipped with four vibrators on the front screed, is used for both the base and top course. In pouring the center section, the finisher is equipped with ordinary flanged wheels which run on the angles forming the longitudinal expansion joints. For the side sections which are 9 in. wider than the center strip, a special adaptor for the outside wheels is used to allow the finisher to run on the steel curbing which is about 12 in. high. Topping material for both decks is poured in about 50 ft. sections immediately after the base course has been placed, to provide a satisfactory bond between the two courses.

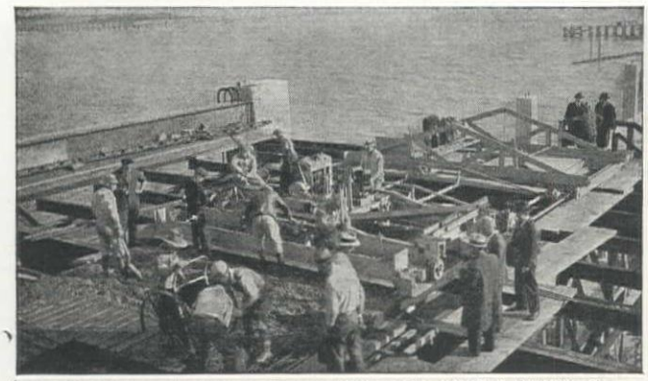
Concrete for the lower deck is discharged from the hopper cars on the upper deck into a double conical hopper mounted on a gantry frame. This gantry spans the entire lower roadway and provides a platform for the concrete buggies to be wheeled into position for dumping. A hand winch with a cable hooked to the reinforcing steel ahead is used to move the platform in front of the finishing machine. A Lakewood finisher spanning the entire 31 ft. roadway and mounted on the steel curbs is used for both the base and top course. After the topping has been poured and properly finished, it is broomed lightly to provide a skid-proof surface.

Curing

Hunt process curing compound is used for curing both deck slabs. The bituminous material is sprayed on the wet concrete with compressed air immediately after the slab has received its final finishing treatment. Loads may be applied on the slab in 10 days and forms may be stripped in 7 days.

Form Stripping

Forms for the upper deck are stripped from a structural steel gantry spanning the lower roadway and extending over the area reserved for interurban railroad tracks. The gantry is mounted on flanged wheels which roll on the steel curb and is pushed into position manually. The floor



Concrete placing operations on the upper deck using a Lakewood finisher with four vibrators on the front screed.

of the top of the frame is 18 ft. wide and extends the full width of the bridge between trusses. In stripping the forms from the lower side of the floor slab the wedges, which hold the timber frames against the plywood panel, are knocked out, permitting the form unit to be loosened and removed. The plywood panels and timber frame are raised to the upper deck and used again.

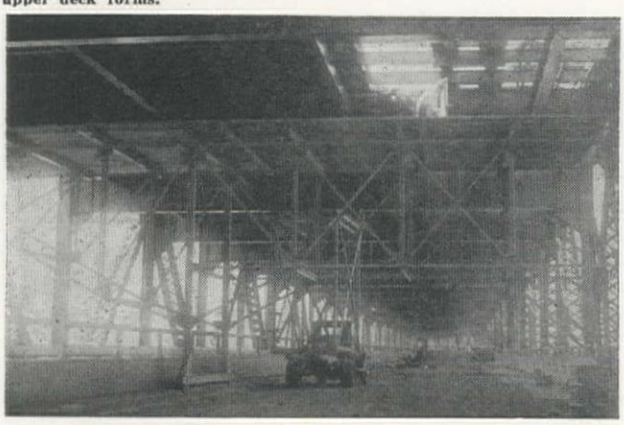
The lower deck forms are stripped from a 34 by 34-ft. platform which is hung from the lower floor beams flanges by means of special 'scissors' type hangers. These hangers are made of two 2½ by 2-in. angles with jaws at the upper end which clamp around the lower flange of the floor girders. The two angles are locked together by means of a special hook bolt fastened through slotted holes to prevent the hanger from being accidently loosened. The hangers are attached to two 7-in. monorail beams spaced at 22-ft. centers which supports the platform by means of trolleys. The entire platform unit is designed to move forward on the monorail through a vertical clearance of about 3 ft. provided in the steel work between the lower flange of the floor girders and the upper strut of the steel towers supporting the trusses.

The monorail is fabricated in 6-ft. lengths to allow erection of hangers on both sides of a tower to support the front part of the platform when moving forward. Hangers and trolley rail are erected and dismantled from small platforms projecting about 9 ft. forward and behind the main platform. Hinged dogs are required on the monorail to prevent the platform from rolling off the trolley beam and falling into the water below, especially where the bridge is on a grade as is the case on the east bay structure.

Expansion Joints

A special steel transverse expansion joint is provided at the end of each truss on the east bay structure and a transverse composition joint is placed in the concrete at each panel point. The steel joint consists of a series of interlacing bars with the surface at the same elevation as the top of the floor slab and provides a longitudinal clearance of 6 in. A single expansion joint of similar type, providing a maximum movement of 4 ft., is located at the junction of the deck and through trusses. The composition joint consist of ½-in. Flextell pre-moulded material set in a copper plate clip to provide a water stop.

Gantry frame spanning full width of bridge for stripping upper deck forms.

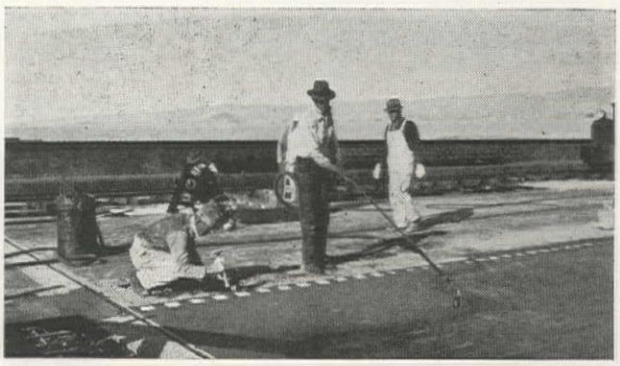


Traffic Markers

Traffic lanes along the full length of the bridge are marked with 4-in. square white terra-cotta blocks set flush with the floor surface at 8-in. centers. These are set into the soft concrete, immediately after finishing and before the curing compound has been sprayed on, by means of steel plate templates. These templates, providing for the proper spacing of the blocks, are placed in the frame of a 4-wheeled timber platform, which is pushed along parallel to the center line of the bridge on the steel curb and angles forming longitudinal expansion joints. After the blocks are pushed through the template openings into the concrete they are adjusted to proper height and the concrete is hand finished around them. Curing compound is removed from the white markers by hand scraping.

Progress

Approximately 40,000 cu. yd. of concrete will be required for the bridge paving including 23,000 cu. yd. for the upper deck and 17,000 cu. yd. for the bottom floor.



Spraying Hunt process curing compound on finished concrete surface. Workman at left is adjusting and finishing concrete around traffic lane marker laid previously with template shown in background.

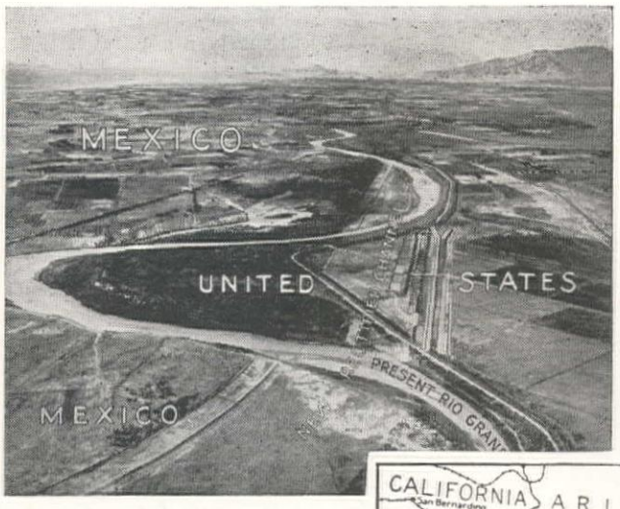
More than 5,000 cu. yd. of concrete has already been placed (April 25) in both floors of the deck trusses of the East Bay structure. The completed paving extends out over the entire group of twelve deck trusses, a distance of ¾ mi. from the easterly end of the bridge.

The present plant on the east approach fill will supply concrete for the floor slabs of the entire east bay structure, including the deck and through trusses, 1,400-ft. cantilever span, and steel viaduct crossing Yerba Buena Island near the east tunnel portal. Present plans provide that concrete for the floors of the two 2,310-ft. west bay suspension spans will be supplied from a plant to be erected near the San Francisco anchorage.

Personnel

Bates & Rogers Construction Co., of Chicago, are paving both decks under a subcontract from Columbia Steel Co., general contractors for both east and west bay superstructures. The work is being done under the direction of: R. Rasmussen, district manager; C. C. Smith, general superintendent; J. W. Maxwell, engineer; and C. B. Sparkman, office manager.

The engineer's field staff includes: V. A. Endersby, construction engineer; H. R. Lendcke, assistant construction engineer, and P. N. Fletcher, junior assistant engineer. The entire bay bridge project is under the direction of C. H. Purcell, chief engineer, C. E. Andrew, bridge engineer, and Glenn B. Woodruff, engineer of design.



River Cutoffs Which Transferred Land Between the United States and Mexico will be eliminated with completion of the present river control work. View Shows Channel Straightening Near El Paso.

Removing the Kinks From the Rio Grande And Reducing Its Flood Menace

River rectification work along the international boundary to cost $12,600,000—Project will include the Cabrillo earthfill dam in New Mexico

AT THE cost of $12,600,000 the United States and the Mexican governments are permanently rectifying the course of the Rio Grande and providing flood control along the international boundary. When the present work is completed a stable river channel will replace the constantly shifting course which has had the habit of transferring large sections of land back and forth between the two countries. Most of the original $6,000,000 PWA allotment for this stabilization program and flood control work has been expended. An additional $6,600,000 will be required to complete the work and this financing may be available from the new public works funds.

The river improvement work is divided into three parts: (1) flood control at Nogales, (2) river rectification and flood control along 155 miles in the El Paso-Juarez valley below these towns, and (3) flood control and a small amount of channel straightening on the lower Rio Grande around Brownsville.

Work at Nogales

Work at Nogales is the farthest advanced, with the first unit of the project completed, the second about 20 per cent complete—about two months more work will be required—and the third unit awaiting funds. The first two units have been financed by a PWA allotment of $433,000 made late in 1933, following the adoption of a cooperative control agreement between the United States and Mexico.

This project corrects a serious flood hazard created by numerous arroyos in the district. Nogales, Ariz. and Nogales in Mexico were equally affected and its was impossible for either city to effect a permanent improvement without the cooperation of the other, so the aid of the International Boundary Commission, which is handling all of the border work, was enlisted and the present plan developed.

Flood control on the American side is provided for by a flood-water conduit about 1 mile long, extending from the international boundary up through the business district of Nogales, Ariz. The first unit is a reinforced concrete culvert 20 ft. wide and varying from 15 to 21 ft. high. This work, which is now completed, was done by the T. A. Allen Construction Co., Los Angeles. It comprised 80 per cent of the conduit. The second unit, being built by Harry Karns of Nogales, consists of placing a concrete lining in the 3,300-ft. section of old flood-water channel which joins the closed conduit. The third unit to be constructed would be a ½-mile length of open, concrete-lined channel below the closed conduit, north to the city limits.

Location problems made construction difficult. For about 4,000 ft. the channel runs between the Southern Pacific railroad tracks and the main street of Nogales, partly under the street. Since there is no other highway for through traffic, it was necessary to keep the roadway open all the time. The problem was solved by providing a hoisting tower on the paving mixer and chuting the concrete across the road into place. A central batching plant was located ½-mile from the job and batched aggregate which was handled in trucks.

Work at El Paso

Removal of the flood menace in the El Paso-Juarez valley and stabilization of the international boundary line at this point will be provided by the river rectification work now under way and the storage to be provided by the proposed Caballo Dam to be built on the Rio Grande about 100 miles above El Paso, at a site 22 miles below Elephant Butte Dam.

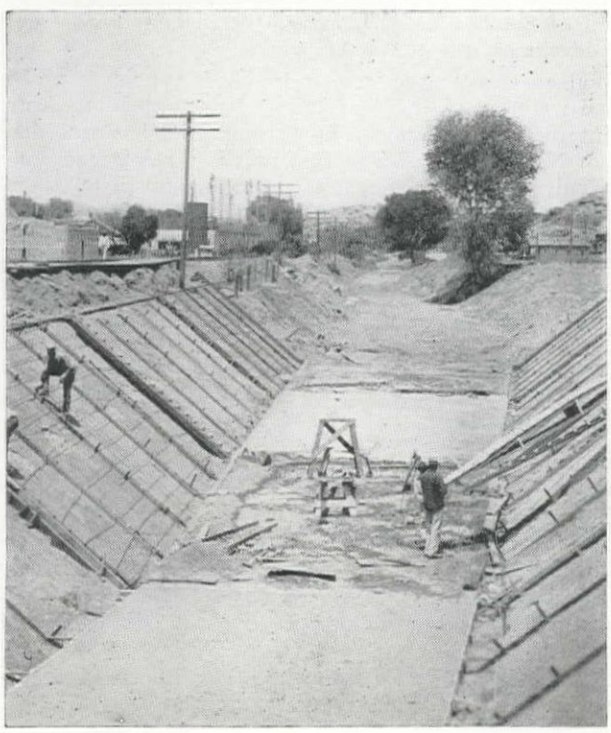
A PWA allotment of $3,300,000 for this work was made following an agreement between the United States and Mexico, reached in February, 1933. An estimated total of $6,000,000 will be required to complete this work. About $500,000 has been spent so far and another $500,000 will be necessary for buying rights-of-way and land to be acquired by the United States when the river channel is straightened.

Grubbing and clearing work in the rectified channel area is practically complete and 10 per cent of the excavation is finished. Three years is the estimated time for the job. Work on both American and Mexican sides is being done by force account. River rectification is being carried forward from both ends of the project. Four draglines are in use below Fort Quitman and two near El Paso. About 400 men are employed on the American side and a like number in Mexico. Each government is using its own men and materials.

Channel straightening resulting from this work in the El Paso-Jaurez valley will reduce the river distance between these cities and Fort Quitman from 155 miles to 88 miles. A total of 128 loops in the Rio Grande will be eliminated by the new channel. Parallel levees, 590 ft. apart over most of the distance, will form the banks of the rectified river and flood-water channel. The United States will construct about 134 miles of these levees on both sides of the river and Mexico 42 miles. Levee heights range from 6 to 15 ft. and side slopes are 2½ to 1.

A 66-ft. pilot channel with an average depth of about 6 ft. will be located in the center of the 600-ft. flood channel, and the center of the pilot channel will be the permanent international boundary. Excavation amounts to 4,775,000 cu. yd. and there will also be 8,985,000 cu. yd. of embankment. About 20 miles of irrigation ditches which formerly ran parallel to the old river bed will have to be replaced in line with the new channel.

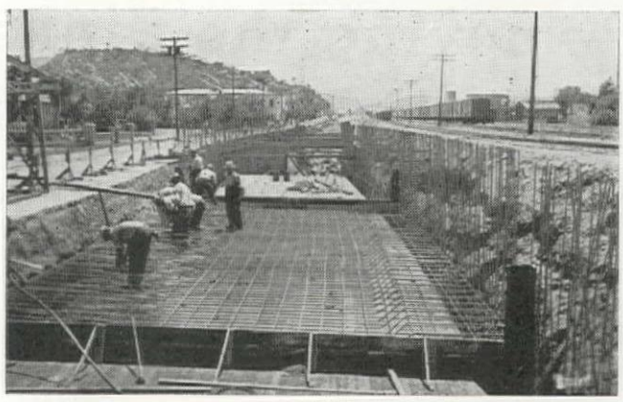
In Nogales, the Flood Control Work Includes Concrete Lining of Existing Channel.



Difficult silting problem

An unusual silting condition exists throughout the El Paso-Jaurez valley. Since 1907, sand deposits have raised the river level 12 ft., and it is estimated that 72 ac. ft. of silt per year are washed into this area for every 100 sq. miles of watershed. Construction of Elephant Butte Dam tended to aggravate this condition. Before this dam was built, spring floods of 24,000 sec. ft. frequently came down the Rio Grande and while these floods carried a heavy load of sand, the volume of water was large enough to distribute it over a long section of river bed.

Since completion of Elephant Butte Dam, the maximum amount of water released has been 3,000 sec. ft., which, as a result of irrigation demands, is reduced to 1,000 sec. ft. at El Paso. However, Elephant Butte reservoir does not control the flood waters from numerous arroyos. While the runoff from this source is not large, it carries heavy deposits of sand and with no flood water in the river to carry these deposits on down they have rapidly built up the river bottom in the valley. Further, heavy silting in the rectified channel will be prevented by raising the gradient from 1½ to 3 ft. per mile with resulting increase in velocity.



A Section of Reinforced Concrete Closed Conduit in the Work at Nogales Presented Problems Because of the Adjacent Railroad.

Plans for Caballo Dam

Supplementing the channel rectification work, the Caballo Dam is to be built on the Rio Grande as the second major part of the river control program. The storage provided by this reservoir is essential for flood protection in the El Paso-Jaurez area. Plans for the structure are being prepared by the Bureau of Reclamation and details are not available. The estimated cost is about $1,250,000 and the design will provide for a future raise which will increase the reservoir capacity from 100,000 to 350,000 ac. ft. and permit the generation of power at the Elephant Butte Dam about 22 miles upstream. It is estimted that the additional cost of constructing the dam to facilitate later raising will be about $100,000. This amount will be paid for with funds allotted to the Bureau of Reclamation for that purpose and not from the rectification allotment.

Caballo Dam will be constructed as a rolled embankment or semi-hydraulic fill. The spillway will be a reinforced concrete structure through a side hill cut controlled by four 25 x 21-ft. radial gates. The embankment will be about 1,000 ft. long, 30 ft. wide at the top, and

On the Lower River Near Brownsville, Texas, Levee Construction Is the Main Part of the Work.

about 60 ft. high at maximum section. The upstream face of the embankment will be built to a 4 to 1 slope and covered with 3 ft. of cobble riprap; the downstream side will be on a 1½ to 1 slope covered by conglomerate or cobbles bringing the finished surface to a 2 to 1 slope for the upper 35 ft. and 4 to 1 below. A cut-off trench is to be excavated to the underlying conglomerate. The construction of the dam will involve the excavation of about 725,000 cu. yd. of materials, the placing of 352,000 cu. yd. of earth fill, 14,000 cu. yd. of concrete, 1,800,000 lb. of reinforcing steel, and 900,000 lb. of miscellaneous metal work.

Joint financing of program

The United States and Mexico are jointly financing the river rectification work, the United States paying 88 per cent and Mexico 12 per cent. This allocation was agreed upon on the basis of relative benefits to be received by the two countries. The United States has an agricultural investment of about $17,000,000 or 34,000,000 gold pesos in this valley in 70,000 acres of land, irrigation and drainage works and first-class roads. Mexico has only about 35,000 acres of cultivated land in the valley and a much smaller value in roads and irrigation works. The total value was estimated at 5,400,000 gold pesos. The percentages were agreed on after considering these figures and the benefits El Paso and Jaurez would receive.

In order that the lands acquired by the two countries after the rectified channel is completed be equal, the channel is centered on a properly located axis. Each government acquires full ownership of the affected lands in its own territory at present and exchanges with the other country, one-half of the area required for rights-of-way and the total area for segregation. Acquisition of necessary land is being handled by a land purchase office established for this purpose. Aerial photography has been used a great deal by this office in checking ground calculations.

Organization

All of the border work has been planned and is being executed under the administration of the International Boundary Commission, an organization of engineers from both countries. L. M. Lawson, with offices at El Paso, Texas, is American commissioner. Col. S. F. Crecelius is project engineer on the Nogales work, C. M. Ainsworth has charge of Rio Grande rectification at El Paso and J. L. Lytel of the work being done on the lower Rio Grande near Brownsville. Engineering consultants are: W. E. Anderson, Louis C. Hill, V. H. Householder, J. B. Lippincott and E. N. Noyes.

Highway Contractors Code (Subchapter 11-C) Approved by President Roosevelt

APPROVAL was given Mar. 16 by President Roosevelt to the Code for Highway Contractors, which is Subchapter II-C of the Code for General Contractors, which, in turn, is Chapter II of the Code of Fair Competition for the Construction Industry. The new Subchapter applies to work of a 'general contractor who by formal contract or otherwise directs and/or superintends and/or coordinates and/or executes substantially in its entirety the work of highway contracting costing $1,000 or more and excluding only buildings and heavy construction and railroad contruction.' The subchapter was submitted by the Associated General Contractors of America and was subsequently revised after public hearings.

The general wage provisions of the approved general code for the construction industry apply to members of the subdivision. The subchapter specifically mentions the maximum hours for watchmen at 56 hrs. per week, field clerks and camp employees are not restricted as to hours but are not permitted to work more than six days per week, and employees engaged in supervisory work who receive less than $35.00 per week are not permitted to work in excess of the maximum hours prescribed for the employee supervised, plus an allowance of 15%.

Provisions for wage agreements

Any group of members in the highway subdivision who may propose to establish an agreement with their employees with respect to hours and wages are required to send to the Divisional Code Authority at the time the hearing is announced, an accurate description of the region to be covered by this agreement, type of work and plans for the hearing. The terms of such a mutual agreement, if approved, are limited to the members of the subdivision working in the region defined. A copy of the agreement or proposed agreement is to be filed with the NRA, together with a copy of any report containing additional information on the subject.

Administrative committee

An administrative committee for the highway contractors subdivision will consist of 13 members, all of whom must belong to the subdivision. Eight of these members shall be members of the Associated General Contractors and will be appointed annually by the Divisional Code Authority. The five remaining members will be appointed annually by the Divisional Code Authority from nominations made by the members who are highway contractors or by the eight other members of the committee. This administrative committee is empowered to appoint local committees for states, regions or localities as may be necessary for the administration of the subchapter. Organizations of highway contractors in any state or region may petition the committee for the establishment of a local committee. Further, the administrative committee is to provide a satisfactory method of filing and checking contractors' bids and the estimates of awarding authorities. Rules will also be established covering the renting or leasing of highway equipment by members of the subdivision.

The code of subchapter also contains provisions for exemptions to requirements, for trade practices and for amendments.

The two other proposed subchapters of the Code for General Contractors are Subchapter II-A for heavy construction and Subchapter II-B for railroad construction. These two subchapters of the construction code have not yet been approved.

Conduit and Canal Work on Colorado

Contractors forces scattered along 147 miles of the desert route rush excavation and concreting operations on this $33,450,000-phase of the project

Less than half a year has elapsed since contracts were awarded for the canal and conduit work on the Colorado River Aqueduct, but exceptional progress has been made by the twelve construction organizations attacking this work simultaneously along a wide front. The work has now progressed to a stage where it presents an unusual opportunity to report on the various methods and operations developed by these contractors. This article carrys forward the reporting which *Western Construction News* is providing on this gigantic water supply development and presents the first comprehensive review to be published on this phase of the work.—*Editor*.

TWELVE contracting organizations are making rapid progress on 147 miles of canals, conduit and siphon construction, to cost $33,451,000 which will connect the 29 tunnels, aggregating 92 miles, to form the 240-mile aqueduct being built by the Metropolitan Water District of Southern California, to deliver water from the Colorado River to the metropolitan area around Los Angeles. The entire project is providing jobs for more than 5,000 men, who are working at 65 points scattered along a 300-mile construction front across the desert.

Since these contracts were let in November and December, 1934, thousands of tons of heavy equipment including power shovels, walking draglines, concrete mixers, and aggregate producing plants have been moved across the desert to various sites of canal, conduit, and siphon construction. Camps have been established by all of the twelve construction firms. Progress figures show that over 2,000,000 cu. yd. of earth and rock excavation out of the total of 26,000,000 required has been moved. The aqueduct, with its tunnels, open canals and conduits, pumping stations, reservoirs, and appurtenant features is scheduled to be completed and delivering water by the latter part of 1938.

The construction organizations carrying forward this canal and conduit work are listed in the accompanying table, with the schedules under contract and the value of the work.

Considering the short time since actual construction was started on open canal and conduit work, excellent progress has been made by all contractors. Due to the extreme desert heat, specifications require that no concrete be placed in temperatures exceeding 90 deg. F. This necessitates closing down all concrete work on June 1 until next fall when this work will be resumed during the winter months. During the hot summer months, ditch excavation will proceed on the many contracts.

Nearly every contractor on canal, conduit, and siphon work employs a different method for excavating the necessary ditch, finishing canal bottoms and sides, procuring aggregates, and placing and finishing concrete. On some schedules, 5 and 6-yd. capacity draglines are used while on others 1¼ and 2-yd. draglines and shovels are employed.

Gravel is furnished in some cases from commercial producers and where the contractor is producing his own aggregate both portable and stationary types of rock plants are used. Concrete aggregate is handled from the batching plants, which, in some cases are adjacent to the gravel pits, both in batching trucks which feed mixers and pavers at the site of work and in transit-mix trucks. Concrete is placed by various methods also, employing belt conveyors, bottom dump buckets, cars, and dumping direct. Finishing of the concrete in the canals will ulti-

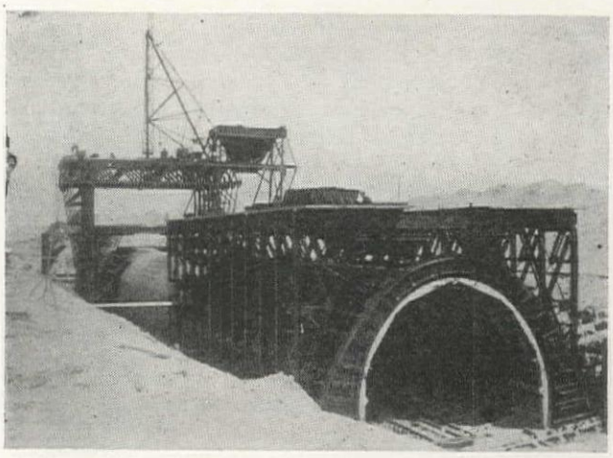


Fig. 3—Steel Forms Being Assembled for Pouring First Arch Concrete on Conduit on Schedule 7. Gantry Crane for Handling Outside Forms in Background.

Fig. 6.—Special Finishing Machine, Consisting of Three Blades and Duplicate Belt and Bucket Conveyors, Is Used in Shaping Canal Side Slopes and Invert on Schedule 8.

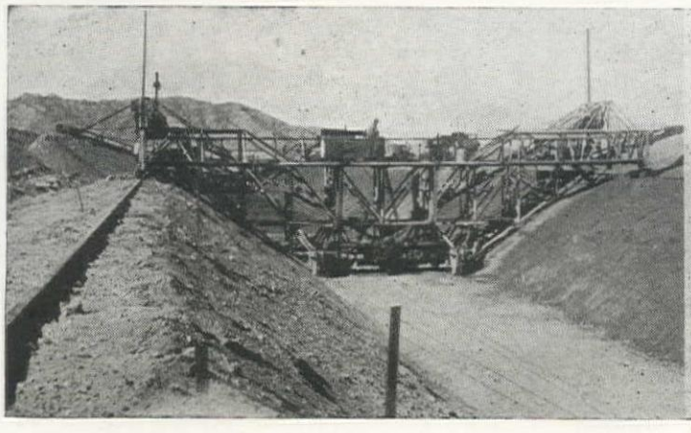
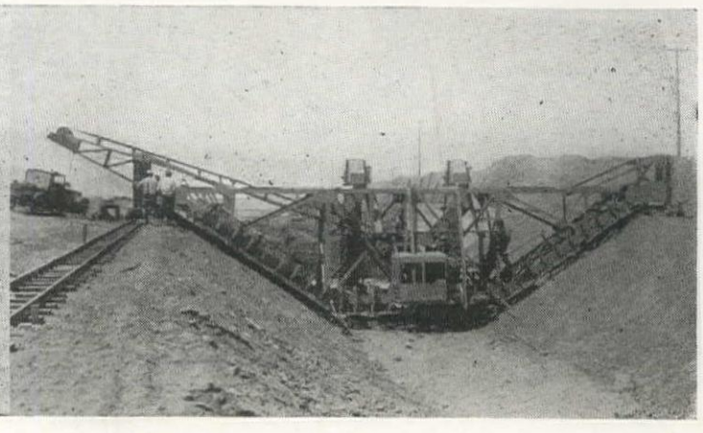


Fig. 4—A Special Finishing Machine on Schedule 5 Delivers Excess Material from the Blades to Berm by Means of Scraper, Belt Conveyors and Two Bucket Elevators.



Progresses at Fast Pace River Aqueduct

Fig. 1—A Bucyrus-Erie 100-B Dragline Equipped with 4-yd. Bucket and 90-ft. Boom Excavating Conduit Trench on Schedule 3.

Fig. 2—In Rough Terrain on Schedule 3, LeTourneau Scrapers and Ripper Are Used to Pioneer Deeper Cuts and Prepare a Flat Sub-Grade for 4-yd. Dragline to Operate On.

mately be done entirely by machines of various types although some hand finishing is being done now, prior to receiving finishing machines now being fabricated, in an effort to place the maximum amount of concrete before the required summer shutdown.

Excavation Completed on Two Schedules

Barrett & Hilp and Macco Construction Co.

Near the east end (Colorado River) of the aqueduct, work has not yet been started by Aqueduct Construction Co. on schedule 1. On the work under contract to Barrett & Hilp and Macco Construction Co. covering schedules 2, 3, and 7, all excavation for the conduit and canal sections on schedules 3 and 7 have been completed, and open cut work has started on schedule 2, working eastward. A Bucyrus-Erie 100-B electric dragline equipped with a 90-ft. boom and 4-yd. bucket is used for excavating all types of ditch. (Fig. 1.) A portion of schedule 3 is located in relatively rough terrain in which Le Tourneau bulldozers and carriers were used to pioneer through the deeper cuts to provide a smoother grade for the dragline to travel on (Fig. 2.) The maximum cut has a depth of 58 ft. from the canal bottom. The 4-yd. dragline operates from the road side of the canal and material is cast on both sides of the trench. A 2,300-v. power line parallels the aqueduct line and power is transmitted to the dragline by a 1,000-ft. trailer cable attached to the line with a special jumper.

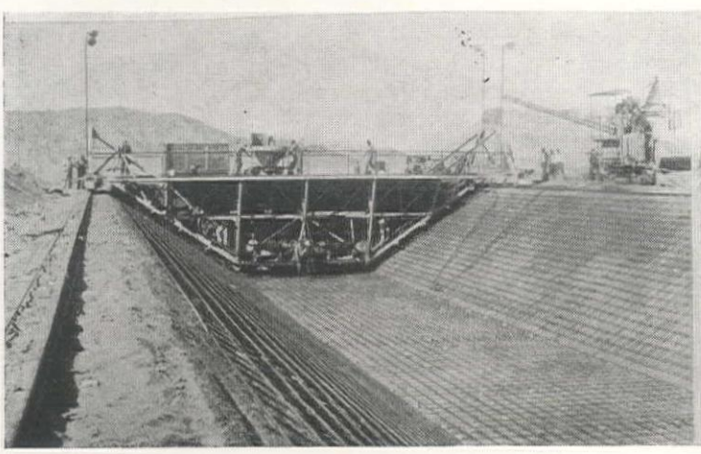
Cemented material was encountered at scattered locations on schedule 3 and blasting was necessary to loosen the material sufficient to be handled by the dragline. A portable electrically driven Gardner-Denver compressor unit constructed by the contractor, is mounted on a truck trailer which also supports the transformers connected to the 2,300 volt line. It has been necessary in some locations to drill and blast 10-ft. holes, the normal depth of the canal in cut sections. The canal invert and sides are finished by rooters and bulldozers and by hand sloping methods. Since completion of the conduit excavation on schedule 7, considerable sand has blown back into the ditch, which requires the use of 1¼-yd. Lorain and 1¼-yd. Bucyrus-Erie draglines for clean up work.

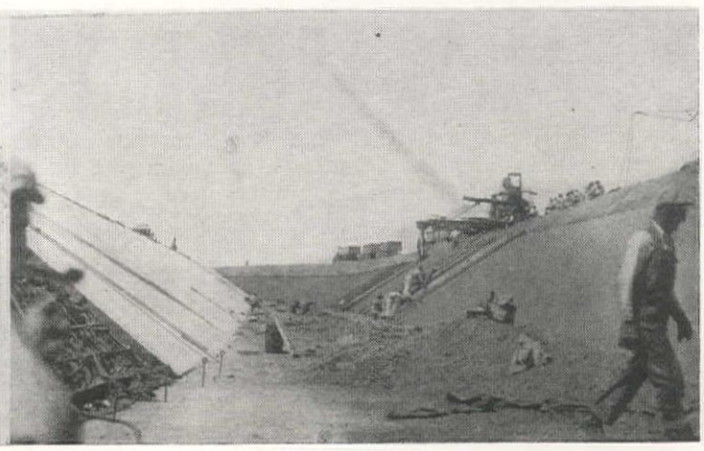
The first conduit concrete was poured about March 15 near the west end of schedule 7. Concrete is delivered to the site in four Rex and four Jaeger transit mixers, mounted on Studebaker trucks from the central-mix plant located at the camp of Barrett & Hilp & Macco Construction Co. near the westerly end of schedule 7. Aggregate is furnished by Western Motors Co. from a pit located about 3 mi. distant. A Johnson batching plant, with a capacity of 1,500 cu. yd. per day is used.

