WCN-07-1935

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME X, No. 7

JULY, 1935

25 CENTS A COPY
$2.00 PER YEAR

CABLE SPINNING STARTS

Out on the catwalk where the wires are adjusted for correct sag during cable spinning for the San Francisco-Oakland Bay Bridge. See page 185.

THE OLYMPIC CLUB POOL PRESENTED

2 Engineering Problems

"The architectural beauty of the swimming pool is blurred by the ravishing action of salt water fumes... walks and walls have been nearly eaten away by the resulting chemical action ... deterioration is evident throughout. This once beautiful room will be remade completely."—From The Story of the Improvements and Additions to the Olympic Club's City Home.

Two problems faced the architects and engineers in reconstructing the Olympic Club pool. *First,* the newly created beauty must be permanent... impervious to the ravages of despoiling chemicals and fumes. *Second,* the old concrete had reached its limit of volume changes, therefore it was necessary to use a cement in the accompanying new concrete that would have the lowest possible volume change to assure uniform expansion and contraction. Golden Gate SEA WATER CEMENT met both requirements.

Throughout the reconstructed building, products of Pacific Portland Cement Company have played their part. Empire Hardwall Plaster to assure lasting beauty for interior walls... Golden Gate Waterproofing to protect the outside walls and Golden Gate Portland Cement for the concrete.

Whatever the requirements, you will always find the right product for the specific purpose under the reliable name of Golden Gate, backed by true cooperation from the producer.

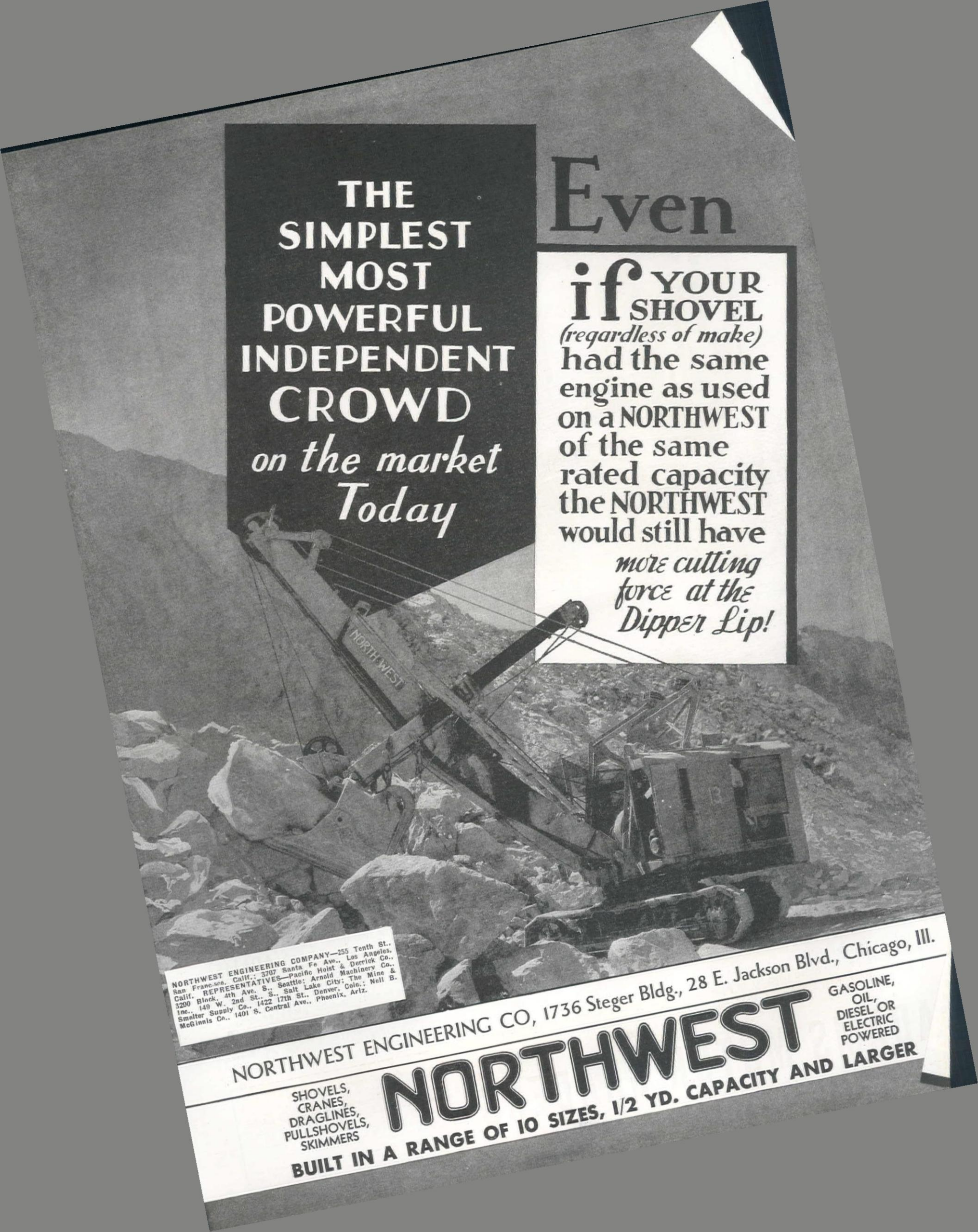
Swimming Pool in the Reconstructed Olympic Club

Douglas Dacre Stone, *Architect*
John A. Baur, Arthur Brown, Jr. & John Bakewell, Jr., *Consulting Architects*
Lindgren & Swinerton, Inc., *Contractors*
Richard Walburg, *Construction Manager*
Neel D. Parker., *Interior Decorator*

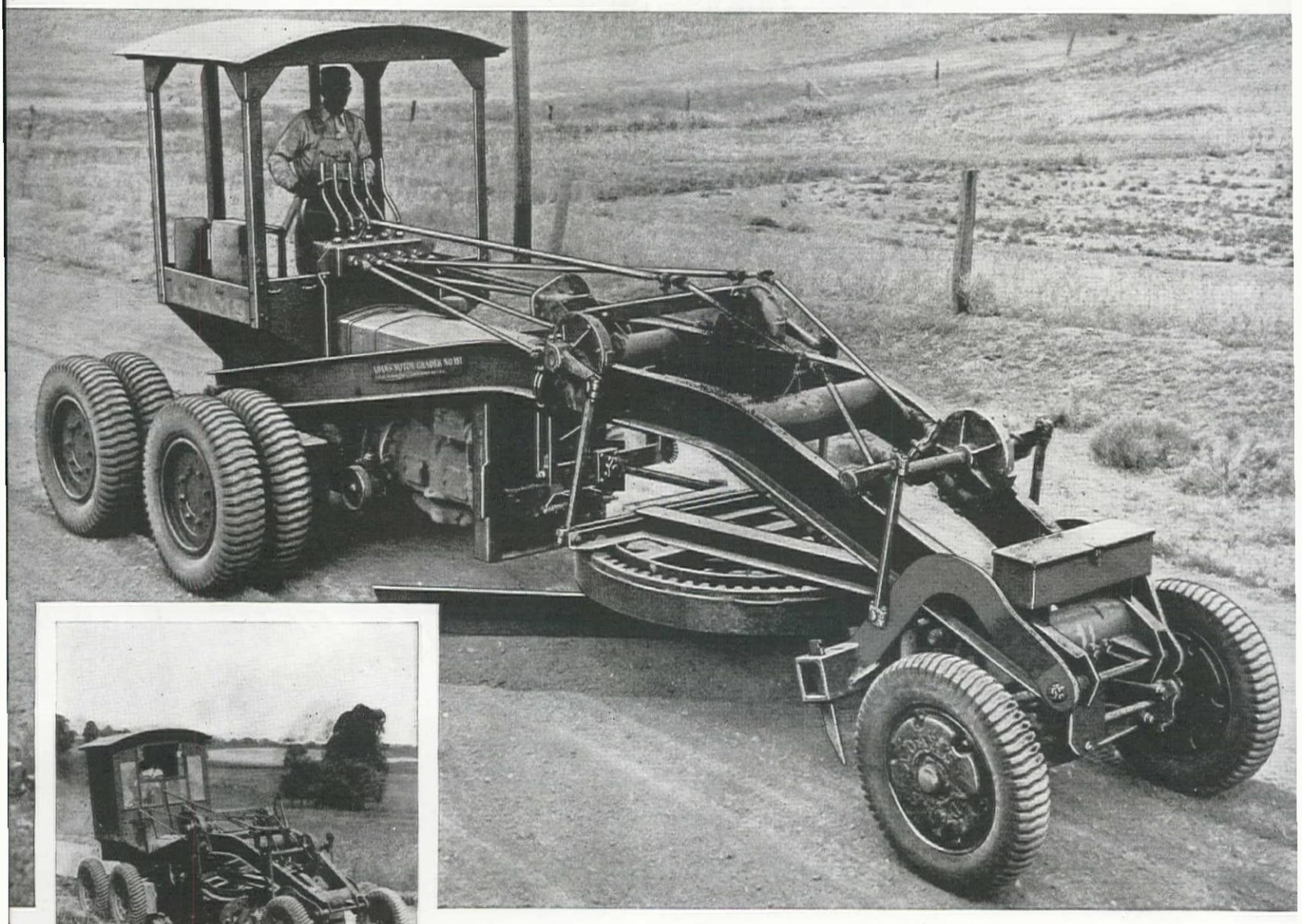
GOLDEN GATE
SEA-WATER
PORTLAND CEMENT

SOLVED THEM BOTH

PACIFIC PORTLAND CEMENT COMPANY
SAN FRANCISCO


THE SIMPLEST MOST POWERFUL INDEPENDENT CROWD on the market Today
Even
if YOUR SHOVEL (regardless of make) had the same engine as used on a NORTHWEST of the same rated capacity the NORTHWEST would still have more cutting force at the Dipper Lip!
NORTHWEST ENGINEERING COMPANY—255 Tenth St., San Francisco, Calif.; 3707 Santa Fe Ave., Los Angeles, Calif. REPRESENTATIVES—Pacific Hoist & Derrick Co., 3200 Block, 4th Ave. S., Seattle; Arnold Machinery Co., Inc., 149 W. 2nd St., S., Salt Lake City; The Mine & Smelter Supply Co., 1422 17th St., Denver, Colo.; Nell B. McGinnis Co., 1401 S. Central Ave., Phoenix, Ariz.
NORTHWEST ENGINEERING CO, 1736 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.
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

POWER... STAMINA
AND A DRIVE TO SUIT YOUR NEEDS



WHETHER you are doing reconstruction, oil-mix, or maintenance work, Adams Motors Graders have the power, stamina and type of drive to suit your needs.

These machines are available with dual-tired, two-wheel drive, or Adams Tandem Drive (4 or 8 drive wheels) to provide the proper traction for the job. Where "soft" footing is apt to be encountered the Tandem Drive is recommended.

The Adams frame — a strong, solidly welded unit of distinctive design—provides unsurpassed strength and rigidity. Adams machine-finished construction, with adjustability for wear, assures a long, useful life.

Mail the coupon at the right for new motor grader catalog more completely describing these machines.

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Please send me your new Motor Grader catalog.

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WCN—7

WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

J. I. BALLARD, Editor

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We Inaugurate a New Service

With this issue of *Western Construction News* we inaugurate a new directory service for our readers, to place them in closer and quicker touch with their sources of supply of equipment and materials. The new directory, which we have called the "Where to Buy in the West" section, will be found in the back of this issue, and in a similar position in subsequent issues. It is designed in the interest of our readers, and as a service to them, because they are the men who specify and buy equipment and materials in what is now the world's richest civil engineering market.

The construction industry of the West is decidedly regional in character. A western contractor has a job this season in California. Last season his job was in Washington; and perhaps next season he will be in Arizona. Wherever he goes, however, he must have equipment and materials. Generally he uses local sources of supply. But where can he get the shovel or tractor or grader he needs? "Where to Buy in the West" now gives the answer; will tell him what distributor or branch house locally can supply his needs—and all as near to him as his telephone.

Because of space limitations we have been able to list under the various distributors and branch houses only the products advertised in the issue in which the directory appears; but because the manufacturers of these products are the leaders in their fields, and because they are the largest group to appear in any western engineering publication, the reader will find in the directory variety and range to suit his individual needs, and from houses of integrity and dependability.

To our readers, therefore, we present "Where to Buy in the West." It is your directory, to be used for your convenience and profit. And because it is your directory, we shall welcome suggestions and criticisms that will make it a better and more effective means of service to you.

Chicago Office:
5737 Kenmore Ave.
6101 N. Sheridan Road
Stephen H. Babcock, Manager

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

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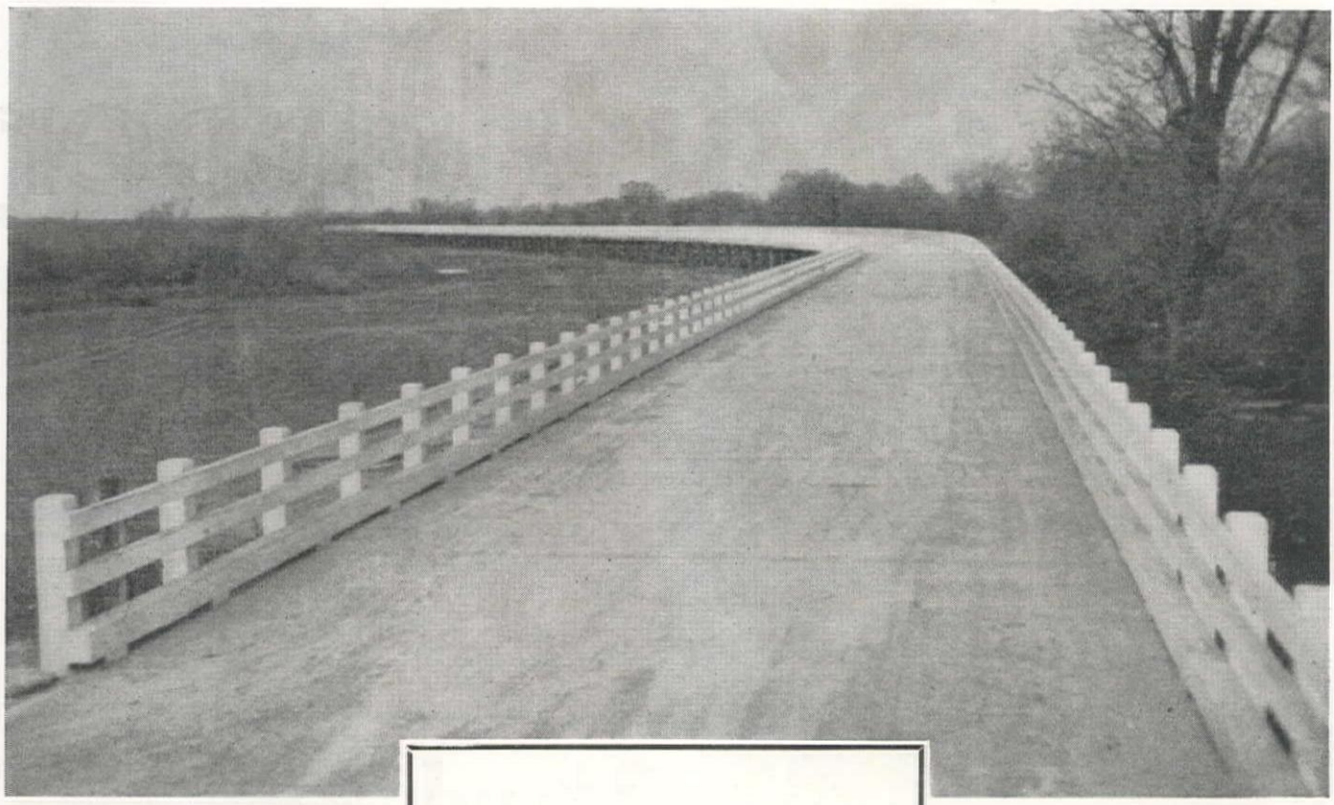
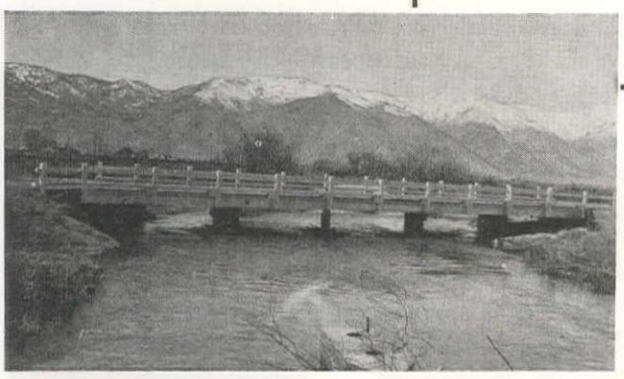


Benson Ferry trestle built of structural Redwood in 1934, 1,824 feet long, 20 ft. roadway. The average cost of two contracts under which the trestle was constructed was $1.43 per square foot of bridge surface.

Simplify *with* Redwood

...these Trestles Cost Less and are More Practical



Redwood trestle across the Carson River near Minden, Nevada. This is typical of Redwood structures that have been built by the Nevada Department of Highways in recent years.

Hundreds of trestles on State and County highways, varying in length from a single span to more than three miles, with roadway widths from 18 feet to 44 feet are constructed of structural grades of California Redwood. These dependable grades are especially selected to meet modern engineering requirements.

The sustained strength of Redwood has been proven in service. In the case of Benson Ferry Trestle, the Sacramento County engineers were influenced by their previous experience with Redwood. The sawed Redwood piles of the original Benson Ferry trestle were in perfect condition after 35 years of service.

CALIFORNIA REDWOOD ASSOCIATION
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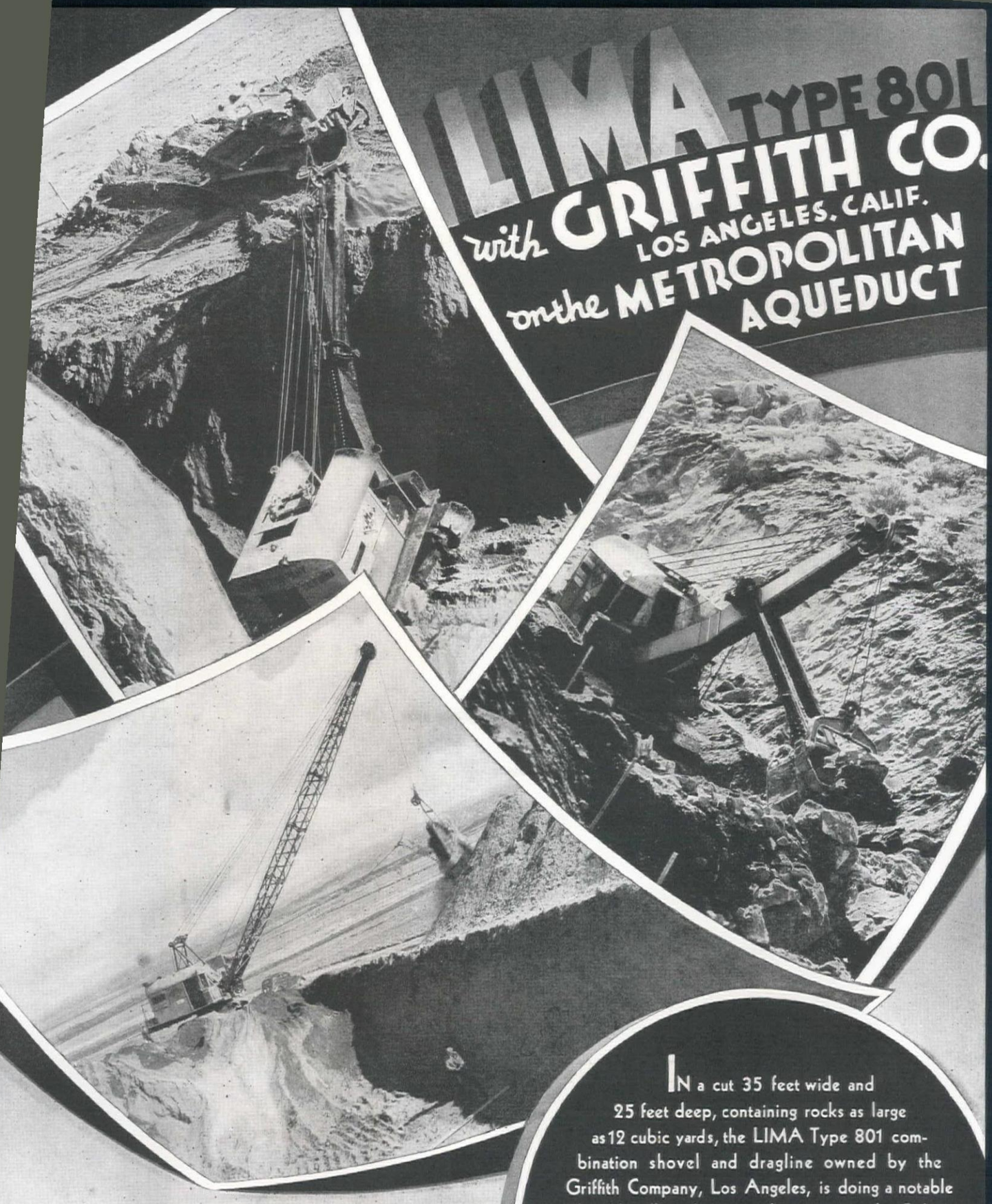
NATURALLY DURABLE CALIFORNIA REDWOOD



LIMA TYPE 801

with GRIFFITH CO. LOS ANGELES, CALIF.

on the METROPOLITAN AQUEDUCT

IN a cut 35 feet wide and 25 feet deep, containing rocks as large as 12 cubic yards, the LIMA Type 801 combination shovel and dragline owned by the Griffith Company, Los Angeles, is doing a notable job of handling the material at top speed. Relentless effort---day in and day out---without delay---is required of the digging unit to keep production on this job at the peak because the operation is restricted by seasonal limitations. This machine is equipped with an oil engine, consequently, fuel costs are exceptionally low. As a shovel the Type 801 handles a two yard dipper, as a dragline, a three yard bucket.

LIMA LOCOMOTIVE WORKS, Incorporated
SHOVEL AND CRANE DIVISION
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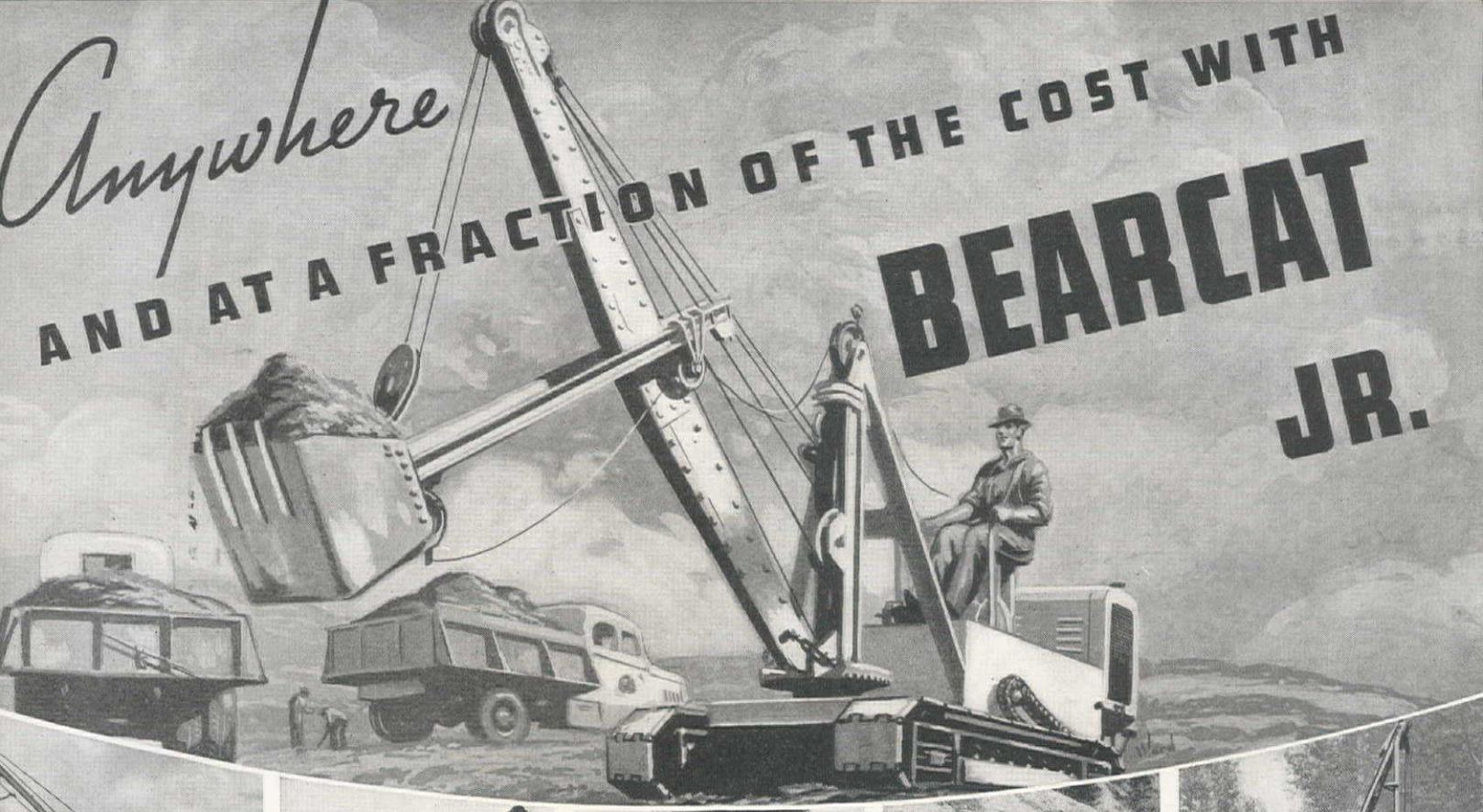
Anywhere AND AT A FRACTION OF THE COST WITH BEARCAT JR.



RIDA • Bear Cat Jr. on special crawlers walked right across, dig-ditches in undrained muck ground soft to support a man's weight

OHIO • Digging drainage ditches for world's largest fish hatchery at St. Mary's, Ohio, the 5th job in 3 days for this Bear Cat Jr.

FRANCE • Digging an 8 ft. trench outside of Paris. Bear Cat Jr. cost-savings are as well known in France and throughout Europe as in the United States

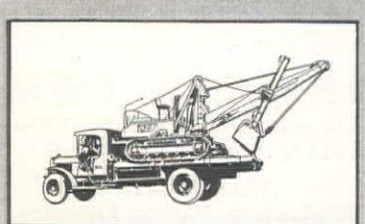
TENNESSEE • J. M. Cartwright says: "In 10 hours I have loaded as high as 500 yards of gravel"

U. S. ARMY • Light weight of Bear Cat Jr. permits driving piling all the way across a 70 ft. stream

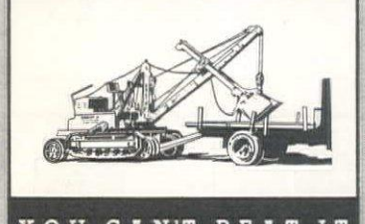
Whatever excavating or material handling you have to do, you can always depend on the Bear Cat Jr. to show big savings over present costs. For proof, ask any Bear Cat Jr. owner. Hundreds of them will tell you that you can excavate 250 to 300 yds. of dirt at the low average cost (excluding operator) of only $5.18 per day!

• Such low cost operation, plus savings you make by moving from job to job at 30 to 35 miles an hour, spells a bigger day's profit on every day's work. . . .

• It will pay you to investigate the Bear Cat Jr. . . Mail coupon below for free book "Bear Cat Jr. Facts."