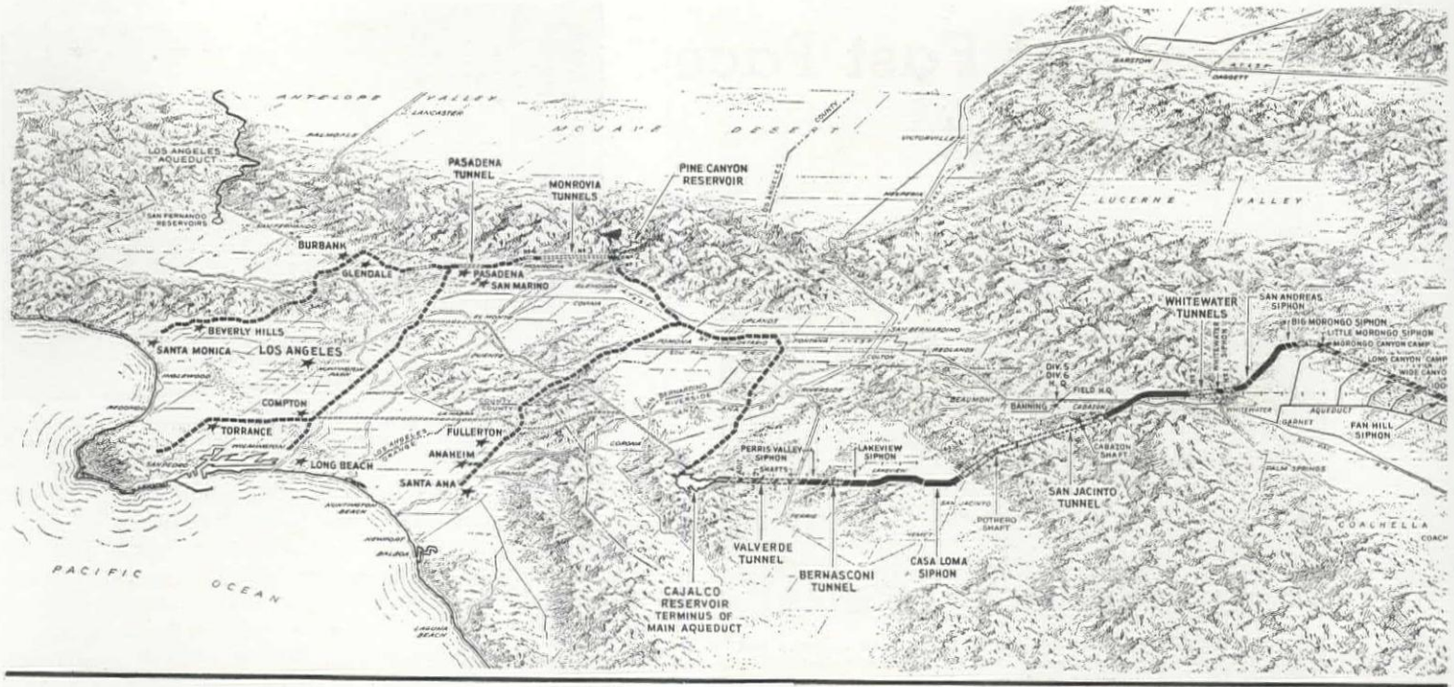
The invert concrete is placed on the hand-finished subgrade with a Jaeger finisher, and from 600 to 900 ft. of invert is poured in advance of the conduit arch. Special steel forms, (Fig. 3) built by Emsco Derrick & Equipment Co. from designs furnished by R. F. McCune, of the general contractor's staff, are used for the outside of the conduit barrel and Blaw-Knox steel forms are used on the interior. The entire outer form is handled by a rather

Fig. 7—Concrete Finishing Machine for Placing Canal Lining on Schedule 8. Concrete Is Distributed Along the Finisher by a Bottom Dump Hopper-Car.

Fig. 5—Hand Finishing Concrete on Canal Side Slopes on Schedule 5. Concrete is Dumped Directly on the Sub-Grade from Rex Paver.

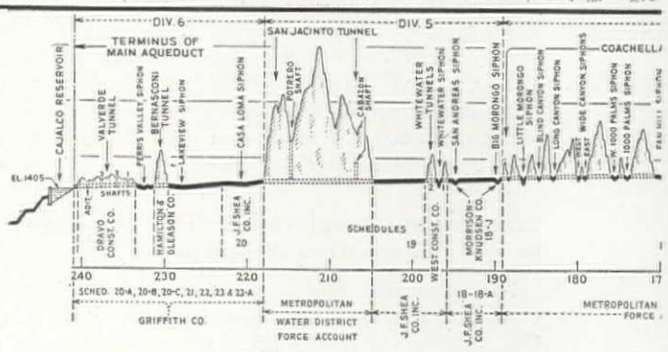






Construction Organizations

Schedules	Contractor	Total Amount
1, 10 11, 13	Aqueduct Construction Company	$3,460,542
2, 3, 7	Barrett & Hilp & Macco Construction Co.	2,923,206
4, 5	Jahn & Bressi Construction Co.	1,419,375
6, 8	C. W. Wood & W. J. Bevanda	1,282,000
9	Utah Construction Co.	955,248
12	Three Companies, Inc.	1,313,272
14, 15, 16	Thompson Starrett Co.	2,769,929
18, 18K, 19, 19A, 20	J. F. Shea Co., Inc.	2,611,204
18J	Morrison-Knudsen Co.	327,189
20A, B, C, 21, 22 23, 23A	Griffith Co.	1,739,846
Total-Contract Work		$18,801,811
Materials and supplies, right of ways, etc. furnished by district		$14,650,000
Total cost of canal, conduit, and siphon work		$33,451,811



PROFILE OF

elaborate gantry which runs on a rail supported on special steel side forms for the invert. The outside steel form and gantry was built at a cost of $62,000. These forms are attached by means of slotted pins set in the concrete and wedges, the wedges being driven out when the forms are ready for stripping.

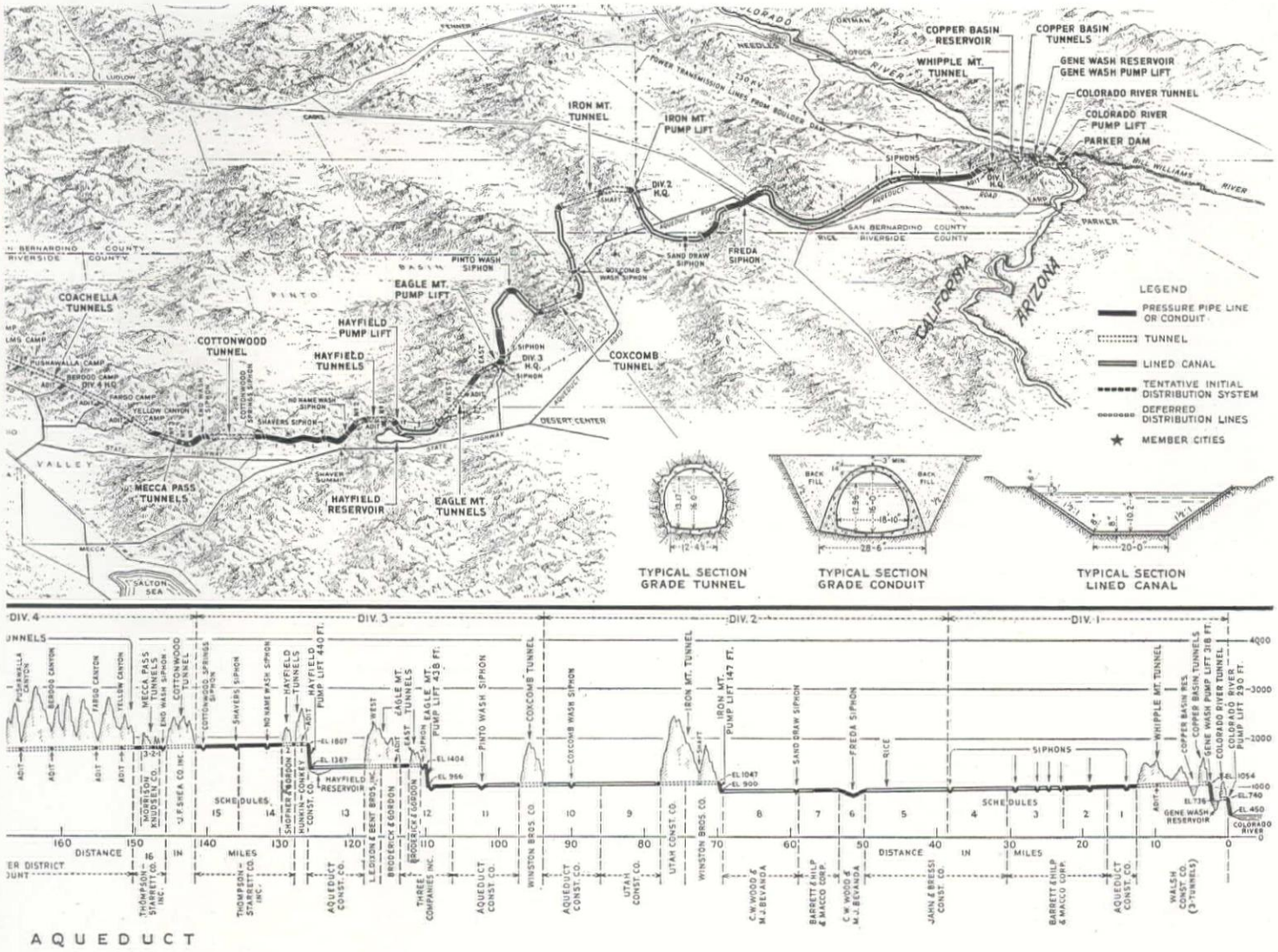
The outside forms, which are supported from a skeleton steel frame, are hinged in two places permitting each section of the 3-part form to be raised or lowered by hand wheels operating screws attached near the center of each section. This permits folding the two upper sections of the form into a nearly vertical position to facilitate pouring of concrete in a nearly vertical line into the lower or upper two adjacent sections. The form is open across the top of the arch to permit pouring and finishing by hand. Both inside and outside forms are built in 35-ft. sections and the outer form is supported when being transported by six long rod hangers attached to the gantry. Separate diesel power plants raise and transport the form. A special derrick separately powered is also operated on the gantry deck. The form is raised a maximum of 8 in. and held in that position while being transported at a maximum speed of 50 f.p.m.

A 30-in. belt conveyor is used for delivering the concrete to the forms from the transit-mixers which travel along the road paralleling the aqueduct trench. This concrete is delivered to a movable hopper mounted on a 6-ft. gage track on the framework of the outside form. This hopper is designed to dump the concrete on either side of the form through an elephant trunk. Four form sections totaling 140-ft. have been erected and this amount of conduit is poured at one time. The contractors plan to increase the length of forms to 210 ft. with the addition of two 35-ft. sections. The weight of a 35-ft. section of outside form is about 35 tons, and the weight of the gantry is about 40 tons. The field personnel for Barrett & Hilp and Macco Construction Co., include: H. W. McKinley, general superintendent; R. F. McCune, conduit superintendent; L. W. Jones, excavating superintendent; and E. J. Turre, office manager. R. C. Booth is division engineer for division No. 1 for the Metropolitan Water District.

Dragline Excavation Without Hand Finishing

Jahn & Bressi Construction Co.

On schedules 4 and 5, under contract to Jahn & Bressi Construction Co., excavation has been completed on schedule 5 and work is just starting on schedule 4. Trenching is being done with Koehring 701 and Northwest model 70 draglines both equipped with 2-yd. Esco buckets. The draglines operate on a level subgrade prepared by bulldozers and excavated material is cast to both sides of the canal trench. An excellent job of finishing is being done by these two machines, the canal bottom and slopes being excavated to within about 0.2 ft. of the finished earth line, with no hand finishing being required. Several bucket teeth are carried on the draglines, these being changed frequently throughout the day to facilitate taking out more easily the cemented material frequently encountered. No blasting has been required on this work to date. The earth berm on the low side of the canal on



which a road will be constructed along the entire length of the aqueduct, is bulldozed into position. An average of about 400 ft. of trench is being excavated per day.

On April 1 a subgrade finishing machine (Fig. 4) manufactured by Standard Steel Co., of Los Angeles, was put into operation and within a few weeks a concrete finisher will also be started. This machinery will facilitate placing 600 cu. yd. per day of concrete canal lining which requires 1.4 cu. yd. per lin. ft. of canal.

The subgrade finishing machine for the bottom and side slopes, which has a capacity of 200 tons per hour, is equipped with three curved blades about 12 in. deep, one being 20 ft. long for the canal bottom and two slightly longer for the sloping sides. Scraper conveyors, operating along the ground in front of the blades, feed the loose material to two bucket elevators which discharge onto a belt conveyor.

This conveyor delivers the material in a continuous berm along one side of the canal excavation, the material being levelled out later with a bulldozer. The entire mechanism is supported on a structural steel frame mounted on two 4-wheel carriages which travel on a 24-in. gage track laid along the top of both banks. The self contained finishing unit is powered by a gas engine and is controlled by one operator from a cab on the front side.

Aggregate for the lining is furnished under subcontract by E. M. Hawley from a pit located at Earp, a town near the Colorado river. The material is transported by railroad cars to Rice where it is unloaded by a Koehring crane into a storage pile, or directly into Blaw-Knox batching bins having the capacity of 300 tons. Cement is unloaded from railroad cars by hand buggies which dump into a hopper feeding a screw conveyor. This conveyor delivers the cement to a bucket elevator which discharges into a Blaw-Knox batching bin separate from the aggregate bin.

Four-compartment Mack trucks are used for transporting the concrete aggregates from the batching plants to two Koehring and Ransome paving mixers which are located on the canal bank, and discharge onto a shuttle belt conveyor, thence to subgrade through a spout. (Fig. 5) After the concrete finishing machine has been installed the concrete will be delivered from the belt conveyor directly to the finisher.

The field staff of Jahn & Bressi Construction Co., includes: Joseph Muscalo, general superintendent; Dominick Bressi, assistant general superintendent; and C. M. Ellison, concrete superintendent.

Special Finishers Used for Subgrade and Concrete

C. W. Wood & M. J. Bevanda

Schedules 6 and 8 under contract to Clyde W. Wood and M. J. Bevanda, work has progressed rapidly on schedule 8, but work has not yet started on schedule 6 and on the 3-mile Freda siphon. About 5 miles of canal of the total 9¼ miles included in schedule 8 have been excavated. This work is progressing at a rate of about 400 ft. per day, using a Northwest model 80 dragline equipped with a 3-yd. bucket. The canal section averages about 7.5 cu. yd. per lin. ft. of excavation. This provides for a canal with a bottom width of 20 ft., a total depth of 12 ft. and 1½:1 side slopes.

The first concrete of the open canal work of the aqueduct was placed by Wood and Bevanda about March 1 and to date more than one mile of the canal has been lined. An average of 400 to 500 ft. is laid per day using two Multifoote paving mixers. Up to April 1 only one mixer was used and this average was somewhat less than the normal rate at present.

A subgrade finishing machine (Fig. 6) designed by Clyde W. Wood and fabricated by Blaw-Knox and Western Pipe and Steel Co., Los Angeles, immediately precedes the laying of reinforcing steel and concrete placing. This finishing machine is equipped with three blades which shape the bottom and side slopes. Material is taken from the blades by two bucket lines which feed two shuttle conveyors, which in turn discharge into a continuous waste pile along the top of the canal bank. The entire mechanism is supported in a structural steel frame which travels on a monorail laid along the top of both banks. The unit is powered by a gas engine and is controlled by an operator from a runway at track level.

Aggregate is furnished from the contractor's own plant located near the base of Iron Mountain about one mile east of the canal. This plant has a capicity of 1,000 cu. yd. of gravel per day. The aggregate and cement is transported from the batching plant located at the gravel pit by twelve 2-compartment Ford dump trucks which feed directly into the mixers located adjacent to the concrete finishing machine. The paver dumps into a hopper car which operates on a track on the upper deck of the concrete finishing machine. (Fig. 7) Operators feed the concrete through a slotted opening extending full length and depth of the finisher. This finisher, also designed by Clyde W. Wood, is supported on the monorails serving the subgrade finisher. A gas engine located in the frame work near the canal floor is used to power the vibrating steel skirt at the rear and also to move the entire unit by means of cables. These cables are attached to the frame work near the wheels operating on the monorail and operate through sheaves which are attached a few hundred feet in advance of the unit to the rail.

Five siphons, each several hundred feet long, have been completed along the canal which has already been lined. The work under contract to Wood and Bevanda is under the direction of: A. F. Weesner, general superintendent; L. L. Green, excavating superintendent; and A. V. Fisher and V. S. Price concrete superintendents. Schedules 5 to 10 are in division 2 for which W. E. Whittier is division engineer and W. J. Neale and M. Hjalmarson, resident engineers for the district.

Slip Forms Used for Canal Lining

Utah Construction Co.

Of the 41,114 ft. of canal in schedule 9, under contract to Utah Construction Co., 12,000 ft. has been excavated to date, representing about 180,000 cu.yd. of common and 50,000 cu.yd. of rock excavation. In common material, two 3-yd. Link-Belt draglines each dig one-half of the ditch to the required depth. In rock sections, the material is blasted out in 14-ft. lifts and removed with the same two draglines. In a few of the deeper cuts it is necessary to handle the material a second time.

In finishing the canal slopes, transverse screeds are set to subgrade in the sides and the surplus dirt is trimmed off by hand. The invert is first graded by a bulldozer, then wet down and compacted by a sheeps foot tamping roller. Header boards, placed to grade along the side, act as guides for the wooden drag which is pulled along the bottom to make the final grade.

In lining the canal, the invert is placed first two days ahead of the side slopes, which are then poured in 18-ft. panels by means of a portable steel slip form. As the concrete is poured into place between the steel form and subgrade, hand controlled compressed air vibrators are immersed in the concrete to provide a uniform settlement.

Fig. 8—Erecting Forms at the West Portal of the Hayfield Tunnel on Schedule 14.

Aggregates are taken from a pit about one mile north of the west portal of Iron Mountain tunnel and hauled to the aggregate plant where it is crushed, screened and batched. This plant, located 200 ft. back from the portal, will also furnish aggregates for lining the west portion of Iron Mountain tunnel, also under contract to Utah Construction Co. The dry-batched aggregates are hauled to the 1-yd. Rex paver at the site of the work, where it is mixed and transported to the forms in buggies.

About 3,000 ft, of canal lining has been placed to date. Ben Arp is general superintendent for both canal and tunnel work and U. M. Samuels is concrete superintendent.

Canal Sides and Invert Poured Separately

Aqueduct Construction Co.

Nearly all of schedule 10 (total length, 39,615 ft.), one of four schedules under contract to Aqueduct Construction Co., has already been excavated and the first concrete was placed in canal lining on April 1. About 5 miles of canal, involving 600,000 cu.yd. of material, has been excavated by the general contractor with an all-electric Bucyrus-Erie 120-B dragline, equipped with a 5-yd. bucket, the second largest dragline used on the aqueduct construction. Two miles of canal and one siphon, involving a total of 200,000 cu.yd. of material was excavated by sub-contractors, Spicer, Robinson & West, using a 1½-yd. Koehring and two 3-yd. Link-Belt draglines. Although some cemented material was encountered by the general contractor, no blasting was necessary, and the large dragline experienced no difficulty in cutting through relatively hard material at times. An average of more than 600 ft. per day of canal was excavated under normal running conditions and on March 19 a record advance of 1,000 ft., involving excavation of 11,000 cu.yd. of material, was made during three 8-hr. shifts.

A unique method is being used in finishing the canal slopes which are left about 0.2 ft. high by the draglines in excavating the canal ditch. Transverse screeds are set to subgrade at 12½-ft. centers. A crane located in the bottom of the ditch lifts a steel template to the top of the bank and in pulling it down the slope excess material is shaved off flush with the top of the screeds. The surplus dirt accumulated at the ditch bottom is later removed by the crane rigged as a dragline. When finishing work was first started by Spicer, Robinson & West, subcontractor for this type of work also, hand tools were employed in sloping the sides to the required sub-grade. The invert sub-grade was prepared in a manner similar to the method used by Utah Construction Co., on schedule No. 9.

Following the subgrade finishing and placing of reinforcing steel bars at 12-in. centers on the sub-grade the concrete lining is placed in three different operations. A 20-ft. Lakewood pavement finishing machine is used in placing concrete in the invert and two specially designed concrete finishers now being fabricated will be used on each side slope. The side slope finishing machines will be supported on the lower end by the invert concrete poured one or more days previously. Approximately 3,500 ft. of bottom lining has already been poured but no concrete has been placed to date on the sides.

The aggregate and batching plants are located together in the bed of Coxcomb Wash about 1½ miles from the middle of schedule 10 and dry-batched aggregate is hauled to the 1-yd. Rex pavers at the site of the work. A separate paver will serve each finisher and concrete will be transported to the invert and sides by means of belt conveyors.

Coxcomb wash siphon, 3,500 ft. in length, is about half excavated and part of the invert, which is hand-finished, has been poured. Collapsible steel forms in 10-ft. sections will be used for the side walls and top deck of this 9-ft. 9-in. square barrel siphon.

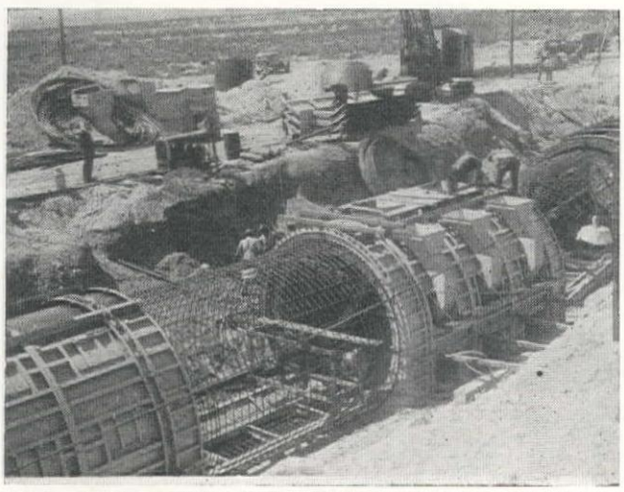


Fig. 9—Blaw-Knox Forms in Position for Pouring at the West End of Big Morongo Siphon. Inside Forms Are Handled by an Inside Traveler and a Crane Is Used for the Outside Form.

The field staff for Aqueduct Construction Co., includes: C. M. Elliott, general superintendent; Charles Harlowe, Jr., excavation superintendent; and R. S. Seabrook, concrete superintendent.

Gantry Hopper Used in Placing Conduit Concrete

Three Companies, Inc.

On the conduit work on schedule 12, near Eagle Mountain tunnel, under contract to Three Companies, Inc., an average of 33 ft. per shift is being excavated and a total advance of 7,500 ft. has been made. A Bucyrus-Monighan type W3 dragline with a 4-yd. bucket and 80-ft. boom is used for the rough excavation and fine grading is done with a fresno scraper and mules.

About 1,100 ft. of completed section has been poured to date with an average of 70 ft. of invert or arch being placed per shift. Inside concrete forms, designed by Garlinghouse Bros., Los Angeles, and fabricated by Ransome Concrete Machinery Co., are made in 7-ft. sections of reinforced ¼-in. steel plate and are hinged at the top of the arch and 3-ft. above bottom of form on each side to facilitate moving. The outside forms are also in 7-ft. sections and are hinged at the top of the arch to permit form removal, and transporting to a new pouring site.

In pouring the invert, concrete from the Ransome 2-yd. dual drum paver is deposited in an electrically powered gantry hopper which moves along rails on the invert forms. A bucket on the gantry travels across the sub-grade allowing placement at any point. Concrete for the arch is carried from the paver to a gasoline powered travelling hopper, running on rails above the forms. Chutes are used in placing the concrete from the hopper to the inside of the forms.

Aggregate is delivered dry-batched from the Garlinghouse automatic batching plant adjacent to the crushing and screening plant in Eagle Mountain Lift Wash. C. G. Clapp is general superintendent for the contractors and D. C. Walker is resident engineer for the district.

Largest Dragline on Aqueduct Speeds Excavation

Thompson-Starrett Co.

Since work was started by Thompson-Starrett Co., on the conduit on schedule 14 near the west portal of Hayfield tunnel more than 5,000 ft. of trench has been excavated with an average of 38 ft. per shift being maintained. A Bucyrus-Monighan type 5W dragline equipped with a 6-yd. bucket and 80 ft. boom is used for trench excavation and material in excess of finished grade is moved with a Le Tourneau bulldozer mounted on an Allis-Chalmers 75 diesel caterpillar.

Inside concrete forms, are in 11 ft. 8-in. sections, hinged at the top and along the sides, 3 ft. 7 in. above the bottom of the form to permit moving. (Fig. 8) The outside forms are also hinged at the top to facilitate removal and are tied to the outside edge of invert with 1½-in. anchor bolts. The forms were designed by John Sweeney, consulting engineer, and constructed by Consolidated Steel Corp.

Concrete for the invert is delivered to the Lakewood Jaeger finisher by a 4-yd. bucket handled by the dragline. In pouring the arch, the same concrete bucket dumps into a gantry hopper over the forms. Movable circular chutes carry the concrete from the hopper to the inside of forms.

The aggregate is prepared at a screening located at No Name Wash. Batched material is transported and mixed from the C. S. Johnson automatic batching plant adjacent to the aggregate plant by nine Sterling semi-trucks with trailers carrying 4-yd. Jaeger transit mixers.

A. E. Barlow, vice-president of Thompson-Starrett Co., is in active charge of the work. C. L. Smith is resident engineer for the district. Schedules 12 and 14 are in Division No. 3 of which John Stearns is division engineer.

Circular Siphon Placed in 20-ft. Sections

Morrison-Knudsen Co.

Since construction was started about February 15 on Big Morongo siphon, which extends 1.2 mi. from the westerly portal of West Coachella tunnels, more than half of the excavation has been completed and concrete work is well under way following the initial placing on March 20. Schedule 18J, under contract to Morrison-Knudsen Co., includes the Big Morongo and San Andreas siphon,

Fig. 10—One of the Few Shovels Used on Trenching Work at Work on Conduit Excavation on Schedule 20.

which has a length of 0.65 miles long and is located near the east portal of White Water tunnels. A 2-yd. P & H dragline is used for rough excavation of the trench which has a minimum depth of about 18 ft. Final finishing of the trench prior to placing of reinforcing steel in the barrel of the siphon is done with a high pressure water stream from a 2-in. hose. The material from the side slopes is sluiced into the bottom of the trench to thickness varying from a few inches to several feet. This material is then removed by a bulldozer and a small dragline.

Reinforcing steel and the circumferential steel plates forming a seal at each construction joint, at 20-ft. intervals, are placed ahead of the forms for several hundred feet. Blaw-Knox steel forms, fabricated in 20 ft. sections are used for inside and outside forms. (Fig. 9) The outside forms are handled by a P & H No. 700 crane and the inside forms are stripped and moved to a new location by a traveler which moves on a track laid inside the forms. The traveler is equipped with hydraulic cylinders operated by a motor driven oil pump. Sides of forms are drawn into a moving position by means of folding arms and the entire inside forms is manipulated for carrying through a toggle arrangement at the bottom which permits drawing in the bottom of the side form to drop the top of the form away from the inside of the pipe concrete. The cylinder is attached to a beam extending the full length of the form section and carries the weight of the inside form. The inside forms are supported on two parallel concrete curbs placed prior to erection of reinforcing steel in the barrel.

Concrete is poured into the form through hoppers provided with spouts which are located in hinged opening on each side of the outside form. Three sets of these openings, located at different levels, are provided on both sides of the form and permit successive pouring from the bottom to the top. In pouring the invert of the siphon the hoppers are placed along the center line at the top and concrete is placed through an elephant trunk which extends through the forms and upper reinforcing steel to the bottom.

The batching plant is adjacent to the gravel quarry located about one half mile west of Big Morongo siphon. Concrete is transported in Rex transit-mix trucks which dump directly into a bottom dump skip which in turn is handled by a crane working alongside the edge of the trench. The skip unloads directly into the hoppers set on the side of the forms. George Fortier is general superintendent for Morrison-Knudsen Co.

Excavation Speeded on Casa Loma Siphon

J. F. Shea Co.

The longest single siphon of the aqueduct is Casa Loma siphon which extends 3.8 mi. from the west portal of San Jacinto tunnel. About 1¼ mi. of ditch has been excavated on this schedule, which is under contract to J. F. Shea Co., with a Bucyrus-Erie 20-B dragline equipped with a 3-yd. bucket. A batching plant has been completed near the portal of the tunnel and concrete work was scheduled to start the last part of April at the westerly end of the siphon. Aggregates furnished by commercial producers, are hauled to the batching plant from the railroad siding at Lakeview. H. F. Remnerbohm is general superintendent for the J. F. Shea Co.

Gantry Handles 35-ft. Form Section

Griffith Co.

Nearly 2 mi. of trench excavation and about 1,000 ft. of siphon and conduit have been poured and backfilled at several sites on the work under contract to Griffith Co. at the westerly end of the aqueduct. This includes 1¼ mi. of excavation and 750 ft. of concrete work on the conduit separating Lakeview and Casa Loma siphons and ½ mi. of excavation for Lakeview siphon. A Lima '801' shovel and Bucyrus-Erie 42-B dragline equipped with a 3-yd. bucket are used in excavating the trench, with slopes providing the steepest safe angle of repose. (Fig. 10).

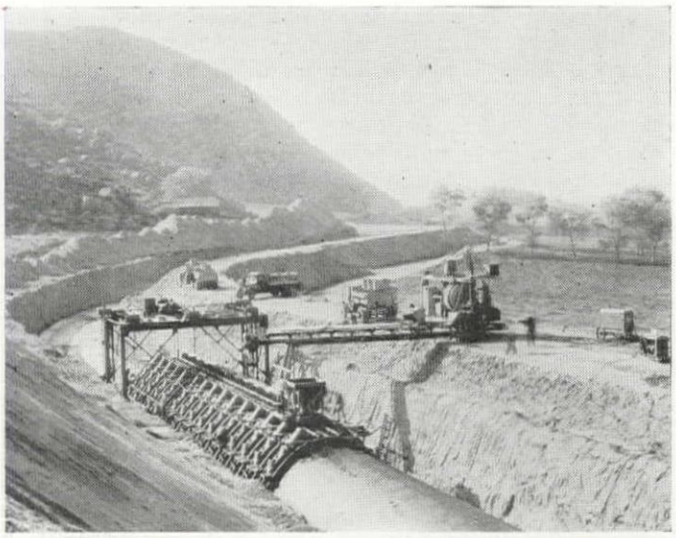


Fig. 11—Concrete Pouring from a Koehring Mixer on Conduit in Schedule 23 near the West End of Casa Loma Siphon.

Special forms, fabricated by Consolidated Steel Co., Los Angeles, are used on the conduit and siphon work. (Fig. 11). The inside forms are collapsed into three hinged sections by means of toggles operating from an oil operated traveler, which transports the forms to a new position after the concrete has been poured. The traveler operates on a track laid on the concrete invert. The outside form for conduit is moved by means of a special gantry operating on a monorail which is a part of the outside form of the invert. Anchor bolts in the sides of the invert concrete holds the forms and rails in position. The siphon forms are handled similarly by a gantry which operates on monorails laid on heavy timbers along the bottom edge of the form. This gantry, which is driven by a gas engine, lifts a 35-ft. section of the form a few inches off the invert and carries it to a new position for pouring. The form is suspended from the gantry frame by means of six vertical rods located at the center line and both sides.

Aggregates are delivered to a special 27-E Koehring paver in four-compartment trucks from the batching plant located at Lakeview, a railroad station near the east portal of Bernasconi tunnel. Aggregates are delivered to the batching plant by railroad from a commercial plant.

Concrete is placed into the forms through pouring pockets located in rows around the periphery of the form. These hinged pockets when closed serve as part of the outside form. The concrete mixer is equipped with a telescope shuttle conveyor which transports the concrete to a distributing hopper mounted on a track along the centerline of the form. Concrete for the invert is delivered from the mixer by the belt conveyor and a chute mounted on a gantry to a Koehring finisher, also mounted on the same monorails serving the gantries.

Harry Davis is superintendent for Griffith Co. The work on schedules 20 to 23 are in division No. 6 of which J. B. Bond is division engineer at Banning and O. J. Scheber is resident engineer for the district.

The general staff of the Metropolitan Water District includes: F. E. Weymouth, general manager and chief engineer; J. L. Burkholder, assistant general manager; Julian Hinds, assistant chief engineer; James Munn, general superintendent; B. C. Leadbetter is division engineer for division No. 4 which includes all of the force account work of Coachella tunnels.

California Sewage Works Assoc. Discusses Operators School

THE relative merits of the chemical and the activated sludge types of sewage treatment and the feasibility of instituting a school for sewage plant operators constituted the major part of the program at the seventh annual spring conference of the California Sewage Works Association held at Fresno, April 26-27. The first morning was taken up by a visit to the Fresno and Lemoore plants. With an attendance of about 70 at the meeting, the sessions witnessed some live discussions of the technical subject presented.

President T. R. Hazeltine, at the dinner meeting, reviewed the seven-year history of the organization and called particular attention to the decline in membership during the past few years. He attributed this decline to the growing tendency of make the meetings more technical, with the result that they held less and less of interest for the operators, who are the largest potential member group. He offered the suggestion that the situation might be improved by having one of the semi-yearly meetings devoted almost exclusively to plant inspection trips and practical demonstrations designed to help solve the problems of the operators, and the other meeting given over to technical papers.

The annual award of merit made for the more deserving plant based on operation, maintenance and appearance, was not conferred, following the recommendation of the committee which found that the data submitted by the three applicants was far below the standard set by previous awards.

The first paper by A. K. Warren, chief engineer, Los Angeles County Sanitation Districts, on the status of 'The Activated Sludge Patents Situation' gave a historic review of the English origin of the method and the recent litigation in this country. The process and the apparatus covered by the patents were outlined and the outcome of the Chicago and Milwaukee cases were noted. The possibility of California cities uniting to carry on a further legal fight has been abandoned for the expedient of settlement out of court, to secure the lowest ultimate cost to the municipalities, regardless of sentiment on the patent case. Several cities have already settled the claims of Activated Sludge Inc., and some of the amounts mentioned were: Escondido $1,000, Ontario $2,600, Phoenix, Ariz., $15,000 and San Francisco $1,000. In the case of the Pasadena, Calif., plant, started in 1924, the final settlement was a compromise at 21½c per capita (119,000 population) based on original claim of 15c by the city and 27c by the patentee. It was evident that there would probably be no effort made by California cities individually or singly to contest those patent claims which have already been passed upon by the courts.

Discussion of operators school

Consideration of the desirability and feasibility of a sewage plant operators school in California was opened with a paper by Prof. Leon B. Reynolds, Stanford University, which presented extended data on existing schools. At present five schools strictly for sewage plant operators are in operation in eastern states as follows (with date of establishment): New Jersey 1927, New York 1931, Michigan 1932, Wisconsin 1933 and Pennsylvania 1935. This list does not include other joint schools with waterworks operators. After reviewing the characteristics of these five schools, Professor Reynolds outlined the principal features which might form the basis for a school in California. It would probably be sponsored, he stated, by the sewage works association and the state board of health, and meet at a university to permit use of laboratory equipment. The 3 to 5-day course would be taught by university staff members, consulting engineers and public health officials, and would cover both laboratory technique and operating practice.

On the same subject C. G. Gillespie, chief of the bureau of sanitary engineering, state department of public health, pointed out the increasing number of sewage plants in the state and the fact that newer processes made control work more exacting. This, in turn, emphasizes the need for better qualified operators. He thought the course could be arranged to meet the needs of both beginners and trained men.

Discussion of the paper was active and seemed quite united on the desirability of starting a school in California provided a course could be arranged which would attract enough attendance to make the effort worthwhile. As to the type of instruction and other details, there was considerable difference of opinion and, as a result, the board of didectors, at a subsequent meeting, authorized the appointment of a committee to study the question in more detail and report at the next meeting. Harold F. Gray, consulting sanitary engineer, was named chairman of this committee.

Chemical treatment methods

Newer applications of chlorine in sewage treatment were reviewed in a paper by A. C. Beyer, district manager, Wallace & Tiernan Co. After outlining the various applications of chlorine in pre- intermediate or final treatment of sewage to reduce odors, maintain freshness of sewage before it reaches the plant and for final sterilization, the major portion of the paper described the details of the Scott-Darcy process of chemical treatment with ferric chloride and chlorine. The application of this type of treatment at Oklahoma City was reviewed, based on a recent visit to the plant.

The commercial production of chemicals for sewage and water treatment including chlorine and ferric chloride was described in a paper by J. F. Smith, Great Western Electro-Chemical Co., which included an outline of the items entering into the cost of the product and its handling.

Future of Chemical Treatment

'The Probable Field of Chemical Treatment of Sewage' was reviewed in a comprehensive paper by R. F. Goudey, sanitary engineer, department of water and power, Los Angeles. Two of the principal reasons for the present emphasis on chemical treatment he attributed to (1) research work done by manufacturers and (2) the desire to escape from the uncertainty of the activated sludge patent difficulties. A third and, in his opinon, more rational reason for the recent interest is the study being carried forward by sanitary engineers in an attempt to find a method of combining the advantages of both the chemical and activated sludge processes. He acknowledged the debt due to the commercial research on chemical treatment but urged caution in a too broad acceptance of unestablished claims and pointed out the possibilities of future patent problems. He reviewed the use of chemicals in all phases of sewage work from aiding in simple sedimentation to complete treatment.

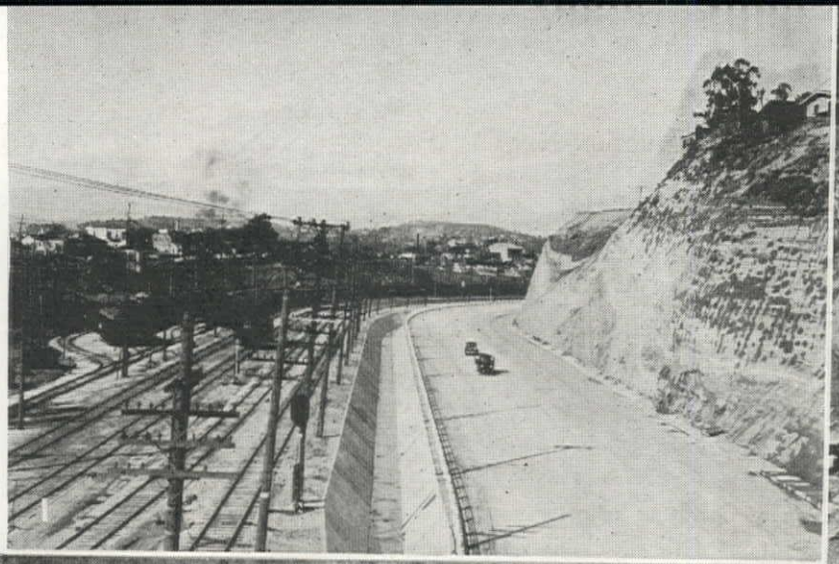
Comparing the costs of chemicals and the activated sludge process, he pointed out the higher cost of chemicals in the west and the relatively lower cost of power which is the largest operating cost item in the latter process. These economic factors effect direct comparisons of results reported in eastern plants. Both methods of treatment require about the same amount and type of labor.

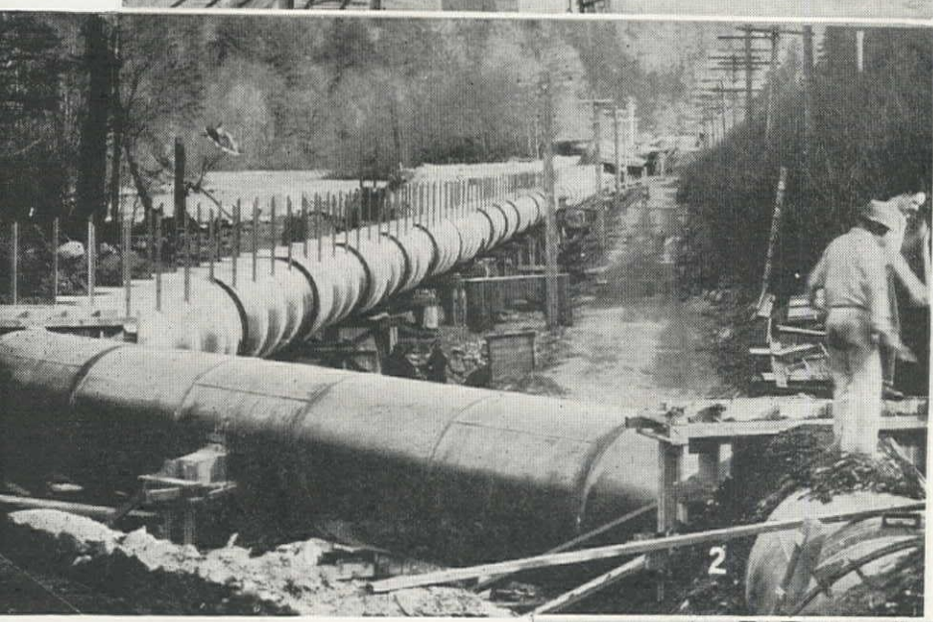
In conclusion, he outlined a treatment plant design, which combined the two methods, to indicate the feasibility of securing the advantages of both processes and particularly to effect a reduction in the quantity of sludge and improvement in its quality with lower water content. In normal operation this proposed plant would put half the flow through each type of treatment, with minimum flows going through the activated sludge treatment and the chemical treatment aiding principally in carrying the peak loads.

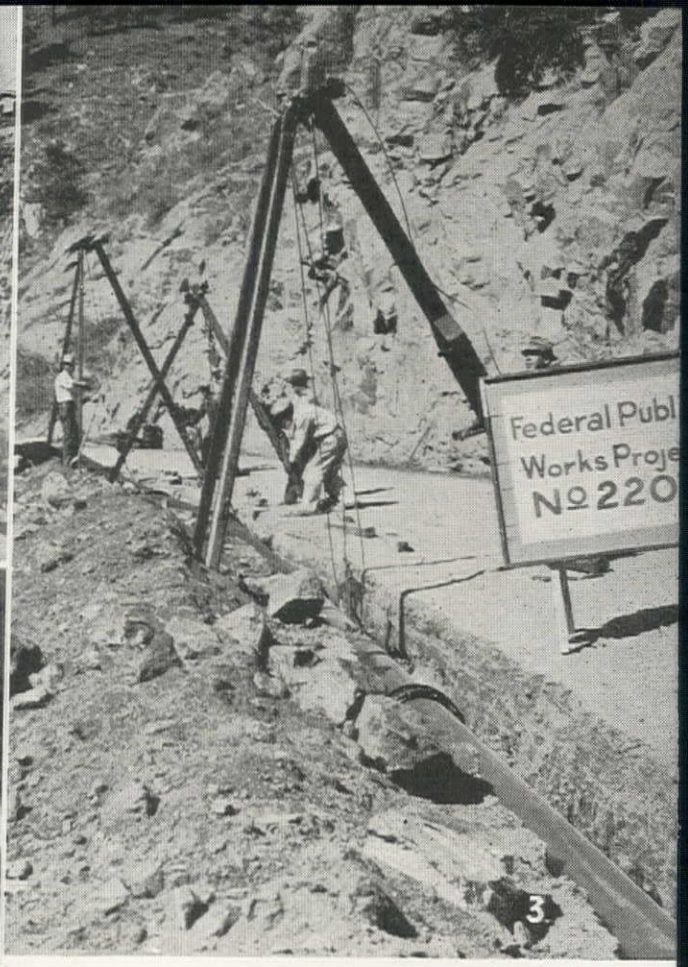
The lively discussion which followed this paper indicated great interest in the subject, but a wide diversity of opinion. There was agreement on the point that comparison between the two processes was difficult because the result from one plant in one locality cannot be translated to another city without a thorough study of all the complicated problems involved.

A venturi-type of meter to measure the flow in sewers was described in a paper by H. K. Palmer and F. D. Bowlus, Los Angeles County Sanitation Districts. The device can be installed readily at manholes in existing sewer lines and uses a contracted section with a measurement of drop in surface, as a result of the higher velocity, to indicate the flow in the line.

The fall meeting of the association will be held Sept. 23 at Palo Alto, with sessions in San Francisco the following day in connection with the meeting of the California League of Municipalities.







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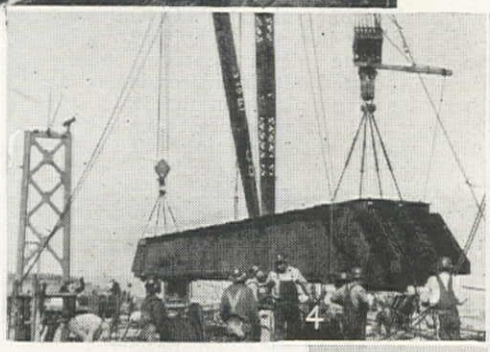
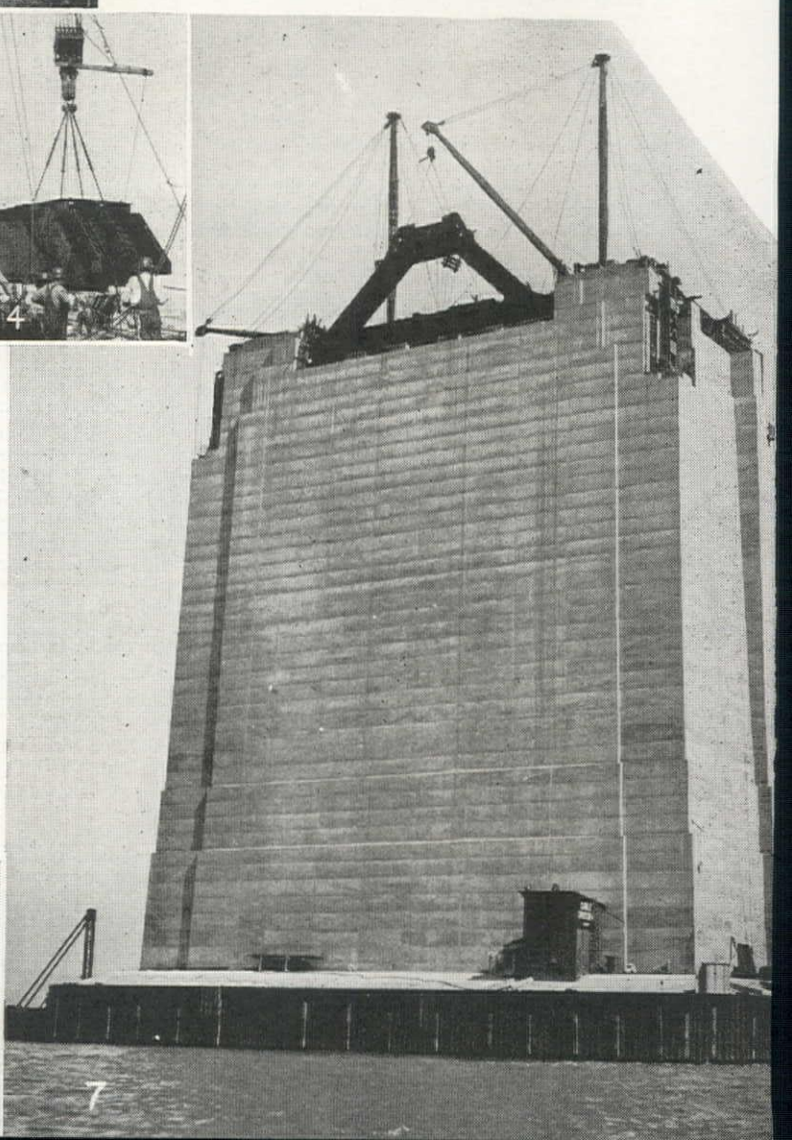
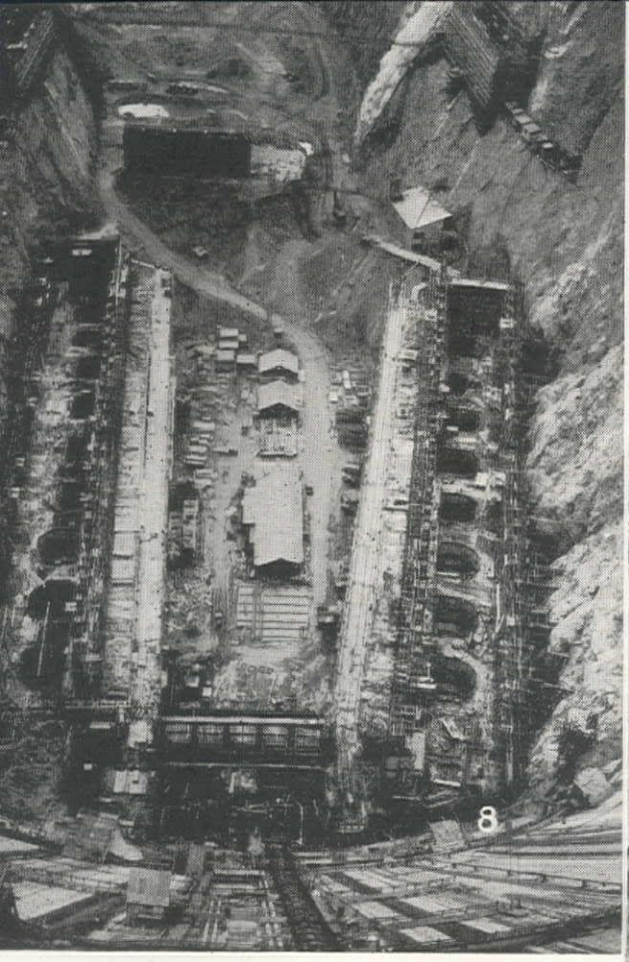
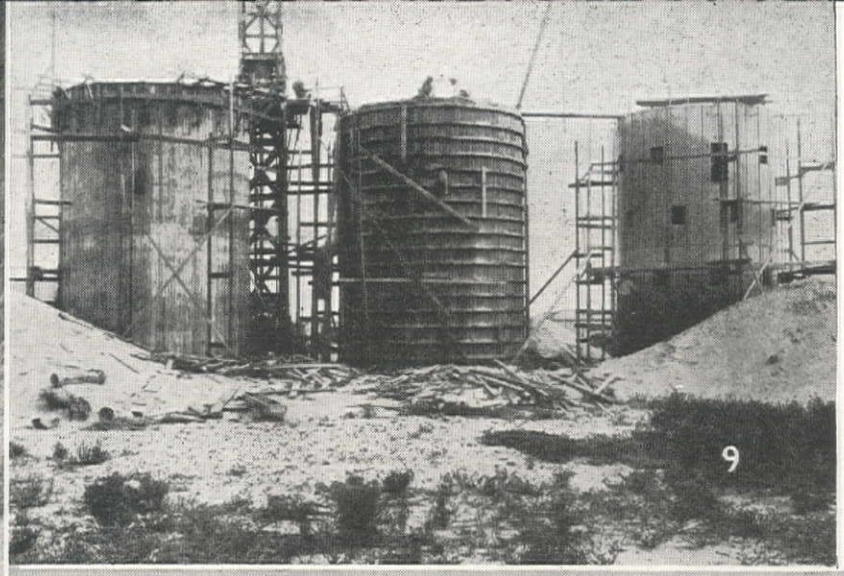
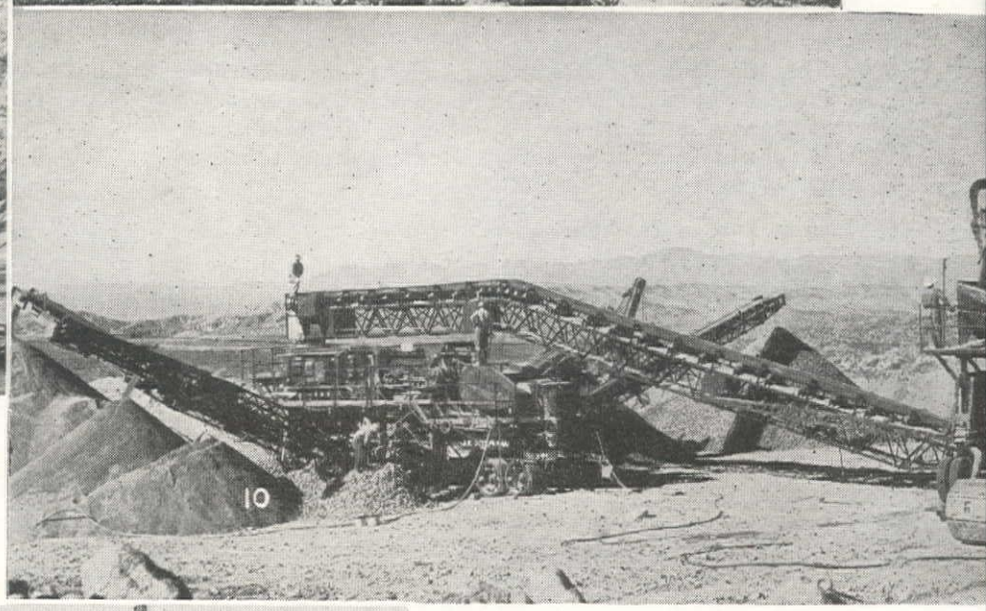


1. Ramona Boulevard in Los Angeles, recently completed as a major traffic improvement project.
2. A pipe-line installation, financed by the P.W.A., provides an improvement in delivering the water supply of Tacoma, Wash., to the municipal distribution system.
3. At Boulder, Colo., another P.W.A. project of water supply improvement results in a new line to improve the city system.
4. Guy derricks place a 72-ton bottom chord member for the A-frame at the top of Pier W-4 (shown in position in picture 7), the central anchorage of the West Channel crossing of the San Francisco-Oakland Bay Bridge.
5. This earthfill dam construction is building the University Mound Reservoir in San Francisco to improve the distribution facilities of the water department.
6. In the Salt River Indian Agency near Phoenix, Ariz., an Allis-Chalmers Tractor and an Adams power-controlled grader are a complete road building unit.
7. Weighing 320 tons, this A-frame on top of the central anchorage for the San Francisco-Oakland Bay Bridge has eyebars extending down into the concrete and the two frames will resist a pull of 11,200,000 lb. when the twin 2,300-ft. suspension plans are completed. Size of the structure can be based on the dimensions of the A-frame which is 92 ft. long and 53 ft. high.



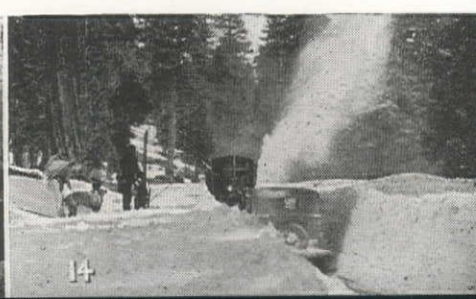






Construction Front

8. Looking down the back side of Boulder Dam the power house structures extend along the canyon walls, showing the draft-tube openings for the sixteen giant turbines.
9. Three decanters under construction at the Terminal Island Sewage Disposal Plant, Los Angeles, are 16 ft. in diameter and 30 ft. high. Sidewalls 15 in. thick were poured in 16 hr. using an electric vibrator. L. W. Odell, Los Angeles, is the contractor.
10. In the desert along the Colorado River Aqueduct line, a Stephens-Adamson portable gravel plant of the J. F. Shea Co. is turning out four grades of aggregate for lining in the Cottonwood tunnel.
11. Steel erection on the lift span tower of the M Street bridge at Sacramento with the fixed span to the right. George Pollock Co., Sacramento, is general contractor.
12. Approaching the top, in this picture, the south tower of the Golden Gate Bridge reached its full height of 734 ft. on May 7 (saddles will add 10 ft.) and is now ready for the beginning of cable spinning.
13. Filling the south (Oregon) channel of the Columbia River, the powerhouse at Bonneville Dam is rapidly rising to full height. The General Construction Co. and J. F. Shea Co. are the contractors.
14. A snow blockade on the Sierra Nevada is opened by a Coleman rotary powered by a 400 H.P. Liberty motor driving the rotor with a 125 H.P. Coleman 5-ton, 4-wheel drive truck.



Port of Stockton Development Plan Balances Warehouse and Berthing Space

Design is based on flexibility and economy of handling freight by grouping steamship berths around a warehouse area, served equally well by rail and truck, at San Joaquin River port in California

By B. C. ALLIN, Director of the Port
Stockton, California

THE terminal of the Port of Stockton, California, has been laid out in a comprehensive manner with controlling factors which are found in very few, if any, terminals in the United States. The first and major basic consideration has been the question of a balance of warehousing area in support of the transit shed berthing space. As a rule, port facilities either involve wharf transit sheds to the exclusion of any supporting warehouse area, or else some particular wharf is designed and constructed multiple story as a warehouse in itself. Both of these systems have defects, the first in that warehousing is confronted with delay and cost of handling often for considerable distances through congested arteries of traffic, and in the second case the wharf warehouse always forces a steamer to move from its usual berth.

Plan at Port of Stockton

In the case of the terminal at Stockton, the ultimate possible flexibility and economy in concentration of freight has been attempted. A system has been used of grouping seven or eight steamship berths around the warehouse area, the entire area being intra-plant, as it were, and connected by a system of concrete roadways in order that small-wheel stevedore gear can, with facility, inter-connect any section of the warehouse area with any ship berth.

The only exceptions to this general scheme are in the case of commodities which have special requirements such as bulk grain or cold storage products. In the case of bulk grain, a conveyor from the grain warehouse is provided to ship side, and in the case of cold storage commodities, the plant when constructed will be connected with ship-side by insulated conveyor systems.

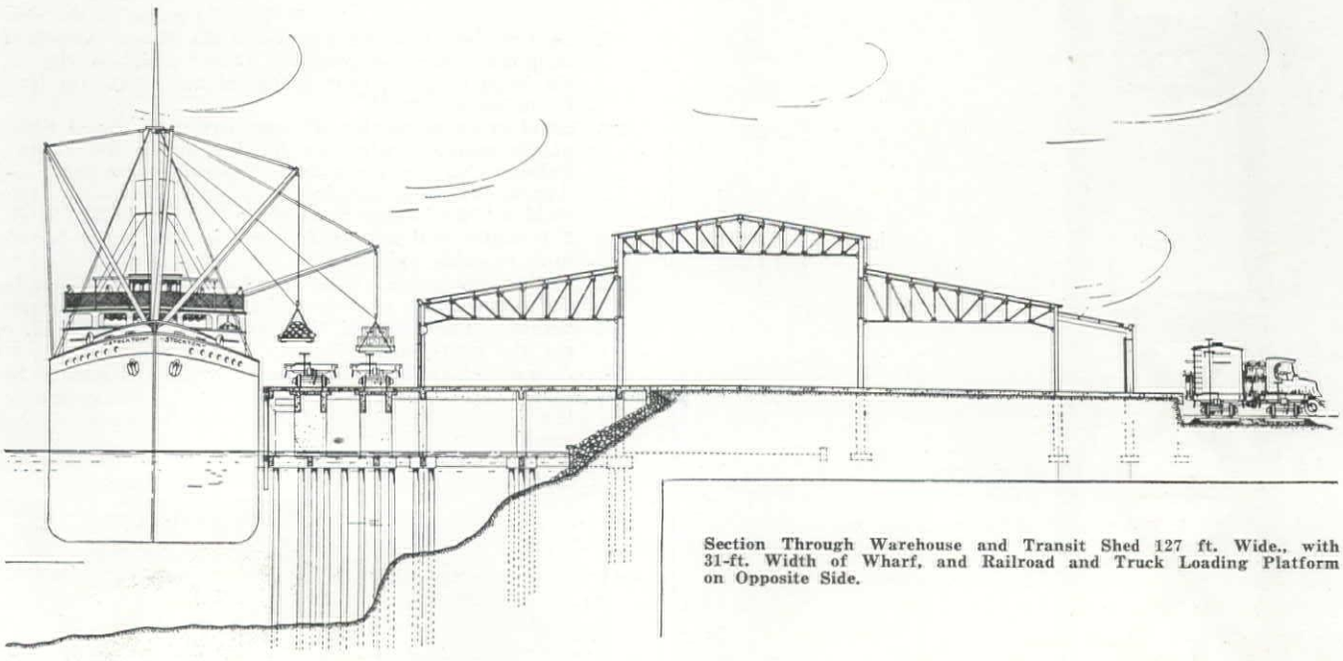
The comprehensive plan of the one piece of property which is under development by the Stockton Port District, provides in general for two groups of wharves. In the case of one of these groups, the major part of the warehouse area is divided about equally between grain and general commodity warehousing, with provision also for lumber and cold storage facilities. In the case of the other group not yet constructed, half of the warehouse area is already improved for the handling of cotton, and the other half designed for general commodities.

All highways, wharf entrances, and roadways are looped to facilitate the movements of truck-trailer units, and eliminate the difficult maneuvers of getting into or away from the point of loading or unloading. All of the facilities are equally well served by rail as by truck, being completely equipped with railroad trackage paved flush with the ball of the rail, to serve both methods of transportation. The warehouse facilities are equipped with automatic sprinklers in order to prevent the accumulation of a fire hazard in this area.

Warehouse Plan and Construction

In the construction of the wharves, certain general considerations may be of interest.

The structures rest on an 8-ft. dredged fill superimposed upon the natural soil and no batter piles were used, nor any bulk-heads provided. The soil has a fairly good sandy consistency, and not very susceptible to flow. Timber piling is used below low water level, capped with con-



Section Through Warehouse and Transit Shed 127 ft. Wide., with 31-ft. Width of Wharf, and Railroad and Truck Loading Platform on Opposite Side.

Airview Showing Transit Sheds 3 and 4 Recently Completed in the Foreground with a Combined Length of 930 ft. and an Area of 123,900 sq. ft.

crete, with a beam and column reinforced concrete super structure.

The rear piling serve as a substantial anchorage to the structure, but as an added factor, reinforced concrete deadmen at 50-ft. intervals, were cast in place and connected with the wharf structure by 2-in. galvanized rods as a further precaution. In the treatment of the bank itself, it is allowed to assume a natural slope, and is covered with rip rap, the toe of which is held in place by a small wave-wash bulk-head, and surcharge is reduced to a minimum. No piles were used under that portion of the structure which rests on the land, spread footings being employed under columns, reaching down to the original elevation of the soil.

In 1932 the City of Stockton constructed three wharves together with necessary railroad facilities, roadways, drainage, water lines, etc. The combined length of these docks was 1,437 ft., providing berthing space for four ships. This development consisted of one open wharf with an area of 38,960 sq. ft. and two covered wharves, the combined transit shed area of which is 121,600 sq. ft. A year after completion these facilities were proving inadequate to handle the ever growing stream of cargo coming through this port and new ones had to be provided.

In February 1934 the Stockton Port District voted bonds in the amount of $900,000 for wharf construction and various other purposes. Applying on this, a PWA grant of $230,000 was obtained. The first step taken in connection with the new project was the necessary dredging. This required widening of the present channel to provide the required depth at the harbor line and the dredging of the first slip in the comprehensive plan of development of this port. Contract for this dredging was awarded to the Hydraulic Dredging Co., Oakland, on April 24, 1934, at a cost of about $103,000 and involved the moving of about 800,000 cu. yd. of earth. This work was completed in July, 1934.

Plans for the new wharves and sheds were completed in June, 1934, and bids were taken in July of the same year. Contract for their construction was awarded to Robert E. McKee, Los Angeles, early in August. Work was started immediately.

This contract involved the construction of four wharves and four transit sheds together with the necessary railroad and highway facilities as well as drainage and water lines. About 1,740 lin. ft. of dock and 185,000 sq. ft. of covered transit shed area was provided for under this contract.

Wharves 5 and 6 were extended westerly from Wharf 4, constructed in 1933, and extend a total length of 832 ft. from the west end of No. 4. Wharves 7 and 8 parallel Slip 1 and extend a distance of 911 ft. from the main channel wharf line. The accompanying airview shows the general transit shed and wharf arrangement as well as locations of roads and rail facilities. The track and building arrangement is covered by a patent held by the Director of the Port.

Wharf Construction

The new construction is very similar to that of the old wharves. The sectional view shown on the bottom of the preceding page indicates the type of construction, with the wharves set over the dredged sections to obtain necessary water depth. The sub-structure of these wharves is entirely of reinforced concrete resting on creosoted wooden piling or concrete spread footings. The sheds are of steel frames with corrugated iron siding, and composition roof laid on a 2-in. wood deck. The fronts of the transit sheds are supported on the wharf structure with an apron 31 ft. wide carrying double tracks. The rear portion of these sheds is on filled soil. Floor level elevation over this area is about 18.5 (U.S.E.D.). To obtain proper soil conditions for the spread footings supporting columns for steel frame of sheds in this filled area, it was necessary to excavate to approximately elev. 3.0.

The wharf structure resting on piling is 77 ft. wide. The piling supporting this structure is cut off 6 in. above mean lower low water level (elevation 2.5) and is embedded 6 in. into a 27-in. thick reinforced concrete cap supporting floor columns. These concrete caps are tied together with 12 by 24 in. precast reinforced concrete beams set in place before pouring of the caps. All concrete in this section of the structure was poured at the lower levels of the tide. No pouring was done when a water depth of more than 8 in. existed in the forms. Forms were made reasonably tight and practically no cement was lost in the pouring operations.

Precasting of tie beams and exercising care in hanging and constructing the forms for the pile caps eliminated the necessity of constructing coffer dams for the execution of this work.

The entire wharf structure was designed for a live load of 500 lb. per sq. ft. except where railroad tracks were

located. Footings, beams and piers supporting the railroad tracks were designed for a Cooper E-50 loading. A six-sack concrete was specified for all pile caps, tie beams and columns in the wharf structure. All other reinforced construction was specified as a 2,000 lb. concrete. Concrete in the floor slab over the earth fill was specified at 1,500 lb.

The floor slabs in the transit sheds resting on the earth fill are composed of a 6-in. concrete base with a 2-in. asphalt topping. To provide for settlement of this front area adjacent to the wharf structure, the floor was laid 2 in. high, to permit equalizing through the addition of asphalt to the surface of the settled area, if it becomes necessary.

Transportation Facilities

The railroad facilities along the face of the dock consist of two parallel tracks. The rails for these tracks are 128-lb. girder sections set in concrete. Switches and cross-overs as well as trestle tracks are of 85-lb. T rail. The tops of all rails are set flush with the level of the wharf. Tracks at the rear of the building are set 4 ft. below the loading platform provided along these sides of the sheds. This brings the car floor level to the same elevation as platform level, facilitating loading and unloading of cars. The area between the tracks is gravelled to the same elevation as the rail grade making it possible for trucks to load and unload at this same point.

Numerous doorways have been provided on both sides of the transit sheds to permit ingress and egress from the buildings with maximum ease. All the doors facing the water are of the steel rolling type with a width of 14 ft. and a maximum vertical clearance of 13 ft. All doors on the land side are of the sliding type with vertical opening of 10 ft. and horizontal opening of 14 ft. These are constructed of non-resinous wood core with metal covering. All fire-wall doors provide ample clearance for motor truck loadings. Firewall openings are equipped with approved fire doors.

In the original transit shed construction the sheds were ventilated through a system of louvres placed in the side of the monitor. Some difficulty was experienced, during periods of driving rain, in keeping moisture from entering the sheds. Consequently, in the new sheds the louvres were eliminated and multi-vane turbine type ventilators were placed on the ridge of the buildings. As a result of difficulty in maintaining a water-tight roof in the original sheds, the revised specifications called for a treble thickness of 35-lb. roofing paper on one layer of rosin sized sheathing laid on a 2-in. wooden deck. Asphalt (90-lb.) and gravel (300-lb. per square) were used in the application. To improve lighting conditions, the under side of the roof was sprayed with washable kalsomine.

Office space is provided in a second floor arrangement of transit shed for the general offices of the Stockton Port District. These offices were designed with the idea of providing a maximum of comfort over the range of temperatures encountered during summer and winter conditions. All walls and ceilings are faced with a 1-in. thickness of Firtex. Floors are of wood 4 in. thick covered with linoleum.

The face of the finished dock is elev. 18.0. Low water level in the stream is about elev. 2.5. Considerable freight is hauled to these wharves by small shallow draft boats. To facilitate the unloading of freight from these craft onto the docks three freight elevators have been provided. One was placed in shed 5 and two in shed 8. Each of these has a lifting capacity of 20,000 lb. at a minimum speed of 35 ft. per min. Each elevator has a platform area of 144 sq. ft. All machines are equipped with automatic stops and operate by push button control. The lower loading platform for these elevators is placed at an elevation slightly above the high tide level. This insures the possibility of being able to operate these machines during the full range of tidal change.

Work was started on the contract in August, 1934, and completed Mar. 25, 1935, at a cost of $687,309. Simplicity of construction and an efficient contracting organization permitted completion of this work in this short time in spite of some delay caused by rainy weather.

The comprehensive plan of the port was made by the director of the port, who also had charge of the original wharves constructed by Stockton, as well as the construction just completed. The detailed design on the original wharves was under the direction of T. P. Moorehead; the wharves just completed were designed under the direction and supervision of Henry Ohm. The general contractor on the last work was the Robert E. McKee Co., Los Angeles, who was represented on the project by C. C. Wright.

The general offices of the port and sub-offices maintained in the distant ends of the sheds are connected with a 2,320-ft. pneumatic tube system, installed by the Lamson Co., which carries containers at a speed of 30 ft. per sec.

In addition to the wharf construction which has been completed, the Port District now has under construction three additional warehouses, and a control gate and gatekeeper's house, as a further means of systematizing the operation of the plant as a whole.

Boulder Dam Reservoir Silting Study

TO PROVIDE for a detailed study of silting in the Boulder Dam Reservoir, as the basis for possible erosion control on the Colorado River and its tributaries, the Soil Erosion Service, in cooperation with the Bureau of Reclamation and the Coast and Geodetic Survey will map in detail the 280 sq. miles in the reservoir site. When completed, this map showing original contours of the reservoir bottom will permit future comparative studies to determine changes in the topography of the lake floor due to deposits of sediment.

Based upon the studies that have been made by engineers of the Bureau of Reclamation, it is estimated that during the first fifty years of the operation of the dam and reservoir there will be a deposit of about 3,000,000 ac. ft. of silt, which is about 10% of the reservoir capacity of 30,500,000 ac. ft. In constructing Boulder Dam, according to Elwood Mead, Commissioner of Reclamation, an allowance of 10,000,000 ac. ft. was made for silt retention and it would probably take in excess of 150 years for this pocket to be filled and something like 500 years before the reservoir will be entirely filled. Commenting on the mapping survey, Dr. Mead declared the problem of silt deposits and their effect on the life and usefulness of the reservoir, is 'one of the most important questions connected with the construction and operation of Boulder Dam.'

'The Bureau of Reclamation,' he stated, 'is developing preliminary plans for the eventual construction of a series of silt-detention dams above Boulder Dam, which will prolong the life and usefulness of the reservoir indefinitely.'

These mechanical protections will be augmented by erosion control measures designed to combat the problem of sedimentation at its source. Revegetation of over-grazed areas and proper range management on the highly erodible lands which drain into the Colorado will reduce soil washing to a minimum and materially reduce the silt load of the river.

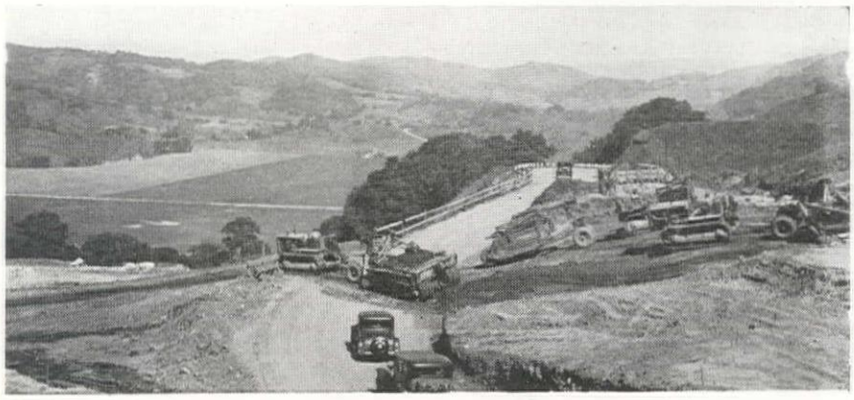
Removing Another Traffic Hazard on the California Coast Route

By L. H. GIBSON
District Engineer
California Division of Highways

ONE of the last traffic bottlenecks on the California Coast Route highway will be eliminated when the work now under way on the Nojoqui grade relocation is completed, cutting out 33 curves and reducing curvature by 2,000 deg. on a 3.7-mile section of highway. The present $425,000 project is not so unusual design or construction as it is a good example of California practice in the continuing work of realigning and modernizing main highway routes. The work was started in November, 1934, and when the present grading operations are completed the section will be surfaced with a standard 20-ft. Portland cement concrete paving.