25 MILES PER HOUR BY TRUCK OR TRAILER



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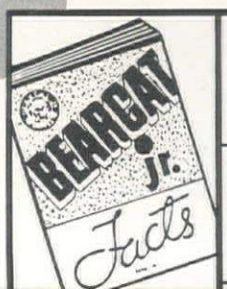

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RAVENNA, OHIO

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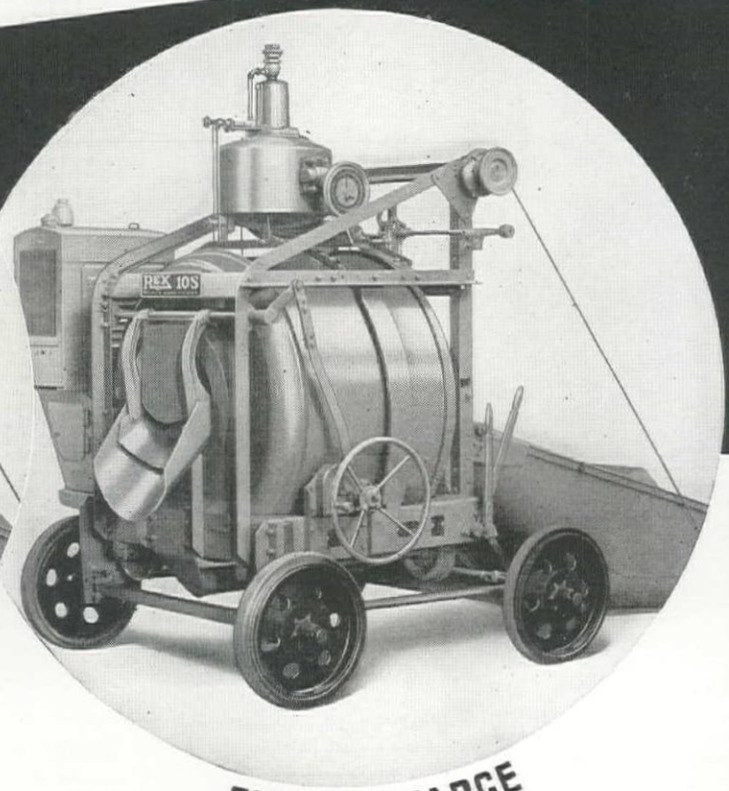
S-B.C.

SPEED-SPEED-SPEED

with the New REX SPEED TWINS

2 BAG SIDE DISCHARGE



END DISCHARGE

With concrete mixing time rigidly set by specifications, higher yardage must come from faster charging and discharging—a faster water system—new ease and speed of handling.

The new Rex 10-Speed "E" and 10-Speed "S" move faster in every part—on every operation. They lead the field of 10-cubic feet mixers for building, bridge and culvert work because they are maneuvered on the job faster and easier than other mixers—because they are lighter in weight—more compact.

The Rex 10-Speed "S" has side discharge—the 10-Speed "E" has end discharge. It can be backed up to the forms and the concrete spouted directly in place.

A new book—Bulletin No. 252—gives the whole story on high speed concrete mixers. Send for your copy.

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☐ 4 Inch ☐ 6 Incl

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..by *far*, the *Lowest* Rate for Coverage of the West . . . . .

This is a strong statement, but you can prove it by a simple comparison. We base our case on three points . . . .

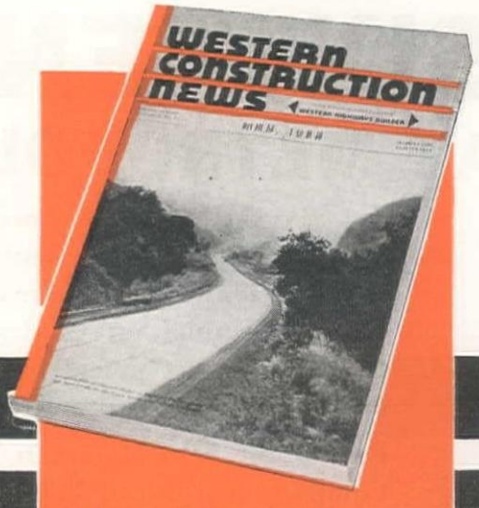
1. QUANTITY. No other civil engineering publication begins to have the circulation of Western Construction News in the West. We now refer to actual circulation . . . and not the mythical figures you sometimes see. Western Construction News has more than twice the circulation of any other Western engineering publication.

2. QUALITY. Compare the editorial pages of Western Construction News with those of any other western publication. It will be apparent at once that Western Construction News is written for operating men whose influences and decision affect buying of equipment and materials. They are the men who count; and they read Western Construction News because what they want cannot be found in any other publication.

3. SPREAD. Compare the dollar volume of engineering works in each of the 11 western states with the circulation of Western Construction News in those same states. You will find that we are not a Washington or Arizona, or Colorado, or California publication alone. Instead, you will find we are all of them combined . . . an ALL western coverage that means your simplest, surest way of doing a promotional job most economically.

But don't take our word for it . . . Make these comparisons yourself. We welcome investigation. If you want figures from us, just write . . . better yet, come to our office and get what you want yourself. We'll open up all our circulation records to you. We can, for our figures are real!

The circulation of Western Construction News is more than **8,100** copies each month.



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P&H

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P&H PERFORMANCE SPEEDS UP YOUR PROFIT PACE

A Galion Motor Patrol Grader with Double Drive leveling off crushed stone surface on a highway in the West.

Nearly 30 years of experience in serving the road building industry enables Galion to provide a machine exactly suited to the job. The line includes Motor Graders—Road Rollers—Pull-type Graders—Rooters—Spreaders—Drags—Scrapers.

The Galion Iron Works & Mfg., Co.

GALION OHIO

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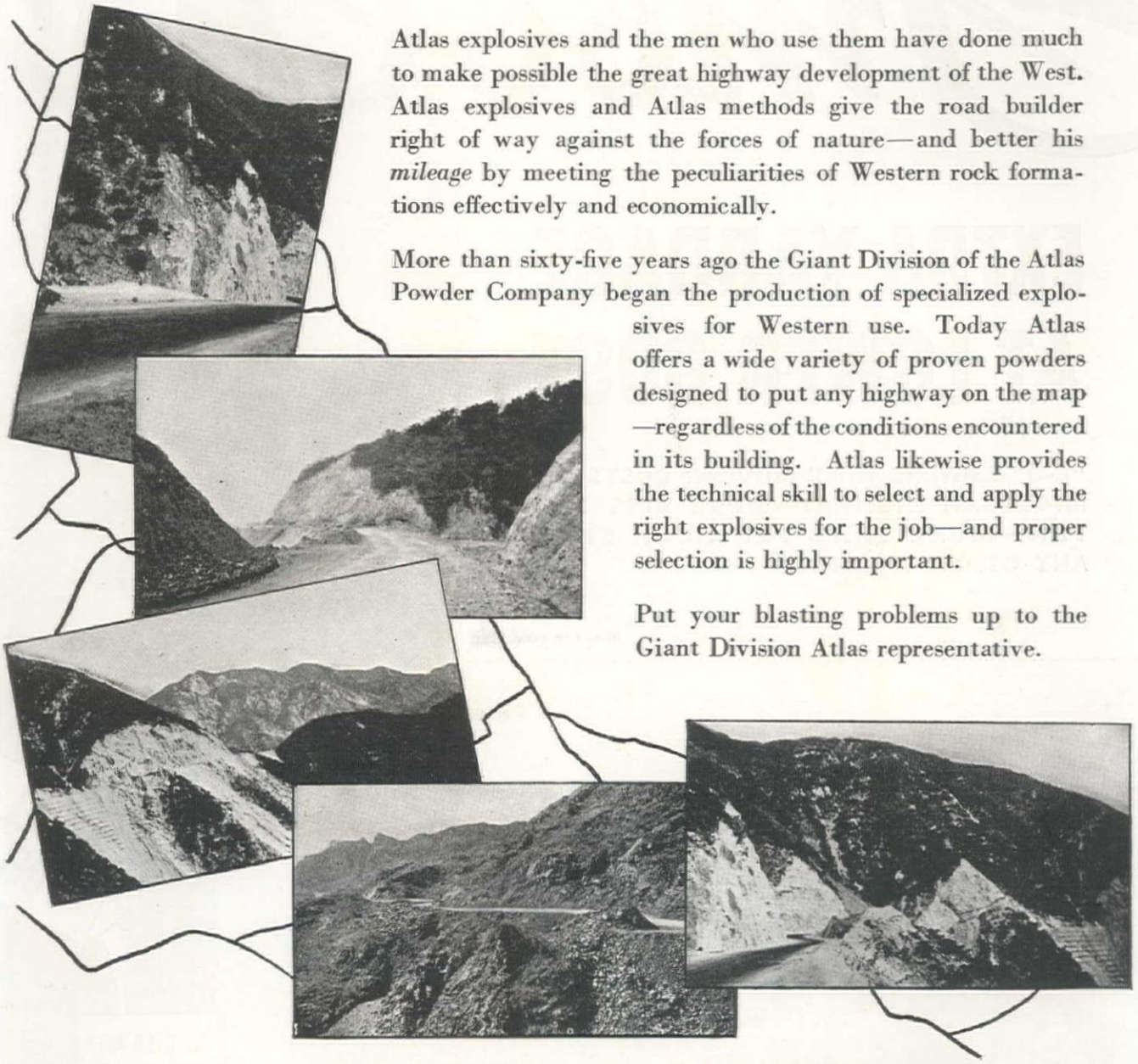
AN "ATLAS ROAD MAP" *would include many of the West's Greatest Highways*



Atlas explosives and the men who use them have done much to make possible the great highway development of the West. Atlas explosives and Atlas methods give the road builder right of way against the forces of nature—and better his *mileage* by meeting the peculiarities of Western rock formations effectively and economically.

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Put your blasting problems up to the Giant Division Atlas representative.

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THE GIANT DIVISION

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ATLAS EXPLOSIVES

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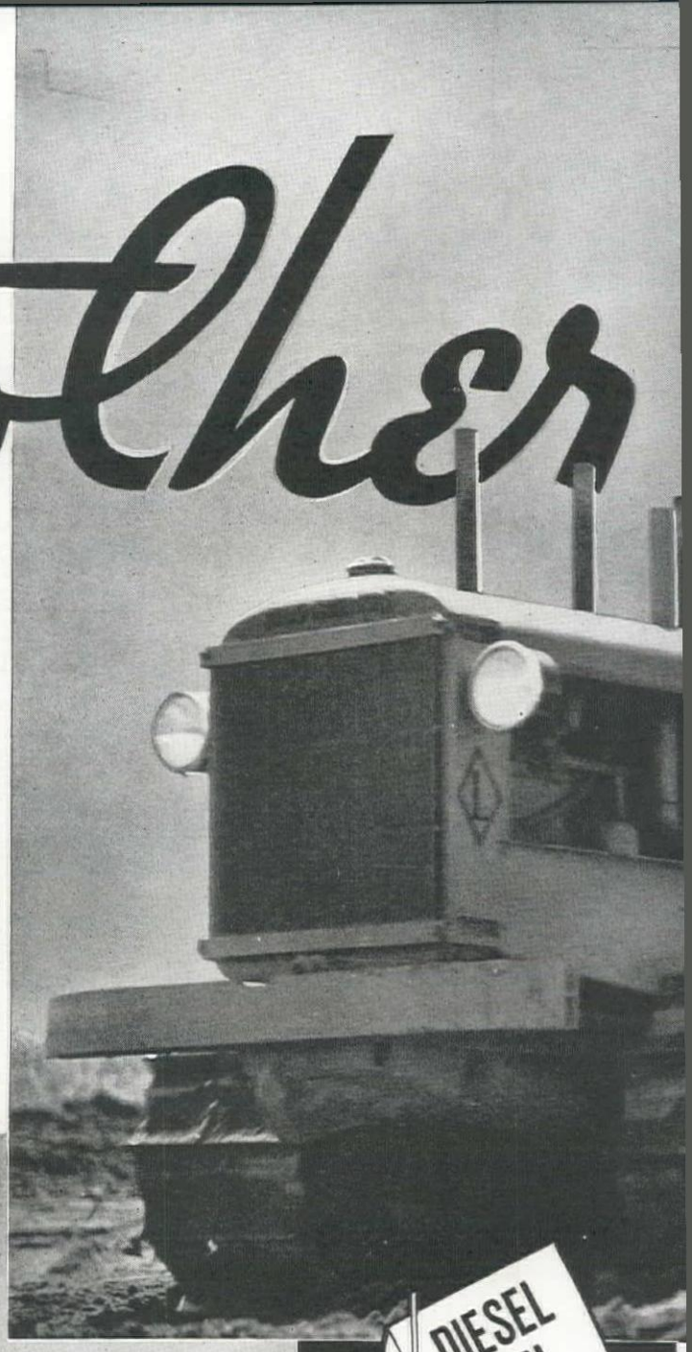
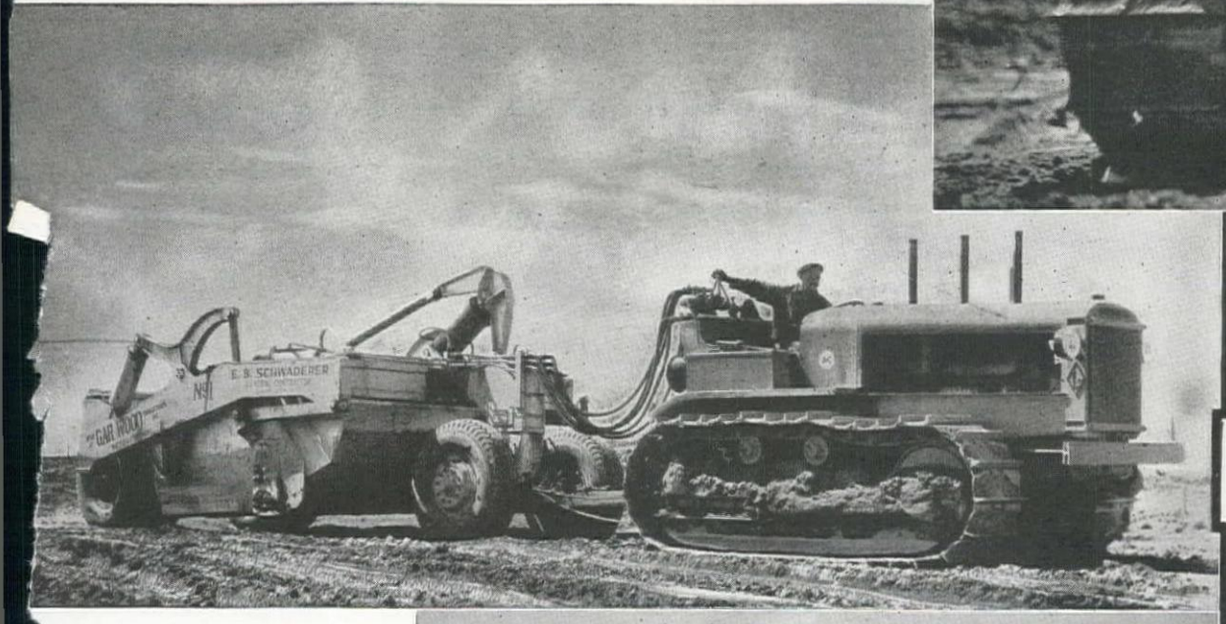
Smoother

EXTRA YARDAGE AT LOWER COST

"L-O" LOWERS DIRT MOVING COSTS ON MICHIGAN HIGHWAY—MORE DIRT PER TRIP—MORE TRIPS PER HOUR THAN ANY OTHER TRACTOR



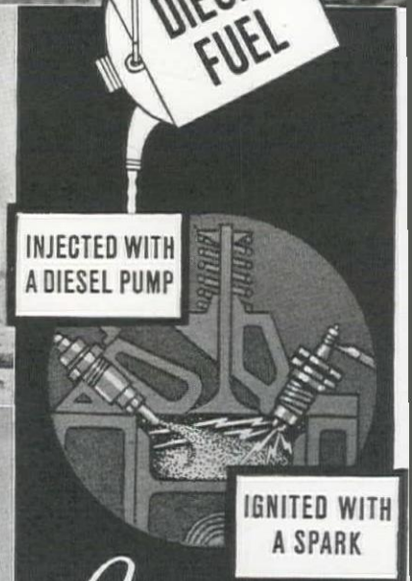


Responsive

This Model "L-O" Oil Tractor steps out faster on the Schwaderer job—"Where you want it, when you want it".

20,000-Pound Scraper

The "L-O" demonstrates its power by filling the scraper bowl with more dirt than competitive tractors.



Gives you:

EASIER STARTING
SMOOTHER OPERATION
LESS VIBRATION
FEWER REPAIRS

OPERATION...

THE vital advantage of low compression in a Diesel-fuel burning tractor is demonstrated on the E. B. Schwaderer job near Detroit. In competition with other makes, the Allis-Chalmers Model "L-O" handled a big 20,000-pound scraper to better advantage ... "got there" quicker ... filled the scraper bowl with more dirt ... delivered about three loads more per hour on the same average haul.

Why? Because of *smoother operation.* Allis-Chalmers Oil Tractors employ a new, improved system of engine operation which eliminates the need for high compression pressures. Diesel fuel is injected into the combustion chamber with a Diesel pump and ignited with a spark. High compressions are not necessary for ignition—compression pressures are only one-fourth to one-third those of the unimproved type.

Result—The Allis-Chalmers Oil Engine is not compelled to labor against high compression pressures. Operation is smoother. Less strain on working parts. Less vibration and wear. Fewer repairs. Claims can't compare with *facts* ... A-C Oil Tractors do the work at Lowest Final Cost.

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

A-C OIL TRACTORS
FOR LOWEST FINAL COST

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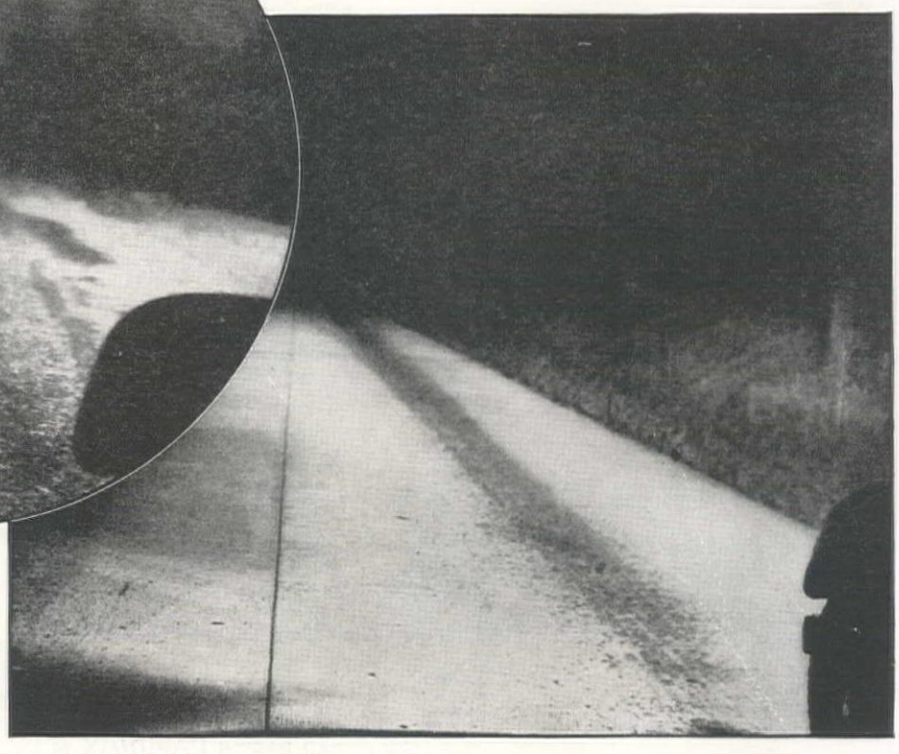

Even on the darkest night, a Concrete road is a ribbon of light

Make night driving safe... specify CONCRETE

Give the night driver a "break" by specifying concrete roads. Their clean, gray surface reflects light. Shoulders, ditches and pedestrians loom up in sharp contrast against its clean-cut light background. Drivers know they can stop quickly and surely on concrete . . . and that they're less apt to skid or slip although tire wear is less.

That's one side of the picture. On the other, is the greater comfort of riding on concrete—its durability and remarkably low upkeep cost—and a saving to motorists in gas, tires and car repairs of up to 2c per mile.

Day or night, concrete serves best—saves most. Send for our free folder, "Mr. Motorist . . . Does Night Driving Give You the Jitters?"

PORTLAND CEMENT ASSOCIATION
Dept. 107
564 Market Street, San Francisco, California
816 West Fifth St., Los Angeles, California

Please send folder "Mr. Motorist—Does Night Driving Give You the Jitters?"

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PORTABLE ASPHALT PLANT

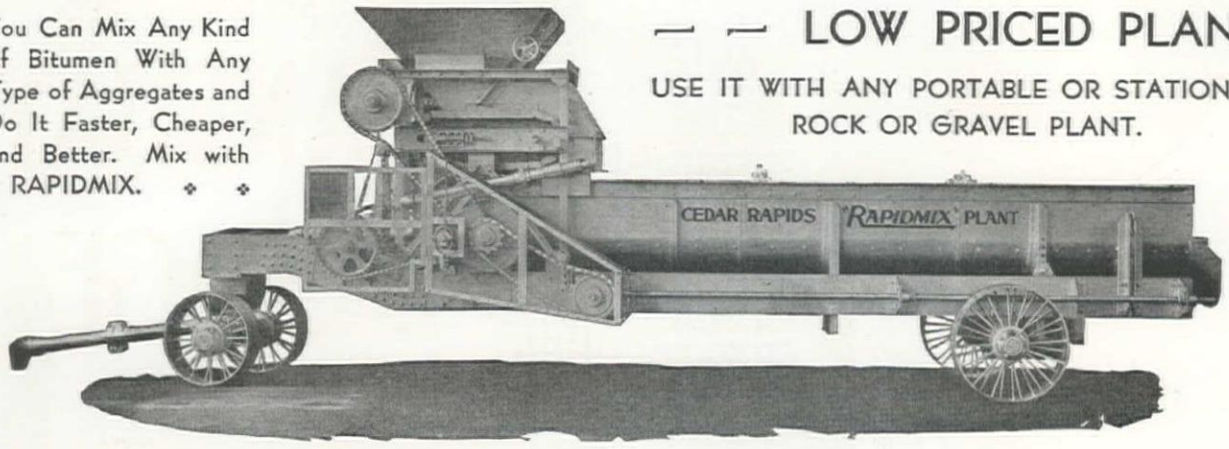
WHAT EVERY ROAD BUILDER HAS BEEN LOOKING FOR!

A FAST — ACCURATE — PORTABLE — LARGE CAPACITY

— — LOW PRICED PLANT!

You Can Mix Any Kind of Bitumen With Any Type of Aggregates and Do It Faster, Cheaper, and Better. Mix with a RAPIDMIX. ❖ ❖

USE IT WITH ANY PORTABLE OR STATIONARY ROCK OR GRAVEL PLANT.



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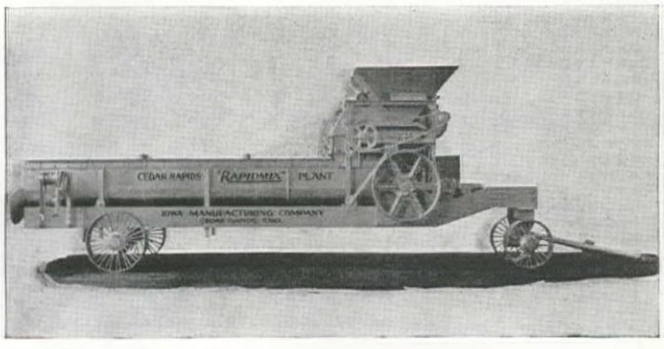
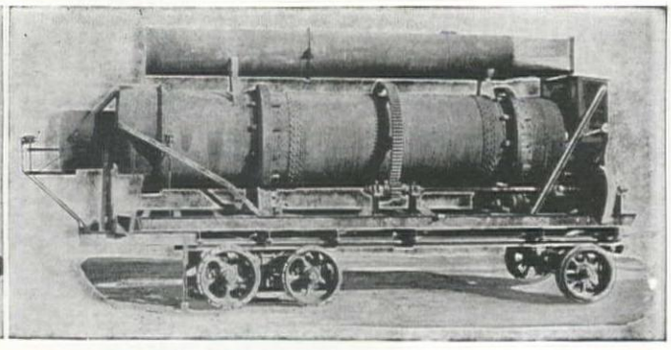


SIDE VIEW SHOWING DRIVES TO POWER PLANT



PORTABLE DRYER FOR USE WITH RAPIDMIX

IF YOU HAVE TO DRY YOUR AGGREGATES — USE THE RAPIDDRYER

IOWA MANUFACTURING COMPANY

CEDAR RAPIDS, IOWA

We also Build the Complete Line of Standard-Cedar Rapids Portable Paving Plants — 500 to 5000 lb. Capacities

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The six big trucks of The Paterson-Leitch Company, Cleveland, haul loads of steel—heavy bars that hang out over the sides—big "I" beams—every type of steel. Tires are pounded over rough city pavements—yanked through the mud on construction jobs.

Yet Superintendent Bolz says, "Service from Goodrich Triple Protected Silvertowns has been very satisfactory. Three of our trucks have run over a year without even a puncture. Our tire repair bills average only $1.38 per truck for the last year."

That's the kind of service you have a right to expect from truck tires!

Because of a new invention in the sidewall, Silvertowns stand up where other tires fail. This invention—Triple Protection—actually checks 80% of premature tire failures! Think what that means in savings on repair bills—in reduced delays. Here's how Triple Protection adds months to tire life:

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.

Try a set of Triple Protected Tires on your toughest job. Prove the dollars and cents savings to your own satisfaction. And remember it costs no more to buy this super-service tire. *No premium price.*

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-76, The B. F. Goodrich Company, Akron, Ohio.

Goodrich *Triple Protected* Silvertowns

SPECIFY THESE NEW SILVERTOWN TIRES FOR TRUCKS AND BUSES

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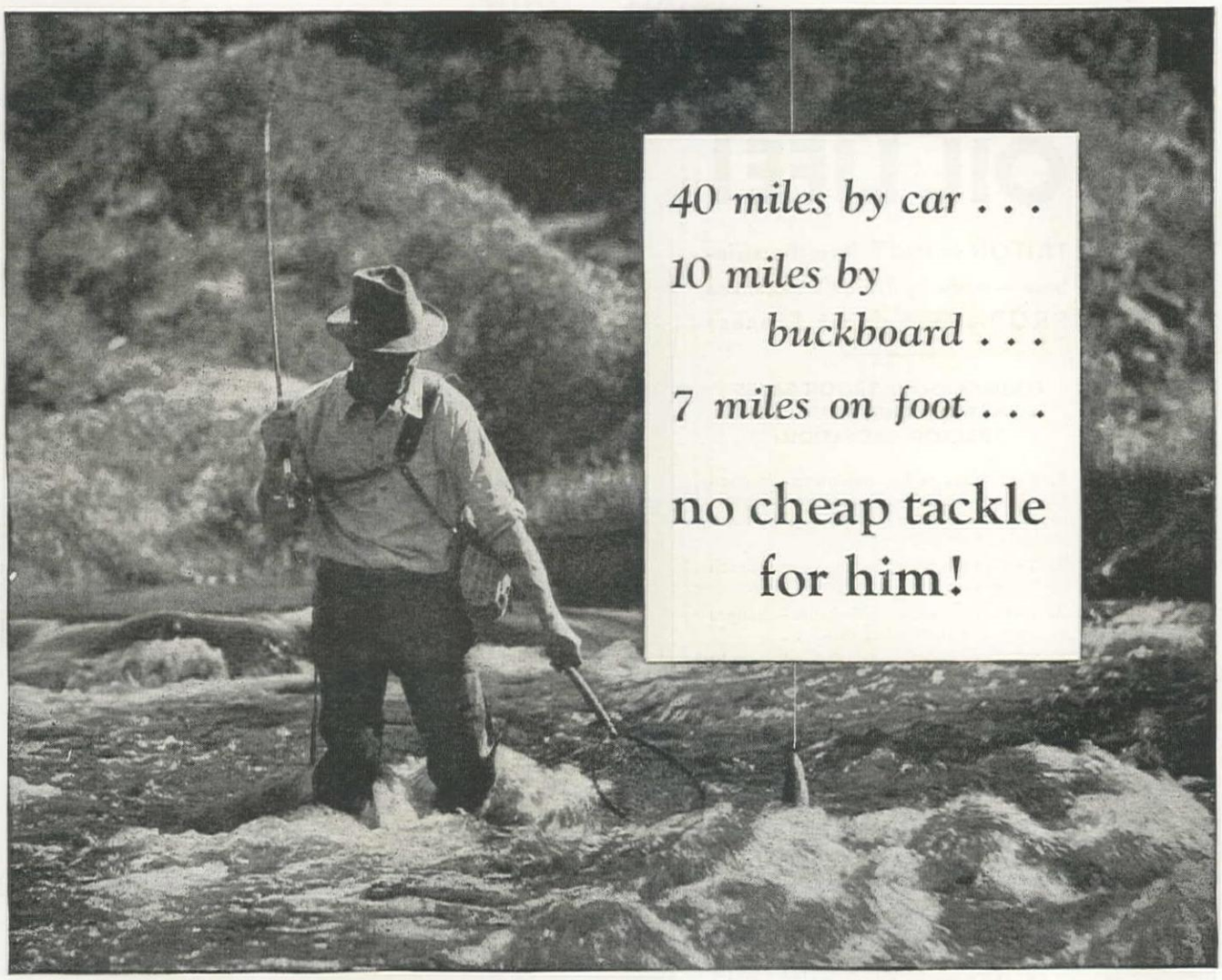
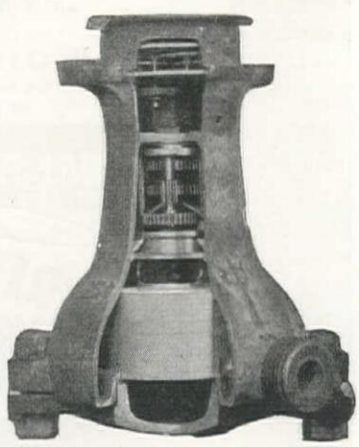


YET this same chap, responsible for revenue from a costly Water Works investment, may fish for economy with cheap, low-first cost Water Meters! That looks good on the books for a few years. But the time comes when maintenance, depreciation and lost revenue from faulty operation far offset initial "savings."