The project is located about 30 miles west of Santa Barbara where the Coast Highway swings north and inland through the Gaviota Gorge. The following 4½ miles climbed over the Nojoqui grade on a crooked and dangerous stretch of road which was entirely inadequate for existing traffic and resulted in serious delays in passing trucks. The relocation will provide a definite economic aid to motorists by affecting the advantages which are indicated in the following table:

	Present	New
Total number of curves	44	11
Number of curves 1,000-ft. radius or less	42	None
Number of curves 500-ft. radius or less	36	None
Minimum Radius	100	1500
Total delta (degrees)	2305	375
Maximum Grade (per cent)	7	6
Minimum vertical sight distance (feet)	315	670
Saving in distance	.....	0.877 mi.



Massed Excavating Equipment Including Six LeTourneau Scrapers Hauled by Caterpillar and Cletrac Tractors, All Diesel Powered, Which Was Used to Move the 580,000 cu. yd. on this job.

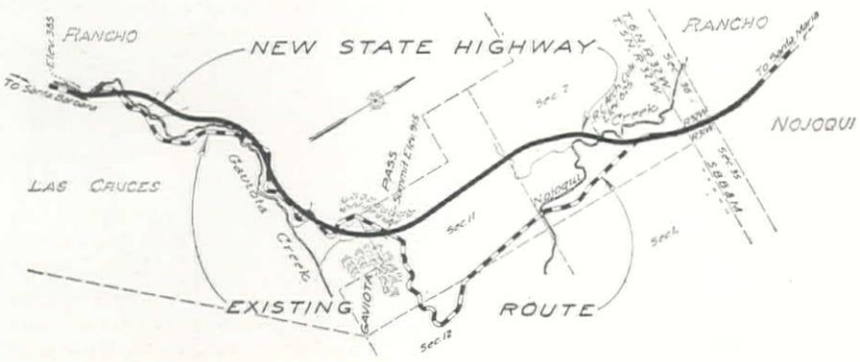
Excavation is one of the principal features of the project and involves 580,000 cu. yd. in a length of 3.7 miles. Of this total 160,000 cu. yd. are in a summit cut which has a depth of 70 ft. The material was relatively easy to handle and tractor-drawn scrapers were used exclusively. The major units included six Le Tourneau scrapers and four angle dozers. This equipment was hauled by six Caterpillar and one Cletrac tractors which were all diesel driven. Scarifiers were used as necessary to loosen material. The average length of haul on the work was about six stations.

Material in the fills was placed in 8-in. layers by the scrapers. The layers were sprinkled where necessary and compacted with two passes of a stiff-leg roller followed by eight passes of a sheep's foot roller. Structures on the project include several concrete box culverts, cattle passes, and one 14 x 16-ft. concrete arch culverts across the Nojoqui Creek. Surfacing, which will not be started until later in the summer, will consist of a 20-ft. Portland cement concrete paving with the usual transverse steel at expansion joints and weakened plane joints but no longitudinal bars.

Because of the adobe character of much of the fill material and its relatively high shrinkage the problem of a foundation for the surfacing was important. Present plans provide for sealing the subgrade with a bituminous membrane spread the full width of the road bed followed by the placing of a 9-in. depth of selected material as a subbase for the 20-ft. width of roadway, and a 6-in. layer of the same material on the shoulders. The seal is intended to prevent percolation of moisture into the fill material.

The contract is being carried out by the Hanrahan-Wilcox Corp., San Francisco, with R. A. Westbrook, superintendent. The project is under the supervision of Lester H. Gibson, district engineer, District V. E. R. Green, district construction engineer, and M. H. Hubbs, resident engineer.

Thirty-three Curves Were Eliminated from the Nojoqui Grade of the California Coast Route Near Santa Barbara with This Relocation Project.



Reconstruction of Spokane River Dam

Reconstruction of a diversion dam and construction of a 5,400 hp. hydroelectric plant to replace the present pumping plant for the Water Department of Spokane, Washington, will be started soon. Plans and specifications are now being prepared for the work which will be done under a bond issue of $500,000 and a PWA grant which was recently approved. The Spokane city charter permits the council to vote revenue bonds, and an ordinance providing for a bond issue is now being drawn.

The work will consist of replacing the existing timber crib dam with a concrete structure. The new dam will be 59 ft. high from bottom of cut-off to the top of the bridge. Eight taintor spillway gates 17 x 26 ft. will be provided. The power house will contain three 1,800 hp. units of the adjustable-blade propeller type.

The larger units of work involved include: Excavation 15,000 cu.yd.; reinforced concrete 19,000 cu.yd.; and 9,000 sq.ft. of sheet piling.

Parker Dam Construction Stopped As Result of Court Decision

Following the United States Supreme Court decision which refused the federal government's request to have Arizona stopped from interfering further with construction work on the Arizona side of the Parker dam site, the Bureau of Reclamation ordered the Six Companies Inc., contractors for this work, to stop all operations until further notice. Since martial law was established on the Arizona side of the dam site several months ago by Governor Mouer, the work of the contractor had been continued on the California side of the river. The recent order will stop all construction work until the effect of the court decision has been studied by the bureau.

The court held that construction of Parker Dam was not authorized by law, and that, therefore, the United States could not prevent Arizona from exercising her rights on the dam site. The decision gives to the state of Arizona an effective instrument in carrying forward the long standing controversy on the division of Colorado River waters.

California representatives in Congress, according to reports, have already taken steps to initiate legislation which will make the construction of Parker Dam legal and thus permit the work to be continued.

Work Already Done

Up to the time the work was stopped the contractor had been engaged in the building of the construction camp, the approach road to the site, construction trestle across the river, and excavating to give access to the portals of the two diversion tunnels on the Arizona side of the river. This tunnel driving operation was subcontracted by the Six Companies, Inc., to the J. F. Shea Co.

On April 27 the tunnel crews moved underground, only two days before the work was ordered shut down. These two diversion tunnels, each about 1,600 ft. long, are 29 ft. in diameter and will be driven from the upstream portals only. The drilling program calls for a drill carriage mounted on a standard gage track, advancing the tunnel by full face operations in 15-ft. rounds. Excavation will be done with 4-yd. shovels.

The construction camp at the site was completed with the exception of two dormitories and a dining hall which will be operated by Anderson Bros. Sixteen houses for the contractor's employees and several houses for Bureau of Reclamation engineers have been built.

Parker Dam is being built for the Metropolitan Water District under contract with the Bureau of Reclamation which provides for design and construction supervision. The work of the main contractor, Six Companies, Inc., has been restricted to the erection of the construction trestle across the Colorado River. Ralph Lowry is construction engineer for the bureau, Perry Yates is general superintendent for Six Companies Inc., and Mort Boss is in charge of the tunnel work of the J. F. Shea Co.

Officials of the Metropolitan Water District have issued statements indicating that aqueduct operation could be carried forward with direct pumping from the river in the eventuality that the difficulty over construction of Parker Dam continues for an extended period. The Parker Dam is designed to provide a reservoir at the intake which would facilitate pumping and provide some desilting action.

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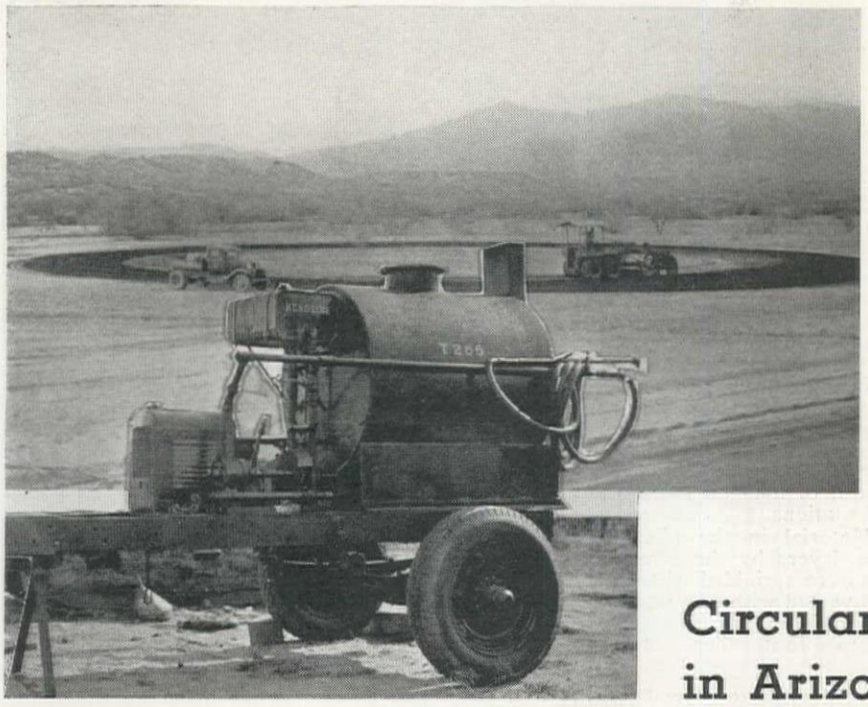

Gov. Johnson Signs Conservancy Bill

Governor Ed C. Johnson of Colorado has signed S. B. 424, the Caddoa Dam Conservancy District act, providing for organization of a district to seek federal funds for construction of a dam across the Arkansas river near Lamar. At the same time it was announced that Colorado and New Mexico, together with Texas, Oklahoma and Kansas, have combined forces to urge the construction of three dams in the Arkansas River basin. Caddoa Dam, Conchas Dam in New Mexico and El Reno Dam in Oklahoma.

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Circular-Route Method Used in Arizona Road Mix

A NOVEL method of preparing oil-mix material for maintenance purposes is used by Arizona Highway Department on U. S. Highway No. 80 between Globe and Geronimo in district No. 3. After recommendations have been made by the state materials engineer as to aggregate grading and amount of road oil necessary, the material is spread on the ground in a level area free from dust and of a size sufficient to permit operation of a motor grader in a circle of about 150 ft. diam. Oil is applied to a leveled-off pile of aggregate, approximately 30 ft. diam., and containing about 15 cu. yd. of material.

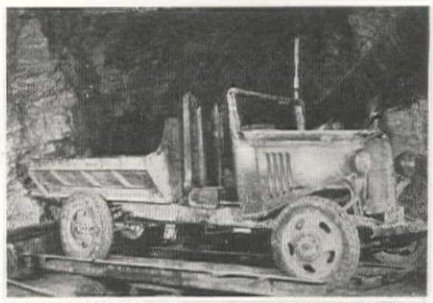
Beginning at the outside of the circular pile an Austin-Western motor grader blades the material to the outside of the large circle. The pitch of the grader blade is reversed and the oiled aggregate is worked back towards the center of the circle. This operation is repeated until the material is thoroughly mixed. With this method of mixing, the blading apparatus does not back up or turn around as is necessary in the straight-away method, most commonly used. The oil is also more evenly distributed through the mix.

An average of 15 cu. yd. of oil-mix material, using 300 gal. of road oil, can be prepared in one 8-hr. shift at a cost of $4.30 per cu. yd. The total cost per unit of 15 cu. yd. amounts to:

Materials, one truck with driver and loader	$18.00
Oil spread over material	30.00
Mixing by motor grader or blade and tractor	17.00
Total	$65.00

The cost for patching or new surfacing amounts to about $1.00 per sq. yd. As much as 200 cu. yd. can be mixed at one time by this method, requiring the employment of two 1½-ton trucks, a motor grader, harrow disk, and an oil-spray unit. T. S. O'Connell is state highway engineer and R. C. Perkins is district engineer.

Mucking Machine Built on Tractor Used in Casper-Alcova Tunnel



A Turntable Was Used in the Tunnel to Turn the Chevrolet Trucks Near the Face and Avoid Excessive Backing.

Turntable near face speeds trucking and reduces exhaust gases.

By PAUL E. KISTLER
Foreman
Edward Peterson Co., Contractor

A MUCKER mounted on a 60-hp. tractor and truck hauling using a turntable near the face were the interesting features of the driving of Tunnel No. 2 on the Casper-Alcova project in Wyoming, about 32 miles southwest of Casper. This 4,395-ft. tunnel is a short distance below the Alcova reservoir outlet and is preceded on the conduit line by Tunnel No. 1 (2,970 ft.) at the outlet followed by a mile of canal, including the Eagle Gulch siphon. These two tunnels and the ditch section are the first units in the main canal which will deliver the irrigation supply from the North Platte River to the area around Casper. Contract for Tunnel No. 2 was let April 14, 1934, and the bore was holed through April 7, 1935.

The tunnel is horse-shoe shaped and was driven to a 16-ft. rough diameter; it will be lined with a 1-ft. thickness of concrete. Carrying capacity of the tunnel is 1,200 sec. ft.

The original work program called for four 6-hr. shifts per day with drilling and mucking alternating. Under this plan the drill shift would drill and shoot, and then the muck crew would complete the cycle by mucking out and setting up the bars and drills for the following drill crew. Six leyners drills were used, three in the top heading and three on the bench. Using this drilling program two 10 or 12-ft. rounds were advanced per day.

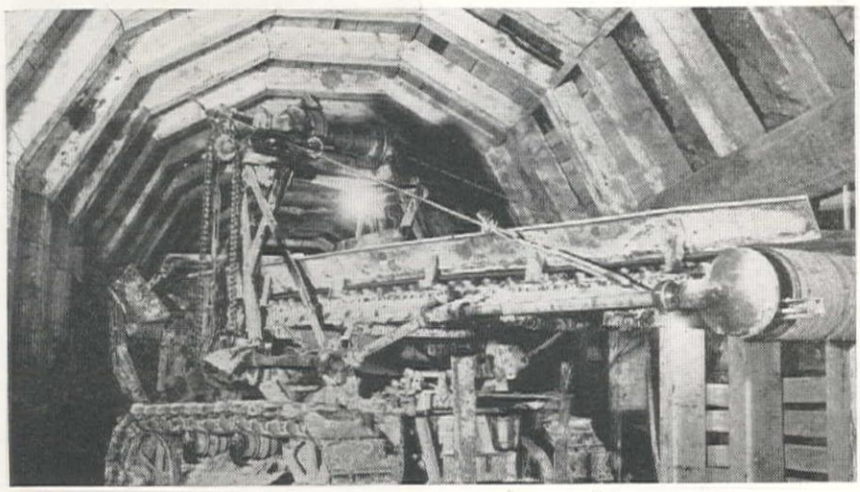
Later, the work plan was modified to three 8-hr. shifts per day. As a result of the government requirements of a 40-hr. maximum week, an extra shift relieved each regular shift two days each week. Thus, each crew worked five 8-hr. shifts per week. Under the changed work program the plan provided for continuous drilling and mucking. As soon as the crew went in after the shot, the three leyner men and chuck tenders proceeded to bar down loose rock and set up the top bar and mount the drills. With this work finished they began drilling in the top heading and at the same time the mucking crew started.

Mucking equipment consisted of an electrically operated mucker built on a 60 Caterpillar tractor and four Chevrolet trucks with special dump bodies, which hauled muck out of the tunnel to the waste pile about 400 ft. from the portal. The trucks operated in the tunnel with the aid of a turntable which was moved ahead periodically to keep the distance which the trucks had to back to a minimum. Use of the turntable permitted a much faster trip and also helped to eliminate exhaust gases in the tunnel. The mucker and trucks were able to clear up after a 10-ft. round in about 3 hr.

The truck drivers consisted of: a leyner man, a chuck tender, a nipper and a handy-man at the face. As soon as this crew had completed the mucking out they set up the bottom bar and began to drill the bench holes. When the holes in the top heading were finished those machines were brought down to the bottom bar to help complete drilling the round.

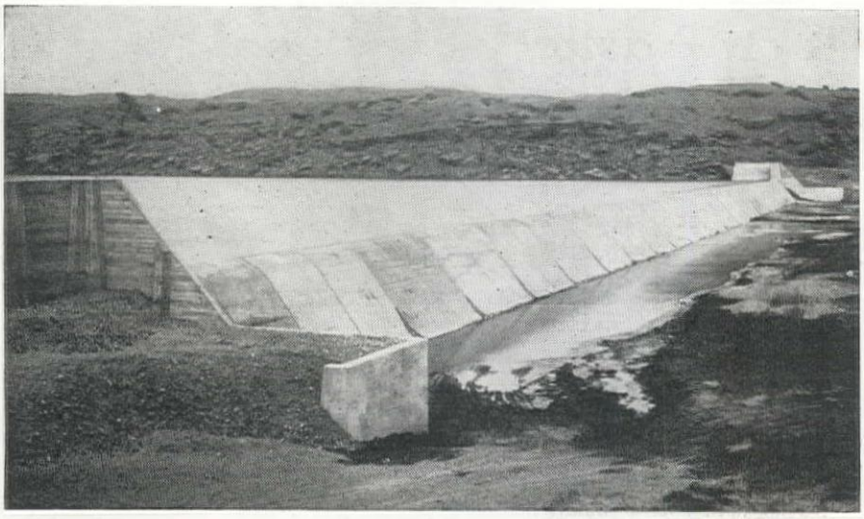
Water encountered in the tunnel was ditched to a sump and was then pumped to the portal. The water supply for the drills was pumped from the sump into tanks which were kept inside the tunnel to prevent freezing. After the water had been used in the drills it was pumped into a separate tank with a small air pump and hauled out of the tunnel before each shot. This procedure helped to prevent mud holes forming in the roadway near the face.

Mounted on a 60 Caterpillar Tractor, This Electrically Operated Mucking Machine, Built Under the Direction of Everett Seabury, Superintendent, Handled a 10-ft. Round (16-ft. Diameter Tunnel) in About 3 Hours.



Compressed air was supplied from two Gardner Denver electrically operated units of 387-ft. capacity each. Ventilation at the face was carried in a 16-in. DuPont Ventube. A telephone system was used with the advance instrument kept as close to the face as practicable. This instrument was connected with telephones in the compressor house, the office and the house of the superintendent.

Contract for Tunnel No. 2 was held by the Edward Peterson Co., Omaha, Neb., Everett Seabury superintendent. Mr. Seabury supervised the building of the mucking equipment. Foremen on the shifts were: J. L. Garrison, Joe Seabury and Paul Kistler. Fred Soper was master mechanic. The company sub-let the work for placing the concrete lining to the Utah Construction Co., which has the contract for Tunnel No. 1 on the same project.



Fort Sumner Dam Completed For Irrigation in New Mexico

To improve the facilities of the Fort Sumner Irrigation District, Fort Sumner, New Mexico, a concrete diversion dam with steel sheet sheetpiling cut-off walls was completed during an 80-day working period which ended February 16. The structure is of ogee section, with a 660-ft. length of overflow and 120 ft. of non-overflow abutment. Quantities included 4,700 cu. yd. of concrete and 21,000 ft. of steel sheetpiling. The contract for $107,500 was carried out for the Fort Sumner Irrigation District by Shufflebarger & Thygeson, Albuquerque, New Mexico, with P. D. Miller, superintendent.

Montana Passes Contractors Law

A LAW passed at recent session of the Montana legislature (H. B. No. 331) provides for the registration of 'public contractors' and supercedes the old contractor's law which was terminated March 13, 1935. The new act is now in effect and applications for licenses will be considered by the Montana Board of Equalization, the law providing that a 30-day period must elapse between the date of filing the application and the issuance of the license.

Provisions of the act

The act provides that all contractors who submit proposals to enter into a contract with the state, or any subdivision, for the construction of any public work exceeding $1,000 in value must be licensed. Applicants for licenses must submit a statement as to experience and qualifications in accordance with a form provided by the board of equalization.

Three classes of licenses will be issued. Class A licenses permit the contractor to engage in public contracting business without limitations as to the size of the work undertaken, and at the time of making application for such license the applicant is required to pay a fee of $200. Licensees under Class B may engage in construction work, for any single contract, up to a $50,000 limit, and are required to pay a fee of $100. Holders of a Class C license are restricted to single contracts not in excess of $25,000 and are required to pay a $10 license fee. There is no license fee required for doing work valued at less than $1,000.

Licenses may be renewed for each successive calendar year by filing a certificate stating the class of license applied for and providing the same general information submitted at the time the original license was granted. Application for renewals must be made before the first day of March and such renewals will then be good for the next calendar year.

The registrar, according to the law, is to maintain an office in Helena, open to public inspection, with a complete indexed record of all applications, licenses issued, cancellations, and suspensions. Any person or organization may file complaint with the registrar, charging that licensees are violating the act. If a license is cancelled the licensee may not be relicensed during the same calendar year.

All bids and proposals on any public contract in the future must contain a statement showing that the bidder is licensed in Montana under the new law.

Workmen's Compensation

In another law passed at the 1935 session of the Montana legislature a section reads: 'Where a public corporation is the employer, or any contractor engaged in the performance of contract work for such public corporation, the terms, conditions and provisions of compensation plan No. 3 shall be exclusive, compulsory, and obligatory upon both employer and employee.' This means that this compensation plan, the State Plan, is required of all contractors performing public work, and contractors must be insured under Plan No. 3 of the state of Montana.

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Certificates of merit were awarded to the Transbay Construction Company and to Bridge Builders, Inc., by the Industrial Accident Commission of California for the safety records made by these two construction organizations in their foundation operations on the San Francisco-Oakland Bay Bridge.

Golden Gate Bridge

With steel erection on the south tower of the Golden Gate Bridge, at San Francisco, rapidly approaching completion, the crews of John A. Roebling's Sons Company, contractor for the cables, have moved onto the job and begun preparations for the work of cable spinning. The first preliminaries consist of erecting 30-ton derricks at each anchorage to handle the reeling equipment. After a week of slow progress during the middle of April, as a result of delay in steel shipments from the eastern fabricating plant, the erection of the south tower moved forward at an increased rate and reached elevation of 630 ft. on April 23. Riveting has been advanced with 26 gangs at work, and employment on the job averages more than 500 men.

On the viaduct approach through the Presidio, San Francisco, the work has gone forward rapidly with 550 ft. of this structure completed up to April 15.

•

Chamber for Sand Blasting and Spraying

A handy air chamber for sand blasting or spray painting is made from a 12 in. pipe about 30 in. long. A head is welded in one end, into which the necessary inlet and outlet pipes are fitted. A 4 by 4 in. threaded connection for insertion of sand, is also welded to the head and is closed with a steel plug.

The bottom end of the chamber is slit with a torch and closed to a 4 in, diameter, the seams being welded. To this end is welded another 4 by 4 in. threaded connection, having a metal plug which is removed to facilitate cleaning the chamber. Three 2 in. angle legs are welded to the chamber and cross braced.

Steps in Spinning Cables for San Francisco-Oakland Bridge

Cat walk cables strung for West span —Process of cable spinning outlined.

ON April 3 the first cat walk cables on the west bay suspension spans of the San Francisco-Oakland Bay Bridge were strung between towers W2 and W3 in the west channel, cable having previously been placed between the San Francisco anchorage and the pylon located near the Embarcadero. These cables will support two cat walks which will be 10-ft. in width, one under each of the 28¾-in. main cables. Each walk will hang from four 2½-in. ropes, each rope having a strength of 480,000 lb.

The surface of the walk will be made of two layers of wire mesh, the lower layer being chain-linked fabric, the upper layer consisting of hardware cloth with mesh about ½-in. square; this mesh is laid on timber cross-beams which are supported from the wire ropes at intervals of about 10 ft. Hand rails consisting of single 9/16-in. wire cables will be erected on both sides of the walk. The cat walks will be connected by cross walks, of which there will be three in the 2,300-ft. center span and one in each of the side spans. These cross walks will brace the two cat walks and also provide access from one to the other.

To add to the rigidity of the system, especially in times of high wind, storm cables are added, these consisting of two 1 in. lines in each span which are connected to the towers about 100 ft. above the water. These cables curve upward and connect with the foot walk cables by wire hangers.

After all foot walk cables are in place, the wire mesh will be erected simultaneously from each side of both towers. The mesh sections will be attached to platforms near the top of the towers, connected to the cable, and sections will then be slid along the cables to their final position. After the wire mesh is all in place it is tightened to reduce the slack in the wire. Storm cables will then be placed, completing the cat walks.

The next step will be the erection of rectangular gallow frames above each cat walk at intervals of about 230 ft. To these frames are secured the haulage lines for the actual process of cable spinning. This haulage system consists, in principle, of an endless rope between the San Francisco anchorage and the center anchorage. Two spinning wheels, 5 ft. in diameter, are placed on this rope over each foot bridge. Also at each anchorage are located the driving equipment for this machinery and a system of towers with sheaves over which the cable wire passes to maintain a uniform tension of the wire.

Cable wire fabricated in eastern mills is supplied in 3,500-ft. lengths to the plant of the general contractor, the Columbia Steel Co. A reeling set-up, in which the wire is transferred from these coils, to reels containing nearly 60 miles of wire, has been installed. In the spinning operation starting at the San Francisco anchorage, a loop of wire is taken from the reel and passed around the spinning wheel. The haulage machinery is then set into operation and the wheel passes from the San Francisco anchorage to the center anchorage carrying this two-wire bight or loop. Arriving at the center anchorage, this loop is removed from the spinning wheel and passed around the strand shoe. A new loop is then taken off one of the reels at the center anchorage and the journey is repeated. It is the present plan of the contractor, however, to carry two such loops between the anchorages, thereby placing four wires per trip of the spinning wheel.

Erecting Equipment for Cable Spinning at the San Francisco Anchorage, Showing the Two Unreeling Towers in Place.

Each strand of the cable contains 472 wires, requiring 236 trips of the spinning wheel. Except for the center strand, which is laid up by itself, the strands are spun in sets of four, each being adjusted to correct elevation before starting succeeding strands. There will be 37 strands, or a total of 17,464 individual wires.

Equal tension in all wires is obtained by adjusting the wires to the same sag, this automatically results in equal stress. The first operation in securing equal tension is to place in the cable saddles a carefully measured guide wire. The measurement of this wire consists in accurate surveys to establish the determined sag when the first wire of any strand is spun. This guide wire is placed in the saddles along side the permanent wire and the sag of the permanent wire is made the same as the guide wire. Also, in adjusting the first strands, very careful instrumental observations will be made to obtain the calculated sag.

Subsequent strands are adjusted so that they have the same sag as the first ones. After all of the 17,464 wires have been laid and bound into 37 individual strands, the cable will be squeezed into a true circle, coated with red lead paste and bound with a spiral wrapping of wire to protect it from the elements. The first cable spinning is scheduled to start about May 15 and all cable spinning on the bridge will be completed during 1935.

Redesign of San Gabriel Dam No. 1 Submitted to State Engineer

Redesign of the San Gabriel Dam No. 1 of the Los Angeles County Flood Control District has been completed under the direction of C. H. Howell, chief engineer, and the plans are being considered by the state engineer. As soon as the modified plan and specifications are approved by the state, the West Slope Construction Co. is ready to resume work at once, according to press reports, having accepted the redesign program.

Although detailed information in the modified design will not be released until state approval has been given, the new design, in general, follows the recommendations of consultants, including the present chief engineer, who considered the original side slopes too steep and the available rock of inferior quality for a high loose-rock dam. As a result, the redesign provides flatter side slopes and use of quarry waste in the fill. This will permit the use of the adjacent quarry (No. 10) already developed, rather than require longer hauls to bring in suitable rock for a strictly rockfill design.

According to flood district statements, the available bond money from the 1924 issue, about $12,000,000 will be sufficient to complete the structure, including a $1,500,000 spillway, in accordance with the redesign.

The informal report made by C. H. Howell, chief engineer, when he was employed by the district as a consultant several months ago, was abstracted briefly in *Western Construction News*, January, 1935, p. 22.

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Construction of the Taylor Park Dam in Colorado will soon be under way. A settlement for the purchase of a 150-acre ranch located on the dam and reservoir sites has been reached, and representatives of the Utah-Bechtel-Morrison-Knudsen-Kaiser Co., low bidders on the project, have started work on a warehouse at Almont, nearest railroad point to the site. Eighteen miles of highway up the Taylor River are being improved.

•

By a vote of 2,344 to 1,848, taxpayers of Colorado Springs, Colo., recently approved a $225,000 bond issue for the construction of a sewage disposal plant. At the same time, Greeley citizens voted to issue $60,000 in bonds for the construction of a sewage disposal plant.

Samuel B. Morris Appointed Professor of Civil Engineering at Stanford

Samuel B. Morris, chief engineer and general manager of the Pasadena Water Department, under whose direction the $7,000,000 Morris Dam development was recently completed, has been appointed professor of civil engineering at Leland Stanford University, to succeed Professor J. C. L. Fish, who will retire emeritus at the end of the current academic year.

Professor Morris was graduated from Stanford in 1911 with the A.B. degree in civil engineering, and has been the engineering head of the Pasadena water department since 1913. He conceived, designed, and had charge of the construction of the dam which was named in his honor, the principal unit of the San Gabriel River water project for Pasadena. Later he had charge of the negotiations for the sale of the dam and reservoir to the Metropolitan Water District.

'The appointment of Professor Morris has an important significance for engineering education,' Dean Theodore J. Hoover, of the school of engineering, stated. 'Professor Morris' active career is an exemplification of the thought that the engineer has an obligation of service to the community which is entirely aside from his mere technological skill or ability. The next decade will see a closer affiliation of engineering and sociology —and perhaps politics. This sense of the obligations of the engineer has motivated Professor Morris since the beginning of his public service career.'

Professor Morris was formerly president of the California section of the American Water Works Association, a member of the committee on properties of mass concrete of the American Concrete Institute, an advisory member of the NRA Committee for Water Works Construction, 1933-34. He is a member of the Am. Soc. C. E.

Personally Speaking

E. J. Himes has been appointed county engineer for Polk county, Ore. Himes was recently elected county surveyor.

●

Lochiel M. King was recently appointed by the City of Alameda as one of three engineers who will study transportation problems which effect the city of Alameda through construction of San Francisco Oakland Bay Bridge.

●

Olaf Laurgaard, construction engineer for the U. S. Bureau of Reclamation on the Parker Dam project on Colorado river has been transferred to the position of engineer in the Bureau's Denver office. Laurgaard was formerly city engineer of Portland, Oregon prior to his entering the service of the Bureau at Parker dam.

Ralph Lowry has been appointed construction engineer in place of Laurgaard at Parker dam.

●

The New Mexico State Highway Advisory Board was recently organized and consists of the following men: Clyde E. Oden, Albuquerque — president; Lea Rowland, Roswell—secretary; and Edward Sargent, Chama.

●

W. C. Lefebre recently submitted his resignation as consulting engineer to the Public Works Department of Phoenix, Arizona.

●

Arthur Witting was recently appointed engineer for Kitsap County, Washington. He was deputy under John H. Pattison, former county engineer. Thomas Hill, of the Bremerton city engineer's staff, was named deputy.

●

William G. Bonelli, former president of the Los Angeles City Council, has been appointed state director of the California Department of Professional and Vocational Standards, and Registrar of Contractors, succeeding Carlos W. Huntington, resigned.

●

Raymond A. Boege, assistant city engineer, San Rafael, California, for the past five years, has been named acting city engineer, street superintendent and building inspector.

Koebig and Koebig, consulting engineers, Los Angeles, have been retained by the city council of San Gabriel, Calif., to report on the problem of sewage disposal for that city.

●

David A. Ogden, Captain, 2nd Engineers, Fort Logan, has been transferred to Fort Peck, Mont., where he will be Assistant to district engineer, T. B. Larkin of Fort Peck project. Ogden was graduated from the U. S. Military Academy at West Point in 1918 and has been stationed at Fort Logan since June, 1934. After graduating from the Army Engineer School at Fort Humphreys, Va. in 1921 he was appointed assistant professor of military science at Massachusetts Institute of Technology, serving in that capacity until 1925. He served in Panama for the following 3 yr. and from 1928 to 1930 he was assistant district engineer at Milwaukee, Wis., and from 1930 to 1934 he was assistant district engineer at Chicago, Ill.

●

Charles L. Hill was recently appointed division engineer of the Nevada Highway Department, with headquarters at Tonopah.

●

Walter W. Larson has been appointed County Engineer of Linn county, Oregon. He formerly served as county engineer for Polk county since 1929.

Obituaries

Charles N. Perry, one of the pioneer engineers in the Imperial Valley irrigation development, died in Los Angeles April 22, at the age of 69. Mr. Perry had been active as a consulting engineer in Los Angeles from 1922 until the time of his death. In the original work on the Imperial Valley development he was responsible for laying out some of the major canal routes. Subsequently he served as engineer on irrigation development work near Calexico until 1922. Mr. Perry was born in Brooklyn, N. Y., and educated in Canada.

●

John C. More, district office engineer, state division of Highways, Los Angeles, died April 17 in that city at the age of 53. He completed his technical education at the University of Michigan, coming to Los Angeles to enter the employ of the Rindge Estate, where he was engaged in engineering work from 1905 to 1912. In 1912 he entered the employ of the California highway commission, being one of the first men employed in the Los Angeles district office. He was employed continuously in the division since that time, with the exception of the world war period.

●

F. P. Bowen, 80, died at his home in Denver following a long illness. He was a prominent contractor in Denver in the early days. He retired from active business several years ago.

●

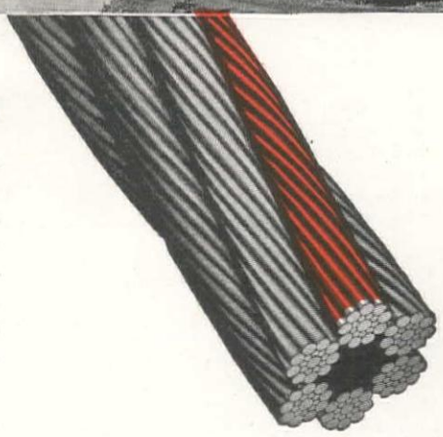
George P. Strubel, contractor of Greeley, Colorado, died recently in that city at the age of 65. He was a native of New York and resided in Greeley more than forty years ago.

●

Theodore von Rosenberg, city engineer of Glenwood Springs, Colorado, and a pioneer engineer in the Intermountain region, died March 20 at the age of 89. Born in Vienna, Austria, he was a graduate from the Austrian Military Academy, coming to this country in 1872. Four years later he was employed on the first survey work for the Denver & Rio Grande Western Railroad, and in 1879 his headquarters were at Leadville. After a brief period as engineer of bridges for an eastern railroad he returned to Colorado in 1884 to become bridge engineer for the Colorado Midland Railroad. During recent years Mr. von Rosenberg made Glenwood Springs his home and was active in the development of that region, serving as city engineer, county surveyor, and state irrigation division engineer.

"HERCULES" WIRE ROPE
REG. U.S. PAT. OFF.
RED STRAND

Norris Dam, a T.V.A. project where "HERCULES" (Red-Strand) Wire Rope is doing its part.



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Users of "HERCULES" (Red-Strand) Wire Rope like the way it performs—on the big jobs as well as the little jobs it consistently renders trouble-free, economical service. They like the resulting low cost too, because they find that frequent changes are unnecessary when "HERCULES" (Red-Strand) is on the job. It is built "to take it." Made from the highest quality acid open hearth steel, rigidly tested to meet the exact requirements for Strength, Toughness, Flexibility and Wearing Qualities.

Made in Round Strand, Flattened Strand, Steel Clad, Preformed and Non-Rotating constructions in sizes to meet all requirements. If you want to be sure of your wire rope—specify "HERCULES" (Red-Strand) the next time you order.

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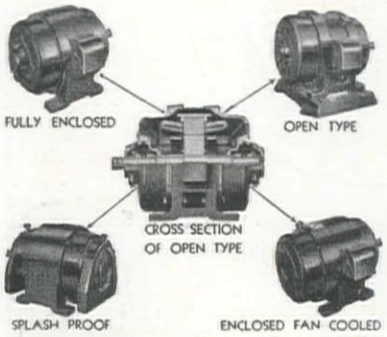
Spokane . . . . . Nott-Atwater Company

NEW Materials and EQUIPMENT



Convertible Motors Added to Harnischfeger Line

A new line of convertible squirrel cage and slip ring induction motors, offering all standard frequencies for service ranging from 110 to 220 volts, has just been released by Harnischfeger Corp., Milwaukee, Wis. The P & H motor is readily convertible from open type to fan cooled, splash proof or totally enclosed construction. This is accomplished through the design of the frame, end heads and bearings to permit interchangeability of single or multi-speed slip ring motors. This development is covered in a new booklet which is available upon application to the company, or any of its agents.

Multigrip Floor Plate

MULTIGRIP, a new floor plate, has recently been announced by Illinois Steel Company. The design of the plate assures skid resistance from every angle. Other features of the new plate are its comfort under foot, for while it offers a sure tread there are no sharp protruberances. All lugs have a flattened top surface; it may be cleaned readily, and drains freely. Its symmetrical design reduces waste in cutting.

Brown-Bevis Appointed Bay City Distributors

Brown-Bevis Equipment Co., Los Angeles, has been appointed exclusive distributor for Southern California, Arizona and Nevada by Bay City Shovels, Inc. They will handle the complete line of convertible power shovels, draglines, cranes and excavators.

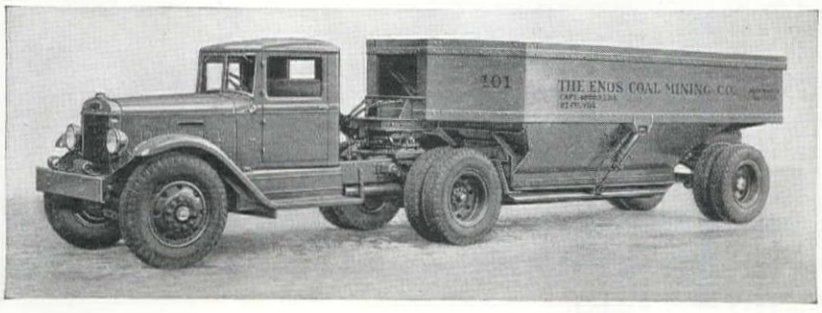
New Blueprint Machine for Draughting Room Use

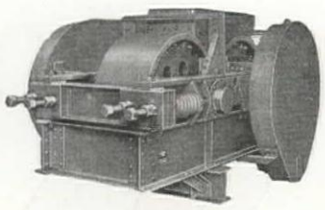
A blueprint machine which utilizes the angstrom blueprint lamp has been placed on the market by Milligan & Wright Co., 4742 Prospect Ave., Cleveland, Ohio. It operates from the regular 110-115 D.C. or A.C. lighting circuit without the need of a transformer choke coils. According to the manufacturers, this machine can be operated by anyone without danger of accident or fire. It is designed primarily for use in draughting rooms for making duplicate copies immediately, and priced so that each room may have one.

Large Capacity Trail Cars for Bulky Materials

A line of trail cars (in 8 to 25-ton sizes) for handling ore, rock, dirt or other materials of heavy weight and bulk has been announced by the Austin-Western Road Machinery Co., Aurora, Ills. Engineered for maximum pay-load operation, these cars (on rubber tires) have features similar to those employed in railroad dump cars. Equipped with bottom or side dump doors that operate by air, hydraulic or mechanical (manual) controls. Three standard body designs, including special, built-to-order construction.

Features include a full universal, gravity-cushioned fifth wheel for rough surface travel without strain or distortion; generous ground clearance for easy dumping; low overall height for quick, convenient loading; dumping controlled by truck driver from cab; short turning radius with ample clearance; semi-elliptic springs, mounted directly under center sills; automatic safety dumping devices, etc. Illustrated booklet describes all models.





40 x 20 Roll Crusher

New Pioneer 40 x 20 Roll Crusher

The 1935 Model Pioneer 40 x 20 Roll Crusher has been perfected in the field, under all conditions, crushing Wisconsin limestone, Minnesota granite, Texas caliche and Montana rock, as a secondary crusher for producing small materials.

The adjustment of the crusher opening remains fixed regardless of the tension on the springs, and results in less pulverization. The maximum stage of reduction is 2" and the opening can be set to produce from 2½" down to No. 10 mesh. The crusher will average about 90 tons per hour, producing 1" minus, or 35 tons per hour producing ¼" minus.

New Adnun Black Top Paver

The Adnun Black Top Paver, made by the Foote Co. of Nunda, N. Y., incorporates a number of new features that will be of value to the contractor. It is simpler in design, easy to handle on the road and has demonstrated an ability to lay an improved quality of pavement, according to the manufacturers. With a new cutter bar the speed may be adjusted in accordance with the density of the mix. The power cut-off permits shutting off the discharge of the mix to the road whenever necessary. This is an advantage in crossing intersections where grade levels are slightly different and in stopping fag end drip at the end of a change.

On the new paver controls are grouped for easy handling where the operator can follow the edge of the course. A new roller lubrication device is provided to prevent material from adhering to the rollers. Scrapers also keep the rollers clean. Power is applied to all four wheels, and with three speeds forward and reverse any traveling condition can be met.

Ateco Roadbuilder Advanced Design

A new bulldozer and a new roadbuilder are announced by the American Tractor Equipment Co., simpler, lighter and, according to the manufacturers, stronger than former models. The new equipment is designed so that the weight is carried on the tractor track frame, the back of the tractor being left clear for handling a scraper, dirtmover or other equipment, which can be operated by the same Ateco hydraulic pump which furnishes pressure for operating the bulldozer or roadbuilder.

Two hydraulic pressure cylinders are provided, one on each side, equalizing pressure at all times at both ends of the blade, which prevents torsional strains in the bowl. Weight has been reduced approximately 1,000 pounds, as compared with former Ateco machines, but improvements in design and use of alloy steels has resulted in greater strength than formerly, the makers say.

PERFORMANCE *Alone*

One of 4 S-A Equipped Plants On the Metropolitan Aqueduct

Rigid Specifications **were set up by the Metropolitan Water District of Southern California for materials to go into the canals and siphons. Too much depends upon the function of the Colorado River Aqueduct to gamble. But, the contractors have found a way to meet these inflexible standards . . . and keep ahead of the contract schedules both as to time and cost.**

J. F. Shea, who owns the Stephens Adamson Portable Gravel Plant illustrated, purchased it only after S-A plants had proved themselves on various other jobs they operate. They knew that the quality of material it produces would meet the specifications . . . that its time saving advantages . . . its mobility . . . its capacity, would assure complete satisfaction and profit. This particular plant is producing *four* grades of gravel and two of sand in one operation and each of them a product that meets specifications.

The entire unit is self-contained. It moves from job to job . . . eliminates the necessity for trucking gravel over long distances. Four S-A equipped plants are in operation on the aqueduct . . . *two* owned by the Metropolitan Water District . . . two by individual contractors. What finer endorsement could be asked of any equipment, when those who made the specifications use S-A Equipment to do the job.

S-A

We Design and Build—

Belt Conveyors—Bucket Elevators — Screening Machinery —Rock and Gravel Plants— Concrete Mixing Plants—Earth Moving Systems — Concrete Placing Systems—Grain Elevators.

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PORTLAND—Ft. of Sheridan St. SAN FRANCISCO—85 Second St. SALT LAKE CITY—Dooley Block

When writing to STEPHENS ADAMSON COMPANY, *please mention Western Construction News*

UNIT BID SUMMARY

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

WATER SUPPLY SYSTEMS

EUREKA, CALIF.—CITY—CONCRETE DAM, TUNNELS, STEEL & WOOD PIPELINE & RESERVOIR

Teufel & Carlson, Skinner Bldg., Seattle, Wn., $1,200,144, (compiete job) and T. E. Connolly, 461 Market St., S. F., and Hanrahan Co., 582 Market St., S. F., $503,145, (Head Works Unit); American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate, Calif., $621,360, (Pipeline Unit); and Mercer-Fraser Co., Eureka, and Bent Bros., Inc., and L. E. Dixon Co., 609 S. Grand Ave., L. A., $68,900, (Reservoir Unit); combined segregated bids totaling $1,193,405, lowest bids submitted to City Council, City Hall, Eureka, Calif., for const. of waterworks improvements consisting of a dam on the Mad River; 12 mi. steel pipe, 8 mi. wood stave pipe; and a 5,000,000 gal. reservoir. Bids from:

	Headwks.	Pipeline	Reserv.	Totals
(1) T. E. Connolly & Hanrahan Co., San Francisco	$503,145	$644,083	$73,900	$1,221,128
(2) Mercer-Fraser Co., Bent Bros., & Dixon	550,415	627,686	68,900	1,246,901
(3) American Concrete and Steel Pipe Co.	597,854	621,360	72,070	1,291,184
(4) MacDonald & Kahn Co., Ltd., San Francisco	542,899	654,603	63,240	1,260,742
(5) Teufel & Carlson, Seattle	526,189	608,615	65,340	1,200,144
HEAD WORKS UNIT	(1)	(2)	(3)	(4)	(5)
27,000 cu. yd. excavation, Class 1	1.50	.30	.95	1.00	.40
8,000 cu. yd. excavation, Class 2	1.50	.75	.50	1.10	1.25
3,000 cu. yd. excavation, Class 3	5.00	8.00	4.80	7.25	3.00
1,000 lin. ft. drill foundation grout holes	2.00	1.00	2.50	1.50	2.00
60 ea. grout pipe assemblies	15.00	3.50	10.90	4.50	.95
300 cu. ft. cement as grout	1.50	2.00	1.18	3.25	2.25
22,000 cu. yd. 'C' concrete in dam	9.00	12.40	13.90	10.65	12.15
Per cu. ft. cement (increase or decrease)	.60	1.00	.78	1.10	.80
3,800 lin. ft. grout pipe, cont. joints	.50	.60	.70	.85	.85
22 ea. outlet assemblies, cont. joints	10.00	5.00	7.50	4.50	14.00
1,400 lin. ft. copper water stops, cont. joints	2.00	1.50	.93	1.00	1.80
1,450 lin. ft. steel grout stops, cont. joints	1.00	1.00	.66	.50	1.10
300 cu. ft. cement as joint grout mixture	1.50	2.00	1.18	3.00	3.00
Lump Sum by-pass pipe structure	$2,500	$2,500	$4,000	$3,300	$3,140
22,000 lbs. reinforcing steel	.06	.05	.054	.06	.062
16,600 lbs. structural steel	.10	.07	.092	.065	.0725
Lump Sum weir board with chains	$1,800	$1,250	$2,000	$1,500	$1,650
Lump Sum foot bridge	$1,500	$1,500	$2,500	$2,200	$1,660
1,980 lin. ft. sec. 1, tunnel ex. and conc. lined	53.00	70.00	68.50	63.00	50.00
200 lin. ft. sec. 3-A, tunn. ex. and conc. lined	55.00	81.00	75.00	68.30	61.00
200 lin. ft. sec. 3-B, tunn. ex. and conc. lined	60.00	81.00	80.00	72.70	64.00
400 lin. ft. steel tunnel supports	30.00	1.00	1.20	17.00	16.50
486,000 lbs. reinforcing steel	.06	.04	.045	.055	.0665
Per cu. ft. cement (increase or decrease)	.60	1.00	.78	1.00	.80
100 ea. grout pipe connections	2.00	2.00	2.00	4.35	2.40
400 cu. ft. cement grout, tunnel sec. 3-B	2.00	2.00	1.50	3.60	2.25
1,500 cu. ft. gunite cement	3.00	2.00	2.10	5.00	4.00
16,500 cu. yd. 'A' excav., tunn. inlet tower	1.00	.21	.35	.58	.40
200 cu. yd. 'B' excav., tunn. inlet tower	3.00	4.00	3.90	2.75	2.40
420 cu. yd. 'B' concrete, tunnel structure	23.00	26.00	28.50	22.80	34.50
Per cu. ft. cement (increase or decrease)	.60	1.00	.78	1.10	.80
34,000 lbs. reinforcing steel	.06	.047	.05	.06	.065
Lump Sum control tower accessories	$4,000	$3,400	$4,500	$3,600	$5,000
Lump Sum wood cover with screens and railing	$300	$200	$500	$340	$300
Lump Sum foot bridge	$500	$500	$650	$940	$460
4,000 cu. yd. 'A' excav. tunn. outlet structure	1.00	.55	.75	.58	.40
200 cu. yd. 'B' excav. tunn. outlet structure	2.00	4.00	3.90	3.00	2.40
50 cu. yd. 'B' conc. tunn. outlet structure	25.00	28.00	31.50	25.60	23.00
15 cu. yd. 'C' conc. tunn. outlet structure	15.00	9.00	13.50	20.00	22.00
Per cu. ft. cement (increase or decrease)	.60	1.00	.78	1.00	.80
8,000 lbs. reinforcing steel	.06	.04	.045	.063	.0675
380 lin. ft. 24" outlet pipe (Alt. A)	8.00	5.00	....	1.80	....
380 lin. ft. 24" outlet pipe (Alt. C)	8.00	....	....	9.40	8.60
2 ea. 24" gate valves, tunn. outlet structure	$600	$480	$500	$727	$785
1 ea. cast steel manhole frame and cover	$100	$100	$105	50 00	$150
1 ea. steel bulkhead	$300	$220	$215	$300	$300
PIPE LINE UNIT					
46,100 lin. ft. 24" woodstave pipe (2 bands per ft.)	3.40	2.85	2.85	3.20	2.77
91,000 ea. additional bands	.50	.46	.40	.33	.30
500 cu. yd. excav. for channel changes	1.00	.53	.60	1.13	1.00
330 cu. yd. found. excav. suspens. bridges	3.00	1.35	2.59	8.00	4.00
550 cu. yd. anchor excav. suspens. bridges	2.00	1.35	2.59	2.60	1.25
630 lin. ft. foundation piles	1.50	1.55	1.20	2.60	.70
390 cu. yd. 'B' concrete	20.00	18.60	30.80	25.50	16.25
Per cu. ft. cement (increase or decrease)	.60	1.00	.90	.95	.75
16,000 lbs. reinforcing steel	.06	.05	.053	.063	.05
43,500 lbs. structural steel towers	.10	.08	.103	.085	.08
Lump Sum cables, suspenders, etc. (Crossing 2)	$15,000	$10,850	$11,330	$11,300	$10,000
Lump Sum cables, suspenders, etc. (Crossing 3)	$16,000	$11,000	$11,330	$11,800	$10,700
82,500 lbs. struct. steel (girders and piers)	.10	.07	.088	.06	.065
1,500 lbs. reinforcing steel	.06	.05	.055	.06	.06
420 cu. yd. 'B' cencrete	20.00	20.75	24.60	34.00	17.00
Per cu. ft. cement (increase or decrease)	.60	1.00	.90	1.00	.75

STRONG? *Why, even an avalanche failed to damage* SPI-WELD PIPE

Maybe the Los Angeles County Road Department figured on an avalanche now and then when they specified Calco Spi-Weld Pipe for this line through San Antonio Canyon. If they did, they couldn't have made a better choice for sheer strength.

When 60 cubic feet of solid rock came rambling down the hillside accompanied by miscellaneous smaller boulders, Spi-Weld stopped the parade without damage to itself other than some degree of distortion. The welds were unbroken. And it was hit with plenty of momentum, too!

Of course, you don't expect your pipe lines to spend their time stopping avalanches . . . but you *do* expect strength. And that's what you get when you specify Calco Spi-Weld.

Write or phone for complete information or a representative's call!

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

28 ea. concrete piles	50.00	65.10	35.10	87.00	33.75
19 ea. blow-off valve assemblies	50.00	49.00	57.50	52.00	100.00
100 lin. ft. 4-in. cast iron pipe	1.00	1.05	1.44	.85	1.50
29 ea. air and vacuum valve assemblies	100.00	210.00	230.00	222.00	175.00
4 ea. 20″ gate valves	400.00	362.50	493.35	431.00	450.00
1,440 lin. ft. foot walk on trestles	.80	1.00	1.17	1.50	.50
39,600 lin. ft. 24″ pipe (centrif. conc.) ALT. A	4.99	5.60	5.25	...	...
39,600 lin. ft. 24″ pipe (cem. wra. bit. lin.) ALT. C	5.04	...	...	5.80	6.01
775 lin. ft. 24″ pipe line in tunnel ALT. A	30.00	18.25	19.00	...	...
775 lin. ft. 24″ pipe line in tunnel ALT. C	30.00	...	...	19.15	6.25
19,550 lin. ft. 21″ pipe line ALT. A	4.50	5.00	4.90	...	...
19,550 lin. ft. 21″ pipe line ALT. C	5.24	...	...	4.70	5.35
1,245 lin. ft. 18″ pipe line ALT. A	3.90	4.40	4.75	...	...
1,245 lin. ft. 18″ pipe line ALT. C	4.73	...	...	4.16	4.35
1,170 lin. ft. 12″ pipe line ALT. A	2.95	3.40	3.35	...	...
1,170 lin. ft. 12″ pipe line ALT. C	...	...	...	4.53	3.22
62 each piles (20 ft. or less)	30.00	82.00	20.24	21.75	11.00
Per lin. ft. piles (in excess of 20 ft.)	2.00	1.00	.55	.50	.50
510 lin. ft. concrete support (24″ pipe)	40.00	33.90	38.50	34.00	25.50
75 lin. ft. concrete support (21″ pipe)	40.00	32.50	38.50	34.00	25.50
400 lin. ft. timber grillage pipe support	1.00	1.00	.85	1.20	1.00
150 ea. expansion joints, 24″ pipe ALT. A	20.00	11.30	10.75	...	...
150 ea. expansion joints, 24″ pipe ALT. C	30.00	...	...	30.00	15.00
100 ea. expansion joints, 21″ pipe ALT. A	...	10.50	10.00	...	...
100 ea. expansion joints, 21″ pipe ALT. C	25.00	...	...	25.00	14.00
95 cu. yd. 'B' concrete anchor blocks	15.00	18.90	20.00	29.00	20.00
Per cu. ft. cement (increase or decrease)	.60	1.00	.90	1.00	.75
12 ea. blowoff valve assemblies	20.00	42.10	96.80	53.00	90.00
21 ea. air and vacuum valve assemblies	275.00	200.00	272.80	287.00	150.00
7 ea. 20″ gate valves	375.00	362.50	440.00	431.00	460.00
1 ea. 18″ gate valve	280.00	326.00	391.60	323.00	290.00
1 ea. 12″ gate valve	100.00	158.00	193.60	159.00	125.00
1 ea. 12″ check valve	125.00	132.50	160.40	136.00	135.00
6 ea. manholes with wood covers	135.00	146.75	133.65	204.00	130.00
6 ea. manholes with cast iron frames and covers	150.00	172.75	239.80	172.00	140.00
8 ea. manholes with wood covers	125.00	185.50	161.70	151.00	105.00
13 ea. manholes with C. I. frames and covers	135.00	186.75	198.55	103.00	115.00
4 ea. manholes with wood covers	100.00	185.50	230.45	151.00	100.00
5 ea. manholes with C. I. frames and covers	125.00	186.75	206.80	103.00	110.00
Lump Sum Chlorination Bdg. complete	$5,000	$4,000	$4,347	$5,300	$5,100
TERMINAL RESERVOIR UNIT					
7,800 cu. yd. reservoir excavation	.50	.50	.65	.30	.30
Lump Sum reservoir unit complete, ALT. 'A'	$70,000	$65,000	$67,000	...	...
Lump Sum reservoir unit complete, ALT. 'C'	...	...	...	$60,900	$63,000

TUNNEL CONSTRUCTION

OGDEN, UTAH—GOVT.—OGDEN-BRIGHAM & OGDEN CANYON TUNNELS

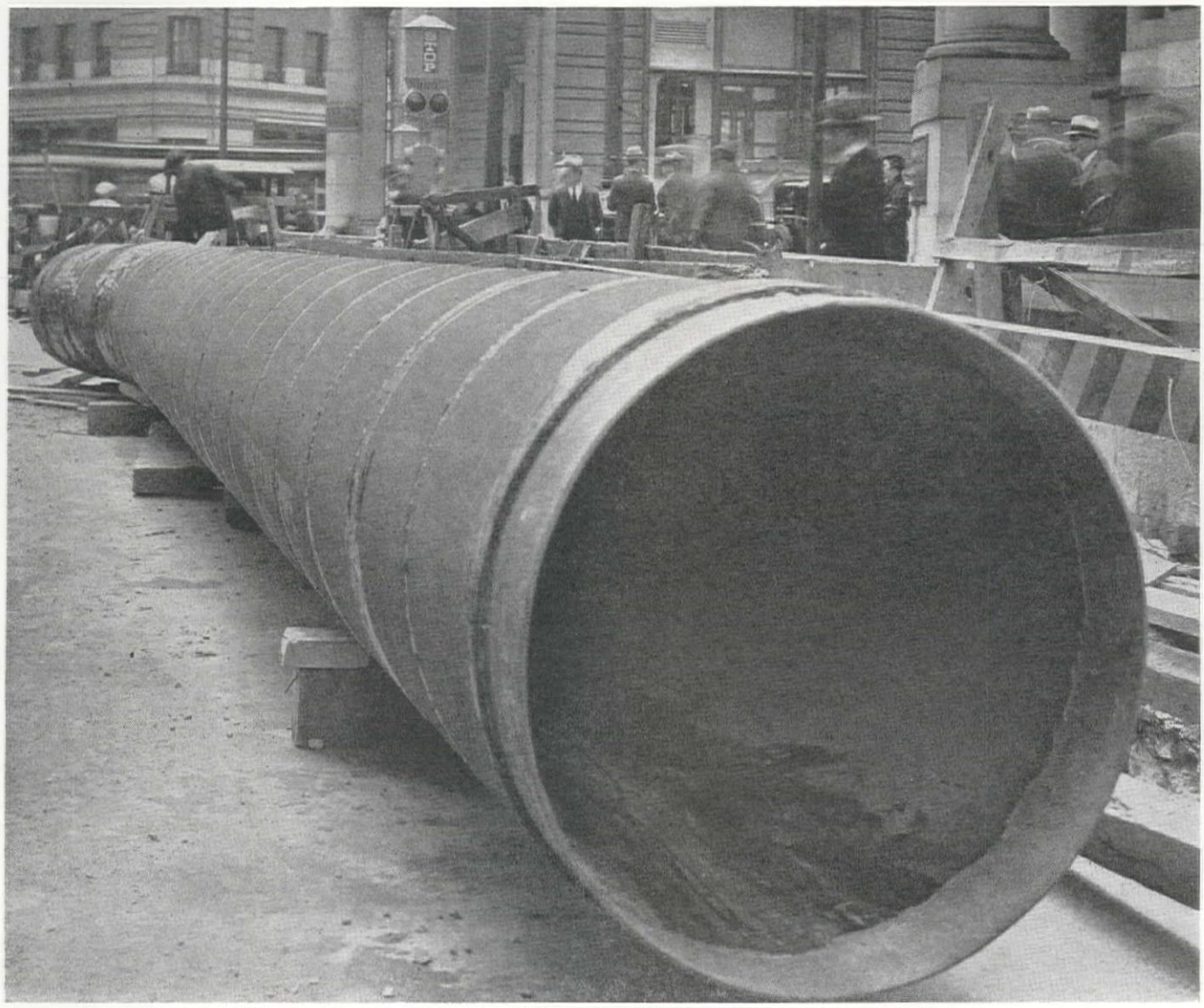
Union Construction Co., Ogden, $77,737. SCHED. 1 (Ogden-Brigham Tunnel) and Shofner & Gordon & Hinman Bros. Const. Co., P. O. Box 2882, Denver, $367,731. SCHED. 2 (Ogden Canyon Tunnel) low to Bureau of Reclamation, Ogden (as stated issue of April 18th) for constructing the Ogden-Brigham Tunnel and the Ogden Canyon Tunnel, Ogden River Proj., under Spec. No. 618. Bids from:

(1) Union Const. Co., Ogden (Sch. 1 only)
(2) Shofner & Gordon & Hinman Bros. $470,511
(3) S. S. Magoffin Co., Adrian 506,494
(4) Utah, Morrison-Knudsen, Boise $511,798
(5) L. E. Dixon, Bent Bros. & Johnson 558,134
(6) L. Coluccio & Co., Seattle 617,482
(7) Siems-Spokane Co., Spokane 642,430

SCHEDULE 1—Ogden-Brigham Tunnel—Station 127 plus 10 to Sta. 168 plus 96.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
100 cy. open cut exc. Cl. 1	$.65	$2.00	$1.25	$2.50	$1.00	$1.25	$1.50
50 cy. open cut exc. Cl. 2	.70	2.00	1.25	2.50	2.00	1.50	2.00
1,000 cy. open cut exc. Cl. 3	1.50	2.00	1.25	2.50	2.50	3.50	2.00
50 cy. backfill	1.25	1.00	.60	1.50	1.00	1.50	2.00
5,432 cy. tunn. excav.	11.50	16.00	16.00	15.00	22.00	17.50	19.20
4 M. ft. BM perm. tun. timb.	90.00	90.00	100.00	150.00	100.00	50.00	125.00
70 cy. conc. up to 200′	20.00	20.00	28.50	20.00	30.00	8.50	40.00
210 cy. conc. 200 to 600′	22.00	20.00	24.25	20.00	20.00	9.00	23.00
80 cy. conc. over 800′	24.00	25.00	24.25	25.00	20.00	9.50	23.00
14 cy. conc. (structures)	20.00	35.00	30.00	35.00	30.00	15.00	40.00
5,000 cu. ft. gun. tunn. coating	1.00	1.00	1.50	1.50	.60	.50	2.25
1,350 lb. plac. reinf. steel	.02	.05	.02	.08	.03	.02	.03
TOTALS—Schedule 1	77,737.00	102,779.00	105,754.00	100,728.00	134,014.00	105,017.00	128,464.00
SCHEDULE 2—Ogden-Canyon Tunnel—St. 120-09 to St. 143-55 & Sta. 148-30, 237-48.							
1,500 cy. open cut exc. Cl. 1		$2.00	$1.00	$2.00	$1.00	$1.50	$1.00
20 cy. open cut exc. Cl. 2		2.00	1.00	2.00	2.00	2.00	2.00
1,000 cy. open cut exc. Cl. 3		2.00	2.00	2.00	2.50	4.00	2.00
250 cy. backfill		1.00	.60	2.50	1.00	1.50	1.50
20,400 cy. tunnel excavation		12.50	13.70	14.00	16.60	21.00	16.80
650 cy. exc., tunnel adits		16.00	16.00	14.00	16.60	21.00	15.00
19 M. ft. BM perm. tunn. timb.		90.00	100.00	125.00	70.00	60.00	125.00
50,000 lb. steel tunn. liner plates		.09	.10	.08	.075	.05	.09
240 cu. yd. concr. (structures)		25.00	17.50	40.00	30.00	20.00	25.00
5,390 cy. conc. (tunnel lining)		15.35	17.50	17.00	10.50	10.00	26.50
24,000 lb. plac. reinf. steel		03	.02	.04	.02	.02	.02
50 lb. plac. groute & weep pipes		.10	.30	.50	.50	.20	5.00
150 cu. ft. pressure grouting		2.00	2.00	2.50	1.00	1.00	.60
200 cu. ft. gunite tunn. coating		2.00	1.50	2.00	1.00	.50	4.25
6,700 lb. inst. gates, gate hoists, etc.		.10	10	.20	.10	.10	.03
TOTALS—SCHEDULE 2		367,731.00	400,740.00	411,070.00	424,120.00	512,465.00	513,966.00

STREET SCENE!



At the corner of Montgomery and Post streets, San Francisco, where three of the West's great banks are situated, the illustration shows installation of steel water pipe fabricated by Western Pipe & Steel Co. of California. The pipe is 30 inches in diameter; the steel plate of 1/4 inch thickness. It is lined with coal tar for rust protection and is wrapped with soil-proof covering. The installation is part of approximately a mile and a half of what is known as the University Mound Extension pipe line. The pipe was supplied under subcontract to Sibley Grading and Teaming Co., Ltd.

WESTERN PIPE & STEEL COMPANY

OF CALIFORNIA

LOS ANGELES SAN FRANCISCO FRESNO BAKERSFIELD PHOENIX

Affiliated:

BLAW-KNOX & WESTERN PIPE CORPORATION

HARDINGE-WESTERN COMPANY

LOS ANGELES, CALIF. — CITY—FIGUEROA STREET TUNNEL

Contract awarded to L. E. Dixon & Bent Bros., & Johnson Inc., 609 S. Grand Ave., Los Angeles, $366,607.00 by Board of Public Works, L. A., for construction of a vehicular tunnel and other street work in Figueroa St., between Solano Ave., and Bishop Road, under Cash Contract. Bids from:

(1) L. E. Dixon, Bent Bros. & Johnson.....$366,607.00
(2) Macco Constr. Co., Clearwater.....$367,302.00
(3) Shofner & Gordon, Los Angeles.....$368,768.00
(4) United Conc. Pipe Corp., L. A.....$414,262.00
(5) Morrison-Knudsen Co., L. A.....$466,144.00
(6) Engineers estimate $386,442.00

	(1)	(2)	(3)	(4)	(5)	(6)
1,034 cu.yd. Class 'F' concrete	$17.00	$15.00	$18.00	$25.00	$20.00	$15.00
200 cu.yd. Class 'G' concrete	6.00	6.00	8.00	15.00	10.00	10.00
500 sacks cement for grout	1.00	3.00	1.50	2.00	2.50	2.50
Lump sum, reinforcing steel	4,125.00	4,500.00	4,000.00	5,000.00	5,000.00	3,200.00
715 lin. ft. tunnel sec. No. 1	376.00	375.00	379.00	414.00	460.00	402.50
Lump sum, tunnel section No. 2	23,000,00	30,000.00	26,020.00	20,000.00	22,000.00	27,537.25
ALT. same as above, per lin. ft.	450.00	750.00	650.00	500.00	700.00	.....
Lump sum, electr. conduit system	1,100.00	1,100.00	720.00	1,500.00	1,300.00	2,500.00
Lump sum, light system, complete	2,800.00	2,800.00	2,600.00	3,000.00	3,500.00	3,000.00
1,165 sq.yd. white glazed tiling	5.10	5.25	4.90	5.50	6.30	5.50
Lump sum, plaster finish of tunnel	3,135.00	3,500.00	3,300.00	3,500.00	4,000.00	5,630.00
600 lin. ft. 2" grout pipe	1.00	1.00	1.00	1.00	1.00	1.50
Lump sum, grading	12,500.00	9,000.00	8,200.00	20,000.00	43,000.00	7,110.00
2,000 cu.yd. remove unpreventable slides	.30	.50	.45	.50	.50	.35
46,384 sq.ft. 8" concrete pavement	.20	.18	.21	.20	.22	.20
40,360 sq.ft. 6" concrete base	.16	.13	.15	.17	.16	.12
39,812 sq.ft. Warren Bit. 2" wearing surf	.09	.09	.10	.10	.10	.092
1,957 sq.ft. 1¼" white conc. traffic line	.25	.15	.17	.15	.22	.20
548 sq.ft. 2" white conc. traffic line	.25	.20	.24	.15	.30	.30
10,884 sq.ft. 1 course walk, 3" thick	.10	.10	.10	.10	.11	.095
1,167 lin.ft. heavy unplastered curb	.44	.40	.40	.40	.50	.40
1,536 lin. ft. special unplastered curb	.46	.45	.52	.50	.60	.45
19 sq. ft. 6" concrete gutter	.20	.16	.20	.20	.19	.20
2,840 sq.ft. 8" combination gutter	.20	.18	.20	.20	.22	.186
19 lin. ft. integral curb and gutter	.65	.60	.70	.60	.85	.60
33 lin. ft. curb armor	1.25	1.00	1.00	1.00	1.00	1.00
Lump sum, storm drain, complete	1,850.00	2,000.00	1,600.00	4,000.00	2,000.00	1,840.00

YUMA, ARIZ.—GOVT.—EARTHWORK—ALL-AMERICAN CANAL

Lewis-Chambers Const. Co., Inc., 1743 Canal Bank Bld., New Orleans, $505,506.00. Sch. 1, 2 and 3, and Mittry Bros. Const. Co., 5531 Downey Rd., L. A., $260,400.00, Sch. 4, are apparent lowest combination of bids submitted to 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. 621. Bids received on:

SCH. 1—2,707,000 cu.yd. comm. excav.
SCH. 2—2,564,000 cu.yd. comm. excav.
SCH. 3—2,518,000 cu.yd. comm. excav.
SCH. 4—3,472,000 cu.yd. comm. excav.