Experienced Water Works men *invest* in Trident or Lambert Water Meters . . . *and never scrap them!* Instead, they just insert new *interchangeable* parts, making those meters equal to new even after 30 years' service! Beware of false economy . . . no matter what type of Water Meters you want, write for Catalogs to the Neptune Meter Company (Thomson Meter Corp.), 50 W. 50th St. (Rockefeller Center), New York City . . . or . . . Neptune-National Meters, Ltd., Toronto, Canada.



Here are modern new interchangeable parts in a Trident Meter casing installed in 1899. Forty years from now the parts may look different (improved); but the principle of INTERCHANGEABILITY *will be the same; and as long as the meter casing lasts—they'll fit!*

TRIDENT & LAMBERT WATER METERS

Never Grow Obsolete

OVER 6 MILLION MADE AND SOLD

By Order of the King of France

this cast iron main was laid 271 years ago

FROM the time, nearly three centuries ago, when the engineers of the King of France installed the famous mains at Versailles (see photo) cast iron has been increasingly recognized as *the standard material for water and gas mains.*

Today, water works improvements constructed with cast iron pipe are regarded by City and Government officials as ideal relief projects.

Since cast iron pipe serves for *more than a century*, such improvements are permanent. They are also a public necessity—any city or town is a better place in which to live if its water supply is pure and its distribution system adequate. They are self-liquidating, paying their way out of water revenues. And they provide direct and indirect employment to a greater degree than most self-liquidating projects.

Your city or town may never again be able to modernize, enlarge or extend its present water distribution system, or build new supply lines, at the low costs and favorable financial terms existing today.

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

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

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

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

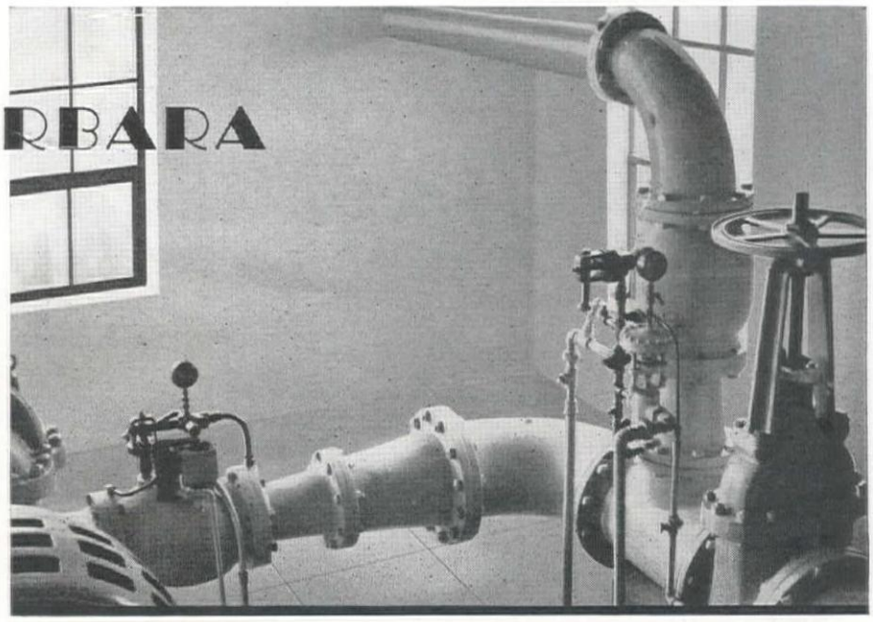
CAST IRON PIPE

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

TRADEMARK REG.

SANTA BARBARA

Assures Protection to Pumps and . . . . Pipelines



SANTA BARBARA, overlooking the Pacific in Southern California, holds front rank among cities of her class for architectural beauty and civic development. The recent completion of an auxiliary water supply system shows, by, analysis, that her hydraulic engineering keeps pace with other progressive activities.

The new water supply is pumped from deep wells into a reservoir from which booster pumps deliver through a long pipe-line into the city distribution system. Protection of this line against excess pressure rise in case of power interruption as well as protection of pumps and motors against reverse flow, is provided by a Pelton automatic surge suppressor and a Pelton check valve. Both valve units, as modern as the station itself, have met every operating test.

Pelton automatic control valves of all types are fully described in our bulletin No. 29

THE PELTON WATER WHEEL COMPANY

HYDRAULIC ENGINEERS

120 Broadway	2929 Nineteenth St.	Paschall Station
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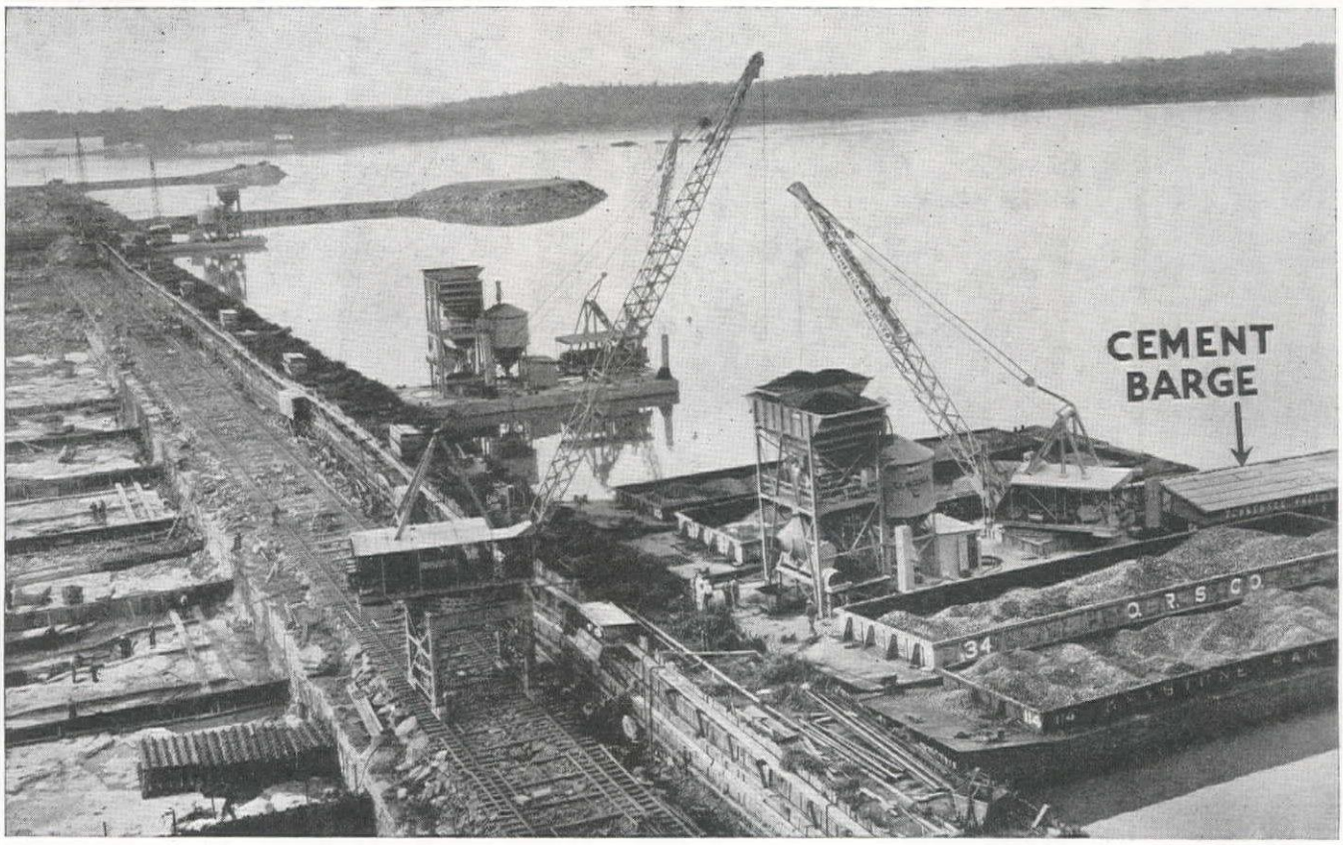
Pacific Coast Representatives for BALDWIN-SOUTHWARK CORPORATION, DE LA VERGNE ENGINE CO., CRAMP BRASS & IRON FOUNDRIES CO., and LARNER ENGINEERING CO., of Philadelphia, Pa.

PELTON

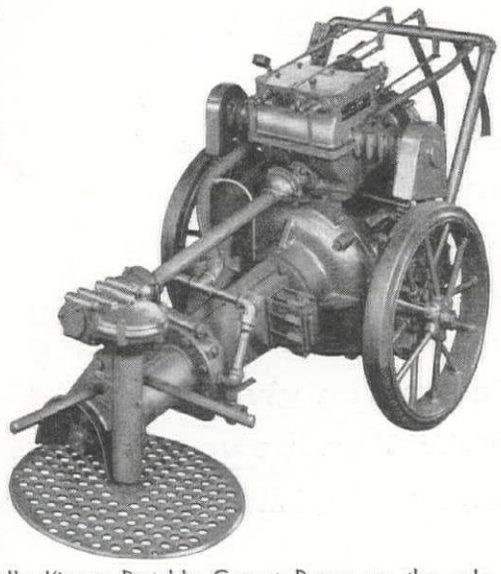
In writing to THE PELTON WATER WHEEL CO., *please mention Western Construction News.*

OBTAIN THESE SAVINGS IN PLACING CONCRETE



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

FLEXIBILITY - SPEED - RELIABILITY - LOW COST



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

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

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

Pacific Coast Representative:
WILLIAM S. WEAVER

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Los Angeles

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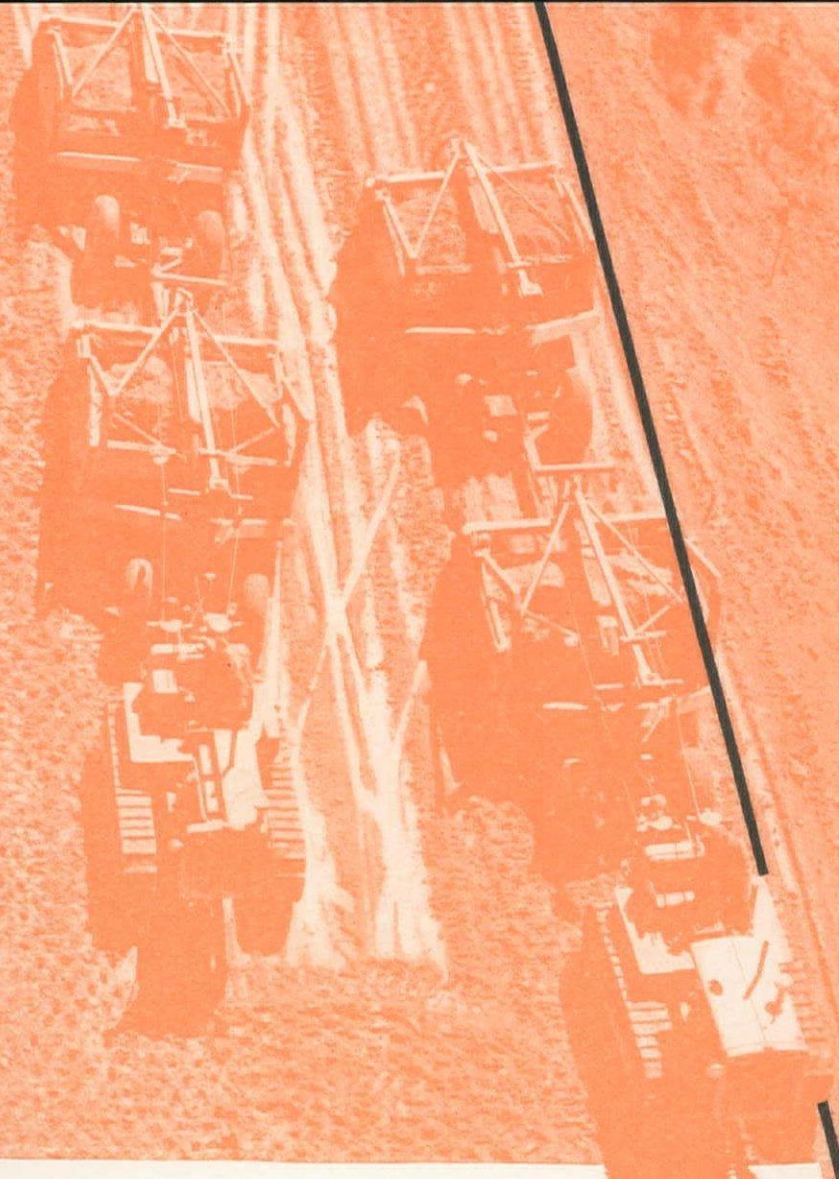

Crow Brothers keep a fleet of "Caterpillar" Tractors busy on this road-building job in Riverside County, Calif. Six are "Caterpillar" Diesels.

(Airphoto by O. L. Snider)

DON'T MISS THE SHOW-DOWN

A revolution in the tractor power field—that's what the "Caterpillar" Diesel means to engineers and contractors. With operating costs hitting new lows, with maintenance cut to a record minimum, with almost unbelievable endurance and versatility—"Caterpillar" Diesels are being chosen for projects of all kinds and sizes. Your dealer can give you the whole story of this SHOW-DOWN on power. Don't miss it! Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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DIESEL

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER
July, 1935 Vol. 10, No. 7

Works Program Tailspinning Into a CWA Farce

IN DEVELOPING the rules for the pending work-relief program the Administration's arithmetic cannot be questioned, but the fundamental benefits to be realized from a broad, constructive program of works are being patently ignored. Having about $4,000,000,000 at its disposal, and an estimate of some 3,500,000 idle workers, the procedure has been to divide dollars by unemployed and arrive at a figure of about $1,150 per worker, *directly employed*. Hence, the rule-of-thumb restriction that unless one man is employed on the job for one year this figure, the project, regardless of its merits or the indirect benefits, is placed under the ban.

From the point of view of western construction, Carl E. Baker, president of Smith-Booth-Usher Co., in a letter to the editor, presents an excellent analysis of the effect of these restrictions with special reference to highway work. Quoting from Mr. Baker's letter:

> "This ruling precludes the possibility of using funds for hard surface concrete or bituminous pavements. The bread-and-butter of the machinery industry, employing thousands of people, engaged in mechanical, engineering and clerical work, depends upon the use of these funds in a normal way. Unless there is a modification, there will result an unbalanced highway program of grading and drainage, a resumption of the inefficient day labor methods, and a general lay-off of men in the material and equipment plants and factories and an increase in the relief rolls because of this lay-off. I think it is the desire of all thinking people to want to return to normal in a normal and economical manner."

When the works program was being initiated, President Roosevelt announced that projects were to be selected on the basis of permanent public benefit, with the definite appreciation that the direct employment constituted only the start of the stimulus to reemployment of men in factories and mines. Such projects, in their very nature, involve expenditures of from $2,500 to $5,000 per man-year.

However, the rules now announced would seem to indicate that the Administration's long-vision glasses have been laid aside, presumably for more expedient short-range bi-focals which magnify political advantage through having more men directly on the government pay-roll. The plan ignores completely the feature of permanent benefits to be secured from expenditure of these public funds, and the advantage of using an already organized construction industry. It overlooks entirely the factor of indirect employment of factories and mines, where basic reemployment finally must originate. In place of these there has been substituted a make-work program that starts and stops with the direct employment of men to be supported by, and on, pick and shovels.

Hope lies in two directions: First, municipalities and states may possibly, but not probably, take the initiative in adding sufficient funds to federal allotments, to permit permanent and constructive work to be done. Second, and much more probable, it is likely that the Administration, in response to widespread protests, may modify the rules to permit solid results to be accomplished. Already some of the bars have been lowered, and certain Washington observers are predicting that the ridiculousness of a works program on a leaf-raking basis of financing will cause a saner view to be taken in the allotment of funds.

Nothing could come closer to actual throwing away of public money than to go forward with the plan on the announced basis.

•

A Colorado State Water Plan

Occupying the roof of the continent and the headwater areas of many of the Nation's major rivers, the state of Colorado is now energetically studying a state-wide program of water development. The immediate incentive comes from the possibility of obtaining federal financing for the initial units. Regardless of the success in securing government aid, the value of a co-ordinated water plan is too vital to the state's future to let it drop after a start has been made. Engineers have a large responsibility in maintaining public interest in forwarding the plan toward the actual construction stage. The problems are more complex than those encountered in the California state plan, because, as a result of physiographic characteristics, the streams of Colorado are not local, but traverse many other states. This condition makes all the more imperative the present study and the preparation of a comprehensive plan which will tend to reserve for the commonwealth its rightful share of the water resources originating within its boundaries.

•

Charles Frederick Swigert

Dean of Pacific Coast foundation builders and nationally known for his mastery of difficult bridge pier construction, the West lost an outstanding contractor in the death of Charles Swigert. For half a century, as head of the Pacific Bridge Co., he undertook and carried out under water construction for bridges and harbor work until his name was familiar from Canada to Central America. It is particularly fitting that he should have been associated with the notable foundation work on the two largest bridges in this region—structures of world-record proportions. His own organization carried out the arduous and hazardous construction of the Golden Gate piers, and was also part of the organization which built the West Channel piers for the San Francisco-Oakland Bay Bridge. These structures will always stand as monuments to the construction genius and skill of Charles Swigert.

•

The Burden of Accidents

Why is the accident rate in the construction industry twice as high as that in the petroleum industry, three times as high as the chemical industry and five times as high as in the manufacture of cement? Is it because construction operations are inherently that much more hazardous, or because the construction industry is not as serious in its appreciation of the cost burden which results directly from laxity in the matter of accident prevention?

LOAD Control

New Austin-Western 12-YARD SCRAPER

Forces out load for quick complete dumping . . . All hydraulic control

● For thoroughgoing efficiency a scraper must not only dig effectively but discharge the load completely with no lost time. On the new Austin-Western Scraper both of these operations are accomplished by hydraulic controls driven by a motor on the scraper and operated electrically from the tractor.

For digging, the bit can be set at any desired depth, depending upon the character of the dirt to be moved. In discharging the load, instead of slow gravity dumping, a hydraulic ram forces the load out.

Among the other features of this most effective tool are: wide axle and heavy pneumatic tires to insure steady running and eliminate the danger of bogging—open top for loading with shovel or elevating grader—rigid frame construction and the elimination of cables, bell cranks, etc. Use the coupon to secure complete engineering and performance details.

● The powerful new Austin-Western Giant Ripper is also hydraulically controlled. At a movement of a valve on the tractor the huge teeth may be forced any desired depth of cut up to 24 inches into the earth or roadway. As the tractor moves the tearing action continues steadily because of the carefully calculated angles and weights at every point of the ripper. At any moment the teeth may be released by hydraulic control.

The Austin-Western Road Machinery Co.

Home Office: Aurora, Illinois Cable Address: AWCO, Aurora

Branches in Principal Cities

The Austin-Western Road Machinery Co.
L, Aurora, Ill.
Send details on ☐ the Austin-Western 12-Yard Scraper. ☐ Giant Ripper.
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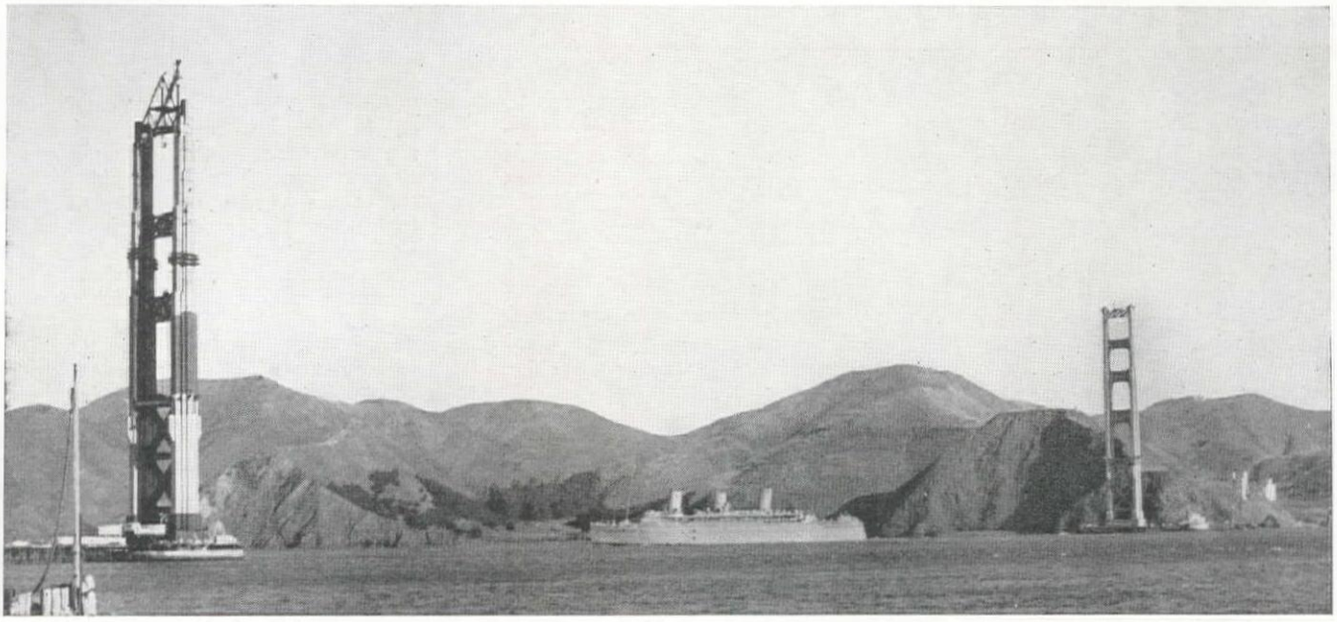
WESTERN CONSTRUCTION NEWS

JULY, 1935



Building the World's Tallest Bridge Towers for the Golden Gate Span

A review of the design problems and erection methods on the 746-ft. towers to carry the 4,200-ft. suspension span

RISING to a height of 746 ft. above the waters of the Golden Gate at the entrance of San Francisco Bay, the two towers which will support the 4,200-ft. suspension bridge establish many records for structural steel design and erection in the Western States. The bridge is being built by the Golden Gate Bridge and Highway District, composed of San Francisco County and several counties to the north.

Work was begun on this important $35,000,000 project in 1931 and the structure is scheduled for completion in 1937. Problems of design and erection of these two towers are highly specialized and this article will be restricted to a general treatment of the subject and will present information on the Golden Gate Bridge towers which will permit engineers and contractors of the West to appreciate the magnitude of these structures.

Progress on the project has already been reviewed in *Western Construction News* by several comprehensive articles covering the major phases of the work and these have carried the description of construction operations up to the building of the two main towers. A list of these major articles is given on another page and the present article will not review the general features of the work which have already been described.

Design

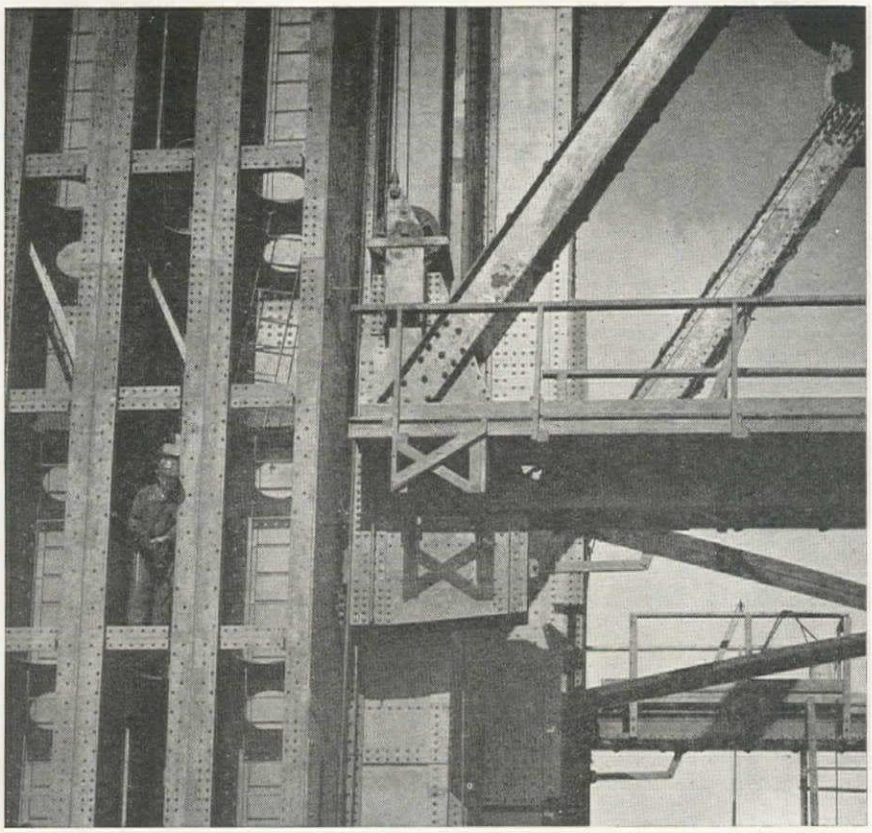
General considerations

The span of 4,200 ft., the sag of 470 ft., which was adopted by the consulting board, combined with the vertical clearance for navigation, dictated the height of the main towers. The clearance required by the U. S. War Department over the Golden Gate was a minimum of 220 ft. at high tide and this height, with an allowance of 10 ft. for deflection under maximum load, a 25 ft. depth of stiffening truss, the shortest allowable length of suspender, and the 470-ft. cable sag resulted in a tower height of 746 ft. to the cable. The top of the concrete pier is at elevation 44 ft. and the structural steel tower is 702 ft. from base to saddle.

The towers are designed for a wind load of 30 lb. per sq. ft. on twice the area of the suspended section and 50 lb. per sq. ft. on twice the area of the towers. In addition, the entire structure is designed to withstand a seismic force of 7½% of gravity. The total load, including the live load, transmitted to each tower by the two cables is 60,000 tons. The weight of the structural steel tower is 21,500 tons, making the total load on each pier foundation 81,500 tons.

Based on these loading requirements the general arrangement of the tower steel was developed. A cellular type of steel layout was selected and a 3½-ft. square cell was considered the smallest practical unit. Further factors established as the basis for the details of tower design were: a minimum plate thickness of ⅞ in., angles standardized at 8 x 8 x ⅝ in. and a working stress of 18,000 lb. per sq. in. for carbon steel and 24,000 lb. per sq. in. for silicon steel.