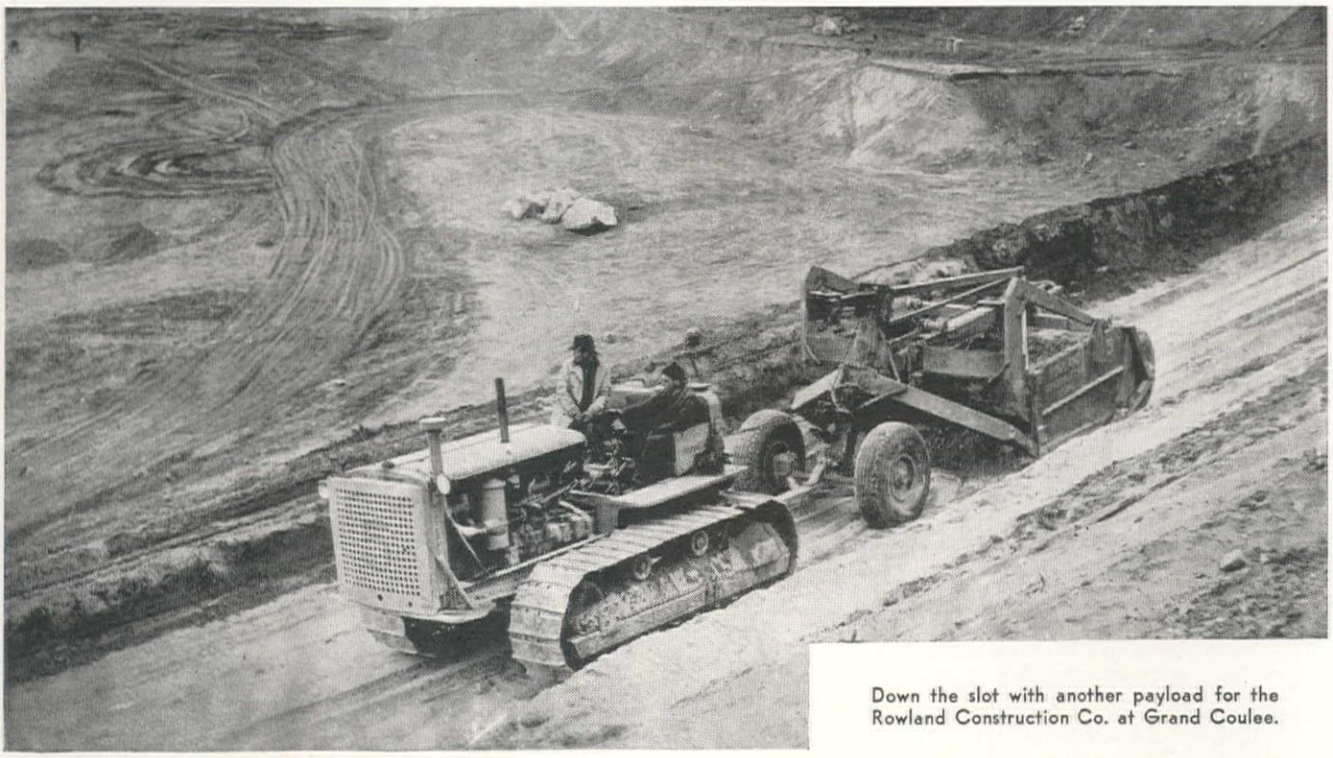
	Sch. 1	Total	Sch. 2	Total	Sch. 3	Total	Sch. 4	Total
Mittry Bros. Const. Co., L. A.	.075	$203,425.00	.075	$192,300.00	.075	$188,850.00	.075	$260,400.00
M. C. Walker & A. Guthrie, Inc.	.0739	200,047.00	.0739	189,479.00	.0739	186,080.00	.0739	256,580.00
Broderich Bros., Villisca, Ia.	.082	221,974.00	.082	210,248.00				
W. E. Callahan & Gunther & Shirley	.07	189,490.00	.07	179,480.00	.075	188,850.00	.075	260,400.00
Hallett Const. Co. Crosby, Minn.	.105	284,235.00	.105	269,220.00	.105	264,390.00	.105	364,560.00
Geo. Pollock Co., Sacramento	.0843	228,200.00	.0843	216,146.00	.0843	212,267.00	.0843	292,689.00
V. R. Dennis, San Diego	.09	243,630.00	.09	230,760.00	.105	264,390.00		
Boyce & Igo Co., Yuma, Ariz.	.0658	178,120.00	.0658	168,711.00	.0708	178,274.00	.0708	245,817.00
David H. Ryan, Coulee, Wn.	.13	351,910.00	.13	333,320.00				
S. S. Magoffin Co., Adrian, Ore.	.0862	233,343.00	.0862	221,016.00	.0862	271,051.00		
Foley Bros, New York City	.079	213,853.00	.079	202,556.00	.079	198,922.00	.094	326,368.00
W. S. Hardwick	.0769	208,168.00	.0769	197,171.00	.0769	193,634.00	.0769	266,996.00
Interior Const. Co., S. F.	.069	186,783.00	.069	176,916.00	.069	173,742.00	.069	129,568.00
J. A. Terteling & Son, Boise	.0766	207,356.00	.0766	196,402.00	.0766	192,878.00	.0766	265,955.00
Lewis-Chambers Const. Co.	.069	$775,882.00 Sch. 1, 2, 3 & 4 comb;	.0649	$505,506.00 Sch. 1, 2 & 3 comb.;	.0716	$374,110.00 Sch. 1 & 3 comb.;	.0716	$377,403.00 Sch. 1 & 2 comb. and
	.0716	$363,871.00 Sch. 2 & 3.						

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

Contract awarded to Barrett & Hilp, 918 Harrison Street, San Francisco, $1,026,780.00 by Calif. Div. of Highways, Sacramento, for const. an overhead crossing over the tracks of the AT&SF RR, S.P. Company & Key System Ltd., in city of Oakland, ALAMEDA CO., Calif., consisting of a steel & concrete viaduct on concr. bents, with a concr. roadway slab. Bids from:

(1) Barrett & Hilp, S. F.....$1,026,780.00
(2) Mittry Bros. Const. Co., L. A.....1,053,965.00
(3) N. M. Ball, Berkeley, and Bodenhamer Const. Co., Oakland.....1,065,780.00
(4) Bates & Rogers Const. Co.....$1,067,813.00
(5) Clinton Const. Co., S. F.....1,087,800.00
(6) MacDonald & Kahn Co., Ltd., S. F.....1,093,518.00
(7) Healy Tibbitts Const. Co., S. F.....1,169,550.00

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1 lot rem. bdgs. & clear site	$21,000.00	$13,000.00	$7,500.00	$13,200.00	$5,000.00	$600.00	$8,000.00
40,000 cu.yd. struc. exc.	1.75	1.95	2.50	3.00	2.00	3.00	2.10
9,000 cu.yd. B concr. (footings)	8.50	8.10	11.00	8.55	9.00	8.45	8.60
22,000 cu.yd. B conc. (superstruc)	15.50	15.50	13.00	14.50	17.20	18.45	19.10
2,000 cu.yd. B conc (stl. strg. slab)	14.50	13.50	14.00	14.65	14.40	13.00	14.00
4,000 bbl. extra cement	1.75	2.20	2.52	2.10	1.50	2.15	2.00
660,000 lb. pipe railing	.09	.12	.10	.1055	.085	.084	.11
3,500,000 lb. reinforcing steel	.04	.039	.045	.0319	.043	.045	.043
4,500,000 lb. structural steel	.045	.05	.051	.0565	.048	.04	.052
21,000 lb. bronze castings	.30	.30	.30	.41	.30	.32	.25
1 lot elec. lighting system	15,000.00	15,550.00	12,000.00	19,500.00	17,000.00	10,750.00	18,000.00
20,000 lb. cast iron drains	.06	.06	.06	.08	.06	.065	.065
2,200 tons field painting	9.00	4.00	5.00	3.70	8.00	3.00	5.00
59,000 ft. 4¼" reinf. trestles	.17	.185	.20	.152	.21	.18	.25
95,000 ft. 5¼" reinf. trestles	.19	.18	.22	.147	.23	.16	.25
1 lot rem. & repl. sewers	2,000.00	3,500.00	7,000.00	625.00	560.00	1,700.00	800.00
1 lot miscell. work	1,000.00	1,800.00	10,000.00	1,375.00	900.00	1,138.00	1,500.00



Down the slot with another payload for the Rowland Construction Co. at Grand Coulee.

They're Cutting Costs Everywhere With

LeTOURNEAU EQUIPMENT

Over the Jack Rabbit Trail (above) with 65 yards an hour on a 4000-foot round trip. A LeTourneau Angledozer (below) cuts a fire trail out of a mountain side and makes a forest safe at North Fork, California.

At Grand Coulee building construction roads with 12-Yard Carryalls, 25-Yard Buggies and Bulldozers . . . . at North Fork smashing fire trails through roots and rocks with a LeTourneau Angledozer, Rooter and 6-Yard Carryall for the U. S. Forest Service . . . on the Jack Rabbit Trail cutting a safe highway through the mountains with a fleet of Angledozers, Bulldozers, Rooters, Sheep's Foot Rollers and Carryalls working tandem—30 LeTourneau Units for Crow Bros.

On all these jobs and hundreds of others . . . . big or little . . . . for contractors or government agencies . . . . LeTourneau Equipment is moving bigger yardages faster, putting roads into use sooner, upping profits for contractors, cutting costs for both contractors and taxpayers.

Our Engineering Department is at Your Service—Write us, describing your dirtmoving problems; our Engineers will gladly advise you as to what LeTourneau Units are best fitted to your job.

R. G. LeTOURNEAU, Inc.

Stockton, California Peoria, Illinois

Cable Address: "Bobletorno"

LE TOURNEAU

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

SACRAMENTO, CALIF. — STATE — UNDERGRADE CROSSING—SAN MATEO COUNTY

Contract awarded to Fredrickson & Watson Const. Co., & Fredrickson Bros., 873-81st Ave., Oakland, $129,908.00, by Calif. Div. of Highways, Sacramento, for widening existing undergrade crossing under the S. P. Tracks and So. San Francisco Belt Railway at So. San Francisco, consisting of one 43 ft. 7″ straight girder and plate girder & conc. deck span, and one 98 ft. 8″ steel beam and conc. deck span, in SAN MATEO CO., CALIF. Bids from:

(1) Fredrickson & Watson & Fredrickson.....$129,908.00
(2) Healy Tibbitts Const. Co., S. F..... 134,282.00
(3) M. B. McGowan & C. W. Caletti, S. F..... 142,766.00
(4) Barrett & Hilp, S. F. $155,502.00
(5) Bodenhamer Const. Co., Oakland 166,120.00
(6) Chas. L. Harney, S. F..... 167,623.00

	(1)	(3)	(3)	(4)	(5)	(6)
200 cu.yd. remove concrete	$4.00	$10.00	$3.00	$6.50	$4.00	$6.25
150 lin. ft. move and reset guardrail	.70	2.00	2.00	1.50	1.00	.51
45,000 cu.yd. excavation	.70	.40	.80	.48	1.00	1.01
100,000 mi. yd. haul	.10	.09	.10	.06	.15	.081
4,700 sq.yd. subgrade (pavement)	.12	.08	.20	.13	.15	.16
1,200 tons crusher run base	1.50	1.60	2.00	2.20	2.00	1.85
945 cu.yd. 'A' concrete (pavement)	9.60	9.00	8.00	13.00	12.00	10.78
1,900 cu.yd. 'A' conc. (grav. anchor)	9.60	10.00	8.00	12.75	15.00	12.48
65 ea. 1″ bar dowel anchors	6.00	5.50	1.00	12.00	1.75	1.35
700 ea. ¾″ bar dowel anchors	.65	5.00	.50	8.00	1.50	1.35
165,000 lbs. reinforced steel	.04	.045	.04	.05	.045	.0522
10,500 lbs. mesh reinf. steel	.10	.10	.07	.09	.10	.0522
2,050 cu.yd. 'A' concrete (structure)	14.00	20.00	20.00	25.00	15.00	19.67
16 cu.yd. 'F' concrete (railings)	40.00	70.0	30.00	75.00	40.00	73.00
550 sq.yd. finish east face cent. wall	1.25	1.00	1.00	1.60	.80	.92
20,484 lbs. cast steel	.12	.15	.12	.14	.12	.135
5,700 lbs. copper strips	.40	.35	.40	.37	.45	.37
103 cu.yd. 'A' concrete (sidewalks)	15.00	9.00	10.00	17.00	15.00	15.26
420 lin. ft. pipe handrail	1.50	1.50	2.00	2.50	2.00	3.39
4,000 sq.yd. waterproof for pave. & walls	.70	.60	.70	.30	.60	.48
1,250 sq.yd. waterproofing for deck	1.37	1.75	1.40	1.00	1.75	1.08
1,150 lin.ft. 12″ plain conc. pipe	1.00	1.00	1.00	1.50	1.00	2.24
1,340 lin.ft. 6″ drain tile	.30	.60	.20	.60	.50	1.76
270 lin.ft. 4″ drain tile	.30	.40	.20	.50	.50	.81
270 lin.ft. 4″ vitrified pipe	.30	.80	.20	.70	.50	.81
12 lin.ft. 12″ cast iron pipe	3.25	3.00	3.00	4.00	4.00	5.40
106 lin.ft. 8″ wrought iron pipe	4.00	3.50	3.00	3.50	3.57	3.30
24 lin.ft. 6″ wrought iron pipe	3.25	2.50	2.00	3.00	2.00	2.70
44 lin.ft. 4″ wrought iron pipe	2.00	1.50	1.50	2.50	1.75	2.00
60 cu.yd. rock filling material	3.00	1.50	2.00	3.00	2.00	4.00
1 lot pumping equipment	1,000.00	1,300.00	900.00	1,250.00	1,000.00	2,000.00
1 lot lighting equipment	2,856.00	3,400.00	4,000.00	1,000.00	4,000.00	3,000.00
1 lot miscel work	500.00	1,366.00	1,814.00	400.00	1,000.00	1,350.00

SACRAMENTO, CALIF.—STATE—STEEL & CONCRETE—PLUMAS COUNTY

Contract awarded to M. B. McGowan, Inc., Call Bldg., S. F., & C. W. Caletti & Co., P. O. Box 243, San Rafael, $113,448.00 by Calif. Div. of Highways, Sacramento, for const. two bridges on N. Fork of the Feather River; one at Rock Creek, consisting of one 183′ thru steel truss span and two 55′, one 59′ and one 16′ steel stringer spans on conc. piers and conc. rubble masonry abutments; and one near Storrie consisting of two 120′ steel pony truss spans and one 59′3″ and one 60′3″ reinf. conc. girder spans on concr. piers & conc. rubble masonry abutments, in PLUMAS COUNTY, Calif. Bids from:

(1) M. B. McGowan, Inc. & C. W. Caletti.....$113,448.00
(2) Lord & Bishop, Sacramento $114,801.00
(3) Bodenhamer Const. Co., Oakland.....$115,838.00
(4) Bates & Rogers Const. Co., Oakland.....$122,114.00
(5) Rocca & Co., San Rafael.....$123,619.00

	(1)	(2)	(3)	(4)	(5)
1,600 cu.yd. structure excavation	$6.00	$7.00	$4.00	$7.50	$2.00
1,385 cu.yd. 'A' concrete (structure)	22.00	25.00	22.00	25.45	28.48
242 cu.yd. 'A' concrete (footing blocks)	10.00	15.00	22.00	18.50	11.00
180,000 lb. reinf. steel	.06	.045	.05	.055	.05
680,000 lb. structural steel	.075	.068	.078	.07	.076
10,210 lb. cast steel	.10	.14	.15	.15	.15
634 lin. ft. timber railing	1.00	1.10	1.25	1.10	1.50
690 cu.yd. rubble masonry	10.00	12.00	12.00	14.00	15.00
1 lot miscel. work	603.00	600.00	1,000.00	1,000.00	4,800.00

DAM CONSTRUCTION

GLASGOW, MONT.—GOVT.—SPILLWAY GATE STRUC. & CUTOFF STRUC, ETC.—FORT PECK DAM

Contract awarded to Addison Miller, Inc., & Fielding & Shepley, Inc., 1111 Bldrs. Exchange Bldg., St. Paul, Minn., $3,985,423.00 by U. S. Engr. Office, Postal Telegraph Bldg., Kansas City, Mo., for const. the spillway gate struct., cut-off struc. & appurtenant works for the Fort Peck Dam 25 mi. southeast of Glasgow, Mont. Bids from:

(1) Addison Miller, Inc., & Fielding & Shepley Inc., St. Paul $3,985,423.00
(2) Spillway Bldrs. Inc., K. C.....$4,387,426.00
(3) Frazier-Davis Const. Co., & G. L. Tarlton St. Louis $4,779,085.00
(4) Six Co.'s of Wash., Inc., S. F.....$5,147,796.00

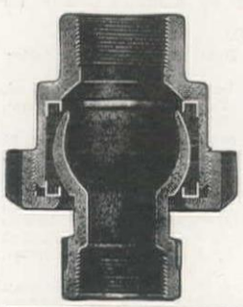
	(1)	(2)	(3)	(4)
516,000 cu.yd. open-cut excavation	1.00	.75	.40	.60
29,000 cu.yd. trench excav. 0-10 ft. deep	3.00	3.50	3.00	3.70
30,500 cu.yd. trench excav. 10-30 ft. deep	3.00	3.50	5.00	4.20
25,000 cu.yd. trench excav. 30-50 ft. deep	3.20	4.00	5.00	4.60
18,000 cu.yd. trench excav. 50-75 ft. deep	3.25	5.00	5.00	5.10
14,000 cu.yd. trench excav. 75-100 ft. deep	3.30	5.00	5.00	5.70
9,000 cu.yd. trench excav. 100-125 ft. deep	3.50	5.00	5.00	6.00
1,200 cu.yd. trench excav. 125-150 ft. deep	3.90	5.00	7.50	8.60
200 cu.yd. trench excav. over 150 ft. deep	4.90	10.00	12.50	15.00
300 cu.yd. excavation for building	2.00	2.00	4.00	3.05
7,700 lin. ft. excav. for foundation piles 0.30 ft	5.80	5.00	7.00	11.00
3,000 lin. ft. excav. for foundation piles 30-40 ft	6.00	6.00	7.00	11.00
5,000 lin. ft. excav. for found. piles 0-40 ft	6.50	7.00	7.00	14.00
3,000 lin. ft. excav. for foundation piles 40-70 ft	7.00	8.00	7.00	14.00
5,000 cu.yd. enlarge drill holes for found piles	3.00	2.00	3.00	12.00

16,000 (100 sq. ft.) apply liq. sealing solution	1.50	1.00	1.65	1.60
700 (100 sq. ft.) apply bitum. spray waterproof sol	1.00	.50	1.65	1.20
1,000 lin. ft. 18" vitr. clay pipe drains	2.00	3.00	2.20	2.45
4,200 lin. ft. 12" vitr. clay pipe drains	1.00	1.50	1.10	1.20
1,000 lin. ft. 8" vitr clay pipe drains	.65	.70	.70	.70
2,900 lin. ft. 6" vitr. clay pipe drains	.49	.60	.55	.60
40,000 cu.yd. backfill	.75	.50	.30	.55
20,000 cu.yd. gravel fill	.75	.70	.70	.70
6,000 cu.yd. riprap paving	2.00	1.50	3.00	2.45
231,000 lb. steel sealing strips furn and place	.06	.07	.047	.065
3,500 sq. ft. joint filler furn and place	.30	.25	.70	.37
30,000 lin. ft. caulking joints	.15	.20	.20	.17
84,720 cu.yd. concrete for slabs	1.85	3.50	4.00	4.50
53,000 cu.yd. conc. for piers and training walls	3.85	5.00	4.00	5.10
22,400 cu.yd. conc. for gate struc. abutment walls	6.85	7.00	9.00	7.35
13,640 cu.yd. conc. for foundation piles	1.75	2.50	2.00	3.70
8,600 cu.yd. conc. for appr. channel sidewalls	4.00	6.00	6.65	6.75
4,220 cu.yd. conc. for highway bridge	15.25	16.00	15.00	30.00
8,540 cu.yd. conc. for bridge abut. and ret. walls	8.00	8.00	12.00	12.25
1,800 cu.yd. conc. for parapet walls	7.00	13.00	25.00	37.00
89,600 cu.yd. conc. for cut-off structure	1.75	3.00	5.00	4.30
800 cu.yd. conc. for counterweights	9.00	6.00	10.00	15.00
400 cu.yd. conc. for drainage structures	3.00	10.00	20.00	11.00
1,000 (100 sq. ft.) gunite coating	4.90	5.00	7.00	6.10
5,000 lin. ft. drilling grout holes	1.15	1.00	1.00	1.50
5,000 lb. furn and inst. grout pipes and connections	.20	.20	.40	.21
100,000 cu.ft. grouting	.80	.50	.35	.30
2,120,000 lb. struc. steel vertical lift gates	.059	.06	.085	.07
1,000,000 lb. furn. place and remove struc. steel bracing	.062	.065	.073	.07
2,500,000 lb. furn. and place struc. steel bracing	.054	.06	.07	.055
16,500 lb. struc. steel ladders	.12	.18	.12	.15
1,050,000 lb. struc. steel for service bridge	.052	.055	.06	.074
15,100 lb. bronze bearing plates for service bridge	.40	.50	.65	.37
126,000 lb. steel rail for service bridge	.06	.065	.06	.05
1,200,000 lb. miscl. structural steel	.06	.055	.10	.09
38,000 lb. miscl. steel pipe	.10	.08	.10	.12
46,000 lb. pipe handrails	.15	.20	.10	.17
22,200,000 lb. furn and place steel reinforcing bars	.039	.0425	.043	.049
10,000 lb. steel reinforcing fabric	.08	.10	.13	.12
104,000 lb. corrosion-resisting steel	.40	.40	.30	.37
12,000 lb. steel bolts, screws, and washers	.10	.10	.10	.15
540,000 lb. steel castings	.13	.12	.19	.155
3,000 lb. cast nickel steel	.25	.25	.30	.40
500 lb. forged steel	.25	.20	.50	.43
25,000 lb. sheet metal	.15	.20	.10	.12
60,000 lb. iron castings	.07	.07	.07	.11
5,000 lb. hardware	.75	.07	.20	.70
130,000 lb. steel floor grating	.11	.10	.09	.12
500 lb. brass	1.00	.50	.70	.60
500 lb. phospor bronze	1.00	.50	.70	.60
50,000 lb. babbitt metal	.20	.25	.15	.25
352 ea. roller bear. mtd. wheels for vert. lift gate	$310	$400	$430	$450
240 lin. ft. 18" corr. met. pipe	2.50	2.50	3.00	2.50
170 lin. ft. 24" corr. met. pipe	3.40	3.50	4.00	3.70
50 lin. ft. 36" corr. met. pipe	6.90	7.00	7.50	6.80
50 lin. ft 48" corr. met. pipe	11.50	10.00	12.00	10.00
380 lin. ft. 60" corr. met. pipe	20.00	14.00	20.00	17.00
100 M ft. BM furn. place & remove timber & bracing	73.50	70.00	70.00	86.00
200 M ft. BM furn. & place timber sheeting & bracing	67.50	60.00	60.00	74.00
2,000 lin. ft. ½" elec. conduit and fittings	.27	.20	.40	.50
2,000 lin. ft. ¾" elec. conduit and fittings	.34	.22	.55	.60
1,200 lin. ft. 1" elec. conduit and fittings	.50	.28	.70	.75
2,500 lin. ft. 1¼" elec. conduit and fittings	.67	.32	.80	.85
10,000 lin. ft. 1½" elec. conduit and fittings	.81	.37	1.00	.95
1,000 lin. ft. 2" elec. conduit and fittings	1.09	.50	1.25	1.10
1,000 lin. ft. 2½" elec. conduit and fittings	1.71	.70	1.30	1.35
1,000 lin. ft. 3" elec. conduit and fittings	2.25	1.00	1.70	1.60
1,000 lin. ft. 4" elec. conduit and fittings	3.25	1.35	2.40	1.95
1,000 lin. ft. 5" elec. conduit and fittings	4.43	2.00	3.40	2.45
900 ea. furn. and inst. conduit boxes	17.00	10.00	6.00	18.50
Lump sum heating system for gate seals and rollers	$38,962	$42,000	$37,000	$31,000
750 cu.yd. concrete for buildings	13.40	10.00	16.00	21.00
78,500 lb. furn. & place reinf. steel for buildings	.051	.05	.06	.06
2,700 lb. furn. & place wire fabric for buildings	.08	.10	.07	.12
Lump sum operator's quarters and machine shop bldg	$23,800	$30,000	$39,000	$28,000
Lump sum control tower	$4,690	$7,000	$7,600	$5,000
1,200 lin. ft. relay std. gauge railroad track	1.00	1.50	2.50	.95
4,465 lin. ft. const. std. gauge railroad track	5.10	4.00	5.30	3.60
540 lin. ft. std. gauge railroad turnouts	10.00	8.00	18.00	9.80
1,000 lin. ft. const. std. and wide gauge RR track	10.00	7.00	9.00	6.10
170 lin. ft. comb. std. and wide gauge turnouts	20.00	10.00	22.00	14.70
9.5 M. ft. BM flooring timber for railroad	80.00	70.00	70.00	73.00
15,500 sq.yd. place and prepare 12" gravel base pavem	.235	.50	.50	.55
19,000 sq.yd. place and prepare 8" gravel base pavem	.20	.40	.35	.45
2,000 sq.yd. place and prepare 3" gravel base pavem	.142	.25	.25	.50
27,000 gal. bitumen 'A' (gravel base course)	.30	.20	.28	.17
3,000 ton 2" bitum. concrete base course	8.50	8.00	9.00	6.00
1,500 ton 1" bitum. concrete top course	10.00	10.00	10.00	7.00

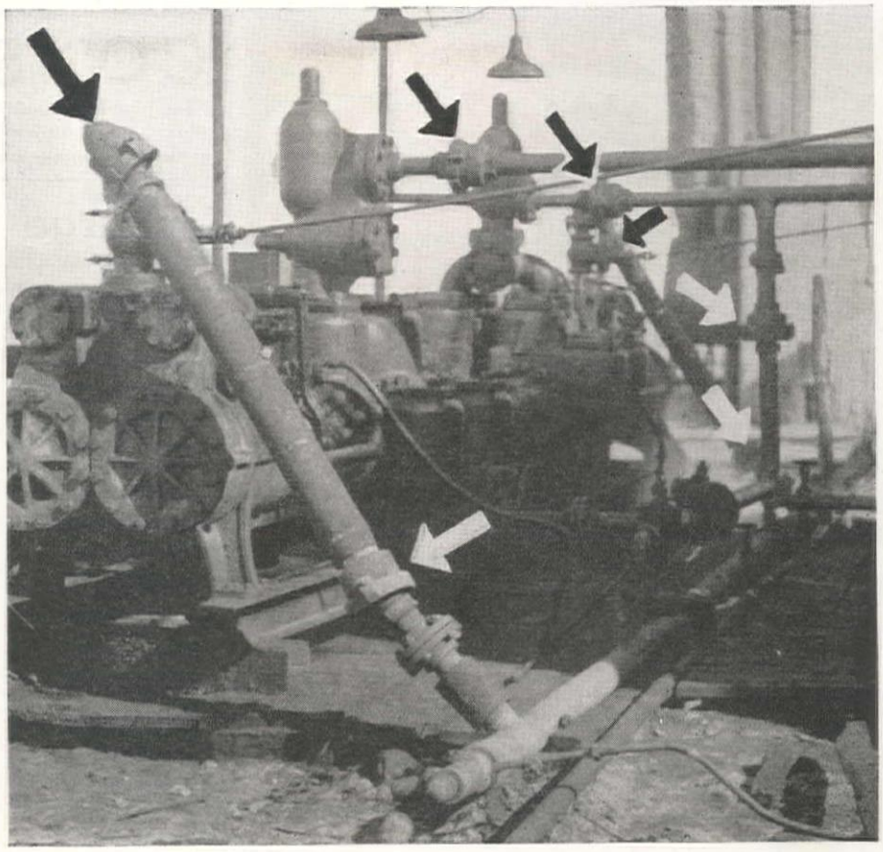
7
BARCO JOINTS
Share in Deep Drilling Record

In drilling to 11,000 feet in McElroy Field, Texas, an unusual record for both men and equipment has been set. Seven Barco Joints installed on one 18″ and one 20″ slush pump did their full share in establishing these records by providing full flexibility, freedom from vibration breakage and leak-proof dependability, both on suction pipes and steam lines.

The presence of Barco Flexible Ball Joints on pipe lines is a sure guide to both efficiency and economy. Experienced engineers generally specify them.



Write for Catalog 205



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BARCO MANUFACTURING COMPANY
1807 Winnemac Avenue Chicago, Illinois

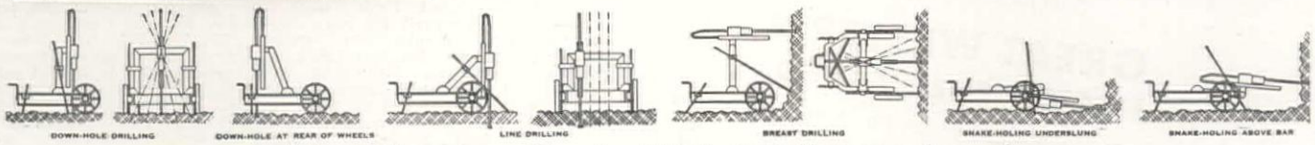
WORTHINGTON ROCK MASTER
SPEEDS UP DRILLING
. . . at any angle . . . on every type of job

A LIGHT, mobile rig . . . can be readily moved from place to place . . . and taken on any job where you can take a hand drill.

The U-bar, adjustable to any position, in combination with the universal drill seat, assures the desired set-up. Peg legs, adjustable in length and position, assure rigidity.

Equipped with quick and effective Hole Spotter, the rig can be furnished with feeds for 3 ft., 4 ft., or 6 ft., maximum steel change . . . Recommended for holes up to 20 ft. depth.

- ***Write for details . . . . Ask for a demonstration***



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Star Machinery Company, 1741 First Avenue South, Seattle, Washington
Contractors Equipment & Machinery Co., 14th at National Avenue, San Diego, California
Garlinghouse Brothers, 2416 East 16th Street, Los Angeles, California
General Machinery Company E. 3500 Block, Riverside Avenue, Spokane, Washington
Vandercook Company, 1014 8th Street, Sacramento, California

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THE WORTHINGTON COMPANY, INC.
SEATTLE SAN FRANCISCO LOS ANGELES EL PASO
WORTHINGTON

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CONSTRUCTION

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

Large Western Projects

WORK CONTEMPLATED

SPOKANE, WN.—Dam and hydro-electric plant for City Water Dept. Est. cost, $612,820.

SALT LAKE CITY, UTAH—Steel pipeline and tunnel, etc., for City Water Dept. Est. cost, $1,004,850.

BOISE, IDAHO—Hydro-electric plant for Idaho Power Co. Est. cost, $1,000,000.

SAN DIEGO, CALIF.—Pipeline and road, etc., for City. Est. cost, $524,000.

LODI, CALIF.—Power plant for City. Est. cost, $600,000.

LONG BEACH, CALIF.—Outfall conduit (partly in tunnel) and balancing reservoir for City. Est. cost, $1,100,000.

LOS ANGELES, CALIF.—Revised plans for completion of San Gabriel Dam for L. A. County Flood Control Dist., estimated at $11,976,826.

VALLEJO, CALIF.—Repaving various streets for City. Est. cost, $300,000. Bonds voted.

YUMA, ARIZ.—Canals, dam and pumping plants, etc., for Gila Project. Est. cost, $19,474,964.

SEATTLE, WN.—300 ft. high Mud Mountain flood control dam for King and Pierce Counties, Wn. Est. cost, $3,000,000.

PEARL HARBOR, T. H.—Steel floating drydock for Navy Dept. Est. cost, $10,000.000.

CALLS FOR BIDS

SACRAMENTO, CALIF.—Undergrade crossing in Alameda County for Calif. Div. of Highways, bids to May 22.

BIDS RECEIVED

DENVER, COLO.—Cherry Creek Retarding Dam (earthfill) for City, M. E. Carlson, Denver, $461,427. Low.

DENVER, COLO.—12.33 mi. grading East Entrance Approach road, Yellowstone Natl. Park for Bureau of Public Roads, Tomlinson Arkwright Const. Co., Great Falls, Mont., $204,447. Low.

YUMA, ARIZ.—Earth excavation, All-American Canal, for Bureau of Reclamation, Lewis-Chambers Const. Co., Inc., New Orleans, $505,506. SCH. 1, 2 and 3, and Mittry Bros. Const. Co., Los Angeles, $260,400. SCH. 4, apparent lowest combination of bids.

EUREKA, CALIF.—Dam, tunnel, pipeline and reservoir for City, T. E. Connolly & Hanrahan Co., S. F., $503,145 (headworks unit); American Concrete & Steel Pipe Co., L. A., $621,360 (Pipeline Unit); and Mercer Fraser Co., Bent Bros., Inc., and L. E. Dixon Co., Eureka, $68,900 (Reservoir Unit); combined segregated low bids.

OGDEN, UTAH—Ogden-Brigham & Ogden Canyon Tunnels for Bureau of Reclamation, Union Const. Co., Ogden, $77,737, Sch. 1, and Shofner & Gordon & Hinman Bros. Const. Co., Denver, $367,731 Sch. 2, low bids.

OGDEN, UTAH—Ogden Canyon Conduit for Bureau of Reclamation, Barnard Curtiss Co., Minneapolis, $211,810. Low.

CONTRACTS AWARDED

SACRAMENTO, CALIF.—Overhead crossing in Alameda County for Calif. Div. of Highways to Barrett & Hilp, S. F., $1,026,780.

SAN FRANCISCO, CALIF.—Crystal Springs Pipeline Tunnels for S. F. Public Utilities Comm. to Barrett & Hilp, S. F., $211,104.

GUNNISON, COLO.—Taylor Park Dam for Bureau of Reclamation, to Utah Const. Co., W. A. Bechtel Co., Morrison-Knudsen Co., and Henry J. Kaiser Co., Ogden, Utah, $798,078.

SAN JOSE, CALIF.—Coyote Dam (earth and grav. fill) for Santa Clara Valley Water Conservation Dist. to Macco Const. Co., Clearwater, $493,825.

LOS ANGELES, CALIF.—Figueroa St. vehicular tunnel and street work for City to L. E. Dixon Co., Bent Bros., Inc., and Johnson, Inc., $366,607.

SAN FRANCISCO, CALIF.—O'Shaughnessy Dam Enlargement for City to Transbay Const. Co., S. F., $3,219,965.

GLASGOW, MONT.—Spillway gate structure and cut-off structure at Ft. Peck Dam for U. S. Engr. Office to Addison Miller, Inc., and Fielding & Shepley, Inc., St. Paul, $3,985,423.

SALT LAKE CITY, UTAH—Moon Lake Dam for Bureau of Reclamation to T. E. Connolly, S. F., $547,221.

STREET and ROAD WORK

WORK CONTEMPLATED

JUNEAU, ALASKA—A call for bids will be issued shortly by Bureau of Public Roads, Juneau, Alaska, for: (1) 2.7 mi. grading and surfacing the Mitkof Highway, Falls Creek-Landing, Section near Petersburg, Alaska Forest, Proj. FHEC 7-D1. (2) 7.4 mi. clearing and grubbing on Wrangell Highway, Shoemaker Bay-Pat Creek Section, near Wrangell, Alaska Forest Project FHEC 16-EF. (3) Treated timber trestle over Montana Creek on Glacier Highway near Juneau, Alaska, Forest Proj. FHEC 2-E2. It is recommended interested contractors go over the projects now so they will be in a position to bid when the official call for bids is issued. 4-23

VALLEJO, CALIF.—Bonds in amount of $300,000 were carried by City of Vallejo, Calif., to finance repaving of various streets 4-4

CALLS FOR BIDS

PHOENIX, ARIZ.—Bids to May 15th, by Arizona State Highway Comm., Phoenix, Ariz., for: (1) PIMA CO.—NRS 110-B (10 a.m.) 10⅓ mi. grading and draining roadway and furn. and plac. aggreg. base course and road oil (pl. mix) on the Ajo-Tucson Highway. (2) PINAL CO.—NRS 111-B (10:30 a.m.), 3 mi. grading and draining roadway and furnishing and placing road mix from the Florence-Coolidge Highway junction at Florence, southeast on the Tucson-Florence Highway. (3) YAVAPAI CO.—NRH 17 (2 p.m.), 5 mi. grad. and drain. and furn. and plac. aggreg. base course about ¾ mi. northeast of Mingus Mt. Summit, extending toward Jerome on the Prescott-Jerome Highway. 4-26

NEWS SUMMARY

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

LOS ANGELES, CALIF.—Bids to 2 p.m., May 16th, by Calif. Div. of Highways, L. A., for 3.6 mi. grad. and rd. mix surf. treatment betw. Lake Hodges Dam and Rancho Santa Fe, in SAN DIEGO CO., Calif. 4-23

LOS ANGELES, CALIF.—Bids to 2 p.m., May 16th, by Calif. Div. of Highways, L. A., for 4.7 mi. widen roadbed and pav. portions with asph. concr. and conc. betw. Monterey Park and Mt. View Road, in LOS ANGELES CO., Calif. 4-23

LOS ANGELES, CALIF.—Bids to 2 p.m., May 20th (tentative date), by County Bd. of Super., 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. 4-30

LOS ANGELES, CALIF.—Bids to 10 a.m., May 22nd, by Board of Public Works, for improving San Fernando Road west, between Aviation Drive and Goodwin Ave., involving: 134,395 sq. ft. conc. pavement, 134,395 sq. ft. 7" asph. concr. pavement. 5-2

LOS ANGELES, CALIF.—Bids to 2 p.m., May 23rd, by Calif. Div. of Highways, L. A., for 1.4 mi. grading and concr. or asphalt concr. paving between Anaheim and Mirashores, in ORANGE CO., Calif. Work involves: ALT. "A"—7,850 tons asph. concr. ALT. "B"—3,490 cu. yd. "A" concrete (pavement), and other items 4-30

SACRAMENTO, CALIF.—Bids to 2 p.m., May 15th, by Calif. Div. of Highways, Sacramento, for 12.5 mi. grading betw. Tugar and Horse Thief Creek in SISKIYOU COUNTY, Calif., involving: 200,800 cu. yd. excav. 4-23

CARSON CITY, NEV.—Bids to May 15th, by Nev. State Highway Comm., Heroes Memorial Bldg., Carson City, Nev., for: (1) NYE AND ESMERALDA CO. (To 2 p.m.)—42.01 mi. grad. and cr. grav. or stone surf. on Secs. H1, K2 and 3, A1 and 2, B, Rts. 5 and 3, betw. Beatty and 3 mi. N. of Springdale and betw. 6 mi. S. of Stonewall Pass and Goldfield. (2) ELKO CO. (To 2:30 p.m.)—11.33 mi. const. portion of St. Highway Syst. betw. 25 mi. N. of Currie and 26 mi. S. of Wells, Rt. 13, Sec. B. 4-29

PORTLAND, ORE.—Bids to 10 a.m., May 15th, by Bureau of Public Roads, Portland, for const. or impr. the John Day-Burns Reconstruction Grading Proj. NR-35-A3, Natl. Forest Road Project, located within the Malheur National Forest, GRANT COUNTY, Ore., involving 163,200 cy. excav. and other items.

OGDEN, UTAH—Bids to 10 a.m., May 17th, by Bureau of Public Roads, Ogden, for 6.981 mi. const. or impr. the Victor-Irwin National Forest Road, Proj. FHEC 37-A1, B1, Sta. 0-00 to 431-61.2, located in the Targhee Natl. Forest, BONNEVILLE CO., Idaho, involving: 127,000 cu. yd. excav., 9,800 tons cr. run bottom course, 9,800 tons cr. run top course. 5-2

RITZVILLE, WN.—Bids to 1:30 p.m., May 17th, by Board of County Comm., Ritzville, Wn., for: (1) 2.4 mi. surf. or Secondary Road Proj. No. 13, involv., 4,300 cu. yd. cr. gravel. (2) 11.4 mi. surf. Secondary Road Project No. 14, involv., 12,512 cu. yd. crushed rock. 4-27

OLYMPIA, WN.—Bids to 10 a.m., May 21st, by Director of Highways, Olympia, Wn., for: (1) PIERCE CO. (NRM 171-F)—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, involv.: 6,488 sq. yd. concr. pavement, 2,572 tons asph. concr. pavement, and other items. (2) LINCOLN CO. (St. Rd. No. 2)—6,500 cu. yd. stockpiling mineral aggregate (oil rock) materials for State Road No. 2, Wilbur to Telford (FPW project). (3) FERRY CO. (FPW Proj.)—7,960 cu. yd. stockpiling mineral aggregate (oil rock) materials and cr. stone surf. material for about 2.8 mi. of State Road No. 3, section 1, Addy to Blue Creek, and 27.7 mi. of State Rd. No. 3, Section 2, Kettle Falls to Laurier. (4) SPOKANE AND PEND OREILLE CO. (FPW Proj)—Stockpiling 9,700 cu. yd. mineral aggreg. (oil rock) materials and cr. stone surf. materials for about 15.7 mi. of State Road No. 6, Bear Creek to Rogers Pass. (5) LINCOLN AND SPOKANE CO. (FPW Proj.)—Stockpiling about 6,730 cu. yd. mineral aggregate (oil rock) materials and cr. stone surfacing material for about 10.9 miles of State Road No. 11, Fishtrap West and Fishtrap to Tyler. 5-3

SHELTON, WN.—Bids to 2 p.m., May 20th, by County Comm., Shelton, Wn., for const. Secondary Road Project No. 14 in MASON CO., Wn. 4-29

CHEYENNE, WYOMING—Bids to 10 a.m., May 16th by State Highway Comm., Cheyenne, Wyo., for: (1) CROOK CO. (NRH 216)—20.410 mi. grad. drain and misc. work on the Belle Fourche-Alzada Road, involving: 300,200 cu. yd. excav. (2) NIOBRARA CO. (NRH 40-C)—11.273 mi. oil treatment by road mix method on the Lusk-Newcastle road, involv.: 18,350 tons cr. rock surf. (3) LARAMIE CO. (NRH 46 and NRS 277)—8.870 mi. oil tr. by road mix method and base course stabilization on the Cheyenne-Laramie and Cheyenne-Ft. Collins road, involving: 8,300 tons grav. surf. (4) BIG HORN AND PARK CO. (NRS 260 and NRS 267)—9.607 mi. base course stabilizing on the Lovell-Byron and Powell-Willwood roads. (5) SWEETWATER AND UINTA CO. (NRS 255 and 269)—13.516 mi. base course stabilization on the Rock Springs-Winton and the Mt. View-Urie road. HOT SPRINGS AND WASHAKIE CO. (NRS 257 and 273)—8.336 mi. base course stabilization on the Thermopolis-Owl Creek and Gooseberry Creek roads. (7) ALBANY CO. (NRS 261)—28.603 mi. base course stabilization on the Laramie-Centennial road, involving: 31,000 tons. 4-20

CHEYENNE, WYOMING—Bids to 10 a.m., May 16th, by State Highway Comm., Cheyenne, Wyo., for: (1) CONVERSE CO. (NRS 271)—3.013 mi. base course stabilization on the Glenrock-Box Elder road, involv.: 33,900 gal oil asph. distrib. MC 2. (2) FREMONT CO. (NRS 274)—6.793 mi. base course stabilization on the Riverton-Pavillion road, involving: 1,750 tons gravel surfacing. (3) SWEETWATER AND UINTA CO. (State Projs. 1127, 1128, 1187, 1188, 1193 comb.)—Placing stone chips seal coat on 24 mi. and seal coat only on 18 mi. of the Granger-Evanston and Gramger-Kemmerer road, involving: 2,640 tons stone chips. (4) CAMPBELL AND JOHNSON CO. (St. Projs. 1205, 1206, 1207 and 1208 comb.)—Placing stone chips seal coat on 10.77 mi. of Midwest-Kaycee road and seal coat only on 49 mi. of the Moorcroft-Ucross road, 30 mi. of the Buffalo-Ranchester road and 8.2 mi. of the Midwest-Kaycee road in Sheridan, Campbell and Johnson Counties, involv.: 132,500 gal. seal coat RC 1. (5) WESTON CO. (St. Proj. 1211 and 1212 comb.)—14.915 mi. placing stone chips seal coat on the Newcastle-Lusk road and 2.65 mi. on the Newcastle-Four Corners road. 4-20

LOS ANGELES, CALIF.—United Concrete Pipe Corp., Box 1, Station 'H', Los Angeles, $24,911, low, to Calif. Div. of Highways, L. A., for 0.06 mi. grading and surfacing with plant mix surf. (medium curing type) at Harmon Barranca, VENTURA CO., Calif. (7 Ventura 9A). 5-2

SAN FRANCISCO, CALIF.—All bids submitted to Bureau of Public Roads, S. F., for 6.886 mi. grading and placing subgrade reinforcement on Sec. C, Rt. 73, Laguna Natl. Forest Highway, Cleveland Natl. Forest, SAN DIEGO CO., Calif., have been recommended for rejection. J. E. Haddock, Ltd., Pasadena, $137,916, submitted low bid. 4-26

DENVER, COLO.—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 CO., Wyoming. 4-29

PORTLAND, ORE.—Kern & Kibbe, 42 E. Salmon St., Portland, $63,964, low, to Oregon State Highway Comm., Portland, for 1.01 mi. paving on the Foster Road, Flavel St. Section of Southeast 82nd Ave., in MULTNOMAH CO., Oregon. 5-4

COLFAX, WN.—L. J. Chambers, Colfax, $25,844, low to Board of Comm., Colfax, Wn., for 3.2 mi. grading, draining and surf. with cr. stone, Secondary Road Proj. No. 24 on Penewawa Road. 4-10

SHELTON, WN.—Allen & Govan, Inc., Box 105, Olympia, Wn., $7,422, low, to Mason County Comm., Shelton, Wn., for construction of Secondary Road Project No. 13. 4-11

CONTRACTS AWARDED

PHOENIX, ARIZ.—To K. DeWitt, Mesa, Ariz., $162,684, by Bureau of Public Roads, Phoenix, for 3.776 mi. grading Sec. A of the Federal Lands Highway Project No. 6, the Globe-Showlow Highway, NAVAJO CO., Ariz. 4-5

PHOENIX, ARIZ.—To Borderland Const. Co., Tucson, Ariz., $42,647, to Arizona State Highway Comm., for 5.6 mi. grading, draining and aggregate base course and oil processing (road mix) on the Ajo-Tucson Highway, NRM 110-A, PIMA COUNTY. 4-8

PHOENIX, ARIZ.—To Rogers Bros., Snowflake, Ariz., $46,081, to Bureau of Public Roads, Phoenix, for 4.527 mi. grading on Section A of Rt. 30, the Globe-Showlow National Forest Highway, Sitgreaves Natl. Forest, NAVAJO CO., Ariz. 4-15

PHOENIX, ARIZ.—To Pleasant Hasler Const. Co., 324 Luhrs Bldg., Phoenix, $31,837, to Arizona State Highway Comm., for 3¼ mi. grading, draining and aggreg. base course, N. E. corner of Fort Huachuca Military Reservation, Ft. Huachuca-North Highway, NRS 103-A, COCHISE CO., Ariz. 4-26

PHOENIX, ARIZ.—To White & Miller, Box 2350, Tucson, $44,906, to Arizona State Highway Comm., for 6 mi. grading, draining, aggregate base course and oil processing (road mix) about 10 mi. north of Tucson, extending northerly on the Tucson-Florence Highway, NRS 11-A, 1935, in PIMA COUNTY, Ariz. 4-26

PHOENIX, ARIZ.—To E. L. Yeager, 2506 N. 7th St., Phoenix, $46,794, to State Highway Comm., for ⅓ mi. removing old pavement, curb and gutter, furnishing and placing select material, new concrete pavement, curb and gutter from north city limits of Holbrook along Porter St. to the railroad tracks, NAVAJO CO. 4-26

PHOENIX, ARIZ.—To R. C. Tanner and W. E. Hall Co., Phoenix, Ariz., $53,930, to Bureau of Public Roads, Phoenix, for 4.718 miles grading Section E, FLHP No. 2, Kingman-Boulder Dam Highway, MOHAVE CO., Ariz. 5-3

LOS ANGELES, CALIF.—To Southern California Roads Co., 2145 E. 25th St., L. A., $51,482, by Board of Public Works, L. A., for improving El Modena St., betw. Figueroa St., and Colorado Blvd., under Cash Contract. 4-4

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bldg., 20,670, to Board of Harbor Comm., L. A., for asph. paving roads, shed floors and wharf decks under Spec. No. 938. 4-11

LOS ANGELES, CALIF.—To Dimmitt & Taylor, 815 E. 59th St., L. A., $34,892, by Calif. Div. of Highways, L. A., for 1.7 mi. grading and applying road mix surface treatment through the Narrows (SD 198 F&G) in SAN DIEGO CO., Calif. 4-12

LOS ANGELES, CALIF.—To Rexroth & Rexroth, 2110-C, Sta. A, Bakersfield, $11,987, to Calif. Div. of Highways, L. A., for 5.9 mi. to be planted to trees, shrubs, and ground cover betw. Mission Road in Los Angeles and Atlantic Blvd., in Monterey Park, LOS ANGELES CO., Calif. 4-16

LOS ANGELES, CALIF.—To Griffith Co., L. A. Railway Bldg., L. A., $60,923. ALT. 'A', by Calif. Div. of Highways, L. A., for 0.6 mi. asphalt concr. paving betw. Ocean Ave. and Lincoln Blvd., in Santa Monica, LOS ANGELES COUNTY, Calif. 4-24

LOS ANGELES, CALIF.—To Mundo Engr. Co., 2305 E. 9th St., L. A., $28,543, by Calif. Div. of Highways, L. A., for 1.1 mi grading and asph. concr. pave. between 17th St. and Fairhaven Ave., in Santa Ana, ORANGE CO., Calif. 5-1

LOS ANGELES, CALIF.—To Daley Corp., 4430 Boundary St., San Diego, $45,437, by Calif. Div. of Highways, L. A., for 2.8 mi. grad. and tr. with liq. asph between 1 mi. east of Barrett and Tecate Rd., SAN DIEGO CO., Calif. 5-1

LOS ANGELES, CALIF.—To Lewis Const. Co., 210 S. Vermont Ave., Los Angeles, and Bodenhamer Const. Co., 354 Hobart St., Oakland, $228,000, to Forest Lawn Memorial Park Purchasing Agent, for 900,000 cu. yd. dirt removal and grading to lines and slope at Forest Lawn. 5-1

SACRAMENTO, CALIF.—To Lee J. Immel, 1031 Evelyn Ave., Berkeley, $14,176, by Div. of Highw., Sacramento, for 1.9 mi. planning exist. surf., rail trenches to be filled, and place plant-mixed surfacing (med. curing type) in Hayward, between 'B' St. and N. City Limits, and in San Leandro, betw. S. City Limits and Begier St., ALAMEDA CO., Calif. 4-27

SACRAMENTO, CALIF.—To E. A. Forde, 640 Redhill Ave., San Anselmo, $15,561, to Calif. Div. of Highways, Sacramento, for 1.3 mi. retread surf. betw. Mill St. and northerly city limits in Ukiah and betw. Broaddus Creek and northerly line of Northwestern Pacific right-of-way in Willitts, MENDOCINO CO., Calif. 4-27

SACRAMENTO, CALIF.—To Heafy Moore and J. A. Casson, 344 High St., Oakland, $89,977, by Calif. Div. of Highways, Sacramento, for 3.8 mi. grading and asphalt concr. paving betw. French Camp and Stockton, SAN JOAQUIN CO., Calif. 4-27

SACRAMENTO, CALIF.—To Jones & King, Jackson St., Hayward, $24,389, by Calif. Div. of Highways, Sacramento, for 0.6 miles grading and concr. and asph. concr. paving betw. southerly boundary and B St., Hayward, in ALAMEDA CO., Calif. 4-27

SACRAMENTO, CALIF.—Awards by Calif. Div. of Highways, Sacramento: (1) SAN MATEO CO.—To A. G. Raisch, 1 de Haro St., S. F., $46,280 for 0.2 mi. grad. and asph. concr. pav. betw. Crystal Springs Rd. and 3rd Ave. in San Mateo. (2) KERN CO.—To Basich Bros., 20,550 Normandie Ave., Torrance, $44,862 for 4.5 mi. grad. and bitum. tr. surf. betw. ½ mi. south and 4 mi. east of Western Waterworks Pumping Station. 4-24

SACRAMENTO, CALIF.—Awards by Calif. Div. of Highways, Sacramento, for: (1) YOLO CO.—To A. Teichert & Son., Inc., P. O. Box 1113, Sacramento, $29,414, for 0.6 mi. grade, widen present pavement with cr. run base and const. pl. mix surf.. over exist. pavement and cr. run base betw. S. City Limit and Main St. in Woodland. (2) PLUMAS CO.—To M. B. McGowan, Inc., Call Bldg., S. F., and C. W. Caletti & Co., San Rafael, $112,448 for const. two bridges on N. Fork of Feather River, one at Rock Cr. and one near Storrie. 4-15

SAN DIEGO, CALIF.—To V. R. Dennis Const. Company, 3911 5th Ave., San Diego, $16,789, by Dist. Eng., Calif. Div. of Highways, San Diego, for 1.1 mile asphalt concrete pavement to be widened between Russ Blvd. and Calle Colon in City of San Diego, SAN DIEGO CO., Calif. 5-3

SAN FRANCISCO, CALIF.—To Peninsula Paving Co., 9 Main St., S. F., $34,703, by Bureau of Public Roads, S. F., for 12.450 mi. placing bitum. surface treatment on Sec C of Rt. 77, the Mt. Shasta-Mt. Lassen Natl. Forest Highway, Shasta Natl. Forest, SISKIYOU CO., Calif. 4-22

SAN FRANCISCO, CALIF.—Peninsula Paving Co., 9 Main St., S. F., $69,431, by Bureau of Public Roads, S. F., for 28.077 mi. placing bitum. surf. tr. (armor coat) on Sec. A of Rt. 11, the Laval Beds Natl. Forest Highway and Secs. A and B, Rt. 12, the Howard Gulch Natl. Forest Highway, Modoc Natl. Forest, Modoc County, Calif. 4-22

SAN FRANCISCO, CALIF.—To Morrison-Knudsen Co., 1121 Title Guarantee Bldg., L. A., $159,413, to Bureau of Public Roads, for 2.155 mi. grading Sec. A2 of Rt. 3, the Big Oak Flat Road, Yosemite Natl. Park, MARIPOSA CO., Calif. 4-19

SAN FRANCISCO, CALIF.—To Peninsula Paving Co., 9 Main St., S. F., $16,800, by Bureau of Public Roads, S. F., for const. a gunite lining in the unlined portions of the Wawona Tunnel, Sec. A5 of Rt. 2, the Wawona Road, Yosemite Natl. Park, MARIPOSA CO., Calif. 4-4

SAN LUIS OBISPO, CALIF.—To John Fesler, P. O. Box 481, Santa Maria, $5,072, by Dist. Engineer, Calif. Div. of Highways, San Luis Obispo, for 0.4 mi. roadway cut to be widened and roadside to be planted betw. 2 mi. N. of Solomon Summit and Santa Maria, SANTA BARBARA COUNTY, Calif. 4-24

VALLEJO, CALIF.—To Ransome Co., 4030 Hollis St., Emeryville, by Sears Point Toll Road, Vallejo, Calif., for filling chuck holes in sub-base and const. ¾" seal coat over 10 mi. of the Sears Point Toll Rd. between Napa River and Tolay Creek, at an estimated cost of $15,000.

DENVER, COLO.—Awards as follows by State Highway Engineer, Denver: (1) MOFFAT CO. (NRH 150-D, Const. Div. 3, and FLHP 1, Const. Div. 3)—To Henry Shore, P. O. Box 658, Grand Junction, Colo., $8,054, for 0.172 mi. subgrade stabilization work betw. Elk Springs and Massadona on State Highway No. 2. (2) ADAMS AND ARAPAHOE CO. (NRS 351C)—To J. H. & N. M. Monaghan, 332 So. Race St., Denver, Colo., $24,268, for 3.077 mi. grav. surf. east of Strasburg near Bijou Creek on State Highway No. 102. 4-6

DENVER, COLO.—To M. E. Carlson, 4483 Newton St., Denver, Colo., $41,501, to State Highway Dept., Denver, for 1.876 mi. gravel surf. betw. Calhan and Ramah, on State Highway No. 4 in EL PASO CO., Colo., Project NRH 79-J. 4-15

DENVER, COLO.—To Larson Const. Co., 1902 Blake St., Denver, Colo., $36,961, to State Highway Dept., Denver, for 1.337 mi. gravel surf. at Oak Creek on State Highway No. 131, ROUTT COUNTY, Proj. NRS 388-B, Colo. 4-15

BOISE, IDAHO—To Olof Nelson, Logan, Utah, $30,348, by Comm. of Public Works, Boise, for const. roadbed, drainage struc. and cr. grav. surf. on 6.263 mi. of the Dayton-Weston Road in FRANKLIN COUNTY, Idaho, USPW Highway Proj. NRS 187. 4-24

CARSON CITY, NEV.—To Fredrickson & Watson Const. Co., Fredrickson Bros., 873 81st Ave., Oakland, and Jones & King, Hayward, Calif., $97,864, by Nevada State Highway Comm., Carson City, for 22.50 mi. grading and gravel surfacing from 10 mi. northeast of Reno to Pyramid Lake, in WASHOE CO., Nev. 4-10

CARSON CITY, NEV.—To Nevada Rock & Sand Co., Inc., Box 1626, Reno, Nev., $68,175, by Nevada State Highway Comm., Carson City, for 12.21 mi. grad. and grav. surf. betw. Toll House and Paradise Hill, HUMBOLDT CO., Nev. 4-10

SANTA FE, NEW MEXICO.—Awards by State Highway Engineer, Santa Fe, N. M.: (1) SANTA FE CO. (NRH 3)—To Cook & Ransome, Ottawa, Kansas, $10,934, for 4.545 mi. grad., planting and misc. landscaping and const. work on U. S. Highway No. 85, betw. Santa Fe and Las Vegas. (2) EDDY COUNTY (NRH 131-A)—To Skousen Bros., Albuquerque, $128,694, for 15.127 mi. grading, minor drain. struc. base course surfacing, double span 50 ft. steel and concrete bridge and miscellaneous construction. 4-22

SANTA FE, NEW MEXICO—Awards by State Highway Engineer, Santa Fe, N. M.: (1) COLFAX CO. (NRS 208-B)—To Cook & Ransome, Ottawa, Kansas, $46,416, for 7.408 mi. grading, minor drainage struc. and cr. sel. material on State Route No. 72 betw. Raton and Folsom. (2) BERNALILLO CO. (NRS 214-B)—To Billington & Furbee, Belen, N. M., $15,040, for 2.237 mi. grading, screened gravel surf. and minor drainage struc. on State Road No. 10, betw. Timoras and Golden. 4-22

PORTLAND, ORE.—To Parker-Schram Co., Counch Bldg., Portland, $39,819, by U. S. Engineer Office, Portland, for excavation and backfill of trenches and const. of reinf. concr. walks, curbs, gutters, etc., and concr. bases for lamp standards; storm drainage pipe system and lawn sprinkling system, at Permanent Quarters Area at Bonneville, Ore., under Bid No. 698-35-535. 4-20

PORTLAND, ORE.—To Joplin & Eldon, Columbia Blvd. and Peninsular St., Portland, $118,070, by Bur. of Pub. Roads, Portland, for 11.90 mi. resurfacing and oil rock stockpiling Proj. PEC-1-B, the Mt. Rainier Natl. Park (Paradise Section) National Park Project located in Mt. Rainier Natl. Park, PIERCE AND LEWIS COUNTIES, Washington. 4-20

PORTLAND, ORE.—To Joplin & Eldon, Columbia Blvd. and Peninsula St., Portland, Ore., $118,070, by Bureau of Public Roads, Portland, Ore., for 11.90 mi. resurf. and oil rock stockpiling Proj. PEC-1-B, the Mt. Rainier Natl. Park (Paradise Section) Natl. Park Proj. located in Mt. Rainier Natl. Park, PIERCE AND LEWIS COUNTIES, Washington. 4-5

PORTLAND, ORE.—To J. C. Compton Co., McMinnville, Ore., $89,581, by Bureau of Public Roads, Office Bldg., Portland, Ore., for 19.108 mi. bitum. surf. the Crater Lake Natl. Park, East Entrance, Lost Creek Ranger Station-Keer Notch Section; Rim Road-Lodge-Diamond Lake Junction; Diamond Lake Rd. Junction, North Entrance, Proj. PEC-5-A2, B and PEC-7-A and B, located in Crater Lake Natl. Park, KLAMATH CO., Ore. 4-20

PORTLAND, ORE.—To Brent-Sturgill Co., Inc., College Place, Wn., $33,543 by Bureau of Public Roads, Portland, for const. or improv. the Mt. Adams Highway reconst. grading and subgrade reinf. proj. FHEC 17-A1, Natl. Forest Road Proj., located in Columbia Natl. Forest, KLICKITAT CO., Washington. 4-8

PORTLAND, ORE.—Awards by Oregon State Highway Comm., Portland, Ore., for: (1) CURRY CO.—To A. S. Wallace, Roseburg, Ore., $15,254 for rock production project on Oregon Coast Highway. (2) JACKSON CO.—To A. S. Wallace, Roseburg, Ore., $11,286, for furn. cr. rock on Siskiyou Summit-State Line Section of Pacific Highway. (3) POLK & YAMHILL CO. NRS 252 (1935)—To Joplin & Eldon, Columbia Blvd. and Peninsula Way, Portland, $36,387 (road oil and pipe culvert) for 1.38 mi. grad. surf. and oil mat. surf. tr. on Yamhill Co. Line-Stratton Ranch Sec. of Salem-Dayton Sec. Highway. (4) HOOD RIVER CO. NRS 253 (1935)—All bids submitted on this project have been rejected and it will be readvertised for opening at a later date, for 0.85 mi. road mix oil surf. tr. on Jericho Lane Sec. of Hood River Secondary Hwy. 4-13

PORTLAND, ORE.—Awards by State Highway Comm., Portland, for: (1) WASCO CO.—To H. C. Rogers & Sons, P. O. Box 181, Yakima, Wn., $9,995, for furn. 6,200 cu. ft. cr rock in stockpiles on Maupin-Cow Canyon section of The Dalles-California Highway. (2) HOOD RIVER CO.—To Babler Bros., 2406 N. W. 28th St., Portland, $5,240, for 0.85 mi. oiling of Jericho Lane section of Hood River Secondary Highway. 5-4

SALT LAKE CITY, UTAH—Awards by Utah State Road Comm., Salt Lake City, for: (1) IRON CO. NRS 156-B and FLH 17-A (1935)—To J. W. Whiting, Springville, Utah, $33,218, for 12.175 mi. grad. and surf. betw. Cedar City and Enterprise and State Rd. No. 56. (2) BOX ELDER CO. NRS 133-C (1935)—To Crane & Corey, Jerome, Idaho, $38,701, for 5.092 mi. grad. and surf. betw. Madsen and Collinston. 4-13

SALT LAKE CITY, UTAH—Awards by Utah State Road Comm. for: (1) SALT LAKE CO. (NRS 163)—To Mullins & Wheeler, 22½ E. 1st So., Salt Lake City, Utah, $25,723. (2) RICH CO. (NRM 108-A&NRH 108-B)—To Toolson & Nielson, Logan, $46,430, for 4.881 mi. grav. surf. betw. Garden City and Idaho State Line. 4-27

OLYMPIA, WN.—Awards by Director of Highways, Olympia, for: (1) KITTITAS CO. (NRM 148-D&NRH 148-B)—To D. Nygren, Lloyd Bldg., Seattle, $67,586, for 0.4 of a mi. concr. and asph. concr. paving and const. a steel girder under crossing of the C. M. St. P. & P. R. R. Co. tracks on St. Rd. No. 7 in City of Ellensburg. (2) THURSTON CO. (NRM 200-A)—To Hart Const. Co., Inc., Box 1096, Tacoma, $22,206, for 0.1 mi. concr. paving and const. a portion of a concrete bridge on St. Road No. 9, West Fourth St. Bridge Revision and Harrison and Rogers Ave. intersection in City of Olympia. 4-4

OLYMPIA, WN.—Awards by Director of Highways, Olympia, for: (1) THURSTON CO.—To Sather & Sons, 8052 15th Ave. N. E., Seattle, $38,784, for 0.1 mi. paving and const. double track steel girder undercrossing at the Northern Pacific railway tracks on St. Rd. No. 1, in Tenino. (2) SPOKANE CO.—To Norris Bros., Burlington, Wn., $37,600, for 1.3 mi. paving county road from Hillyard north to Mead, est. cost $50,000. (3) JEFFERSON CO.—To Allen & Govan, Inc., Box 105, Olympia, Wn., $84,192, for 4.2 mi. grading and surfacing on Port Ludlow County road from junction with State Road No. 9 near Uncas to Center. 4-11

SEATTLE, WN.—To N. Fiorito, 844 W. 48th St., Seattle, $29,241, to King County Comm., Seattle, for 1.06 miles concr. paving on Issaquah Newport paving gaps, Secondary Road No. 18 (West Side Lake Sammamish). 4-18

SEATTLE, WN.—To Washington Asphalt Co., 17 Lander St., Seattle, Wn., $51,234, to King County Comm., Seattle, for 7.5 mi. clearing, grubbing, grading, draining and constructing a bitum. surf. by plant mix method on the Kent-Kangley-Witte roads. 4-18

WENATCHEE, WN.—To E. B. Link, Wenatchee, Wn., $20,120, to Board of County Comm., Wenatchee, for 3 mi. grad. and surf. Wheeler Hill to Stemilt Hill, 9 mi. South of Wenatchee. 5-4

CHEYENNE, WYO.—Awards by State Highway Comm., for: (1) LINCOLN CO. (NRH 34-A—1935)—To Ed. Selander, Greeley, Colo., $37,577, for 10.689 mi. grading, draining, base course surf. and misc. work on the Cokeville-Star Valley Road. (2) PARK CO (NRS 268—1935)—To Taggart Const. Co., Cody, Wyo., $40,619, for 1.187 mi. grading, draining, base course surf. and misc. work on the Cody-Clarks Fork Road. (3) BIG HORN CO (NRS 270—1935)—To J. J. Dooling, 1316 St. Paul St., Denver, $28,150, for 5.587 mi. grading, draining, base course surf. and const. 1 tr. timber bridge and misc. work on the Basin Burlington Road. 4-18

BRIDGES and CULVERTS

CALLS FOR BIDS

LOS ANGELES, CALIF.—Bids to 2 p.m., May 16th, by Calif. Div. of Highways, L. A., for const. bridge across Tujunga Wash on San Fernando Road betw. Truesdale Ave. and Wentworth St., consisting of nine 45-ft. concr. spans on concr. piers and about 197 lin. ft. timb. trestle on pile bents, in LOS ANGELES CO., Calif. 4-23

LOS ANGELESñ, CALIF.—Bids to 2 p.m., May 23rd, by Calif. Div. of Highways, L. A., for reinf. concr. girder bridge across Newhall Creek at Newhall, consisting of four 30-ft. spans to be widened, in LOS ANGELES CO., inv.: 1,100 cu. yd. struc. excav., 110 tons asph. concr., 68,000 lb. rein. steel, 465 cu yd. A concrete. 4-30

SACRAMENTO, CALIF.—Bids to 2 p.m., May 22nd, by Calif. Div. of Highways, Sacramento, for const. undergrade crossing under SP 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, inv.: 28,000 cu. yd. struct. excav., 600 cu. yd. B concr. (precast deck slabs), 4,000 cu. yd. B conc. (walls, pier shafts, and base slabs), 570,000 lb. reinf. steel, 30,000 lb. pipe railing, 6,000 lb. cast iron pipe and spec. castings. 4-30

OLYMPIA, WN.—Bids to 10 a.m., May 21st, by the Director of Highways, Olympia, Wn., for a bridge 263.16 ft long over the Wenatchee River in Tumwater Canyon, Section 1; and a steel girder bridge 145 ft. long over Chiwaukum Creek, in Tumwater Canyon, Section 2, on State Road No. 15 in CHELAN COUNTY, Wn., PWP 5926, involv.: 491 cu. yd. concrete, 279,000 lb. struct. steel, 63,350 lb. reinf. steel, and other items. 5-3

CHEYENNE, WYOMING—Bids to 10 a.m., May 16th, by State Highw. Comm., Cheyenne, Wyo., for const. 4 reinf. concr. culv. and 2 tr. timb. bridges on the Belle Fourche-Alzada road, CROOK CO., Wyo. 4-20

BIDS RECEIVED

LOS ANGELES, CALIF.—Bodenhamer Const. Co., 354 Hobart St., Oakland, and Silveria & Robbins, P. O. Box 902, Ventura, $72,166, low to Calif. Div. of Highways, L. A., for bridge 301 ft. long across Arroyo de las Posas & PE RR Co. tracks at Marengo St. in city of L. A., consisting of reinf. conc. girder span, on reinf. concr. abutm. and piers, LOS ANGELES CO. (Southern L A 4 L A), Calif. 5-2

LOS ANGELES, CALIF.—Silveria & Robbins and J. P. Immel, P. O. Box 902, Ventura, $17,850, low, to Calif. Div. of Highw., L. A., for reinf.. concr. girder bridge across Calleguas Cr., 2½ mi. S. of Camarillo, consist. of one 40-ft. span and two 35-ft. span on concr. bents and abutments in VENTURA CO. (7 Ventura Camarillo St. Hospital.) 5-2

OGDEN, UTAH—S. G. Morin, 309 South Bernard St., Spokane, Wn., $23,021, low, to Bureau of Public Roads, Ogden, for const. or improving the Lewis & Clark Highway, Kooskia Bridge, Natl. Forest Road Proj., FHEC 16-A5, Unit No. 2, near Selway Natl. Forest, IDAHO CO., Idaho. 4-24

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To D. A. Loomis, 676 Salem St., Glendale, $11,284, by Calif. Div. of Highways, L. A., for const. of a steel and concr. pedestrian overhead structure across the State Highway in Santa Monica, about 0.5 mi. northwest of Colorado Ave., in LOS ANGELES CO. 5-1

LOS ANGELES, CALIF.—To J. E. Haddock, Ltd., 357 N. Chester Ave., Pasadena, $39,633, by Calif. Div. of Highways, L. A., for reinf. conc. girder bridge across Trabuco Creek, 2 mi. north of San Juan Capistrano, consisting of three 48-ft. spans on concr. piers and grade and concr. pave. approaches, in ORANGE CO., Calif. 5-1

LOS ANGELES, CALIF.—To Lynch Cannon Engr. Co., 5658 Wilshire Blvd., Los Angeles, $39,993, by Board of Public Works, L. A., for widening existing reinf. concr. girder bridge over San Fernando Road at Southern Pacific Co.'s new tunnel station, under Cash Contract. 4-4

LOS ANGELES, CALIF.—To John Strona, Philadelphia and East End Aves., Chino, $149,962 (cast in place) to Board of Public Works, L. A., for const. of Gaffey Street bridges, one a concrete girder bridge on Gaffey Street over Summerland Ave., and a reinf. concr. arch bridge on Elberon Ave. over Gaffey St. 4-4

SACRAMENTO, CALIF.—To Fredrickson & Watson Const. Co. and Fredrickson Bros., 873 81st Ave., Oakland, $129,908, by Calif. Div. of Highways, Sacramento, for widening existing undergrade crossing under the S. P. tracks and S. San Francisco Belt Railway at So. San Francisco, consisting of one 43-ft. 7 in. straight girder and concr. girder and concr. dock span, and one 98-ft. 8-in. steel beam and concr. deck span, in SAN MATEO CO., Calif. 5-1

SACRAMENTO, CALIF.—To Barrett & Hilp, 918 Harrison St., S. F., $1,026,780, by Calif. Div. of Highways, Sacramento, for const. overhead crossing over tracks of AT&SFRR, SP Co., and Key System, Ltd., in City of Oakland, ALAMEDA CO., consisting of a steel and concr. viaduct on concr. bents with concr. roadway slab. 4-24