In the actual design calculations, carbon steel was used up to a unit stress of 18,000 pounds with ⅞ in. plates. Silicon steel plates ⅞ in. thick were used with unit stress up to 20,000 lb. per sq. in. For unit stresses ranging from 20,000 to 23,000 lb., the plate



Corner of the traveler showing one of the four sheaves for raising. Note the cell structure of the tower on the left.

thickness was increased to 15/16 in. When this 23,000-lb. unit stress was exceeded the web thickness was increased by adding a second plate, and the allowable unit stress was increased to the maximum of 24,000 lb. As a result, silicon steel was used to Elev. 200 at roadway level, followed by carbon steel for about 268 ft. higher to the second strut, with silicon steel used for the remaining 210 ft. to the top.

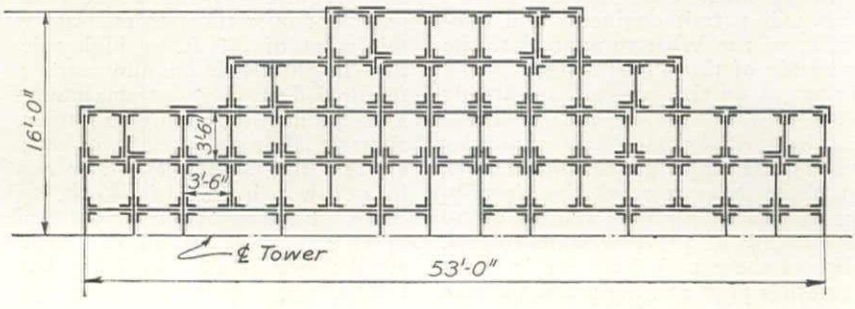
The mathematical analysis of the complicated stresses in the towers, and the individual members, and the numerous studies required in arriving at the final design are too complicated and voluminous for detailed review. The complexity of the problem is indicated by the fact that it involved the solution of 26 simultaneous equations. Incidentally, the design used an arbitrarily selected slenderness ratio $\left(\frac{l}{r}\right)$ of 60 for the tower shafts.

Above the floor level at elevation 200 the towers are designed with horizontal struts about 30 ft. in depth, in place of the customary X-bracing. The original reason for the adoption of this bracing was to effect a more pleasing appearance, but the design also proved satisfactory from a structural analysis. This resulted from the fact that the usual X-bracing, when used in so large a structure, tends to develop heavy secondary stresses and excessive bending movements in the tower legs, which were not so serious with the horizontal-strut design. In the final structure the horizontal struts are fabricated as trusses, but are masked to appear solid, for the sake of appearance.

Model test

To check the behavior of the tower under various loadings, a model was built to exact dimensions and sections of material. The model was fabricated out of stainless steel to a scale of 1 to 56 and was about 12 ft. high. It was built by the Budd Manufacturing Co. and was tested at Princeton University under the direction of Prof. G. E. Beggs. Both vertical and horizontal loads were applied to the model and deflections and unit stresses were measured. The model study was designed primarily to indicate the general behavior of the tower under load rather than to check the mathematical analysis of the individual members. The results of the load test, however, agreed very well with the previous analytical calculations.

Half section of one leg of one of the towers at the base where there are 97 cells. Arrangement of plates, fillers and angles is shown.



Characteristics of towers

Each tower consists of two legs at 90-ft. centers. The cellular construction, at its maximum section at the base, covers an area of 53 x 32 ft. for each tower leg. At the base there are 97 of the 3½-ft. cells in each leg, this number decreases at the higher elevations with the size of cells and the size of the steel remaining consistent. Cells are dropped off at the elevation of the struts to assist in maintaining the appearance of the towers in proper proportions. The individual cells in the central section of the legs continue in an uninterrupted line from top to bottom. At intervals of about 12 to 15 ft. each cells is provided with horizontal diaphrams in which a 20-in. manhole was left to facilitate construction and maintenance. The general arrangement of the cells to form the tower section is indicated in the accompanying drawing.

Fabrication

The steel for the towers was fabricated in the shop into units which had a cross section of 2, 4 or 6 cells, prior to shipment to the field. The largest unit of shop fabrication which consisted of a 2 x 3 cell section required steel plates 126 in. wide.

One of the principal problems in the fabrication of this number of individual units to form the complete tower was the danger of "packing-out" of the units which might result in the final outside dimensions exceeding those of the design, and destroy the design provision for having the vertical plates form a continuous plane from base to top. In other words, an uneven packing-out of the cells, as erected in the field, would have eliminated the design plan to have direct bearing in the vertical walls of the cells.

For this reason, the cell units were fabricated inside of structural steel frames so that the outside dimensions of these shop sections were exactly in accord with the designed sizes. As a check upon the effectiveness of the fabrication procedure, about 60% of the base section of one of the tower legs was erected in the shop. This shop erecting, in the early stages of fabrication, was considered necessary, so as to permit an early change in method if the desired results were not being obtained.

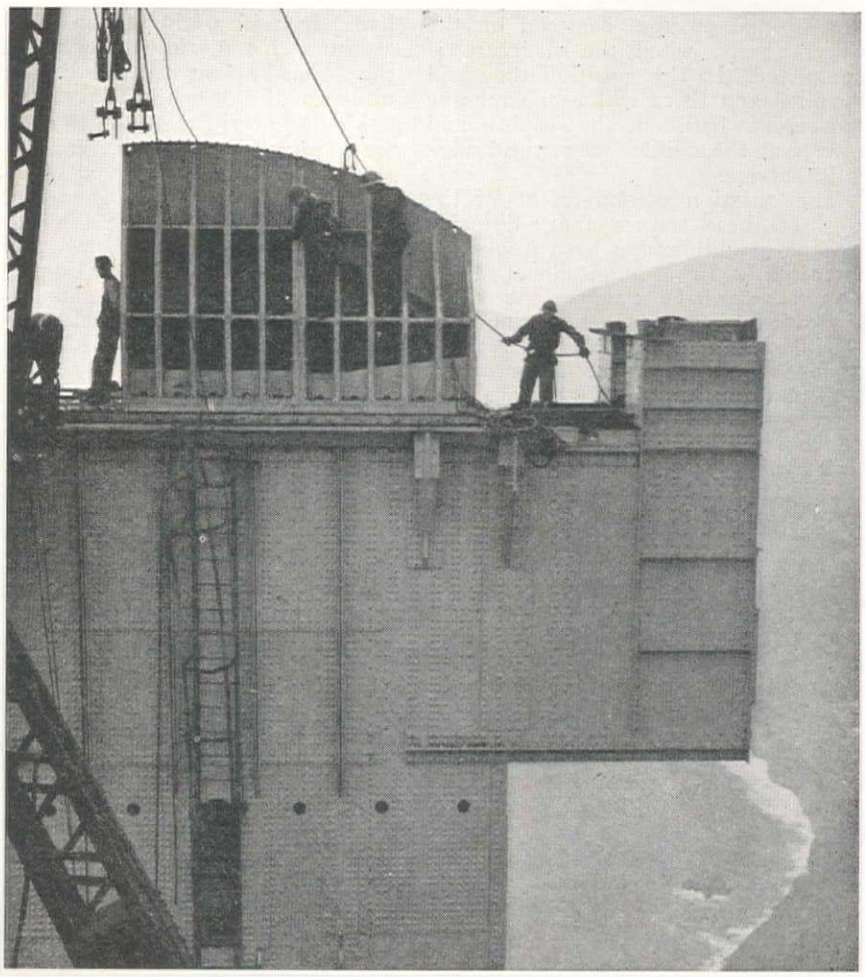
Anchorage

The anchorage provided between the towers and the concrete pier is one of

the most unusual features of these structures and includes provisions which differ materially from previous practice in providing more definite restraint both vertically and horizontally. To provide for a vertical anchorage, 48 pairs of 6 x 4 x ½-in. angles (24 per leg) were embedded 50 ft. into the concrete of the pier. These anchors were set so that the pairs of angles straddled the web plates of the cells. For a depth of several feet below the top of the pier, the angles were not initially embedded in the concrete.

After the base cells had been set up over the angles, these anchors were prestressed by jacks and held under this stress until holes were drilled and rivets driven connecting these angles with the web plates of the cells. This procedure is a departure from the usual provision of anchor bolts which are relatively unstressed in their original condition. Subsequent to these prestressing operations the spaces left in the top of the pier around the anchors were concreted in.

To provide for horizontal anchorage forty, 6½-in. steel dowels 4½ ft. long were set 4 ft. into the concrete. The ends of these bars which extend 6 in. above the concrete passed through holes in the base plates of the tower leg. After these dowels had been set and the base plates placed they were grouted into the pier and the hole in the base plate was completely filled with "rust-joint." These provisions for vertical and horizontal anchoring were duplicated at each of the two legs of each tower.



Setting one of the three castings to form the 150-ton saddle at the top of each leg. These saddles were set on roller nests as described in the text.

Looking down one of the tower legs showing the cellular construction, and the steel barge alongside the pier. Steel brought to the pier by barge was unloaded by the stiff-leg derrick and hoisted by derricks on the traveler.

Bases and saddles

The base plates for each leg consist of 5-in. slabs of steel planed to a tolerance of .008 in. These steel slabs were placed upon the ground surface of the concrete (described later) bedded in a red lead paste.

On the top of the towers the saddles to support the cables consist of steel castings, three sections to each saddle with a maximum metal thickness of 7 in. These saddles rest on nests of rollers and in their original position are set shoreward (5 ft. 10 in. for the south tower and 3 ft. 4 in. for the north tower) from their final position. With the construction of the suspended structure of the bridge the cable back stays tend to decrease in sag and elongate slightly with the result that the saddles will gradually move, as the weight comes to the cables, until they

are in final position centered on the tower shafts, when the structure is completed. In this position they will be fixed and there will be no relative movement between the cables and towers at the saddles when the bridge is in service.

The question of movement of the tops of these towers under different loading conditions has been frequently mentioned. In a longitudonal direction there will be a movement of the top of the towers up to a maximum of 18 in. either way from the vertical, under the most severe condition of live load and temperature. In a transverse direction with the maximum wind load, which is estimated to be about twice that which can be expected in this location, there will be a maximum deflection of 13 in. either way from the vertical.

Inside one of the cells in the east leg of each tower a service elevator will be provided. This elevator with a car only about 3 ft. square will be used only for convenience in maintenance work and for servicing the beacon lights at the top of the tower.

On the San Francisco pier a regulation lighthouse will be constructed because this pier is located about 1,100 ft. off shore.

Erection

The assembly of the 21,500 tons of structural steel, including 404 main column sections, into each of the 740-ft. towers was the work done under the McClintic-Marshall Corp. contract. The time differential between the completion of the north main pier and the south pier permitted the work to be carried out separately with the same equipment and using the same methods.

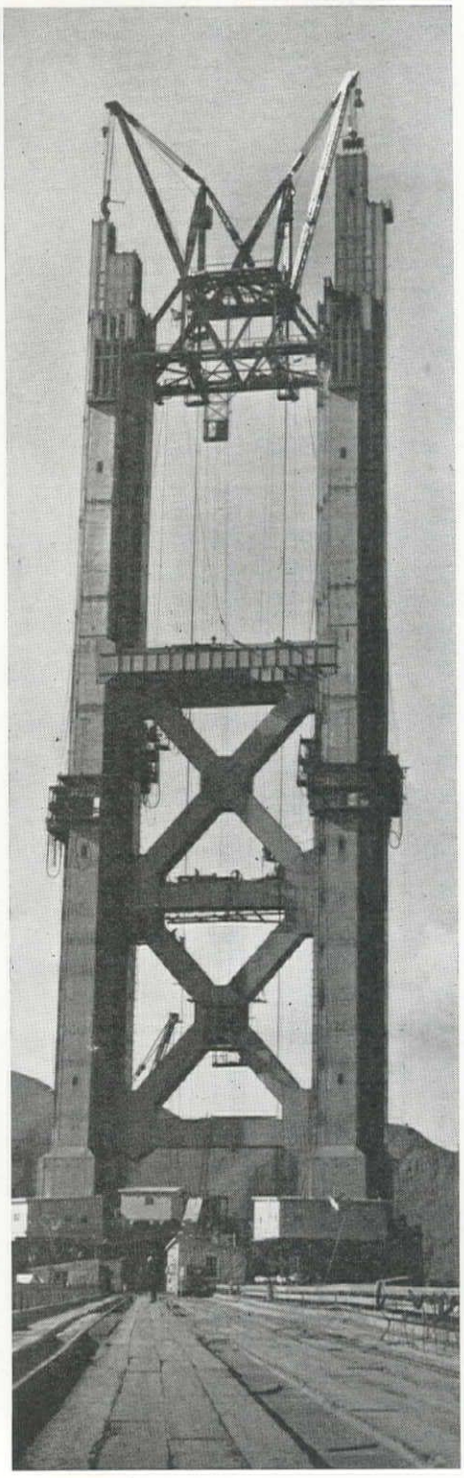
Steel was fabricated at plants of the McClintic-Marshall Corp. and the Bethlehem Steel Co. at Pottstown, Pa. and Steelton, Pa. The fabricated units averaged 45 tons in weight (85-ton maximum) and were 8 x 12 ft. in section and 45 ft. long. Moved by rail to Philadelphia, the steel was transferred to boats of the Calmar Steamship Line (Bethlehem subsidiary) for shipment. This movement of fabricated steel is reported to be a record for steamer transportation, both as to tonnage and size of units handled. Loads of steel per trip varied from 1,000 to 2,000 tons, which was in addition to general cargo.

Arriving at San Francisco Bay the boats did not discharge steel directly at the pier sites because of the danger of docking in these exposed locations and because of the limited storage space available for handling advance shipments.

Steel was unloaded at a receiving yard of the McClintic-Marshall Corp., at Alameda by two 85-ton steel derricks specially built for this use. The sections were placed on flat cars and moved to the storage yard where they were handled by an 85-ton gantry crane of 73-ft. span operating on a runway 1,200 ft. long. This storage yard had a capacity of 14,000 tons of tower sections. No fabricating was done at the Alameda plant because of the magnitude of the operations involved.

Moving out of the yard, the sections were transported by flat cars to the same dock where they were loaded onto steel barges carrying an average of 450 tons, with an occasional maximum of 600 tons. Barges were towed the 12 miles to the site by commercial tugs in about 2½ hr. Unloading at the piers, which was difficult and hazardous work, because of the swift tides and rough water, took from 4 to 6 hr. This work was done with an electrically operated 85-ton capacity stiff-leg derrick with a 100-ft. boom, which also rehandled the sections to the traveler derrick lines.

Traveler in operation showing the two 85-ton derricks with 90-ft booms. Hoisting speed for heavy sections was 30 ft. per min. Riveting scaffolds are shown at the elevation of the upper X-bracing.



Base plate preparations

Specifications called for grinding the surface of the pier concrete as accurately as possible to a horizontal plane. Special machinery for this work, built by the contractor consisted of a carborundum grinder mounted on a supporting bridge. The grinding wheel, 24 in. in diameter and 4 in. thick, rotated at a speed of 6,600 to 8,300 ft. per min. at the circumference and was moved across the surface of the concrete at a rate of 3 or 5½ ft. per min. making a cut 1/16 to ⅛-in. deep. The area which was ground amounted to about 1,200 sq. ft. for each tower leg (4,800 sq. ft. total). Accuracy of the finished surface was not more than 1/32-in. above or below the fixed datum.

Base plates consisting of 19 slabs of steel 5 in. thick were placed on a layer of red lead paste, without grouting.

Traveler

The erection traveler used to place the column sections and bracing was of structural steel construction 28 x 79 ft. in plan and 33 ft. deep. It carried two derricks of 85-ton capacity, having 90-ft. booms. Each derrick was operated from hoists located on the ground near the tower.

The two electric motors were geared to two 4-drum hoisting engines arranged to work in unison. Hoisting speed for heavy column sections was 30 ft. per min.

In erecting each tower the traveler was jumped 15 times after its initial setting, averaging 35 ft. per move. To raise the traveler, two beams were first placed across the highest steel in each leg, and sheaves in the ends of these beams, and sheaves in the four corners of the traveler were then rove with a 1-in. wire rope with the lead line carried to the hoisting engines on the ground. The rate of raise was 6 ft. per min.

At the end of the 35-ft. raise the traveler was supported by four steel plungers which were extended into rectangular slots left in the permanent steel of the column. Following the placing of the steel which could be handled by the two 90-ft. derrick booms in that position, the beams were placed, the sheaves rove and the raise was repeated.

Raising and placing of the column

Articles on the Golden Gate Bridge

General Review of the Project..... ..... Sept. 10, 1930
General Design and Features of the Specifications. May 10, May 25, 1931
Foundation Progress and Concreting Operations .....June 10, 1933
Construction of the South Pier.... .....Jan., 1935

sections, bracing and miscellaneous steel involved no unusual erection features except the tonnage involved and the height to which the towers went. Each derrick had its own raising gang, including a signal man stationed in a crow's nest on the top of the derrick mast. Hoisting signals were transmitted by this signal man to the hoist operator on the ground, the desired movements being indicated by electric lights. Erection was carried forward during a 40-hr. week (five 8-hr. day shifts), the specifications prescribing this working arrangement.

Riveting

Riveting crews, following behind the erection operations on the traveler, drove the 600,000 rivets required for each tower. Heating was done on coal forges located on outside scaffolds surrounding each tower. The principal problem in the riveting was the large number of closed cells. At the base, as mentioned in the design section of this article, each tower leg consists of 97 closed cells and at a height of 300 ft. there are 53 cells, with 21 at the top.

For passing rivets to the crews inside these cells, a penumatic system with flexible steel tubing was used. The loading end of this tube and the compressed air connection was located near the rivet heater, and the tubing extended through 6½-in. diameter holes, left in the steel for this purpose, to delivery at the crew.

Members of erection and riveting crews were required to wear hard fiber hats and riveters working in the enclosed cells wore respirators. Lifting of crews to various working levels was done in an enclosed-cage man hoist operating in wire rope guides.

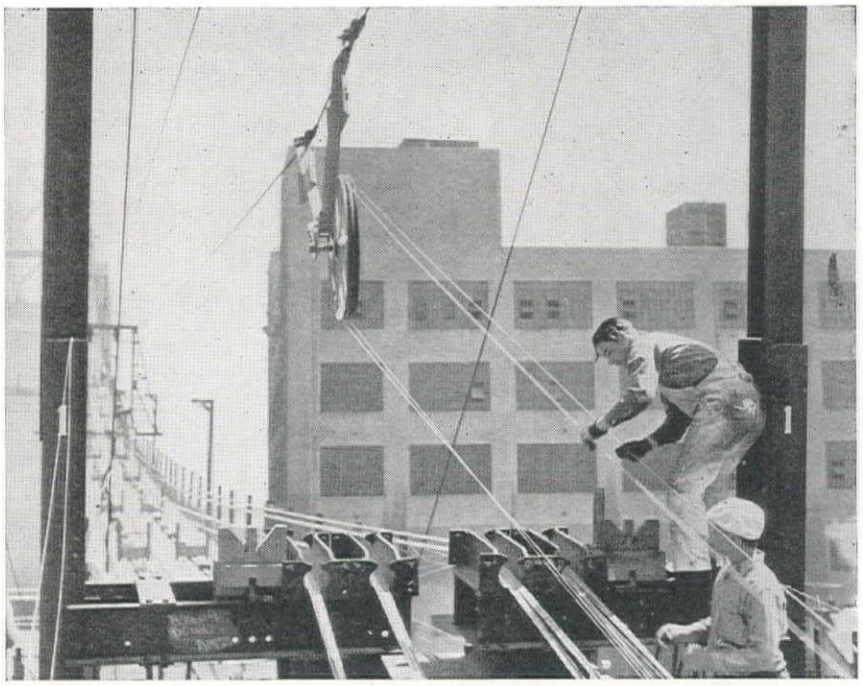
Concluding work on each tower included the raising of three 50-ton steel castings forming the 150-ton saddle for each leg of the tower. Two field coats of lead paint completed the tower work.

Fabrication and erection of the towers was carried out by the engineering and construction organization of the McClintic-Marshall Corp. A. F. McLane was superintendent of erection. The contract price is $10,494,000 for the entire steel superstructure work on the main bridge, including the two towers.

Engineering Personnel

All work on the Golden Gate bridge project is carried out under the direction of Joseph B. Strauss, chief engineer. Reporting to the chief engineer is Clifford E. Paine, principal assistant engineer, in direct charge of design and construction. Russell G. Cone is resident engineer. Charles Clarahan, Jr., assistant engineer, made all design computations. D. N. Wetherell, assistant engineer, is responsible for drafting of plans.

Collaborating with the chief engineer is an engineering board composed of O. H. Ammann, Charles Derleth, Jr. and Leon S. Moisseiff. Irving S. Morrow, consulting architect, also collaborated with the chief engineer.



Cable Spinning Operations On the San Francisco-Oakland Bridge

CABLE SPINNING operations are well started on the west unit of the two 2,300-ft. suspension spans of the San Francisco-Oakland Bay Bridge. Up to July 1 the work was confined to the four lower strands of the north cable. Each of these strands contains 472 individual wires, and 37 strands are required to complete each 28-in. cable.

Typical views of spinning operations are shown in the front cover picture and the accompanying illustration. Each of the two spinning wheels used for each cable carry two loops of wire as they are pulled across the span. As the wheels pass the control stations, the two dead wires are hooked down and the two live wires are placed under the small wheels shown near the feet of the attendant on the right-hand side of the cover picture, to keep them from swaying violently. As soon as the pair of loops has been spun they are released from the hooks and the wheels and adjusted to the proper sag for the strand. Adjustment is made by applying tension at the anchorages as directed by the observers with telephones stationed at mid-span. One of these sag stations is located at the center of the main span and two in the back stays. The upright timbers are used to keep the strands separated and prevent sway in the wind.

Cat-walk construction is clearly shown in the cover picture. The four 2¼-in. wire ropes supporting each walk have been pre-stressed and will ultimately be used for suspender ropes in the final structure.

Cable spinning operations were started June 15 with a ceremony attended by Governor Merriam, municipal officials and others.

Four Debris Dams Recommended by Army Board

Four dams to retain debris from hydraulic mining operations in California, to cost $6,945,000, have been recommended to Congress in a report by the Army Board of Engineers. The structures, according to the plan in the report, would be built by the government and the cost repaid in a 20-year period by mining interests using the reservoirs. The recommendation of the board, over the signature of Major General E. M. Markham, Chief of Engineers, included the building of the Upper Narrows Dam on the Yuba River, the Dog Bar Dam on the Bear River, the North Fork Dam on the North Fork of the American River and the Lower Ruck-Chucky Dam on the Middle Fork of the American River.

The report was made to the Rivers and Harbors Committee of the House.

The California Debris Commission has developed a program for a 20-year period to permit resumption of hydraulic mining in the state on a substantial scale. Estimates indicate that $600,000,000 of gold could be recovered with hydraulic operations.

●

$12,000,000 for Wyoming

Highway expenditures in Wyoming during the next two years will approach $12,000,000, the biggest biennium in the history of the state highway department. In the last two years, highway expenditures in the state have totalled about $10,000,000.

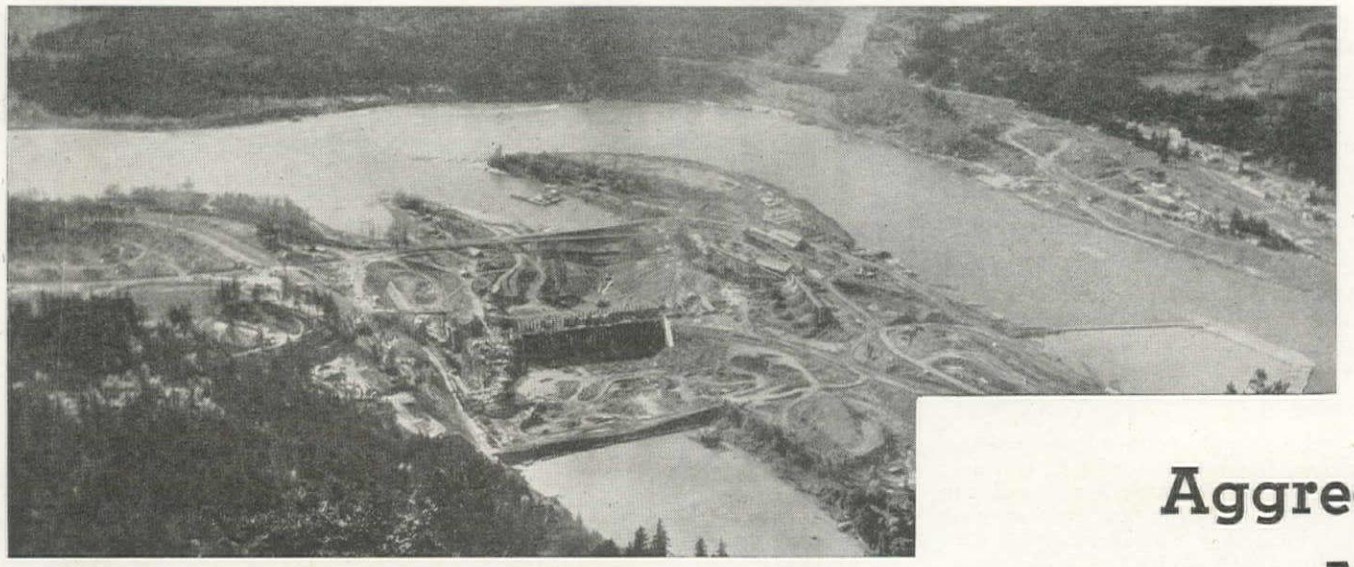


Fig. 1. Airview of the Bonneville project looking downstream, with the lock and powerhouse at the left. The main or spillway damsite, on the right (Washington) side of Bradford Island is indicated by the cofferdam which is nearly overtopped. This cofferdam is shown in Fig. 2.

Aggregate Main

IN the eighteen months which have elapsed since construction operations started on the Bonneville project, for power development and navigation on the Columbia River about 40 miles upstream from Portland, several major contracts have been advanced to the stage where the methods of operations can be reviewed with some detail, to indicate the construction procedure used on this $31,250,000 development being built by the federal government under the direction of the Corps of Engineers. Items of work which have already been completed include: relocation of the S. P. & S. railroad tracks on the Washington side of the river, P. L. Crooks Co., contractor; construction of the permanent government town and utilities; and the deck plate-girder swing over the lower lock approach, McRae Bros., contractors.

Prior to Sept. 1, 1934, a total of $17,447,684 was obligated in contracts (*Western Construction News*, November, 1934 for details) and since that date twelve additional contracts, involving $4,594,315 have been awarded, making a total of $22,041,999 in contracts completed or now under construction. The latter contracts are listed in the accompanying table.

Further, two large contracts, involving more than $1,500,000, were called for bids on July 9 and 10, and, include intake gates for the powerhouse, steel gates for the main spillway dam, a 30 and 130-ton and two 350-ton gantry cranes, and lock operating equipment composed of mitre gates, taintor gates, and operating mechanism.

Present construction activities are centered at several points scattered over the entire project and include the following major phases of the work; (1) main spillway dam; (2) powerhouse and navigation lock; (3) OWR & N track relocation on Oregon side; and (4) lock approach and fishway excavation. Since the middle of April the Columbia River has steadily been rising, the peak flood occurring on June 11 with an estimated flow of 490,000 c.f.s., when the water level at the upper earth cofferdam in Bradford channel reached Elev. 44.2. The powerhouse and lock area inside the Bradford channel cofferdams is also flooded, the maximum pool level reaching Elev. 32.6.

Main spillway dam excavation

Immediately following the completion and sealing of the timber crib cofferdam (Fig. 2) for unwatering the south abutment of the main spillway dam, under contract ($8,972,650) to the Columbia Construction Co., excavation was started about the middle of March in the enclosed area (*Western Construction News*, January, 1935, for details of cofferdam construction and design). During the month prior to April 19, when operations ceased in the cofferdammed area due to high water, 330,000 cu. yd. of material was taken out with an 8-yd. Bucyrus-Monighan dragline, Marion 490 and Bucyrus-Erie 43B and 75B shovels, loading into 35-yd. LeTourneau penumatic-tired buggies and various sized trucks. The material was stored for backfill or wasted in the levee connecting the powerhouse and main dam, and at the lower end of Bradford Island downstream from the project.

With the subsequent rise in the river, the cofferdam was overtopped on May 8 and during the maximum high water, about 12 ft. of water was flowing over the cofferdam.