BOISE, IDAHO—To James J. Burke & Co., Salt Lake City, Utah, $156,216, by Comm. of Public Works, Boise, for a concr. subway, 711 ft. long, under the O.S.L. RR. tracks on 11th Ave. in Nampa, CANYON CO., Idaho. 4-24

PORTLAND, ORE.—To Tom Lillebo, Reedsport, Ore., $31,675, to the Oregon State Highway Comm., Portland, for const. four piers for a bridge over Eagle Creek on Columbia River Highway, 1½ miles east of Bonneville in MULTNOMAH CO., Ore. 5-4

CHEYENNE, WYOMING—To Olof Nelson, Logan, Utah, $70,293, by the State Highway Dept., Cheyenne, Wyo., for 8 reinf. concr. culverts and 8 bridges on the Cokeville-Star Valley Road, in LINCOLN CO., Wyoming. 4-18

WATER SUPPLY SYSTEMS

WORK CONTEMPLATED

PHOENIX, ARIZ.—Plans have been completed and call for bids will be issued shortly by City Commission, Phoenix, for construction of connecting lines from the newly constructed water main to the new consumers. A PWA loan of $100,000 and a grant of $50,000 has been obtained to finance the project. 4-6

SAN DIEGO, CALIF.—The PWA has made a loan and grant of $524,000 to the City of San Diego for a water system, involving installation of a pipeline from El Capitan Dam to present distribution system and constructing a road around the dam and reservoir site. 4-20

SEAL BEACH, CALIF.—City Council, Seal Beach, has authorized City Engineer Vic Hayes to prepare plans and specifications for construction of a municipal water system, a PWA Project. Bonds in the amount of $30,000 were voted recently. 4-9

SALT LAKE CITY, UTAH—The PWA has made a grant of $314,025 to Salt Lake City to finance: Construction of a steel pipeline and tunnel betw. the Silver King Mine at Park City to Lambs Canyon in Parley. Replacement of wood stave pipe lines in Cottonwood and Mill Creek areas, including installation of appurtenances and re-connections in existing services; and a steel pipe in 17th East St., from Parleys Creek, Garfield Ave., and 15th E Street to the 5th South Reservoir, with intake and outlet structures. Est. cost, $1,004,850. 4-26

GOLDENDALE, WN.—The PWA has made a loan and grant of $35,000 to Goldendale, Wn., for improvements to waterworks system, including replacement of mains and distributing lines with woodstave and cast iron pipe; enclosing and piping of several new springs to the system; and the concrete lining of existing 250,000 gallon storage reservoir. 4-15

TACOMA, WN.—The PWA has made a loan and grant of $43,000, to the Metropolitan Park District, Tacoma, for Park improvements consisting of underground irrigation system in Point Defiance Park; tennis courts, garage and Administration Bldgs. in Wright Park, and waterworks system consisting of a well supply, pumphouse, pumping equipment, pressure tank and distribution system in Jefferson Park. 4-15

CALLS FOR BIDS

JACKSONVILLE, ORE.—Bids to May 23 by City Clerk, Jacksonville, for improvements to waterworks system involv.: 200 ft. 6x8 ft. tunnel, 8,500 ft. 6-in. water pipe, 1,330 ft. 8-in. water pipe. 5-1

EMERYTOWN, UTAH—Bids to 11 A.M., May 21, by the City Clerk, City Hall, Emerytown, Utah, for construction waterworks improvements, involving: 7,577 ft. 2-in. cast iron pipe, 4,774 ft. 3-in. cast iron pipe, 6,176 ft. 4-in. cast iron pipe, 1,650 ft. 6-in. cast iron pipe, valves, fire plugs, and fittings. Est. cost $18,000. 5-4

BIDS RECEIVED

EUREKA, CALIF.—Teufel & Carlson, Skinner Bldg., Seattle, Wn., $1,200,144 (complete job), and T. E. Connolly, 461 Market St., S. F., and Hanrahan Co., 582 Market St., S. F., $503,145, (Head-Works Unit); American Concrete & Steel Pipe Co., 4635 Firestone Blvd., Southgate, Calif., $621,360, (Pipeline Unit); and Mercer-Fraser Co., Eureka, and Bent Bros., Inc., and L. E. Dixon Co., 609 S. Grand Ave., L. A., $68,900, (Reservoir Unit); combined segregated bids totaling $1,193,405, lowest bids submitted to City Council, City Hall, Eureka, Calif., for const. of waterworks improvements consisting of a dam on the Mad River; 12 mi. steel pipe, 8 mi. wood stave pipe; and a 5,000,000 gal. reservoir. (See Unit Bid Summary.) 4-24

STOCKTON, CALIF.—Viking Automatic Sprinkler Co., 114 Sansome St., San Francisco, $31,427, low to Stockton Port District, for furn. and delivering and installing underground piping, valves, fire hydrants and sprinkler system for Port of Stockton. 4-10

PANGUITCH, UTAH—Low bids as follows by City Clerk, Paguitch, for improvements to waterworks system: (1) Pacific States Cast Iron Pipe Co., Provo, Utah, $26,220 for pipe. (2) Waterworks Equipment Co., 149 W. 2nd St., Salt Lake City, Utah, $774 for brass fittings. (3) Enoch Smith, 737 E. 2nd S., Salt Lake City, Utah, $13,642 for labor. 5-4

CLARK FORK, IDAHO—G. L. Arnett & Son, 3rd and Cedar Sts., Sand-Point, Idaho, $31,000 to City Clerk, Clark Fork, for a dam on Spring Creek, laying a 2½-mile pipeline from dam to City and one mile of distribution mains. 4-23

OGDEN, UTAH—Barnard Curtiss Co., 808 Phoenix Bldg., Minneapolis, Minn., SCHED. 1, $211,810; SCHED. 2, 1st ALT., $399,554, 2nd ALT., $426,422, low to Bureau of Reclamation, Federal Bldg., Ogden, Utah, for constructing the Ogen Canyon conduit, Ogden River Project, Utah, Spec. No. 622. 5-2

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To P. L. Burr, 320 Market St., S. F., $27,055 by Dept. of Pub. Works, S. F., for constructing Section B of Marina Extension to Auxiliary Water Supply System. 4-26

SAN FRANCISCO, CALIF.—To P. J. McHugh, 363 Valencia St., San Francisco, who bid $83,961 to the Dept. of Pub. Works, S. F., for installation of Sec. A of Marina Extension to Auxiliary Water Supply System. 4-19

SAN FRANCISCO, CALIF.—To E. J. Treacy, Call Bldg., San Francisco, $52,836 by Dept. of Public Works, S. F., for constructing Sec. D of Potrero Dist. Extension to Auxiliary Water Supply System for fire protection. 4-12

SAN FRANCISCO, CALIF.—To Robt. B. McNair and H. Gould, 3745 Rhoda Ave., Oakland, $69,815 by Dept. of Pub. Works, S. F., for constructing Sec. C of Potrero District Extension to Auxiliary Water Supply System for fire protection. 4-4

TORRANCE, CALIF.—To Chicago Bridge & Iron Works, 608 S. Hill St., Los Angeles (subject to P.W.A. approval), $26,265 to City Council, Torrance, for a 250,000 gallon elevated steel water tank and tower. 5-4

TORRANCE, CALIF.—To Roscoe Moss Co., 4360 Worth St., L. A., $7,061 (subject to P.W.A. approval) by City Council, Torrance, for drilling one rotary type gravel envelope water well, approximately 700 ft. deep, 12 to 16-in. diameter. 4-25

WALNUT PARK, CALIF.—To Fred Weber, 8442 Calif. Ave., Huntington Park, $8,300 by Walnut Park Mutual Water Co., 7216 S. Seville St., Huntington Park, for furnishing and installing cast iron B & S pipe. 4-20

MT. HOME, IDAHO—Awards by Town Clerk, Mt. Home, Ida., for furn. and install. cast iron water pipe for distribution system: (1) To H. C. Malott, 6542 17th Ave. N.E., Seattle, $8,297, for CONSTRUCTION ONLY, (2) To Water Works Equipment Co., 149 W. 2nd S., Salt Lake City, $32,416 for MATERIALS ONLY. 4-23

CHINOOK, MONTANA—To Hugo T. Schellin, Chinook, Montana, $23,710 to City Clerk, Chinook, for const. improvements to Municipal Water Plant. 4-26

DAYTON, ORE.—Awards by City Recorder, Dayton, Oregon, for constructing improvements to waterworks system: (1) To D. P. Slater, 744 N. Capitol St., Salem, Ore., $5,642 for LABOR ONLY; (2) To Pacific Water Works Supply Co., Inc., Atlantic St. Dock, Seattle, $13,858 for steel wrapped pipe and fittings. 4-25

YACHATS, WN.—To D. P. Slater, 744 N. Capitol St., Salem, Ore., $5,008 (steel), by Yachats Water District, for water system improvements involving 10,800 ft. 4-in. pipe and fittings. 4-10

OREM, UTAH—Awards by Town Clerk, Orem, for waterworks system improvements: (1) To Pacific States Cast Iron Pipe Co., Provo, Utah, $38,774 for pipe and $1,328 for pipe fittings. (2) To Thomas C. Davis, Spanish Fork, Utah, $9,029 for trenching and installing pipe, etc. 5-4

MABTON, WN.—To A. A. Durand, Walla Walla, Wn., $9,666, by Mabton City Council, for drilling, casing and testing a 950 ft. well. 4-20

SEWER CONSTRUCTION

WORK CONTEMPLATED

COLTON, CALIF.—City Council, Colton, has under consideration the following proposals for providing an outfall line from the sewage disposal plant: (1) Construction of a booster plant to handle the clarified water at a higher level than from a gravity line at plant. (2) Obtaining a right-of-way from sewer plant to Santa Ana River. (3) Construction of perpetual outfall at the Pollisior Ranch. 4-11

HUNTINGTON BEACH, CALIF.—City Council, Huntington Beach, has purchased a 44-acre tract ½ mi. east of Hampshire and Coast Aves., Huntington Beach, as a site for the proposed sewage disposal plant. 4-4

LONG BEACH, CALIF.—City Council, Long Beach, has approved tentative plans for drainage facilities submitted by J. W. B. Blackman, public service director, and has authorized them to be submitted to Federal, State and County Flood Control District Engineers. Project consists of an outfall conduit and a balancing reservoir; the conduit to be partly open cut and partly in tunnel running from the existing sump or reservoir to the ocean along Walnut and Falcon Aves. and 9th Place; 1,850 ft. to be a 9-ft. 8-in. box and 8,300 ft. to be a 10-ft. by 9-ft. 6-in. horseshoe section tunnel. Est. cost, $1,100,000. 4-12

RIVERSIDE, CALIF.—Hearing will be held May 27 by Board of Supervisors, Riverside, for construction of sewage treatment plant, 40-acre site acquirement and two miles of main, to be located approximately 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 4,000. Est. cost $102,000. 4-24

RIVERSIDE, CALIF.—County Supervisors, Riverside, have appointed A. C. Fulmor, engineer, to prepare cost estimates for formation of the Coachella Sanitary District. Project will also include construction of a garbage incinerator. 4-24

SAN GABRIEL, CALIF.—The City Council, San Gabriel, has authorized Koebig & Koebig, Consulting Engineers, to prepare plans and estimates for construction of a sewage disposal plant. 4-26

SAN MATEO, CALIF.—Plans and specifications are being prepared by City Engineer and call for bids will be issued shortly by City Clerk, San Mateo, for const. an outfall sewer. Bonds have been sold. Est. cost $146,000. 4-4

SEAL BEACH, CALIF.—City Council, Seal Beach, has authorized the Currie Engineering Co., San Bernardino, to prepare plans and specifications for the constr. of a sewage disposal plant, a P.W.A. project. Bonds of $40,000 were voted recently. To be sedimentation and trickling filter type. 4-9

DENVER, COLO.—Election will be held May 21 by Denver, Colo., to vote on a $2,000,000 bond issue to finance construction of a sewage disposal plant. 4-27

FARMINGTON, UTAH—Plans and specifications are being completed and call for bids will be issued shortly by City Clerk, Farmington, for improvements to sewer system, involving: 1 mi. 6-in. sewer pipe, 1¼ mi. 8-in. sewer pipe, ⅛ mi. 10-in. sewer pipe, ½ mi. 12-in. sewer pipe. Imhoff Tank and appurtenant work. Est. cost $51,000. 4-24

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To. S. M. Milovich, 208 Cochrum Bldg., Montebello, $15,422 to Calif. Div. of Highways, L. A., for const. 618 lin. ft. reinf. concrete box storm drain in Redlands at 3rd and 8th Sts., in SAN BERNARDINO COUNTY, Calif. 5-1

RIVER and HARBOR WORK

WORK CONTEMPLATED

ALAMEDA, CALIF.—Plans and specifications have been completed by City Engineer, Geo. Sperbeck, and call for bids will be issued shortly by City Clerk, Alameda, for constructing a Yacht Harbor at west end of Alameda adjacent to Alameda Airport. Work involves: Creosoted timber pile bulkhead, 180,000 cu. yd. dredging. Est. cost, $85,000. 4-23

SAN DIEGO, CALIF.—An appropriation of $247,000 will be available shortly to the Bureau of Yards & Docks, Washington, D. C., to constr. various improvements on the San Clemente and San Nicholas Islands, northwest of San Diego. 4-11

SAN DIEGO, CALIF.—The following projects will be undertaken by the County of San Diego, if funds are made available by the P.W.A. Dredging and developing of Mission Bay area near Bonita Bay including construction of bulkheads, a promenade and large bird refuge. Estimated cost $1,000,000. Dredging and construction of bulkheads at Silver Strand State Park. Sea wall and beach equipment at Carlsbad. 4-23

SAN DIEGO, CALIF.—The following work is considered necessary in the port of San Diego by the 11th Naval District, according to facts brought out in the hearing held by Major H. H. Stickney, U. S. District Army Engineer of L. A.: Dredging to 35 ft. to north and N.W. of turning basin; widening by 1,200 ft. the area along the north side of the channel. Dredging the south bay area to 26 ft. beyond the destroyer base. Removal of middle ground shoal. Commercial interests asked for dredging the south bay; yachting interests asked for dredging of the yacht basin. The City of San Diego asked for: Dredging Dutch Flats to a depth of 18 ft. and lesser area along north side of fairway and turning basin to 35 ft. Dredging area north end of Dutch Flats to 12 ft. Widening to 2,500 ft. and deepening to 30 ft. the channel from ferry fairway to destroyer base, including removal of shoal off Standard Oil Pier. Widening to 1,900 ft. and deepening to 30 ft. channel from destroyer base to National City. Dredging Roseville yacht basin to 20 ft. Dredging out Ballast Point middle ground.

SEAL BEACH, CALIF.—City Council, Seal Beach, has authorized City Engineer, Vic Hayes, to prepare plans and specifications for construction of a breakwater and jetty at the west entrance to Anaheim Bay, a P.W.A. project. Bonds of $62,000 were voted recently. A grant of $20 000 has been made. 4-9

PEARL HARBOR, T. H.—Call for bids will be issued in September by Bureau of Yards and Docks, Navy Dept., Washington, D. C., from Pacific Coast concerns exclusively for construction of a steel floating drydock for Pearl Harbor, T. H., at estimated cost of $10,000,000. The structure will displace 32,000 tons, have 175-ft. beam, approximately 1,000 ft. long. Bids will also be asked from Pacific Coast concerns for a smaller floating dock at Pearl Harbor, costing $750,000. 5-1

CALLS FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 a.m., May 15, by General Manager, Harbor Dept., L. A., for furn. and driving 15,000 lin. ft. of reinf. concr. driving piles, etc., for wharf at Berth 155, under Spec. 940. 4-25

BIDS RECEIVED

PORTLAND, ORE.—L. Colluccio & Co., 103 Securities Bldg., Seattle, Wn., $192,450, low to U. S. Engineer Office, Portland, 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. 4-24

CONTRACTS AWARDED

OAKLAND, CALIF.—To A. W. Kitchen & Co., 110 Market St., S. F., $169,770 (with P.W.A. approval) by Oakland Port Commission, for constructing a 300 ft. extension to wharf, located at north end of present wharf in Oakland Outer Harbor. 4-23

STOCKTON, CALIF.—To Biasotti, Willard & Biasotti, 40 W. Clay St., Stockton, $18,750 to Stockton Port District, for building extensions to road and drainage systems and control gates and gatekeeper's house for Sockton Port District. 4-17

HONOLULU, T. H.—To Hawaiian Contracting Co., Honolulu, T. H., $58,800, to Bureau of Yards and Docks, Navy Dept., Washington, D. C., for constructing the Honolulu Quarantine Station Wharf. 4-15

Railroad Construction

CONTRACTS AWARDED

DESERT MOUND, UTAH—To Morrison-Knudsen Co., 319 Broadway, Boise, Idaho, by Union Pacific System, 1416 Dodge St., Omaha, Neb., for constructing 12 mi. new railroad and 2 mi. side tracks, betw. Desert Mound and Iron Mountain, Utah. Work consists of grading, track laying, and surfacing, also constructing bridges and culverts. 4-22

Irrigation and Reclamation

WORK CONTEMPLATED

YUMA, ARIZ.—Porter J. Preston, consulting engineer, has made the following report of plans and cost estimates for the proposed Gila Project; consisting of 585,000 acres in the lower Gila River Valley, from above Aztec to near Yuma, where it abuts the Mesa unit of the Yuma project. The four units are as follows: (1) Yuma desert area (139,000 acres), between Gila Mountains and the Mesa unit of the Yuma project, and from the Gila River to the Mexican boundary. Approximately 11,000 acres in north and south Gila areas which are irrigated by gravity from the Colorado River or pumping from wells, will be irrigated from canals serving the Yuma desert area. . (2) Wellton Mesa and Mohawk Valley area (153,000 acres) south of the Gila River and between the Gila and Mohawk mountains. (3) San Christobal Valley (184,000 acres) from south of the Gila River. (4) The Palomas Area (109,000 acres) along the north side of the Gila River eastward from the Muggins Mts. The diversion canal will travel 17.5 miles from Imperial Dam, crossing the Gila River about 1 mi. below the Gila River Bridge on the Yuma-Quartzsite Road to 0.7 mi. S.E. of Blaisdell, where pumping sta. 'A' will be located. Plans call for construction of one settling basin at the intake of the first unit of 1,900 second feet; two additional units will be constructed later to make total capacity of 6,000 2nd ft. The canal will have a bottom width of 22 ft. water depth of 13.5 ft. in earth sections, and 33 ft. bottom width and 24 ft. water depth for rock sections. Cost estimates for first unit are: Dam, headworks and desilting works, $1,397,910; Canal System, $4,217,612; Dumping Plants, $4,793,580; Distribution System, $8,475,862; Transmission Line, $590,000. Dr. Elwood Mead, Commissioner of Reclamation, has indicated that the project will be considered by the Bureau of Reclamation, when funds for such construction are available. 4-4

PRIEST RAPIDS, WN.—The P.W.A. has made a loan and grant of $95,000 to the Priest Rapids Irrigation District, Priest Rapids, Wn., for excavation of power intake canal to permit operation of existing power plant during the low water season. 4-15

BIG PINEY, WYOMING—The P.W.A. has made a loan and grant of $86,000 to the North Piney Irrigation District, Big Piney, Wyo., to finance construction of a dam on the North Piney Creek, to create a storage reservoir for irrigation purposes. 4-20

BIDS RECEIVED

YUMA, ARIZ.—Lewis-Chambers Const. Co., Inc., 1743 Canal Bank Bldg., New Orleans, $505,506 Sch. 1, 2 and 3, and Mittry Bros. Const. Co., 5531 Downey Rd., L. A., $260,400 Sch. 4, are apparent lowest combination of bids submitted to 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. 621. (See Unit Bid Summary.) 4-25

ONTARIO, ORE.—Morrison-Knudsen Co., 319 Broadway, Boise, Idaho, $127,485, low to Bureau of Reclamation, Ontario, Ore., for const. of earthwork and structures, South Canal, Sta. 736 to Sta. 1340, and South Canal Lateral 17.7, Succor Creek Div., Owyhee Project, Oregon-Idaho, under Spec. 619. Work is located near Homedale, Idaho. 5-1

ONTARIO, ORE.—George B. Henly, Nyssa, Ore., $10,502 low to Bureau of Reclamation, Ontario, Ore., for constructing earthwork and structures, Shepard Gulch Drain, Dead Ox Flat Div., Owyhee Project, Oregon-Idaho, under Spec. 676-B. 5-1

DAM CONSTRUCTION

LOS ANGELES, CALIF.—C. H. Howell, chief engineer, county flood control district, has reported to Board of Supervisors, L. A., that the cost of San Gabriel Dam No. 1, under revised plans will be $11,976,826. Work includes a bulwark 281 ft. above the floor of the canyon; a funnel-shaped spillway 1,440 ft. top width tapering to a 40-ft. conduit at the bottom. 4-11

BIDS RECEIVED

DENVER, COLO.—M. E. Carlson, 4483 Newton St., Denver, $461,427 low to W. B. Lowry, Manager of Improv. and Parks, Denver, for const. the Cherry Creek Retarding Dam to be located near Sullivan, Colo., 5 mi. southeast of Denver. 4-24

CONTRACTS AWARDED

SAN FRANCISCO, CALIF.—To Transbay Const. Co., Pier 24, San Francisco, $3,219,965 by Public Utilities Comm., S. F., for enlargement of the O'Shaughnessy Dam by the construction of an addition to the existing dam, for the purpose of increasing the capacity of Hetch Hetchy Reservoir. The addition will raise the crest of the dam by 85.5 ft. Construction of a new spillway, installation of new outlet control valves and spillway gates, clearing of the reservoir area betw. the present and future high water surface elevations, road and trail construction. 4-9

SAN JOSE, CALIF.—Contract officially awarded (with P.W.A. approval) to Macco Const. Co., 815 Paramount Bldg., Clearwater, $493,825 by Santa Clara Valley Water Conservation Dist., 62 Grant Bldg., San Jose, for const. the Coyote Dam and Spillway, located on Coyote Creek, 5 mi. E. of Morgan Hill, SANTA CLARA CO., Calif. 4-18

GUNNISON, COLO.—To Utah Const. Co., W. A. Bechtel Co., Morrison-Knudsen Co., and Henry J. Kaiser Co.; 1st National Bank Bldg., Ogden, Utah, $798,078 to Bureau of Reclamation, Gunnison, Colo., for constructing the Taylor Park Dam, Uncomphagre Project, located near Gunnison, Colo., under Spec. No. 594. 4-19

GLASGOW, MONT.—To Addison Miller, Inc., and Fielding & Shepley, Inc., 1201 Builders Exchange, St. Paul, Minn., $3,985,423, by U. S. Engineer Office, Kansas City, Mo., for const. the spillway gate struct., cut-off struc. and appurtenant works for the Fort Peck Dam, 25 mi. S.E. of Glasgow, Mont., on the Missouri River. The spillway is to be located about 3 mi. east of the east end of the dam and consists of 2,000 lin. ft. unlined approach channel, struc. steel gates, a concr. lined channel 5,000 ft. long, and a cut-off struc. at the lower end of the lined channel; and an unlined outlet channel from the cut-off struc. to the river valley, under Spec. No. 35-225. (See Unit Bid Summary.) 4-4

SALT LAKE CITY, UTAH—To T. E. Connolly, 461 Market St., San Francisco, $547,221, by Bureau of Reclamation, Salt Lake City, Utah, for constructing the Moon Lake Dam, Moon Lake Project, Utah, under Spec. No. 605. 4-4

SEATTLE, WN.—To D. Nygren, Lloyd Bldg., Seattle, Wn., $65,783 to Board of Public Works, Seattle, Wn., for const. a concr. dam with movable steel crest gates to replace existing wood crib dam across Cedar River at Landsburg, under Ord. 63736. 5-2

TUNNEL CONSTRUCTION

BIDS RECEIVED

OGDEN, UTAH—Union Construction Co., Ogden, $77,737. SCHED. 1 (Ogden-Brigham Tunnel) and Shofner & Gordon and Hinman Bros. Const. Co., P. O. Box 2882, Denver, $367,731. SCHED. 2 (Ogden Canyon Tunnel) low to Bureau of Reclamation, Ogden, for constructing the Ogden-Brigham Tunnel and the Ogden Canyon Tunnel, Ogden River Proj., under Spec. No. 618. (See Unit Bid Summary.) 4-19

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To L. E. Dixon and Bent Bros. & Johnson, Inc., 609 S. Grand Ave., Los Angeles, $366,607, by Board of Pub. Works, L. A., for a vehicular tunnel and other street work in Figueroa Street betw. Solano Ave. and Bishop Road, under Cash Contract. See Unit Bid Summary.) 4-16

SAN FRANCISCO, CALIF.—To Barrett & Hilp, 918 Harrison St., San Francisco, $211,104 (SEC A & B) by Public Utilities Commission, S. F., for constructing the Crystal Springs pipeline tunnel under S.F.W.D. Spec. 74. 4-23

POWER DEVELOPMENT

WORK CONTEMPLATED

PHOENIX, ARIZ.—State of Arizona has appointed a committee to prepare application to the Federal Government for construction of a power line across the State of Arizona, for Boulder Dam. 4-26

LODI, CALIF.—The P.W.A. has made a loan and grant of $600,000 to Lodi, Calif., for financing construction of a Municipal Power Plant. City election has to be held to allow the people to approve the construction of the power plant. 4-19

BOISE, IDAHO—Plans and specifications are being prepared by Engineering Dept. of the Idaho Power Co., Boise, Idaho, for construction of a hydro-electric plant on the Snake River at Twin Falls, Idaho. Work involves a dam across two channels of the river, a penstock through lava, and a power plant on the south side of the river. Est. cost $1,000,000. K. M. Robinson is General Manager of Idaho Power Co. 4-25

ZUNI AGENCY, NEW MEXICO—The P.W.A. has made an allotment of $30,000 for the installation of an electrical generating unit at the Zuni Agency, New Mexico, to the office of Indian Affairs, Department of the Interior. 4-26

SPOKANE, WN.—Plans and specifications are being made by Alex. Lindsay, Water Supt., City Hall, Spokane, Wn., for replacing timber crib dam with 8 gate concr. spillway dam, replacing present hydro-pumping plant with 5,400 H.P. hydro-electric plant to drive present centrifugal pumps. Dam is to be 59 ft. high from bottom of cutoff to top of bridge; 28 ft. high from bottom cutoff to crest. Gates 17 ft. by 26 ft. taintor individual hoists. Power house for 3 1,800 H.P. adjustable blade propeller type turbines and 3 1,625 KV.A., 2,300 volt alternators. No transformers. Work involves: POWER HOUSE AND INTAKE; 15,000 cu. yd. earth excavation, 5,700 cu. yd. reinf. concr., 4,000 sq. ft. sheet piling. Lump sum, superstructure: 3 1,800 H.P. adjustable blade propeller type turbines, 3 1,625 KV.A. 2,300 volt alternators, 3 headgates vertical lift, 100,000 lb. trash racks. DAM: 13,250 cu. yd. reinf. concr., 1,650 cu. yd. excav., 1,600 cu. yd. rem. Ashlar masonry, 320,000 lb. taintor gates, 5,000 sq. ft. sheet piling, 1,000 sq. yd. masonry wall. Est. cost $612,820. 4-29

FLOOD CONTROL WORK

WORK CONTEMPLATED

SEATTLE, WN.—Preliminary plans have been completed by J. P. Dodd, King County Engineer, Seattle, Wn., and P.W.A. financing is being sought for const. of the 300 ft. Mud Mountain Dam on the White River, east of Buckley, PIERCE COUNTY, Wn. Dam would prevent disastrous floods in the lowlands of KING and PIERCE COUNTIES. Est. cost $3,000,000. 4-30

MISCELLANEOUS

WORK CONTEMPLATED

NOME, ALASKA—The P.W.A. has made a loan and grant of $100,000 to Nome, Alaska, for construction of drainage system, fire protection system, sidewalks, Municipal buildings, and street surfacing. 4-20

CHACO CANYON, NEW MEXICO—The P.W.A. has made an allotment of $30,000 for the construction of fences in Chaco Canyon National Monument in New Mexico. Allotment was made to the Natl. Park Service of the Dept. of the Interior. 4-26

CALLS FOR BIDS

MARE ISLAND, CALIF.—Bids to 11 A.M., May 22, by Public Works Officer, Mare Island, for furn. and installing necessary apparatus to equip 4 boilers, Nos. 11 to 14 inclusive, to natural gas operation, and for furn. (but not installing) the necessary apparatus to equip two boilers, Nos. 9 and 10, for natural gas operation, all in the Central Power Plant, Building No. 121 at the U. S. Navy Yard, Mare Island, Calif., under Spec. No. 7920. 4-30

AMERICAN LAKE, WN.—Bids to 2:30 P.M. June 4, by Veterans Administration, Room 764, Arlington Bldg., Washington, D. C., for constructing and finishing complete transformer station and transmission line at Veterans Administration Facility, American Lake, Washington (Proj. No. 970). 5-2

BIDS RECEIVED

PASADENA, CALIF.—General Electric Co., 5201 Santa Fe Ave., Los Angeles, who bid $12,910, low to City Clerk, City Hall, Pasadena, for supervisory control for Municipal Light Department. 5-3

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Trucks
Chrysler Motors—Dodge Div.
International Harvester Co.
Marmon-Herrington

Truck Tires
Goodrich Rubber Co., B. F.

Tunnel Shovels
Bucyrus-Erie Co.
Harnischfeger Sales Corp.
St. Louis Power Shovel Co.

Turbines, Hydraulic
Pelton Water Wheel Co., The

Unloaders, Car and Wagon
Link-Belt Co.

Valves
California Corrugated Culvert Co.
Columbian Iron Works
Pacific Pipe Co.

Valves, Gate
California Corrugated Culvert Co.
Pelton Water Wheel Co., The

Valves, Hydraulic
California Corrugated Culvert Co.
Pelton Water Wheel Co., The

Wagons (Track Laying)
Adams Co., J. D.
Allis-Chalmers Mfg. Co.
American Tractor Equipment Co.
Austin Western Road Machy. Co.
Western Wheeled Scraper Co.

Waterproof Cement
Pacific Portland Cement Co.

Water Wheels
Pelton Water Wheel Co., The

Welders, Acetylene
Air Reduction Sales Co.

Welders, Electric Arc
Adams Co., J. D.
Air Reduction Sales Co.
Harnischfeger Sales Corp.
Lincoln Electric Co.

Welding Apparatus
Air Reduction Sales Co.
Lincoln Electric Co.

Welding, Wire
Adams Co., J. D.
Air Reduction Sales Co.
Columbia Steel Co.
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Roebling's Sons Co., John A.

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National Wire Cloth Co.

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OPPORTUNITY SECTION

RATES: SITUATIONS WANTED—5c per word; HELP WANTED—No charge to subscribers; OFFICIAL BIDS—20c per line; ALL OTHERS—$2.50 per column inch.

POSITION WANTED

Master Mechanic and Chief Electrician, 30 years experience. Now working; desires change. Mines, Mills, Smelters, Tunnels, Dams, Industrial Plants. Best references from past employers. Go anywhere. Address Box 460, Western Construction News, 114 Sansome Street, San Francisco.

OPPORTUNITY SECTION

The Southern California Edison Company Ltd.

Invites bids for the equipment in its Redondo Steam Plant at Redondo, Calif.

To obtain inventories address H. L. Wheeler, Sales Agent, Box 428, Alhambra, Calif.

No bids received after July 31st will be considered and the Company reserves the right to reject any or all bids.

FOR SALE
SACRIFICE PRICE

New 310′ portable compressor equipped with self starter and all modern features, will run four drills. Telephone ANgelus 14181. Address 6200 East Slauson Ave., Los Angeles, Calif.

Contractors, Attention!

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Suction Dredge for Sale

...Ready to operate—in first class condition. This 12″ suction dredge, equipped with 1300 ft. of 14″ pipe, contains a main unit of 12″x32″ Byron Jackson heavy duty rock and gravel pump, direct connected on steel base to 200 hp. over wound 2200 volt motor. Ideal for use in any suction dredge work.

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Address: **Fred L. Hayes, Supt.**
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complete with 500-ft. submarine cable, priming pump, draw works, etc.
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OFFICIAL BIDS

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office of the East Bay Municipal Utility District, until 8:00 P.M., Wednesday, May 22, 1935, and will at that hour be opened, for furnishing approximately 120,000 feet of cast iron pipe, of diameters 4 in., 6 in., 8 in., 12 in. and 20 in.

Specifications (No. LS 147) may be obtained upon application at Room 1204 Latham Square Building, 508 Sixteenth Street, Oakland, California.

JOHN H. KIMBALL,
Secretary.

Oakland, California
May 9, 1935.

NOTICE TO CONTRACTORS

Sealed proposals will be received at the office of the East Bay Municipal Utility District, until 8:00 P.M., Wednesday, May 22, 1935, and will at that hour be opened, for furnishing approximately 2,000 Barrels High-early-strength Portland Cement.

Proposals (No. 622) may be obtained upon application at Room 1427 Latham Square Building, 508 Sixteenth Street, Oakland, California.

JOHN H. KIMBALL,
Secretary.

Oakland, California
May 9, 1935.

UNITED STATES DEPARTMENT
OF THE INTERIOR

Bureau of Reclamation

(Federal Emergency Administration
of Public Works Project)

Construction of a Garage and Fire Station, Columbia Basin Project, Washington

Washington, D. C., April 25, 1935.

Sealed bids (Specifications No. 624) will be received at the office of the U. S. Bureau of Reclamation, Coulee Dam, Washington, until 10 a.m., May 25, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the **construction of a garage and fire station** at the Government camp at Grand Coulee Dam,, Columbia Basin project, Washington. The work is located about 22 miles northwest of Almira, Washington. The garage and fire station will be a one-story building, approximately 70 feet by 121 feet in size. The outside walls will be of reinforced concrete or brick. The inside partitions will be of timber construction covered with portland-cement plaster over metal lath. The roof will be of timber construction supported on structural steel trusses placed 15 feet on centers. The roof will be covered with built-up roofing. The floors will be concrete. The schedule provides for lump-sum bids for the construction of the building except excavation, compacted back fill, and concrete and for unit prices per cubic yard for excavation, compacted back fill, and concrete. The installation of plumbing and electrical facilities will be included in the lump-sum price bid for the construction of the building. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be a part of the contract. Bid security in an amount not less than 10 per cent and performance bond not less than 50 per cent will be required. No charge to prospective bidders for copies of the specifications and drawings; to others $2.00, not returnable. For particulars, address the Bureau of Reclamation, Coulee Dam, Washington; Denver, Colorado, or Washington, D. C.

ELWOOD MEAD, Commissioner.

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

INDEX TO ADVERTISERS

PUBLISHERS STATEMENT OF CIRCULATION

as Required by the Code Authority for the Periodical Publishing and Printing Industry

This is to certify that the average circulation per issue of Western Construction News for the six months period July 1 to and including December 31, 1934, was as follows:

Total Net Paid	**6,704**
Additional Controlled	**930**
Copies to Advertisers, employees, etc.	**413**
Total Distribution	**8,047**

Subscribed and sworn before me May 3, 1935, Eleanor J. Smith, Notary Public, San Francisco, California.

This statement of the circulation of Western Construction News is correct and true to the best of my knowledge and belief.

Signed, L. P. Vrettos, Circulation Manager.