It was the original plan of the contractor and engineers to place only the midstream river leg of the cofferdam (cribs 8 to 13 inclusive) during the low water season of 1934-35 and complete the remaining shore legs after the high water of 1935 had receded to permit resumption of activities. Through cooperation of the U. S. Engineers Office, which is responsible for contingencies involved in the cofferdam work, and the smooth functioning organization of the Columbia Construction Co., it was possible to complete the shore legs of the cofferdam and part of the excavation before the regular flood period, thus advancing the original construction program by several months.

Contracts Awarded Since September 1934

Walks, Curbs, sprinkler system in townsite, Parker-Schramm Co	$ 39,819
Exploratory drilling at damsite, Cannon Bros.	$ 4,480
Civic auditorium and administration building, A. S. Hansen Co.	57,500
Bridge structure over lock approach, McRae Bros.	55,349
Permanent road system in townsite, Parker-Schramm Co.	61,860
Emergency dam derrick, 13 emergency dam bulkheads, 50 fishway stoplogs, emergency dam lifting beam, etc., Pacific Car & Foundry Co.,	108,278
Turbines and governing equipment, S. Morgan Smith Co.	1,135,329
Balance of OWR&N track relocation on Oregon side and riprapping at Ruckle slide, Sam Orino	793,191
Lower lock approach and fishway construction, Columbia Construction Company	247,500
Two 43,200 kw. generators, General Electric Co.	1,144,880
565,000 bbl. Portland puzzolan cement, Pacific Portland Cement Co.	916,522
Rails and fittings for OWR&N relocation, Bethlehem Steel Co.	29,607
Total additional contracts	$4,594,315

Fig. 2. Timber crib cofferdam for the main, or spillway, dam in the north channel during March, before the high water season. Excavation under way with the 8-yd. Monighan dragline.

and Concrete Plants for Dam at Bonneville

Preparations ready for concreting on main unit as soon as flood season ends—Aggregate plant described—Progress on other phases of the project reviewed

By G. E. BJORK
Northwest Editor, Western Construction News

During the time the cofferdammed area is flooded the Monighan dragline and LeTourneau buggies are being used in excavating part of the fishway on the north side of Bradford Island and the lock approach which are under a separate contract to the Columbia Construction Co. The material in the lock approach is being dredged out in about 40 ft. of water and is being wasted near the new OWR&N alignment at the government townsite.

Cableway for main dam concrete

Concrete for the main spillway dam will be placed with a cableway spanning the main channel from Bradford Island to North Bonneville on the Washington side. This cableway, with a span of 2,022 ft., is provided with two 90-ft. moveable head tower and a stationary tail tower 223 ft. high, one of the highest towers for this purpose ever built. The head tower and Lidgerwood operating mechanism, including two 6-wheel trollies, were formerly used at Boulder dam. The entire cableway, including fabrication of the new tail tower, is being erected by the Washington Iron Works, Seattle, which fabricated and erected the cableway for the General-Shea Co. on the powerhouse and lock construction.

The 3-in. Roebling lock-coil track cable has a total stress of 351,000 lb. and a capacity of 20 tons and will handle an 8-yd. bucket used in placing concrete. This cable has a 6% sag and will provide a 22-ft. minimum clearance over the highest portion of the dam. The maximum elevation of the tail tower is 285 ft. and the head tower is at Elev. 203. The cable is connected to the tail tower by means of a special 3-ft. steel link which is connected to the tower at one end and to the track cable through sheaves and a back bracing cable, at the other end, thus transmitting the stresses indirectly to the tower members.

The head towers are mounted on four railroad trucks and operate on a 45-ft. 8-in. gage tail track having a radial length of 892 ft. and located about 375 ft. south of the end of the main dam on Bradford Island. Horizontal thrust of the cable is carried through the moveable tower to a horizontal thrust rail by horizontal wheels mounted on a girder attached to the bottom tower sill. The thrust rail is anchored to a 15-ft. high gravel-filled timber bulkhead on which the entire runway is supported. Steel tie rods extend on an angle from the bottom of the back bulkhead wall through the fill material to the braced wooden stringers to which the thrust rail is fastened at track level. The back legs of the head tower are counterweighted with a block containing 200 cu. yd. of concrete. The tail tower in North Bonneville is braced by means of guy cables fastened to the top of the tall tower. Erection of one head tower has already been completed and the tail tower was approximately 50% completed on June 22.

Aggregate and mixing plant

The largest and most complete aggregate, batching, and mixing plant (Fig. 3) ever constructed in the Northwest is being built to furnish concrete for the main dam for the Columbia Construction Co. by George H. Buckler Co., subcontractor. This plant, located immediately below the dam on the Washington shore at North Bonneville, will have a normal capacity of 4,320 cu. yd. of concrete per day (180 cu. yd. per hr.). The entire unit was

Fig. 3. Aggregate plant of the Columbia Construction Co., designed for a concreting output of 4,320 cu. yd. per day. Note the timber crib construction for the four 1,500-cu. yd. aggregate storage bins, each 30 ft. in diameter (octagonal section) and 57 ft. high.

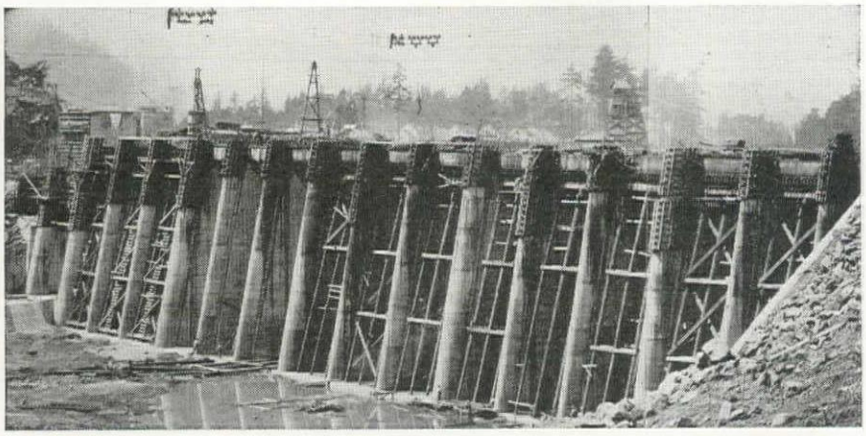


Fig. 4. Upstream face of the powerhouse structure in the south (Oregon) channel, showing intake openings. About 113,000 cu. yd. of concrete have been placed in this structure and the contract of the General Shea Co. is more than 70% complete.

about 80% completed June 22. The mixing plant is located 580 ft. below the axis of the dam and the aggregate handling plant is 368 ft. below the mixing plant, the two being connected by an inclined belt conveyor.

Aggregate is unloaded through 12-in. grizzlies into four track hoppers from railroad gondolas which transport the sand and gravel from separate deposits at Bingen and Rabbit Island, located 25 and 50 mi. upstream. The pit run material is loaded into railroad cars with draglines.

Four Traylor vibrating feeders and two 21-ft. belt conveyors, located in the covered pit under the track hoppers, feed onto the 231-ft. main inclined belt conveyor which delivers the material to a 4 by 10-ft. scalping screen with 6-in. openings. The oversize goes to a 15 by 38-in. Wheeling jaw crusher and is returned to the circuit on a belt conveyor to the main conveyor for rescreening. Belt conveyors are 30 in. wide and Buffalo vibrating screens are used throughout the plant.

The material passing the screen drops onto a 221-ft. inclined conveyor and is fed to a 5 by 12-ft. double deck screen with 3-in. and 1-in. openings, located on top of the storage bins. The oversize material drops directly into the storage bin and the minus 3-in. material passes to an inclined belt conveyor and then to two 4 by 12-ft. double deck screens having 1½ and ¾-in. openings. The oversize product from these screens passes to a short horizontal conveyor which feeds it into a storage bin. The minus 1½-in. material is taken off on another short conveyor, which is reversible, and is delivered to an adjacent storage bin. The minus ¾-in. gravel is also delivered to the same conveyor and fed into another storage bin from the opposite end of the conveyor.

The minus 1-in. product from the first double deck screen drops directly onto two 3 by 12-ft. double deck screens with ½-in. and No. 4 openings. The oversize material is fed onto the belt conveyor which also receives gravel from the 1-in. screen above. The fines are fed through a flat chute to two 36-in. Bodinson classifiers which in turn delivers the sand to a 24-in. horizontal conveyor, 107 ft. long, over the open storage area, located next to the storage bins. Material is discharged to the storage piles, which have a total capacity of 2,000 cu. yd., by means of a belt tripper.

In case it becomes necessary to produce a greater proportion of smaller sized gravel, a 201-ft. belt conveyor has been provided along the north side of the storage bins to deliver the material to a 4-ft. Symons cone crusher located near the primary jaw crusher. Material is drawn from the bins through chutes in the sides. The crushed material is returned to the circuit over the same conveyor system as is used in the primary crushing. It is also planned to provide a similar conveyor on the opposite side of the bins to permit drawing off material from the bins to facilitate, if necessary, additional storage in open storage piles.

Gravel and sand are drawn from storage through Traylor vibrating feeders onto a 235-ft. reclaiming conveyor under the silos and sand piles. This conveyor delivers the aggregate to a 368-ft. conveyor on an 18¼ deg. slope, which feeds the storage bins over the batching plant.

The gravel handling plant which is timber throughout, excepting chutes and hoppers, is covered with galvanized corrugated iron and has a total length of 603 ft., the upper floor level being 90 ft. above the ground. The four storage bins are rather unique in design and provides a capacity of 1,500 cu. yd. each. These octogonal shaped silos are 30 ft. diam. and 57 ft. high and are constructed as a crib, using 6-in. thick timbers varying from 10 to 16 in. in width. These crib walls are fastened together at the corners with steel dowels and will be lined with tongue and grooved lumber, if necessary.

Boulder Dam mixers used

A similar arrangement to that used at the Lomix plant at Boulder dam will probably be used for handling concrete. The mixers will discharge directly into the 8-yd. bottom-dump buckets which will be transported to a loading position under the cableway over two nearly straight "peddling" tracks on flat cars designed to fit the buckets. The alternate plan provides for 8-yd. concrete cars which will dump into the cableway buckets near the axis of the dam under the cableway.

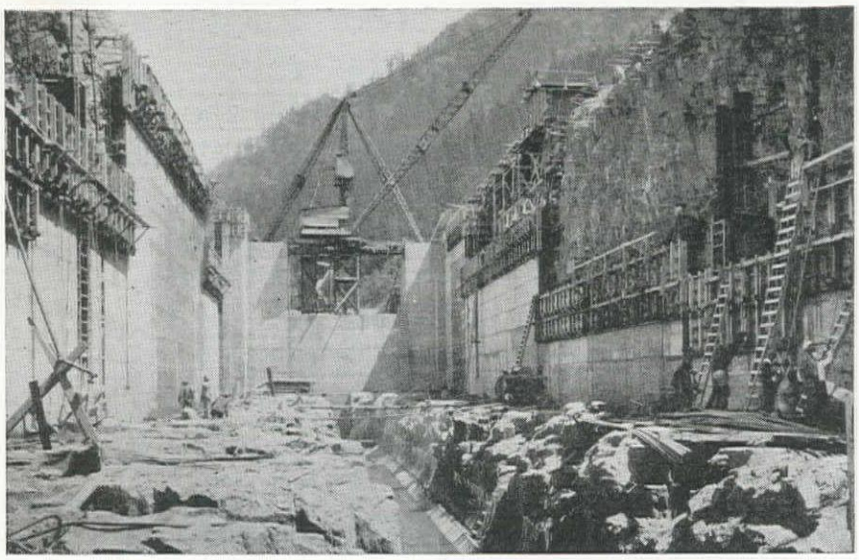


Fig. 5. Ship lock, looking upstream with top concrete at Elev. 85, has foundations extending to a maximum depth of Elev. 80.

The concrete batching and mixing plant is in one unit and contains four 4-yd. Smith mixers which were formerly used on the Boulder dam project. The batching equipment is that used for furnishing concrete on the San Francisco-Oakland Bay bridge substructures. The mixers are supported on 36-in. I-beams resting on a concrete platform 19 ft. high and the upper batching floor and laminated wood storage bins are supported on a heavy structural steel frame. The platform on top of the bins is 96 ft. above the ground and the entire plant is 69 by 48 ft. in section.

A novel arrangement is used to distribute material from the incoming conveyor to the nine 300-cu. yd. capacity rectangular bins over the batching floor. These bins are 42 ft. deep, 15½ by 17 ft. in area, and are built of laminated 3-in. planks, the walls varying in thickness from 6 to 12 in. Material is discharged onto a shuttle belt con-

veyor, 18 ft. long, which is pivoted near the tail pulley end and is mounted on wheels near the discharge end. The conveyor is revolved around the circular track over the bins and aggregate can be discharged directly into any desired bin.

The two automatic batching units equipped with Kron dial scales and steel weighing hoppers dump into a hopper provided with a swivel chute for feeding either one of the two mixers, located opposite each other. Water is fed into the rear of the mixers through a chute leading from two tanks above on the batching floor. The tilting mixers discharge into hoppers located in the mixer floor and which load the concrete buckets. The two hoppers, equipped with radial arc gates, are placed between the discharge end of the two opposite mixers.

Cement is delivered in bulk in boxcars and is unloaded with a Clark shovel into a track hopper feeding a screw conveyor which delivers it to a mill-type bucket elevator used to raise the cement to the top of the steel silos, located adjacent to the batch storage bins. The Clark shovel is a drag scraper, cable controlled, which pushes the cement from any position inside of the car into the unloading hopper and is manually operated. The cement is distributed to the three silos by means of a screw conveyor, and is conveyed to the weigh bins of the mixers by means of a gathering conveyor and two screw conveyors, one for each of the batching units.

The Columbia Construction Co. per-

Fig. 6. Concrete placing by Blaw-Knox bucket in the ship lock from two 15-ton cableways. Note the dowels in the rock wall.

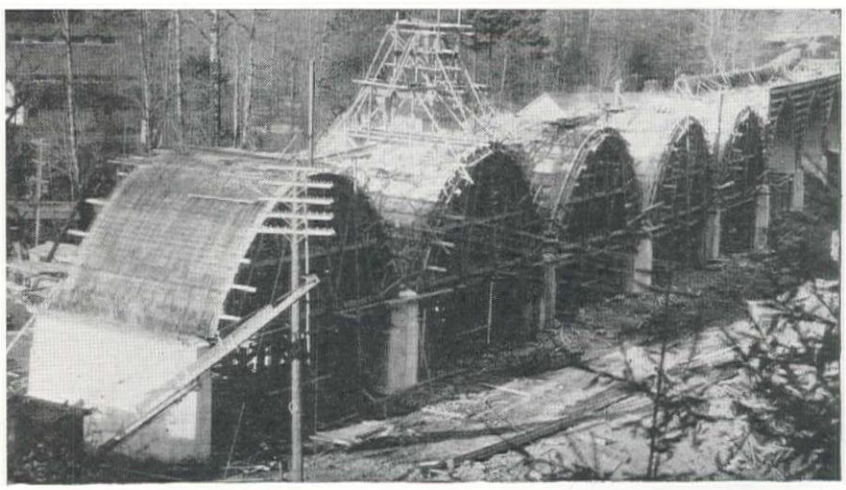


Fig. 7. Tanner Creek double-track viaduct on the OWR & N track relocation includes sixteen earth filled spandrel arches. Maximum height is 50 ft. and the work involved 11,000 cu. yd. of concrete.

sonnel includes: Edgar F. Kaiser, administrative manager; Clay P. Bedford, general superintendent; R. E. McGrew, consulting engineer; George Havas, chief engineer; A. Donaldson, office engineer; H. P. Davis and F. R. Greyson, designing and construction engineers on the concrete and aggregate plant; and F. W. Crocker, designing engineer on the cableway. Columbia Construction Co. is composed of the following firms: W. A. Bechtal Co.; Henry J. Kaiser Co.; Morrison-Knudsen Co.; Utah Construction Co.; and McDonald & Kahn Co. Henry J. Kaiser is president.

Powerhouse substructure and lock

Since Nov. 1, 1934, when the first concrete was poured in the powerhouse foundations, more than 185,000 cu. yd. of the 231,000 cu. yd. required has been placed (112,000 cu. yd. in the powerhouse and 63,000 cu. yd. in the lock) by the General-Shea Co.; the entire contract is about 70% completed. Only 9,000 cu. yd. of concrete remains to be placed in the substructure.

The 120-ft. cantilever wall at the north end, fishway structure in front, upstream intake structure, and powerhouse substructure proper to Elev. 55 (maximum height under this contract) have already been completed. The backfill behind the high cantilever wall which is part of the earth levee connecting the powerhouse and main dam has been placed and rock riprap has been placed along the downstream face of this fill.

Connecting roads have been completed to the powerhouse and traffic between Bradford Island and the Oregon shore is now carried over the fishways. No construction difficulty was experienced because of water in the powerhouse area, since concrete had been placed to the powerhouse floor level (Elev. 55), about 23 ft. above the water level reached in the cofferdam area. The upstream earth cofferdam, however, was raised about 13 ft. above the low water level dam and this provided a difference in elevation of 11 ft. between river above and the pool on the opposite side.

Approximately half of the concrete in the lock (Fig. 5 and 6) remains to be placed and includes: the upper 50-ft. portion of the south wall (up to Elev. 35 at present); the upper guide wall for which concrete buttresses are already in place; the upper portion of the lock filling structure; and the Ambursen type wall on the power-house side near the east end above Elev. 60 to the maximum finished level at Elev. 85. In excavating for the foundations of the lock filling structure near the east end of the lock last winter considerable difficulty was experienced when a 50-ft. layer of quicksand was encountered. It was necessary to extend the foundation to Elev. -80 to reach satisfactory foundation rock.

In handling the quicksand a battery of Mooretrench pumps were used and these dried out the material sufficiently to permit shovels and derricks and clamshell buckets to work in the pit. The quicksand was of a sand-clay type and when unwatered was of an impervious nature.

Concrete has been placed in the powerhouse and lock with the two 15-ton cableways spanning Bradford channel. Concrete for the extreme upper end of the cantilever wall and upper and lower lock guide walls were placed with Rex Plumbcrete units. Lock mitre gate monoliths were placed with a derrick and concrete bucket, concrete being delivered to a loading hopper in the lock from the batching and mixing plant on Bradford island by the cableway. (*Western Construction News*, November, 1934, contained a description of aggregate and mixing plants and cableway.) During normal operation an average of from 1,000 to 1,500 cu. yd. of concrete was placed per day. The lower cableway headtower has already been dismantled and is to be used on the Hetch Hetchy dam project in California which is under contract to the Transbay Construction Co. of which General Construction Co. and J. F. Shea Co. are members.

The powerhouse and lock work is proceeding about on schedule and completion is expected in December of this year. The construction personnel of

General-Shea Co. include: Ben H. Cook, general superintendent; C. W. Wood, concrete superintendent; Al. Lewis, construction superintendent; E. A. Webster, excavation superintendent; R. E. Cook, chief engineer; and D. H. Henderson, office manager.

OWR&N track relocation

The first section of the OWR&N track relocation, which is under contract ($846,247) to Orino-Bell-Malcom Co., will be completed about July 15. This work includes: 1½ mi. of grading from Moffett Creek to Tanner Creek, involving about 350,000 cu. yd. of excavation; driving of Tooth Rock tunnel, which is 600 ft. long and 31 by 36 ft. in cross section; construction of piers and abutments for Eagle Creek bridge; construction of Tanner Creek viaduct (Fig. 7), consisting of sixteen earth-filled spandrel arches having a total length of 899 ft.; and placing 300,000 cu. yd. of riprap at the foot of Ruckel slide, located about 2 mi. above the powerhouse.

Of major interest on this railroad work is the Tanner Creek crossing and Tooth Rock tunnel. This viaduct was built by sub-contractors, Birkemier & Saramel Co., at a cost of approximately $225,000 and is one of the largest of its type in the United States. The viaduct rises to a height of 50 ft. above streambed and contains about 11,000 cu. yd. of concrete. It is laid out on a 3 deg. curve and provides for double tracks.

Initial driving of the large tunnel was started Nov. 1, 1934 and holing through occurred April 25 with excavation totaling 25,000 cu. yd. The tunnel was driven from the upper portal only due to better access facilities. Shoring was necessary only in one short section and at the upper portal. Material was taken out from the full tunnel face and drilling was done with a full-face jumbo drill carriage mounted on a truck, 10 ft. being pulled per round.

About half of the total 5,500 cu. yd. of concrete tunnel lining has been poured with a production of about 18 ft. of complete lining being placed per day. Wall footings and gutter, were first poured the entire length of the tunnel and these provide a support for Blaw-Knox steel forms equipped with wooden panels. These forms are 18 ft. long and are wheel mounted, moving along a track on each side which is laid on a timber sill on the gutter concrete.

In placing the form, it is hand jacked off the track about 3 in. and wedged into place with heavy bracing timbers spanning the tunnel floor, the top of the arch being spread about 6 in. and a steel plate inserted in the opening. In stripping, the form is lowered to the track and collapsed at the top to permit moving it to a new pouring position. Three 18-ft. sections of forms are used and stripping is done from 36 to 48 hr. after the pour has been made.

A unique arrangement provides for mixing and placing the concrete with a 1-yd. Koehring mixer and Rex Pumpcrete unit. The mixer is mounted on top of a skid-mounted timber platform inside the tunnel and it is charged by three-compartment trucks which back up a ramp to the feed hopper. High early strength cement is batched by hand from sacks. The mixed concrete is discharged to the Pumpcrete unit immediately below the mixer and is pumped directly into the top of the form through a 6-in. pipe which varies in length from 50 to 150 ft.

In placing the side walls, the spouts lead down from the discharge end of the pipe to the spring line of the arch and distribution of concrete and spading is done by workmen inside the form. A special pipe section at the end of the concrete line is used in sealing the arch and crown. It is provided with a compressed air line connection in the side and it acts as a nozzle in blowing the concrete into place.

R. A. Bell and C. T. Malcom are resident managers on the railroad work and J. M. Bruce is concrete superintendent. Tunnel excavation and grading work was directed by O. Archord and John Hogan. During the course of tunnel excavation a rock slide containing about 5,000 cu. yd. of material came down at the lower portal taking out about 50 ft. of the tnuuel and covering the OWR&N main line tracks below. It was necessary to excavate this material from the lower track level. No damage was done to the Columbia River highway immediately above the tunnel.

A $793,191 contract for the balance of the OWR&N relocation was recently awarded to Sam Orino and grading has already started with Lima 701 and 1½-yd. Northwest shovels and trucks. This work includes the following items: 530,000 cu. yd. of solid rock excavation; 280,000 cu. yd. of unclassified excavation; 9,000,000 sta. yd. of overhaul; 180,000 cu. yd. placing riprap at Ruckel slide; removal of Eagle Creek and Tanner Creek spans and erection of new Eagle Creek through-truss steel and timber deck bridges; removal of 27,000 ft. of existing track and laying of 34,000 ft. of track. This work will complete the railroad relocation on the Oregon side from Moffett Creek to Cascade Locks, a distance of 4¼ mi. Due to the steep topography of the country it has been necessary to locate

Rock Asphalt Deposit Used Highway in

Natural material in Uintah Basin mined, retorted and proportioned—Inaccessible location and local unemployment are factors

By H. V. RICHARDS

Statistical Engineer, Utah State Road Commission

IN THE Uintah Basin, an area rendered relatively inaccessible by surrounding mountains, transportation costs, and the occurrence of a deposit of rock asphalt, combined with the desire to give preference to local labor, resulted in the Utah State Road Commission developing this source of road material and using it to surface a section of highway near Vernal. The rock asphalt is mined, treated in a retort, and blended with careful proportioning before being laid in a 1½-in. surfacing. Prior use of this material locally for sidewalks, streets, and an experimental section of highway surfaced last year provides satisfactory data on the durability of this material.

Characteristics of the region.

The Uintah Basin in eastern Utah is a region enclosed on all sides by high mountain ranges. Roughly 120 miles long from west to east and 70 miles wide, the basin contains about 500,000 acres of irrigable land, and in addition has a vast talent wealth in mineral resources. In the strata of sandstone known as the Green River formation, extensive areas of oil-bearing shales have been reserved by the Federal Government as naval stores. Extending generally throughout the region, and closely associated in origin with oil shales are found the largest deposits of asphalt and related bitumens found in this country.

Railroads, though often projected, have not solved the problem of crossing the mountains on economical location, except in one remote corner where a narrow gage line has been built from Mack, Colo., to a gilsonite mine. However, the area is traversed by a major highway (U. S. 40) and the mail and stages travel this route throughout the year, although snow must be cleared from an 8,000-ft. summit and across Strawberry Flat at 7,500-ft. altitude for a distance of 16 miles. The road is paved or oiled from Salt Lake City to a point in Daniels' Canyon, 15 miles east of Heber, and thence is standard gravel with some oil sections across the basin.

From Duchesne, which is 120 miles east of Salt Lake City and the westerly town of the basin, state route No. 33, also a federal highway, extends south 45 miles to the railroad at Price, but has to cross a much higher and steeper summit. This connection is also kept open to traffic throughout the year. As this was the first federal aid project built in Utah it is much inferior in width and alignment as compared with the main highway and is, for the most part unsurfaced.

Steadily increasing traffic, resulting

the new railroad and the relocated Columbia River highway grade in the same cut but at different elevations.

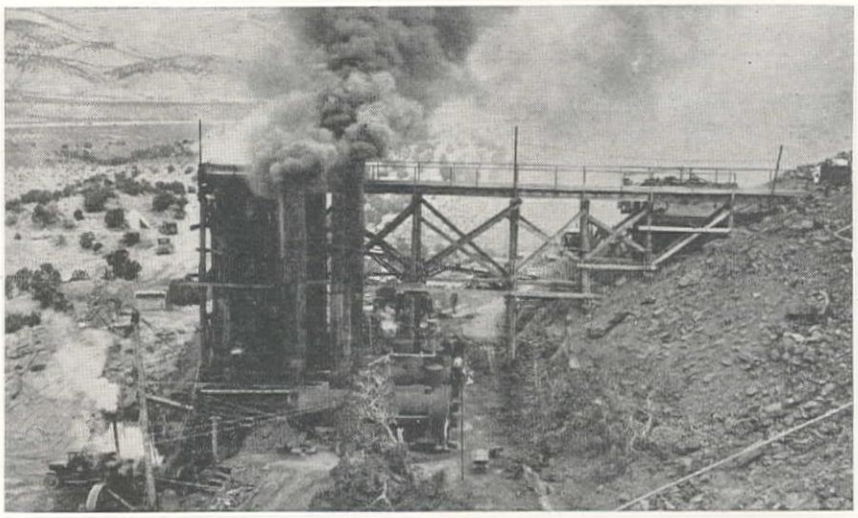
Engineering personnel

The Bonneville project is being built under the direction of the U. S. Engineers Office in Portland. The engineering personnel includes: Lt. Col. Thomas M. Robins, division engineer, North Pacific Division; Major Charles F. Williams, district engineer; C. I. Grimm, chief engineer; A. E. Kennett, assistant chief engineer; R. R. Clark, spillway dam design; C. C. Galbraith, powerhouse design; Ray E. Mackenzie, lock design; A. S. Bray, office engineer in Portland. The field staff at Bonneville includes: Capt. J. S. Gorlinski, resident engineer; Ben E. Torpen, senior engineer in charge of field engineering; Lieut. Colby Myers, administrative engineer; I. E. Burks, concrete technician on design and mix; O. C. Hartman, resident engineer for main spillway dam; Howard Rigler, resident engineer for Powerhouse and lock; and N. C. Pearson, resident engineer on the railroad work.

for Surfacing Eastern Utah

from the highway improvement in the region, has presented the state road commission with a serious problem in its efforts to maintain adequately the large mileage of graveled roads in the Basin. In 1933 the highway was oil treated between Duchesne and Myton, 20 miles and this section now has a satisfactory dustless surface, but one which has been demonstrated to be an expensive type to build and maintain in this region. Construction and maintenance of both the gravel road and the oil-mixed gravel surface is exceptionally high per mile in the Basin because local gravels usually require expensive crushing, in addition to the cost for the long haul of commercial materials.

In view of these conditions, studies were made of the possibilities of utilizing the abundant deposit of natural rock asphalt as a road material. The problem was to find stone of correct bitumen content—11.5%—to produce a durable road surface or, failing of that ideal condition, to develop a quarry having both lean and rich strata so that a plant could turn out a controlled product in quantities that would render its operation economically feasible.



Reducing plant at the quarry, showing tram line to top of the retorts. Power is furnished by the boilers in the foreground and the crushers for the lean material are behind the runway to the vats. Mixers and weigh boxes are under the retorts.

For many years, sidewalks in Vernal have been paved with the output of an adjacent quarry, and in 1924 the commission paved the town's main thoroughfare with local material, using makeshift equipment and employing an expensive routine which included quarrying during winter months when the frozen condition of the deposit made blasting feasible. The result has, however, proved highly successful. Across the mountains, in Carbon County, the product of a commercially operated quarry has been extensively used during recent years to pave the streets of Price and the state roads in that locality. The material is from the same formation as that in the Uintah Basin.

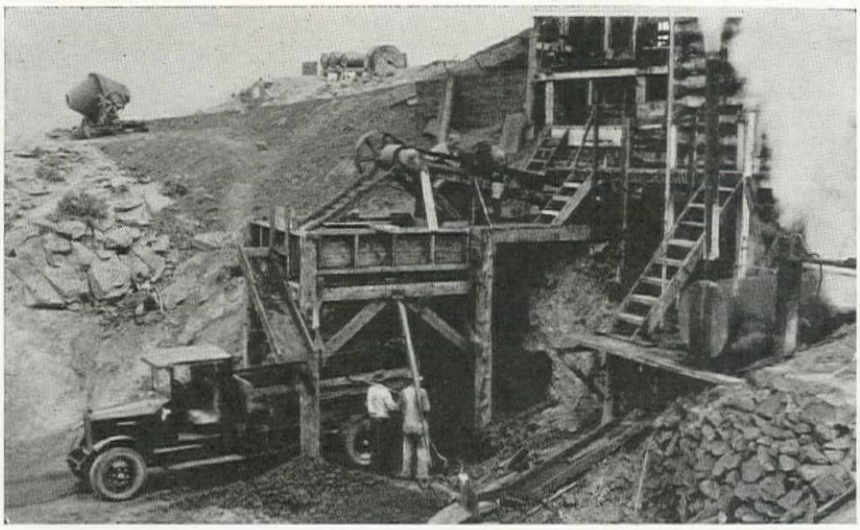
Following extensive field and laboratory investigation the commission leased an asphalt quarry in 1934 located about 7 miles west of Vernal. State forces built and are operating a plant which is turning out rock asphalt graded for highway use at the rate of about 200 tons per day. The Reynolds-Ely Construction Co., Springville, has the contract for hauling and placing 7,000 tons of the material on nine miles of highway U. S. 40 west of Vernal. The location of the quarry requires a haul of about 5 miles to the east end of the project.

Quarrying on the rich vein of rock asphalt, which is shot out in large pieces and then broken up by air hammers and loaded by hand.

Quarrying operations

The deposit occurs in a well-defined ridge south of Vernal. At only a few points has this 35-mile ridge been thoroughly prospected. Different strata vary in thickness and asphaltic content, and at the state quarry the deposit has a vein of lean material 35 ft. thick, running 6 to 9% asphalt, above which is a 6-ft. vein of rich material carrying 13 to 15% asphalt, with an overburden of varying depth. The quarry has been stripped for a width of about 100 ft. Use of a wider area will involve deeper stripping, and excavation, if continued, will entail production by tunnel operation, as the ridge rises sharply above the deposit.

For each round of blasting, 4-ft. holes are drilled into the face of each vein with air drills, water-lined to reduce the heating of the asphalt. When shot, the lean material breaks like ordinary rock and can be conveyed by team and scraper to the trap. The rich material is exceedingly tough and breaks into pieces too large for the mill. This problem has been solved by using air operated chisel-bitted concrete breakers. The men engaged in this work acquire a considerable skill in this breaking operation and in making just the right application of power, for the chisel-bits may be easily broken on this tough rock asphalt. When properly sized the rich material is loaded into mine cars and conveyed by



Storage bin for finished material at the base of the reducing and proportioning plant. The abandoned concrete mixer on the hill was used before the installation of the pugmill.

gravity to the plant, a tram system being used to return empties.

There are three 5-hour shifts in the quarry, the work being continuous from 8 a.m. to 11 p.m. At night the quarry and plant is lighted with electricity supplied from two turbine driven generators.

Plant operations

Operation of the plant was started in April for production of material for the Reynolds-Ely contract, but the equipment was first installed and operated last year to supply material for a short experimental stretch east of Vernal. Very little new material was purchased, the state utilizing so far as possible such equipment as could be obtained locally. The plant is capable of producing 200 tons or more per day and cost the state only $12,000.

Power is supplied from a battery of four steam boilers which, operating under 80-lb. pressure, can generate 275 h.p. This furnishes adequate power for air pressure at the quarry, plant operations and the electric lighting system. Fuel for the plant operation is obtained from a local coal mine.

Reduction of the lean material presents no special problem. It is put through a 15 x 54-in. primary jaw crusher followed by a set of 14 x 30-in. reduction rolls and then moved by belt conveyor to ¼-in. square opening screens, and into a storage bin or transference to the mixer as needed. In passing through the rolls, particles of asphalt sometimes "pancake" into discs ⅛-in. thick and from 2 to 3 in. in diameter. At present this material is passed over the screen and wasted. While involving only small loss it is possible that a refinement in plant operation may be introduced to salvage this material.

The material from the upper or rich vein of asphalt is conveyed to the reducing vats. These consist of four corrugated metal pipes, each 30 ft. long, set vertically. Two are 48 in. in diameter holding 18 tons each and the other two are 60 in. in diameter holding 26 tons each. Perforated steam coils, 1 in. in diameter are placed in these vats, through which steam at 80-lb. pressure is maintained to melt down the material. Temperatures are not taken in these vats, but the retort operation continues for about 4 hr. and at the end of this period the material has attained the desired consistency.

The most interesting part of the plant operation is the mixing of the rich and lean materials to form the road surfacing material. Under a method of materials control, described later, the rich material is drawn from the retorts and the lean material from the storage bins into a weigh box. The melted materials are drawn through 12-in. diameter gates at the bottom of the vats. These gates are steam actuated to avoid the danger of accident which would otherwise attend their operation. From the weigh box the materials drop into a pug mill type mixer of 15-cu. ft. capacity for blending. This operation results in a mix of 11.5% asphalt, within narrow limits, and includes the addition of water to bring the moisture content to 6% in order to obviate setting-up of the material when stockpiled. The mixing operation is completed in from 45 to 60 sec. At the start of plant operations last season, a concrete mixer was employed for the blending operation, but as the output showed numerous balls and lumps the pugmill was installed.

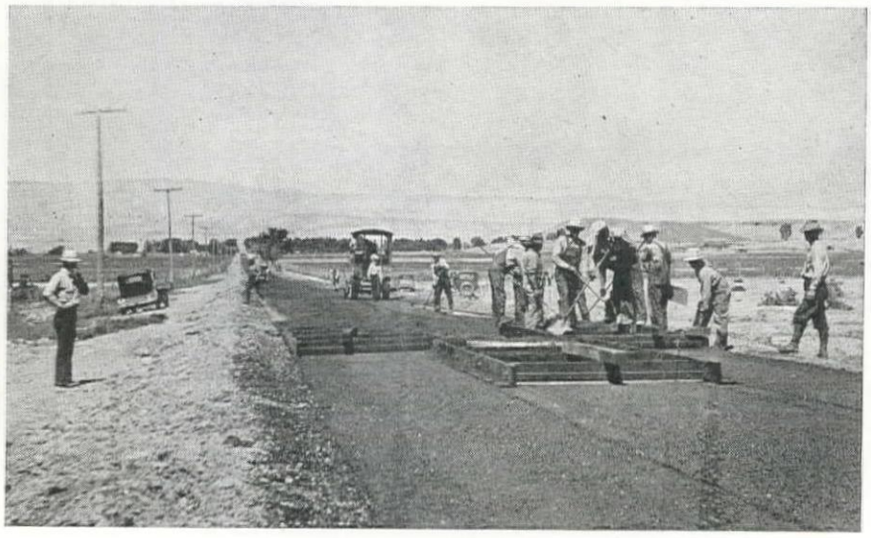
A belt conveyor moves the mixed material to a ¼-in. screen above a storage bin for the purpose of removing any lumps that may have formed in the mixer. From the storage bin the material is moved to stock pile by truck.

Work at the plant is divided into two 5-hr. shifts: 6 a.m. to 11 a.m. and 2 p.m. to 7 p.m., the interval allowing for heating the retort material. A total of 120 men are employed at the plant and quarry, all but four being hired from the local labor rolls.

A characteristic plant report from the records of May 20 shows the following data on the proportioning and analysis of the material used in the mix:

Asphalt, rich	13.6%
Asphalt, rich, water content	4.9%
Asphalt, lean	7.2%
Asphalt, lean, water content	2.8%
Asphalt required for mix	11.5%
Mixture:	
Rich	68%
Lean	32%
Sieve Analysis:	
Passing ¼ in., retained on No. 10	3.7%
Passing No. 10, retained on No. 20	1.8%
Passing No. 20, retained on No. 40	1.8%
Passing No. 40, retained on No. 80	61.4%
Passing No. 80, retained on No. 100	7.5%
Passing No. 100, retained on No. 200	15.0%
Passing No. 200	8.8%

Based upon the respective asphaltic content of the two materials, the lean and rich asphalts are combined in the proportions of 25 to 30% of lean and 70 to 75% of rich by weight, to which



Drags pulled by motor graders are used to spread the mix on the highway, with men riding the drag to add weight and to distribute the material along the front blade.

water is added to bring the moisture content to 6%. The commission has established a field laborator at the plant equipped for making all routine tests. Extraction tests are run at least every hour and the proportion changed as indicated in order to keep the road mix as nearly as possible at 11.5%. Samples taken from the road surfaced with this mix show a stability of 1,500 lb. (Hubbard-Fields) and it is believed will show a stability of between 4,000 and 5,000 lb. after one year's traffic, judging from results obtained on the section placed last year. This large increase in stability is due to oxidation of the binder material.

Laying the road surface.

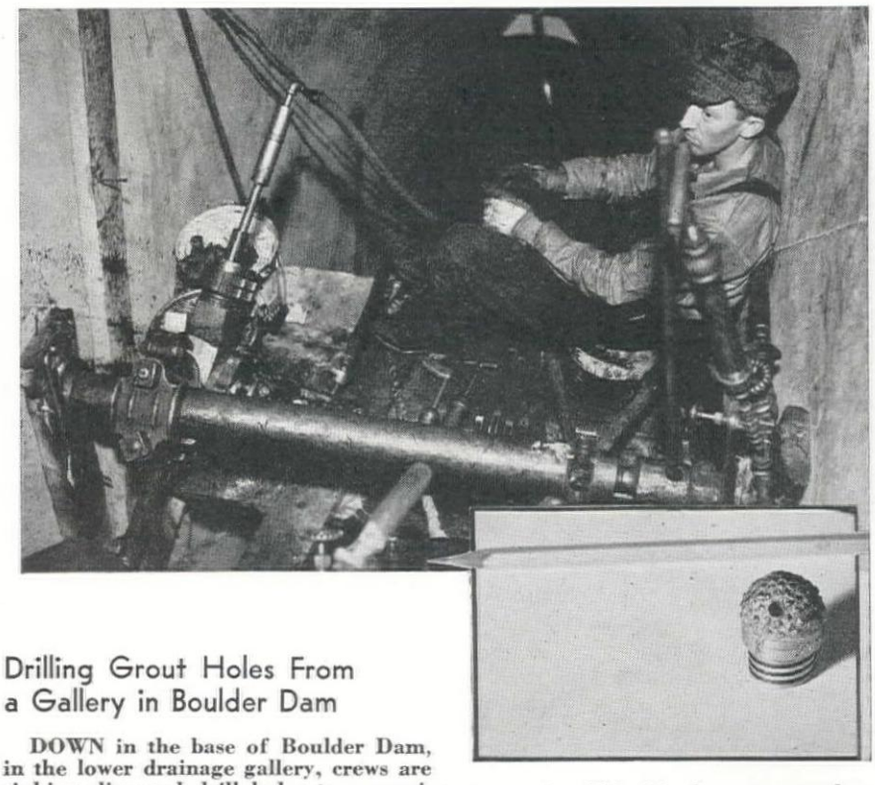
A gravel subbase, 7½ in. thick and 18 ft. wide was placed under a last season's contract and is kept under intensive maintenance by the state in advance of surfacing operations. The first operation of the contractor is to scarify this surface lightly and apply a penetration coat of cut-back (MC-1) at the rate of about ½ gal. per sq. yd. by a distributor. This tack coat provides a film of asphalt which consolidates the natural rock asphalt surface with the base. The stockpiled material at the plant is loaded by steam shovel into trucks, weighed, and transported to the project where it is unloaded and spread by drags to the required cross section to provide a depth of 1½ in. compacted.

The application is made in two courses, the first course being checked to remove irregularities. No asphalt may be spread or rolled when the air temperature is less than 50 deg. F. All that is required in the way of forms is a 1½ in. rope securely spiked in position. Each course is rolled with a 10-ton tandem type roller. In conjunction with the rolling of the final course a light drag, 7 ft. wide and 20 ft. long, provided with four blades, is used to assist in securing a smooth and uniform surface. After removal of the rope side forms the gravel shoulder is carefully raked into line to support the asphalt.

Production of 7,040 tons of rock asphalt is estimated to cost the state an average of $2.50 per ton, or $17,600 exclusive of rental charge on state-owned equipment which is figured at $3,520. Contract items are furnishing and applying 1,235 bbl. of oil at $6.00 per barrel; placing rock asphalt at $1.75 per ton. The total, including 10% for engineering and contingencies, is $44,583 or $4,760 per mile for the total project length of 9.371 miles.

Organization

This work has been carried out under the general direction of K. C. Wright, chief engineer, Utah State Road Commission. R. A. Gillis, district engineer, with headquarters at Price, is in direct charge of the work and the building of the plant. D. P. Maher is plant superintendent and was largely responsible for its assembly. R. W. Griffin is resident engineer and William Larson is materials inspector at the plant.



Drilling Grout Holes From a Gallery in Boulder Dam

DOWN in the base of Boulder Dam, in the lower drainage gallery, crews are sinking diamond drill holes to a maximum depth of 150 ft. into the foundation rock for grouting a cutoff curtain across the upstream face of the dam. The drainage gallery follows the concrete-rock contact line up the abutments rather closely, at a distance of about 15 ft. in the concrete. Grout holes from the gallery are drilled at 5-ft. intervals and are inclined about 15 deg. upstream. Depths range from 50 to 150 ft. in the abutments and the maximum along the base is 150 ft.

In addition to the usual type of 2-in. diamond drill bit, a special 1-in. bit is used. This bit does not produce a core and consists of hemispherical head set with diamonds. A water hole in the bit (see illustration) provides for cooling and for cleaning the hole. In the confined space of the drainage gallery, 5-ft. lengths of drill rods were used.

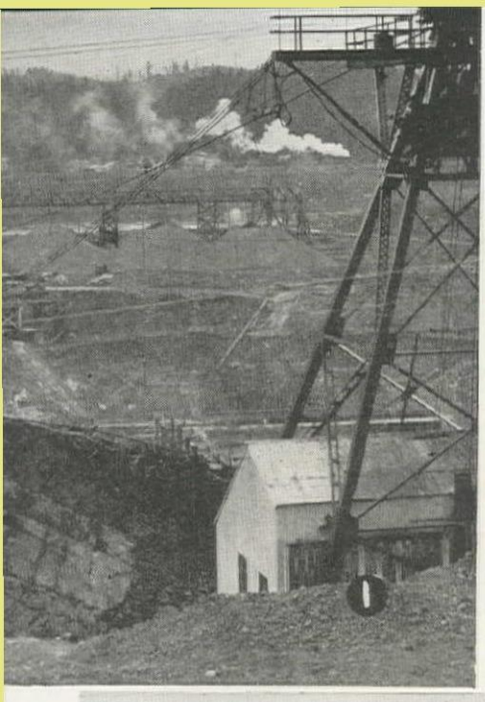
Grouting in this series of holes, and the other lines of holes drilled to provide a complete grout curtain, was done at a pressure of 1,000 lb. per sq. in. and the neat grout averaged about 0.8 sacks per linear foot. After all grouting is completed, the drain holes will be drilled from the gallery.

Colorado Highway Bond Question in Supreme Court

THE Colorado Supreme Court has been requested to rule on the constitutionality of the $25,000,000 highway loan program, authorized by acts passed during the last legislative session, but recently declared unconstitutional by the district court in Denver. The program has been in difficulty ever since it was proposed. Under the state constitution, Colorado cannot borrow money except on a vote of the people. The $25,000,000 program was planned as a loan from the PWA, augmented by a $10,000,000 grant, making a total of $35,000,000 for highway construction. The last state legislature made an effort to get around the legal requirements for borrowing by authorizing the highway department to issue revenue anticipating warrants and, also, by incorporating the department.

State highway engineer C. D. Vail, following a trip to Washington, reported that the chance of getting this loan and grant were favorable. After this, it was decided that a friendly suit should be brought to determine the constitutionality of the loan so that the federal government could make it immediately when funds became available. This suit proved disastrous, when the district court held the loan to be unconstitutional. The court ruled the legislature had exceeded its powers in authorizing the loan. The loan was to be paid back with money received from gasoline taxes, but the court ruled that the legislature has no power to dispose of these excise taxes which, by an article voted into the constitution two years ago, can not be used for anything except construction, supervision and maintenance of public highways.

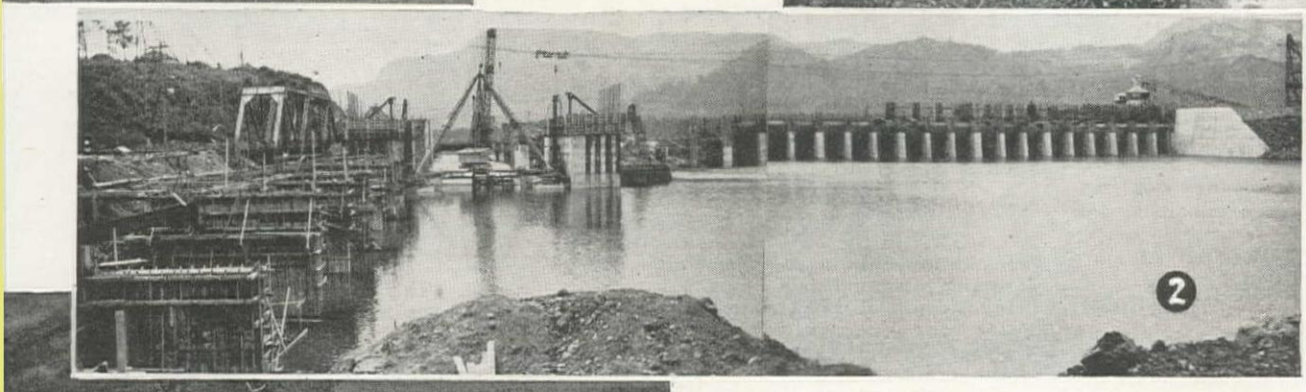
Governor Johnson asked for a decision by the state supreme court, which was followed by the state auditor challenging the constitutionality of the gasoline tax refund law which he claims is invalid under the gasoline tax amendment passed in early 1934.

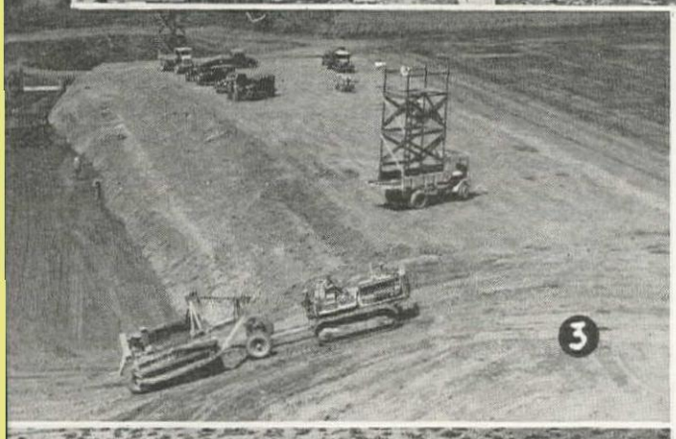


1—Cableway tower used by the General-Shea Co. in building the powerhouse and lock for the Bonneville project. Two of these 15-ton cableways were used for concrete placing.

2—Looking downstream at the south (Oregon) channel of the Columbia River at the Bonneville project. The powerhouse structure is at the right and the lock on the left. This work was the contract of the General-Shea Co.

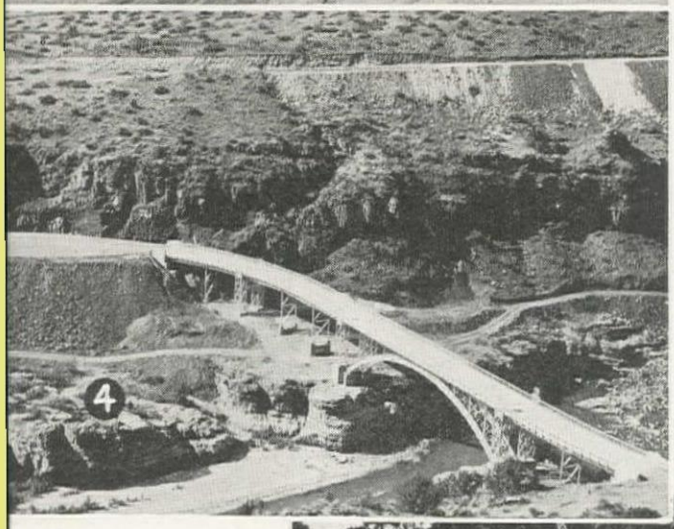
6—Cartright Creek bridge, on the Randle-Yakima National Forest Highway in Lewis County Wash., is a 200-ft. open spandrel arch with the deck 180 ft. above the stream. The structure was built by the Western Construction Co., Seattle, for the Bureau of Public Roads.





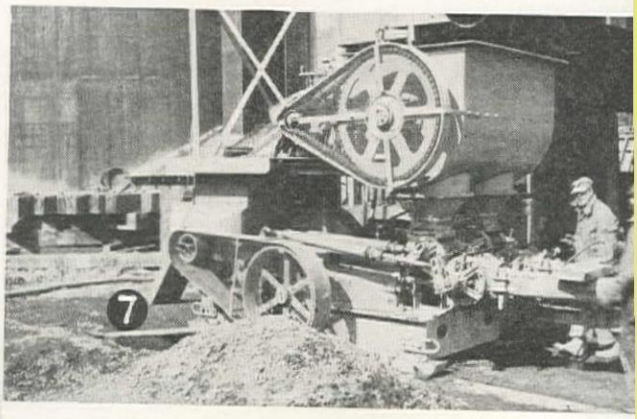
3—Placing and compacting fill for the Calero earth dam of the Santa Clara Water Conservation District near San Jose, California. Contract for building this dam is held by D. McDonald.

On the Construct



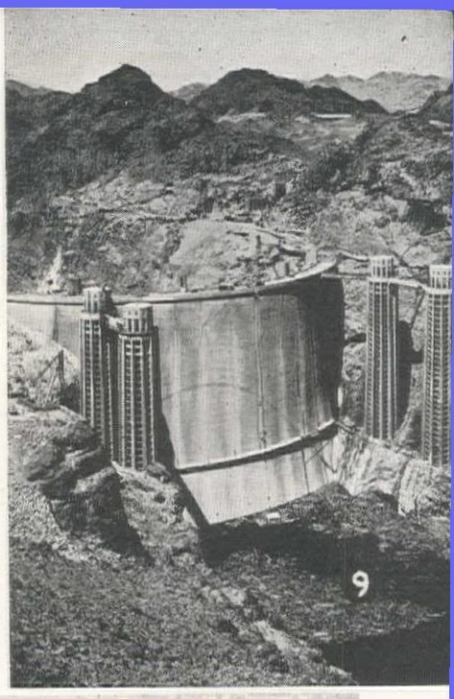
4—Salt River bridge, 40 miles east of Globe, Ariz., includes a two-hinged arch as the main unit in the 455-ft. length of structure. R. A. Hoffman is state bridge engineer.

5—Work is well advanced on an extensive system of storm drains for Phoenix, Ariz. The view shows trenching and laying of concrete pipe.

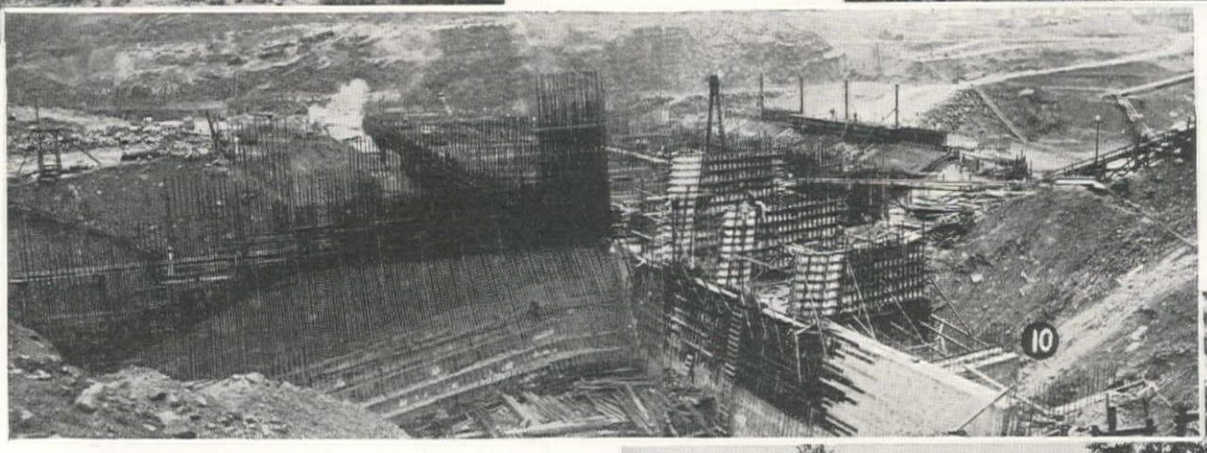


7—At the lower portals of the Fort Peck diversion tunnels a Pumperete unit is at work pumping concrete for the tunnel lining. Tunneling operations were described in the April issue.

8—On a highway job near Walsenburg, Colo., the Driscoll Construction Co. used a 1000-gallon tank mounted on an International truck to deliver road oil.



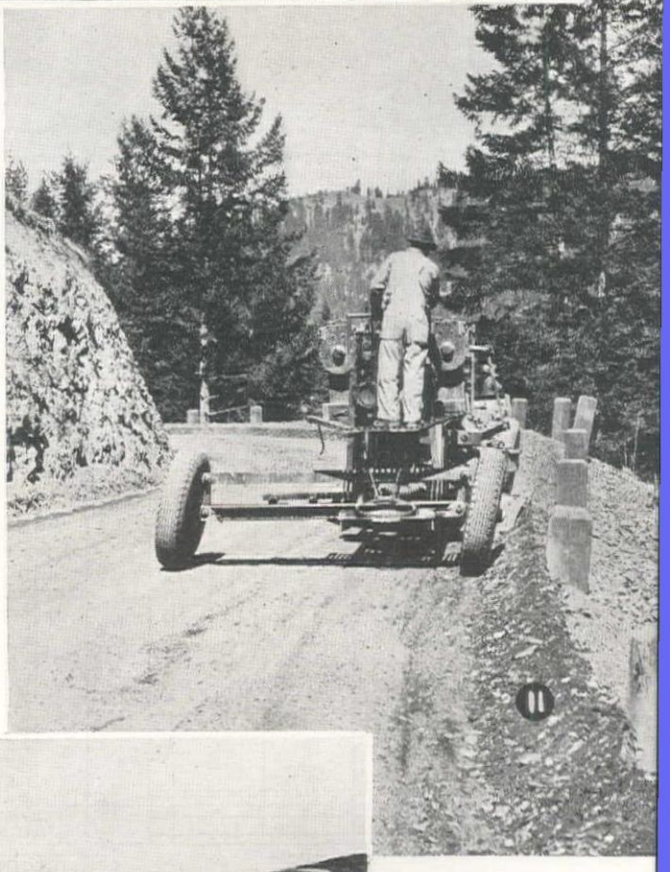
9—Boulder Dam, as it looks completed, showing the four intake towers and the water rising in the reservoir.



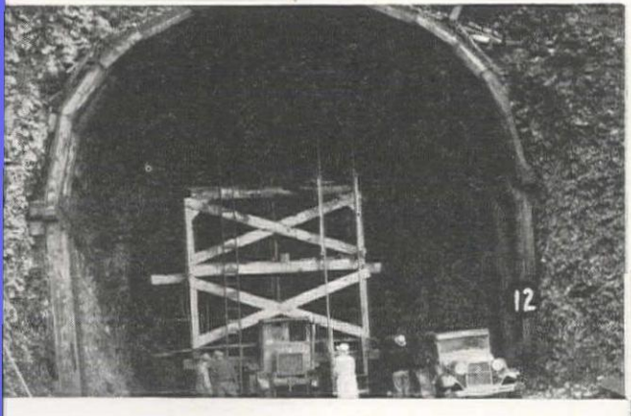
10—A forest of reinforcing steel was used for the 120-ft. cantilever retaining wall which is one of the features of the Bonneville project. This wall has already been completed and backfilled.

Western ion Front

11—On the Blewitt Pass route over the Cascade Mountains in Washington the state highway department uses an Adams Leaning Wheel Grader for maintenance work. The grader is mounted on balloon tires.



13—Size of the All-American Canal is hard to visualize, but here is a view of a rock cut on the Griffith Co. contract which indicates the magnitude of this "ditch" as compared to the men and machines in the bottom.



12—A truck-mounted, full face drill carriage was used by the Orino-Bell-Malcom Co. in driving the Tooth Rock tunnel for the OWR&N track relocation on the Bonneville project. A 10-ft round was pulled in driving.

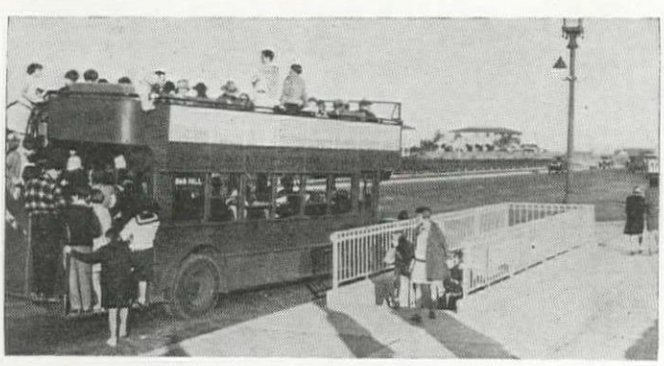
Improvements Made Pedestrian

SINCE the first pedestrian subway was built in Los Angeles in 1926, the city has continued this type of municipal improvement work and more than 75 have been completed. The recognized advantages of these safety underpasses for school children and the general public on busy traffic arteries, combined with the gradual improvements which have been made in the design and construction features, warrants a brief review of the work for the benefit of municipal engineering staffs in other western cities. The original pedestrian subway in Los Angeles was described in detail in *Western Construction News*, Nov. 10, 1926, p. 27.

From a fund of $350,000 provided by a 1925 bond issue 20 subways were built in 1926, 14 in 1927, 5 in 1928 and 1 in 1931. The board of education financed 1 in 1931, 13 in 1932 and 2 in 1933. During 1929, 1930, and 1931, 5 were built with funds contributed in equal shares by the city and the board of education. Since 1918 the city has financed and built 14 subways besides those financed by the 1925 bond fund. The total number of subways constructed up to the end of 1934 was 75, having a combined length, including entrance steps, of about 2 miles, a total cost of about $550,000 and an average cost of $7,330 each.

A traffic census indicates that the average rate of use of subways by school children is about 90%. Use by adults is quite variable depending upon the volume of vehicular traffic, with an average of about 15% and an occasional rise to 75%. There is no doubt that the construction of these structures has been fully justified by lives saved and injuries avoided, as well as by the great relief afforded to motorists from slowing up and stopping for pedestrians.

Although the most recently constructed pedestrian subways are of the same general type and cross-sectional dimensions as described in the previous article, several important improvements have been introduced as the result of experience gained, and these are reviewed.



Safety for school children is one of the essential reasons for the building of pedestrian subways.

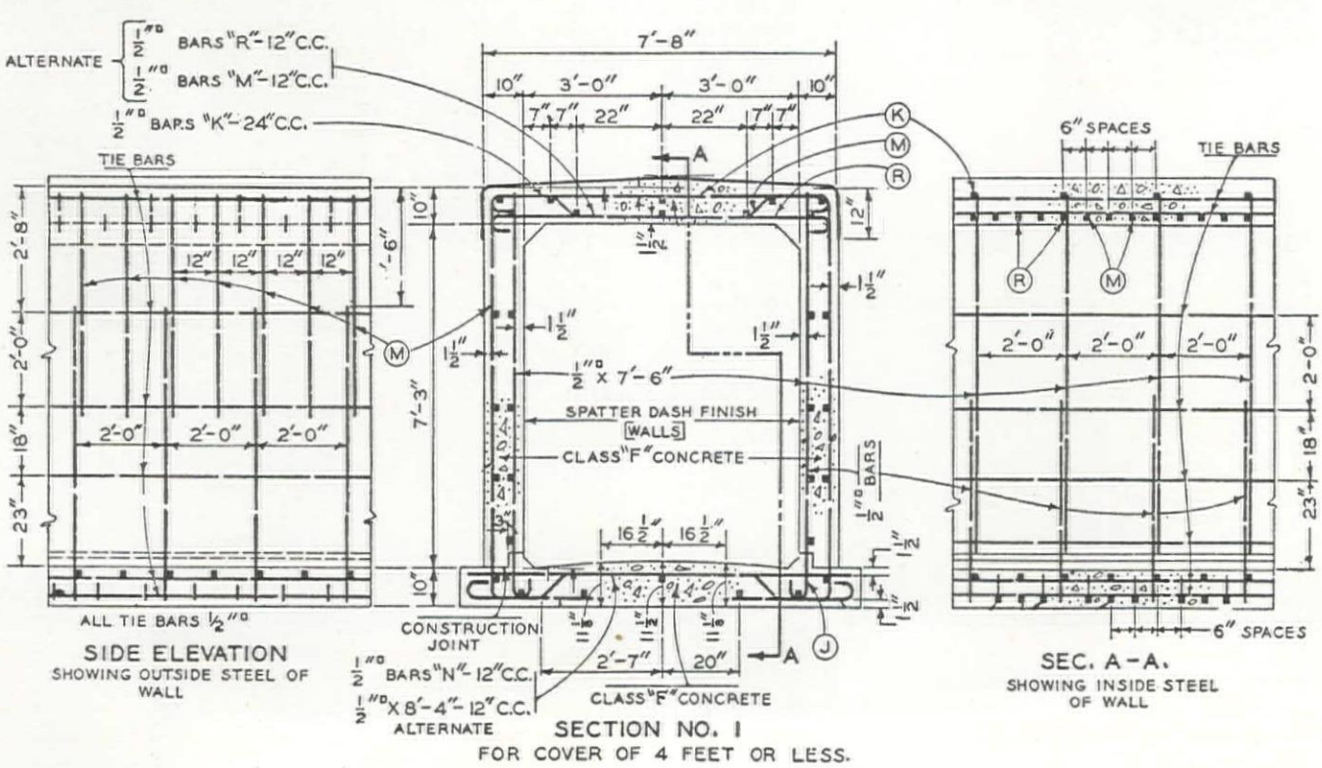
Drainage problem

A crown of 1½ in. is now used for floors to drain rain water, which falls at open entrances, to both sides of the subway where it runs to 12 x 12-in. side inlets. In the first subways, disposal of this rain water was to a sanitary sewer, where one low enough was available; if not, it was by automatic eductor actuated by water pressure from a city main, to an outlet into the gutter above or to a storm drain.

The practice of outletting to a sewer has recently been discontinued to reduce the load carried by the outfall sewer during heavy rains, even by the very small quantity from the subways. This drainage even during the hardest showers, amounts to only about 6 g.p.m. per subway. In two cases it was possible to drain subways by gravity to a gutter down hill from the subway.

In the earlier subways trouble was encountered with groundwater leakage through transverse shrinkage cracks

Details of structural design.



in Design for Subways in Los Angeles

Building of more than 75 subways in decade results in evolution to present design

By ROBERT H. BACON
Division of Bridge and Structural Design,
City of Los Angeles

in the ceiling and particularly at the center construction joint. This has been overcome in the case of the transverse cracks by giving the top slab a 1½-in. ridge at its center and covering with membrane water proofing which extends down 12 in. on each side. The floor crown, roof ridge, etc., are shown in the accompanying section.

In the first designs, crimped copper plates across the transverse construction joint were relied upon to hold back seepage, but these were found unsatisfactory. A V-shaped groove across the top filled with hot asphalt is now used and a 3-foot strip of membrane waterproofing, centered on the joint is carried down each vertical wall to the footing the copper plates being entirely omitted. This type of construction is giving good results.

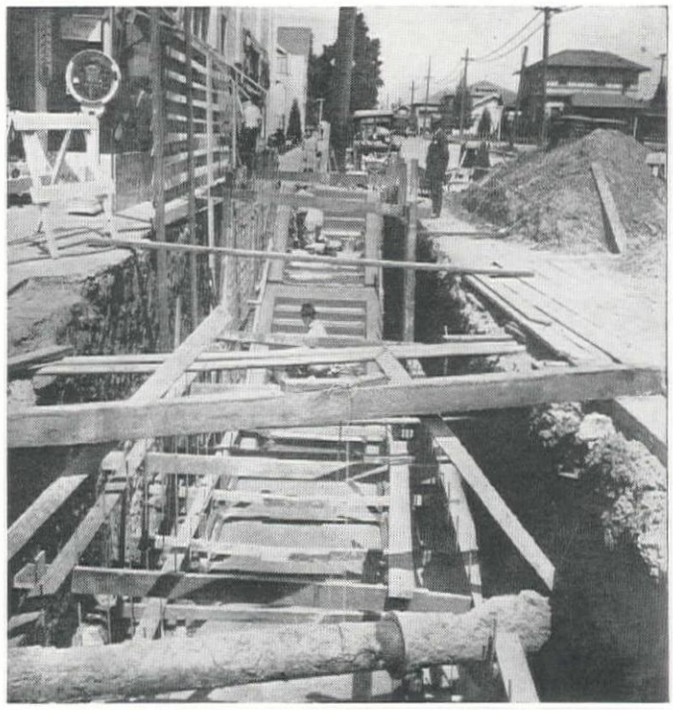
Where the approach sidewalk slopes down toward the top step of an entrance, the last tread is raised somewhat above the adjacent surface and the walk sloped away from it. If conditions indicate that storm water may flow down the walk, or rise above top of curb and a portion flow down the steps, an extra riser is added at the top of the flight and a short ramp, sloping in the opposite direction to the curb grade constructed to act as a barrier.

In a few of the earlier subways, water mains, telephone conduits, etc., were permitted to project into the top slab. This practice was soon discontinued as it was found that cracks were likely to occur near these pipes and admit ground water, generally in minute quantities, which would be of no consequence in ordinary structures but which was objectionable for these subways used by pedestrians.

It is considered preferable to make adjustments of the subway grades or even to re-locate the intersecting conduits rather than to permit them to intersect the top slab of the subway or its waterproofing coating. Some subways have been built with two summits in the floor grade and with grades as steep as 16% for short distances to pass over sewers and under large water mains.

It is surprising how many destructive acts are committed in and around subways, many for no particular purpose. The lighting system has been found the most subject to damage, the glass in light recesses being smashed, bronze doors of light recesses stolen and many lamps removed. A new and smaller type of light box, made of case aluminum with heavy wire mesh in lieu of glass has been designed and is now used exclusively. These boxes are set in the ceiling before the concrete is poured, and they can also be used in headwalls above steps and are proving more satisfactory than side wall recesses. Being in the ceiling 7 ft. above the floor they are inconspicuous and difficult to get at and to open.

The 14 x 14-in. cast iron grating over drainage inlets are sometimes removed and wilfully broken. The new standard plan for these calls for fastening them down to the frames with brass machine screws which will at least tend to discourage removal. Cast iron covers of drainage sumps weighing 79 lb. each are occasionally removed and the automatic drainer wilfully damaged. These covers will now be made thicker and weigh 130 lb., making removal more difficult.



Typical construction operations showing handling of forms and the usual location problems.

Shortening construction period

Specifications call for the subway to be constructed across half the roadway at a time, the other hald to be kept open for traffic. During the earlier years of subway construction 90 days was allowed for completion and it was often necessary to extend this time. The inconvenience to the public caused by loss of use of half the roadway for so long a time led to a study being made to ascertain the best method of shortening this period.

Ordinary Portland cement was used and it was at first thought that the most economical way would be to strengthen the inside forms sufficiently to allow the fill to be made and traffic turned back soon after outside forms were removed. But it was soon realized that, no matter how strong the inside forms, the upper outer portions of the subway sections would have to set until the concrete was strong enough to be safe against super-imposed live loads.

This led to giving up the form strengthening idea and to the adoption of high early strength cement for use in the top slab and side walls of these strucutures. Outside forms are now removed in 24 hours, inside forms in two days and the traffic turned back across the completed portion of the subway as soon as the excavation can be filled and repaved. The time allowed for construction has been cut to 60 days.

A 7-ft. clearance over steps is maintained and the new type of light box allows the use of a headwall of 14-in. face height. These controlling dimensions allow an overall entrance length of 16.5 ft. to be used where the street grade is nearly level and the steps have 13-in. treads and 6½-in. risers. A reasonable sidewalk width is always left between the railing and the property line.

The subways were designed in the Division of Bridge and Structural Design, Bureau of Engineering, City of Los Angeles. Lloyd Aldrich is city engineer, Merrill Butler, deputy engineer of design, R. W. Stewart, engineer of bridge and structural design and R. H. Rock, engineer of construction. The writer had charge of the details of designing and planning.

Plans for Seminoe Dam in Wyoming Provide 260-foot Concrete Arch

Major unit for Casper-Alcova project on the North Platte River will contain 163,000 cu. yd. of mass concrete—Reservoir capacity will be about 1,000,000 ac. ft.

BIDS will be opened July 22 at Casper, Wyo., for the construction of the Seminoe Dam for the Casper-Alcova project. The structure will be of the massive, arch type 260 feet high, containing 163,000 cu. yd. of mass concrete and will include a powerhouse with a 37,500 Kva. installation using the head produced by the dam. Storage, in addition to use for power development, will conserve flood water of the North Platte River for irrigation use on the Casper-Alcova project in the vicinity of Casper. Discharge from the reservoir formed by the Seminoe Dam will be redistributed through the Pathfinder Dam, which is located about 5 miles below.

Dam site conditions

The Seminoe dam site is in a narrow gorge of the North Platte River between the Seminoe Mountains and Bennett Mountain, and about 33 miles northeast of Rawlins, Wyo. The Pre-Cambrian granite, which forms the foundation and abutments, is dark reddish gray, moderately crystalline, exceptionally hard and strong, generally uniform in character, and is only slightly weathered where exposed. The major movements which formed the rugged mountains in this region resulted in an extensively jointed and fractured condition, but in very little dislocation and crushing of the rock.

Investigation by test tunnels and diamond drilling disclosed that the rock is more sound and tight a few feet from its surface. However, it is expected that a greater amount of excavation than is usual in granite foundations will be required on account of the numerous joints. The river fill, consisting of large boulders, coarse gravel and a relatively small amount of sand, is from 27 to 30 ft. deep. The west abutment of the site is precipitous, a large part being almost vertical, although its base is covered with large angular rocks broken from the higher canyon walls forming a talus slope to a height of about 100 ft. The east abutment, completely exposed, rises less steeply, but is more broken with jointing.

The reservoir formed by the Seminoe dam will have a capacity of 1,020,000 ac. ft., with water surface at elev. 6357, practically 200 ft. above the low water surface of the river. The year of maximum run-off of the river, for 18 years of record, yielded 2,160,000 ac. ft. The flooded area of 20,000 acres is now practically a barren waste, without timber or other vegetation of value. The geologic formations in the reservoir consist largely of impervious shale and minimize the danger of much storage loss through seepage.

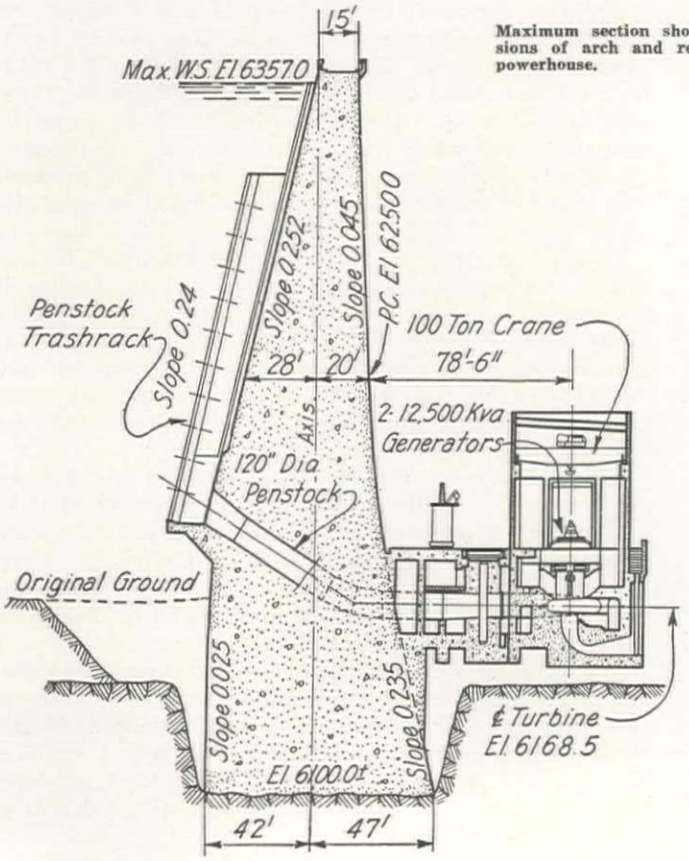
Design of the dam

Seminoe dam will be of the massive concrete arch type, with a maximum height of about 260 ft., crest length of 540 ft., a base thickness of 89 ft. and a top thickness of 15 ft. Concrete parapet walls, 3½ ft. high, together with 6-in. curbs will extend the full length of the outer edges of the crest enclosing a 12-ft. width roadway.

The dam will be constructed with vertical radial contraction joints spaced generally about 50 ft., but closer in the vicinity of power penstock conduits through the central part of the dam. These joints, which will be formed with continuous vertical keyways, will be provided with a pipe and outlet box grouting system, the grout to be applied under pressure after the concrete has been cooled to its future average temperature. Metal grout stops will be installed across the joints near the faces of the dam, and horzontally at 50-ft. intervals to divide the joints into suitably sized areas for grouting.

The temperature of the mass concrete in the dam will be artificially reduced by running water of low temperature through cooling coils, consisting of 1-in. O.D. metal tubing embedded in the concrete. These coils, having a horizontal tube spacing of 5 ft. 6 in. will be placed on top of each 5-ft. concrete lift before the succeeding lift is placed. All inlet and outlet connections will be on the upstream face of the dam. Ordinarily the coils will not cross contraction joints, but near the abutments where access to the concrete sections from the upstream face is impossible, the coils will be carried across the joints by expansion couplings. After cooling has been completed, the coils will be filled with grout.

Due to the excessive jointing in the contiguous granite, foundation and abutment grouting and drainage are considered of the utmost importance. A grout curtain will be provided in the rock below the heel of the dam by drilling a single line of 1⅜-in. diameter holes, normal to the rock surface, at 5-ft. intrevals, and later forcing in a neat cement grout under high pressure. Holes at 10-ft. centers will be drilled 100 ft. deep, and the intermediate holes will vary from 50 ft. at the mid section of the dam to 100 ft. at the abutments. Grout will be introduced, after a substantial thickness of concrete has been placed, through

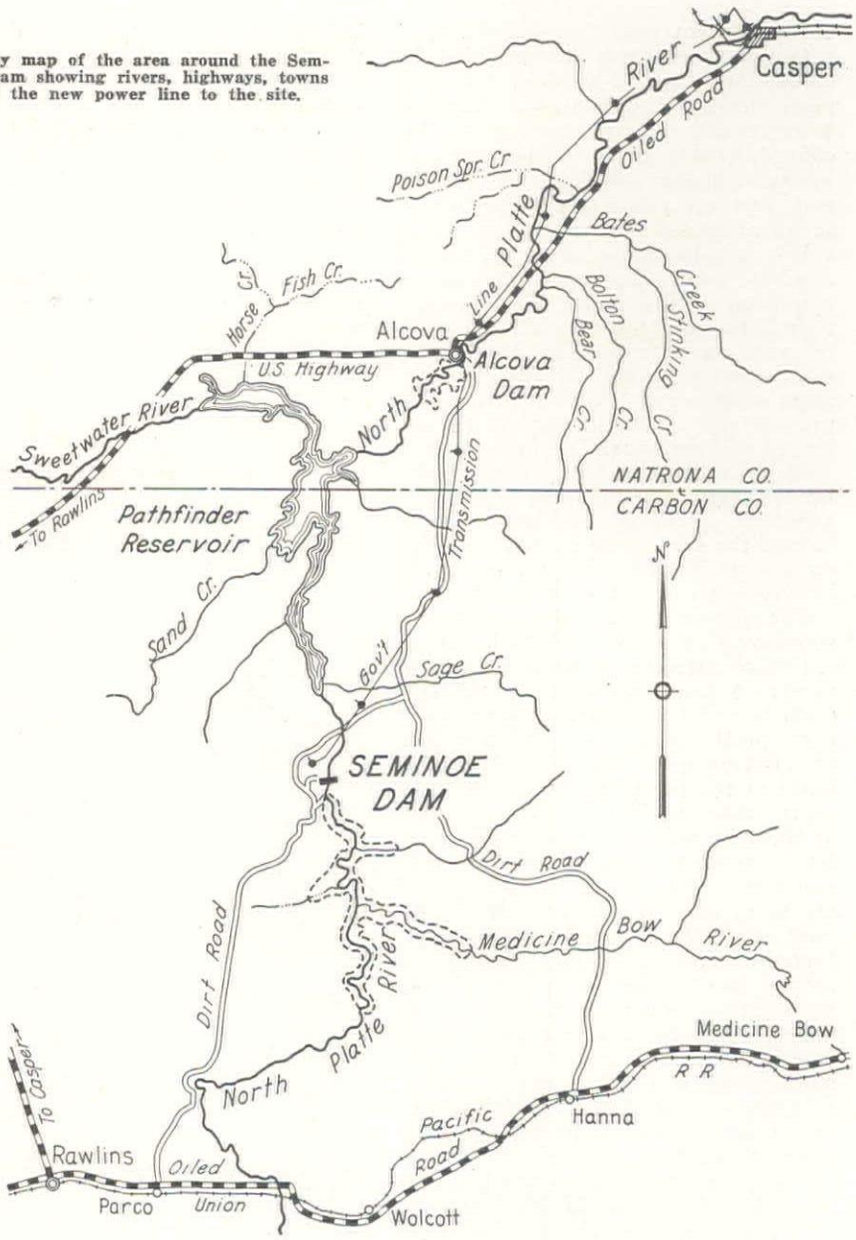


Maximum section showing principal dimensions of arch and relative position of the powerhouse.

2½-in. steel pipe embedded in the concrete. Springs and defects encountered in other parts of the foundation will be grouted before concrete is placed.

Drain holes, 30 ft. deep on 10-ft. centers, will be drilled in a single line 5 ft. downstream from the grout holes, after grouting has been completed within a radius of 50 ft. The minimum diameter of these holes will be 2⅜ in., and drilling will be done from the upstream face of the dam through embedded 3½-in. diameter steel pipes. The downstream dip of the holes will vary between 60 and 85 degrees. The drainage outlets will consist of 2½-in. steel riser pipes discharging into 6-in. collecting headers, paralleling the upstream face of the dam, which in turn will discharge into 8-in. outlet drains running radially to the downstream face of the dam at about maximum tailwater elevation. Porous concrete drain tile, with an interval diameter of 3 in., spaced on 10-ft. centers, 5 ft. from the upstream face of the dam, will also discharge into the 8-in. radial outlets, and provide drainage for the mass concrete of the dam.

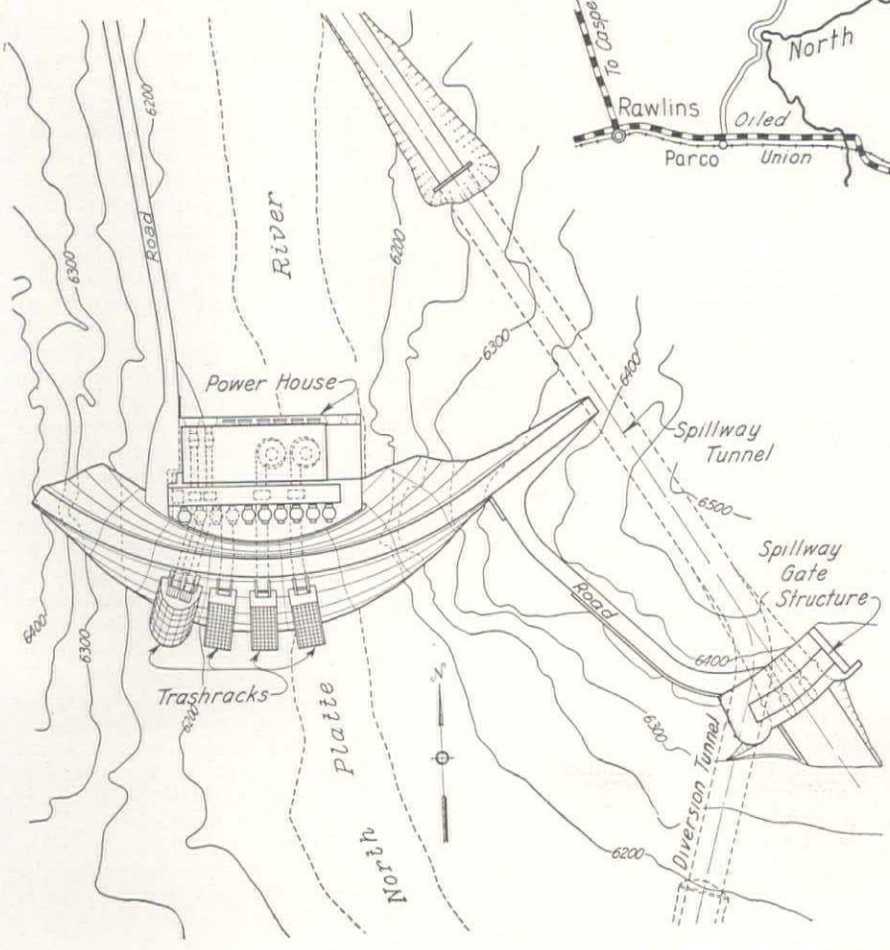
Vicinity map of the area around the Seminoe Dam showing rivers, highways, towns and the new power line to the site.



Spillway

The spillway will consist of a concrete lined inclined shaft and horizontal tunnel through the rock of the right abutment, controlled at the inlet end by three 14 by 50-ft. counterweighted and electrically - operated stoney gates. The total center-line length of shaft and tunnel will be 535 ft., and a 200-ft. straight open channel from the outlet portal will carry the flow into the river 300 ft. downstream from the power house. The spillway has been designed for a maximum capacity of 50,000 sec. ft., amounting to 6.75 sec. ft. per sq. mi. of drainage area. The maximum recorded flood for 18 years of measurement was 18,800 sec. ft.

Plan of the Seminoe Dam. The construction diversion tunnel becomes part of the permanent spillway system. In addition to the power-house discharge there are two 60-in. needle valve outlets. Foundation rock at the site is a hard granite.



The horseshoe-shaped section of the inclined shaft at the inlet, about 44.1 ft. wide by 43.3 ft. high, will merge to the 30-ft. diameter circular section of the horizontal tunnel. The concrete lining will have an average thickness of 24 in. After this is placed the surrounding rock will be made tight by low pressure grouting through holes extending only through the lining, followed by high pressure grouting through holes drilled 20 ft. into the rock.

Outlet system

Outlet works will be provided by embedding two 72-in. diameter steel pipes through the dam above the left bank of the river channel. The discharge through these will be regulated by 60-in. needle valves installed at the ends of the conduits about 56 ft. from the downstream face of the dam. These valves will be housed by a reinforced concrete structure, which will be an extension of the power house to the right. For emergency purposes a 72-in. paradox gate will be installed in each conduit about 39 ft. upstream from the needle valves. Stop log grooves will be constructed at the inlets of the conduits. The outlet works will be protected by a semicircular heavily reinforced concrete trashrack structure anchored to the upstream face of the dam. The capacity of both outlets under full reservoir head will be 2,700 sec. ft.

The power plant when completed will have a capacity of 37,500 kva, consisting of three equal units. The three power penstocks, with an internal diameter of 120 in. will be embedded through the central part of the dam, and extended to the 14,000 h.p. turbines in the power house about 40 ft. downstream from the dam. Shut-off of the flow will be accomplished by a 102-in. paradox gate installed in each penstock about 10 ft. upstream from the power house. Each penstock will have a trashrack structure of reinforced concrete constructed on the upstream face of the dam. One structural steel bulkhead gate, 11½ ft. wide by 15⅓ ft. high and 27 in. thick, will be provided for closing any penstock at its inlet end, being moved on gate guides extending to full reservoir water surface and operated from the crest of the dam.

The combined power and needle valve house will be 127 ft. long and 46 ft. wide, with an annex of an additional 29 ft. of the same width on the east containing control, pump and oil storage rooms. A 75-ton traveling crane will run the full length of the main building which will be used for the installation and repair of the power machinery and the needle valve outlets. The transformers will be located on an open concrete platform between the power house and the dam.

Sand and gravel for concrete aggregates may be obtained from natural deposits adjacent to and in the stream bed from 2 to 8 mi. upstream from the damsite. The contractor will be required to haul all equipment and materials, regardless of by whom furnished, from the delivery point at Parco, Wyo., on the Union Pacific R. R. This station is connected by a 37-mi. road with the damsite.

A 66 Kv. transmission line, which has recently been constructed from Casper, Wyo., to the damsite, will provide power for construction purposes. A lump sum bid price will be asked for diversion and care of the river and unwatering the foundations during construction, but the contractor will be expected to utilize the horizontal leg of the spillway tunnel in diverting the river.

Principal quantities involved are estimated as follows: 440,000 cu. yd. of open cut excavation; 22,000 cu. yd. of tunnel excavation; drilling 30,000 lin. ft. of grout and drainage holes; placing 191,000 cu. yd. of concrete, of which 163,000 cu. yd. is mass concrete in the dam; and installing 5,300,000 lb. of metal work, including reinforcement bars, pipe, and gates and valves with operating machinery.

Organization

Harold L. Ickes, Secretary of the Interior and federal public works administrator, has directed the U. S. Bureau of Reclamation, headed by Elwood Mead, commissioner, to design and construct this project. The work is under the direction of R. F. Walter, chief engineer, with headquarters at Denver. H. W. Bashore, at Casper, Wyo., is construction engineer for the Casper-Alcova project.

Program for Sewage Treatment At San Francisco Outlined In Board's Report

Plans to improve waterfront conditions involve estimated cost of $3,500,000—Work from present funds to include four pumping plants, connecting mains and a $543,000 treatment plant

By JOHN C. CASEY
City Engineer, San Francisco

APPROVAL of a $2,625,000 bond issue for improvements to the San Francisco sewerage system, including the construction of disposal plants, was voted in November, 1933. The program provided for PWA financing. The additions to the sewer system have been carried forward during the past months and are now about 90% completed. This work has involved the building of 6½ miles of lines ranging in size from 8-in. pipe to double-compartment 9½ x 9-ft. sections, some of which required pile foundations. About half of this work was the reconstruction of inadequate old sewers, located south and east of Market Street, and the remainder included extensions to the system; the total expenditure for sewer work was about $1,300,000.

While this work has been under way the problem of disposal has been studied. The consulting board appointed to advise in this matter consisted of: Harrison P. Eddy, Boston; Prof. Charles Gilman Hyde, University of California; Clyde C. Kennedy, San Francisco, and Prof. Leon B. Reynolds, Stanford University. The board, appointed in July, 1934, when the PWA funds became available, was directed to make a study of sewage disposal and specifically:

(a) To go over preliminary reports and studies prepared in connection with sewage disposal.
(b) To inspect all local conditions affecting the problem.
(c) To advise as to the general sewage disposal scheme that should be adopted.
(d) To advise as to the proper location of plants and outfalls.
(e) To recommend type of process that should be adopted, and to estimate cost of construction and operation.

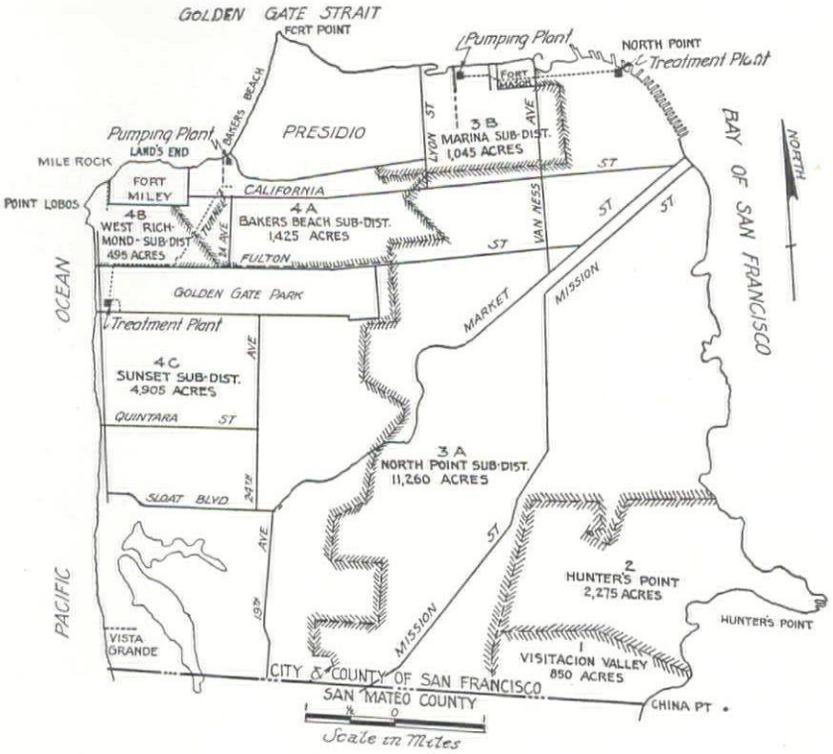
As a result of studies previously made by the municipal bureau of engineering and from data procured by the bureau under the supervision of the board it was found that:

1. Insanitary conditions exist at a number of points along the entire bay, the south shore of the Golden Gate and the ocean waterfront.
2. Unsightly and offensive waters, and deposits of sewage solids, exist in the vicinity of the North Point outlet; sewage matter from this outlet is clearly visible along the shore for long distances; and bacterial contamination of shore waters at times extends at least as far westerly as the Marina.
3. The discharge from the Pierce Street outlet causes gross pollution of shore waters in that vicinity, the contamination at times extending long distances east or west from the outlet in accordance with the direction of the tidal currents.
4. The sewage from Baker's Beach outlet causes gross pollution of the recreation beaches and waters in this vicinity and the contaminated water extends long distances east or west in accordance with the direction of the tidal currents.
5. The sewage discharged from the Mile Rock outlet causes gross pollution in the immediate vicinity and serious contamination for long distances, even extending southerly along the ocean front.
6. A considerable stretch of the southwest shore line is polluted by the sewage discharged by the Vista Grande outlet.

To clear up these conditions the consulting board made the following specific recommendations in its report of May, 1935:

1. That the sewage of the existing Southeast sewerage district be intercepted and carried to treatment plants at or near China Point, Hunter's Point, and North Point, in accordance with the general plan which the City has been following.

2. That the sewage of the existing North Point sewerage district and of



a portion of the existing Southeast sewerage district be pumped at the proposed North Point sewage treatment plant; and that the sewage of the existing North Point, of a part of the existing Southeast, and of the Marina sewerage districts be treated to remove (a) grit, (b) oil, grease, and other floating matter, and (c) the coarser portion of the suspended material, by means of racks, grit chambers, aerated skimming tanks, and fine screens; and that the treated sewage be discharged at a distance of 2,000 ft. from the bulkhead line, in water at least 50 ft. deep, through a submerged outlet pipe equipped with a system of diffusion nozzles.

3. That the sewage of the Marina sewerage district be pumped through a force main to the North Point treatment plant.

4. That the North Point sewerage works be constructed as soon as the necessary funds become available, and that, pending their construction, the sewage of the Marina sewerage district be discharged at North Point.

5. That land for the North Point sewage treatment plant be acquired as soon as financially practicable, even though plant construction cannot be undertaken at that time.

6. That the sewage of the major portion of the Baker's Beach sewerage sub-district be diverted and conveyed by gravity through a sewer tunnel, thence through a sewer to the proposed treatment plant in Golden Gate Park; and that the sewage of the remainder of the Baker's Beach sub-district be pumped at an underground pumping station, to the proposed connecting sewer.

7. That the sewage of the major portion of the West Richmond sewerage sub-district be diverted and combined with the sewage from Baker's Beach sub-district, and that the remainder of the sewage of the West Richmond sub-district be pumped through a force main to the proposed sewer leading to the treatment plant.

8. That the sewage of a portion of the Sunset sub-district be diverted and conveyed by gravity to the treatment plant; and that the sewage of the remainder of the Sunset sub-district be diverted and pumped from the existing Mile Rock trunk sewer in Golden Gate Park to the treatment plant.

9. That the sewage of the Mile Rock sewerage district, comprised of the Baker's Beach, West Richmond and Sunset sub-districts, be treated to remove (a) grit, (b) oil, grease, and other floating matter, and (c) that portion of the suspended solids which will settle in a moderate period of time, by means of racks, grit chambers, aerated skimming tanks, and sedimentation tanks; that as much as needed of the effluent be furnished for use in the Park, and that the remainder after chlorination be discharged temporarily into the existing Mile Rock trunk sewer and discharged through the present outlet at the north shore a short distance eastward of Lobos Point; and that the sludge from the sedimentation tanks be subjected to biological digestion in gas-tight tanks, that the digested sludge be dewatered by means of vacuum filters, and that the dewatered sludge be furnished for use in the Park, upon municipal golf courses, and other areas.

10. That a comparison be made between the discharge (in deep water well offshore) of the effluent from the Golden Gate Park treatment plant and complete treatment in the Park, and that the more advantageous of these plans be adopted and executed.

11. That negotiations be undertaken immediately with the authorities of Daly City and the adjoining areas in San Mateo County, which are tributary to the Vista Grande sewer outlet in the extreme southwest corner of the City and County of San Francisco, to the end that provision be made for eliminating the nuisance now existing, due to the sewage from these areas, either by complete treatment and appropriate disposal of the effluent or by

ESTIMATES OF CONSTRUCTION COST

Work recommended for present bond funds

North Point and Marina Sewerage Project

Marina pumping plant and force main, including repairs to Pierce St. sewer at outlet end	$ 252,000

Richmond-Sunset Sewerage Project

Baker's Beach pumping plant, diversion structures and connecting sewer lines to treatment plant	465,000
West Richmond pumping plant and force main, and Sunset connecting sewer lines	40,000
Richmond-Sunset treatment plant	543,000
Total	$1,300,000

Work recommended as soon as funds are available

North Point and Marina Sewerage Project

Land for treatment plant site	$ 600,000
North Point treatment plant, including pumping plant, sewer line changes and outlet pipe to bulkhead line	1,250,000
Outlet pipe to approximately 2,000 ft. from bulkhead line, including diffusion system	400,000
Total	$2,250,000

Richmond-Sunset Sewerage Project

Outlet pipe to deep water or complete treatment in Golden Gate Park	Not estimated

pumping through a force main into the sewers leading to the treatment plant in Golden Gate Park.

12. That the city request the War Department to make provision for delivering all of the sewage of the Presidio and Fort Mason into the sewerage system of the city, that it may be properly treated with the city's sewage.

Plans and specifications are now being prepared for various units of this disposal program. Bids will be called, according to present plans, before the end of the year on the Marina pumping plant and force main to North Point, the main tunnel carrying the sewage from the Baker's Beach district to Fulton St., some of the connecting sewers to the treatment plant, and the determining features of the mechanical equipment for the treatment plant. Plans and specifications for the general contract for the treatment plant, and the balance of the connecting system will be called in 1936.

Unique Water Softening Plant Serves Glendive, Montana

Yellowstone River water hardness reduced from 24 to 6 grains per gallon — Soda ash obtained from local well— Public reaction proves highly gratifying to officials

A WATER softening plant which reduces the hardness of the Yellowstone River supply from a maximum of 24 to 6 grains per gallon and uses the unique feature of a natural well water supply for the soda-ash treatment has recently been completed by the city of Glendive, Mont. Public acceptance of this improvement has more than justified the undertaking, according to a paper describing the plant which was presented by Claude W. Eyer, city engineer of Glendive, before the Montana Section of the American Water Works Association. The paper, slightly condensed, follows:

Glendive, Mont. draws its municipal supply from the Yellowstone River. The raw river water is moderately hard in summer and objectionably so during winter months, with a yearly average of 14 grains per gallon, and usually very turbid, requiring considerable chemical treatment for sedimentation. The promoting of the Glendive softening project proved difficult, but extremely interesting. It was necessary first to educate the average consumer to the fact that the lime added for softening would not come through the tap. It actually became necessary, in some cases, to treat a small sample of hard water with lime to demonstrate the precipitate formed, to prove that something undesirable was being removed rather than merely adding a new element for no good purpose.

Through this type of public education, supported by a studied campaign of publicity in the press and at public gatherings, the Glendive project was finally undertaken under the loan-and-grant provisions of the PWA. The community authorized an issue of $15,000 in 4% bonds, to be supplemented by a grant of about $6,000 in federal funds. The negotiations necessary to secure final approval of the project proved to be as difficult and protracted as the usual case involving PWA financing.

Finally, the city found it necessary to buy its own bonds to expedite construction. Actually, this proved a wise move, as the investment in these 4% bonds was made with a surplus in the depreciation reserve fund, using a dead balance returning only ½% interest.

The construction contract was awarded Oct. 12, 1934, for $19,235, and provided for remodeling the mixing and sedimentation sections of the old plant to adapt it for the softening process. The plant was completed March 11, 1935; it has not been in operation long enough to determine accurately the final operating results, but the general benefits to be realized are already indicated.

Construction of plant

The plant uses the lime-soda process of softening, with the unique feature of a soda-ash supply obtained from a deep well drilled and equipped expressly for this purpose. From available information, the Glendive plant is the only one using this method of procuring one of the essential softening chemicals.

The principal features embodied in the construction of the plant were:

1. Installation of a rate-of-flow controller in the raw-water line.
2. Rebaffling of the mixing chamber to insure a more thorough mixing of the softening chemicals, the raw water, and the well water.
3. Installation of two dry chemical feeders.
4. Building of a new concrete basin with installation of a paddle-wheel type of mixing or flocculating device.
5. Rearranging of the first settling basin and erection of a syphon feed clarifier and sludge removal pump.
6. Installation of a recarbonating unit with a distribution grid in the basin just after clarification.
7. The drilling of a 100-foot well equipped with a deep-well turbine type pump and rate-of-flow controller.

Treating process

The process consists of feeding hydrated lime and sodium aluminate in correct proportions to the incoming raw river water. Sufficient well water is added to provide the required amount of soda-ash. This step constitutes the unique feature of the softening process and is possible because this well water carries 7.2 grains per gallon of free sodium carbonate and 35.2 grains per gallon of sodium bicarbonate, the latter being changed to soda-ash by adding lime. The well water also carries a small amount of chlorides, some iron, a trace of hydrogen sulphide, and about 12 grains per gallon of sodium sulphate which is not sufficient to be objectionable.

The baffle mixing chamber accomplishes the mixing in a fairly satisfactory manner and the flocculator builds up the floc so that it readily settles out in the clarifier. Part of the clarifier sludge is now being returned to the mixing chamber, and this plan is proving highly advantageous. Before starting this recirculation of sludge a considerable part of the calcium carbonate remained in suspension in a state so fine that it carried over to the filters and caused complete stoppage in a short time.

With the addition of a large amount of sludge to the mixing chamber, even in highly turbid water, the nearly colloidal precipitate of calcium carbonate is settled out in the clarifier and the filter runs become normal. It was also noted that lime requirements were reduced nearly 10 pounds per hour as a result of sludge recirculation. After clarification the water is recarbonated, settled and filtered. Chlorine and ammonia are then added for purification.

The raw water varies in turbidity from 50 to 50,000 p.p.m. and the hardness ranges from 8 to 24 grains per gallon; with about one-half the hardness in the non-carbonate form, combined with a considerable quantity of magnesium. The softening program is designed to produce a water with 5 to 6 grains of hardness per gallon, with as low an alkalinity as possible and carrying just a trace of hydroxide. The residual hardness is then chiefly calcium sulphate—the least objectionable of the various forms of hardness. The magnesium which is the most objectionable is all removed.

Results obtained

Since putting the plant in operation, results have been somewhat erratic, but this condition is being gradually rectified by careful adjustment of the equipment. The water is being softened from approximately 20 grains to 5.5 grains per gallon. Due to the large amount of magnesium hydroxide and magnesium aluminate formed in the

process, the filter runs have been doubled, with half the wash water required for washing as compared with previous clarification practice.

Alum is no longer necessary to aid sedimentation. Before softening, the filters were heavily over-burdened due to lack of adequate sedimentation space; now, however, the influent water to the filters is practically clear.

Further, by carrying a hydroxide alkalinity in the flocculator and clarifier, the bacterial load is materially reduced on account of the sterilizing action of the lime. The chlorine now necessary for purification is about two-thirds the amount required previously, with the probability that it may be reduced still more. Chemical costs have averaged about 3c per thousand gallons, or about 11 lb. of lime per million gallons of water per part per million of hardness removed. This does not include the cost of recarbonation, which has not yet been determined.

The difference between the cost of alum and aluminate for plain sedimentation, and the cost of lime and aluminate for softening is about double. However, the savings realized from soft water will, of course, offset the additional cost many times over.

Public reaction

The worth of any project must be measured in terms of customer and public reaction and, according to Mr. Eyer, no public improvement in his experience has been so universally accepted. The fact that the majority of the public not merely approve but are actually enthusiastic, has been highly gratifying to those in charge.

Of course, there remain a few who object and a few complaints have been registered, one claiming stomach trouble and a few complaining of skin eruptions and roughness; but in all probability none of these alleged ills were caused by the water. One lady who had been skeptical of the predicted saving in soap attempted to use the customary amount of soap with the new soft water, with the result that she had soap suds boiling out of the washing machine and piling up on the floor. At first quite a few objected to the flatness of taste, but after a few days could detect no difference.

Movable Guniting Outfit Lines Canal in Arizona

Lining Irrigation Canal On the Beardsly Project, Ariz.

CRAWLER mounted equipment including a Gunite machine and compressor plant drawn by tractor along the ditch bank is the feature of special interest in the canal lining work which is being done on the Beardsly Project of the Maricopa County Municipal Water Conservation District, near Glendale, Ariz., by Vinson and Pringle, contractors of Phoenix. This mobile Guniting unit is being used on the $70,000 contract for lining about 6½ miles of main canal. Excavation was carried out by district forces using teams and also a tractor and grader outfit.

The bottom and side slopes were finished by hand by the contractor. The next step was to lay reinforcing of 4x4-in. Clinton welded steel mesh, stretched along the ditch with block and tackle, and held in place by metal pins. After the earth had been sprinkled, the 1-in. thickness of Gunite was applied on bottom and sides, increasing to a 2-in. thickness along the upper edge.

Sand for the lining is loaded with a trap and hauled to a Jaeger 10S mixer at the contractor's camp with Ford V8 trucks. The sand and cement are then dry mixed and three Chevrolet trucks haul to the job, using canvas covers over the truck bodies to prevent blowing.

Transferred to a timber bin mounted on crawler treads, the mixture is fed into the Gunite machine which is located on a platform hung behind the bin. Ahead of the machine unit is a crawler mounted Ingersoll-Rand compressor. The two are pulled along the bank of the canal by a Bates 30 H.P. tractor. On a separate truck-trailer is a 1,250-gal. tank holding the water supply, which is kept supplied by a 600-gal. tank truck.

The canal being lined has a bottom width 4, 5 and 6 ft. wide in the section under contract, with side slopes 1¼ to 1½ to 1. Water depth is about 3½ ft. with a 1-ft. freeboard. Drops are being eliminated and chutes installed, using 1½ to 2 in. of Gunite. As the lining dries, it is swept off and a curing coat of asphaltic material applied.

Some concrete head walls of siphons along this section of canal were saved by chipping out a larger opening for the new concrete box siphon and tying in the old headwall with the new concrete work. Corrugated pipe with Calco headgates are being installed at laterals. These are installed with concrete head and wing walls.

Plan Additional Denver Water Supply

A SPECIAL election probably will be called in Denver this summer on the issuance of bonds for bringing into the city the water from the western slope which is to be diverted through the pioneer (Moffat) tunnel. The water board has decided to ask the mayor and city council to call an election, and if it is held, taxpayers will also be asked to vote on other bonds for various public works projects in the city, deemed necessary by Mayor B. F. Stapleton.

The water board has made formal application for a $2,137,000 grant and a $2,612,000 loan from the federal works fund, for the completion of the trans-mountain water diversion program now under construction. This money would be largely expended in construction of (1) an 11,000-ac. ft. reservoir on Ralston Creek, near the town of Arvada; (2) a new filter plant below this reservoir; and (3) a conduit from the filter plant to the Ashland Avenue reservoir in the city. The Ralston reservoir would cost $1,310,000.

The new project would begin where the present PWA project ends, at a point about 15 miles from Denver. A canal would be built to conduct the water from the tunnel into Ralston Creek and into the reservoir. From there the water would be piped to the Ashland reservoir and then into the city. It has been suggested that a 48-in. concrete or 54-in. steel conduit be laid from the Ashland station to the Denver business district, and also that the Willard and South Marston filters be abandoned and that a 60-in. concrete or 66-in. steel main be laid from North Marston, a part of the city's water supply, to conduit No. 13.

This new project would bring the diverted water from the western slope directly into Denver instead of placing it in the Platte River, below Denver, in exchange for water that would be taken from the river above Denver.

Restriction Placed on Federal Works Plan Censured by Am. Soc. C. E. at Los Angeles Convention

Registration of 750 at annual convention — Changes in grade of membership discussed—Technical sessions well attended — Portland is selected for 1936 meeting

ADOPTION of a resolution which pointed out the nullifying effect of the $1,140-per-man-year ruling for the present works program and urged that the regulations be modified to provide for the cost of materials and equipment, was the outstanding action at the annual convention of the American Society of Civil Engineers held in Los Angeles, July 3-6. Two other resolutions adopted by the convention urged the continuance of the work of the Water Resources Section of the National Resources Board and voiced support of the present federal mapping program.

The meeting, which was attended by about 750 including 500 members of the society, consisted of a day devoted to general sessions and a day of technical papers presented before four divisions, followed by excursions to Catalina Island and the San Diego Exposition. Portland was selected as the place for the 1936 annual convention.

Action taken at the convention will result in the society taking a formal letter-ballot on a change in the grades and names of membership. Briefly, the question to be put before the membership will involve the elimination of the present grade of Associate Member and the giving of the title of Member to this group; then, all of those Members of the society who "shall have been a Member of the Society for not less than five years and shall have been engaged in the active practice of his profession for not more than twenty-five years and for at least ten years thereof have been responsibly engaged in work of substantial importance requiring engineering ability of a high order" shall be designated a Fellow. Other grades in the society will be Honorary Member, Junior Member and Student Member. The question of this change in the long-established grades and titles of members was actively discussed on the floor.

General sessions

The annual address of President Arthur S. Tuttle, consulting engineer and State PWA Engineer of New York, traced the development of the society and stressed particularly the recent trends toward wider service rendered to members of the profession. He mentioned the fact there were no local sections in fourteen states and spoke of the usefulness and value of sections as active instrumentalities of the society. He urged greater freedom be given the local sections in participation in local affairs for the good of the profession, the society and the public.

An address on "The Romance of the Ranchos of California" by Palmer Conner, assistant secretary, Title Insurance and Trust Co., Los Angeles, was especially interesting and was related to engineering in its review of the earliest mapping of Los Angeles.

The afternoon of the first day was devoted to three papers which, in general, described the physiography of the Los Angeles area, reviewed engineering development in the area and other parts of California and, finally, pictured the future outlook for engineering in Southern California. The first paper by A. L. Sonderegger, consulting engineer, Los Angeles, outlined the natural features of the area and reviewed the climatic characteristics. An outstanding feature is the steep topography of the back country combined with the irregular precipitation which results in a serious flood hazard. He discounted the practicability of surface storage, ordinary check dams and the effectiveness of spreading grounds for the handling of peak floods. His suggested solution of the problem was the maintaining of adequate flood channels. The most difficult problem for this program, as he pointed out, is the fact that during the past two decades, since the great flood of 1916, the development of the area has seriously encroached on these natural channels. He also touched on the value of native ground cover in holding soil on the steep watersheds and the danger of mud flows whenever the brush has been burned.

California's contributions to engineering were reviewed in an interesting talk by J. B. Lippincott, consulting hydraulic engineer, Los Angeles. He divided the state into two sections and first sketched the engineering development which naturally followed the coming of the miners in central California. The bulk of this work was directly related to hydraulic mining and the notable contributions he named were: (1) the hydraulic fill earth dam, (2) the rockfill dam, (3) slip-joint riveted pipe, (4) the long-boom clamshell dredge and (5) the suction dredge. He also mentioned the development of the track-laying type of tractor and the early railroad work through the mountains.

Turning to Southern California, Mr. Lippincott described the arid climate and the great underground reservoirs to indicate the logical development of the California type of well, which can now be put down to depths of 1,000 ft., in diameteres up to 30 in., the deep-well pump and the resulting power distribution systems, as the leading contributions from this region. He also touched on irrigation development, oil-field engineering and the scientific work done at the California Institute of Technology.

A discussion by C. T. Leads, consulting engineer, Los Angeles, added the miner's inch for measuring water, the chain-bucket dredge, the initiating of a state wide plan for the development of water resources and the building of long aqueducts as further contributions of California to engineering.

The "Engineering Outlook for Southern California" as outlined by R. F. Goudey, sanitary engineer, Los Angeles Department of Water, is particularly clouded with the present lack of coordination and confusing overlap in governmental agencies which initiate and build engineering works. Specific problems of the future for this area, mentioned by Mr. Goudey were the solution of the sewage disposal question in a well ordered fashion and the already pressing need for an adequate rapid transit system.

Technical divisions

Of special Western interest, were the technical sessions of the Irrigation Division, the Construction Division and the Sanitary Division. There appeared three significant conclusions from the paper by Prof. S. T. Harding, University of California, on "Variations in Runoff of Western Streams" and the discussions which followed: (1) periods of below-normal precipitation may be expected in the future which will exceed in severity the record of the last decade, (2) no data were presented to indicate that any of the speakers had discovered any cyclic characteristics in their studies which were worthy of mention, and (3) the use of tree ring data for tracing precipitation trends back beyond the existing actual records must be done with extreme caution because of other factors which may affect the annual growth record of the rings, other than mere variation in rainfall.

By means of a representative group of slides, Fred C. Scobey, senior irrigation engineer, Department of Agriculture, discussed flow conditions and the question of capacity in some of the outstanding conduits and aqueducts of the West.

A comprehensive paper by Charles H. Lee, consulting hydraulic engineer, San Francisco, reviewed the fundamentals of selecting suitable material for rolled earth-fill dams. The presentation covered such factors as: size,

compaction, permeability, moisture content and handling.

Construction Division

Outstanding engineering projects of Southern California provided the subjects for the papers presented at the session of the Construction Division. A paper by Verne L. Peugh, construction engineer, Pasadena Water Department, reviewed the design and building of the Morris Dam and a comprehensive presentation by J. L. Burkholder, assistant general manager, Metropolitan Water District, reviewed the tunnel work on the Colorado River Aqueduct and the preliminary features of the project. Both of these projects have been previously described in articles appearing in *Western Construction News*. A paper by N. D. Whitman, chief engineer, American Concrete and Steel Pipe Co. on "Large Siphons Under High Heads" traced the development of these conduit units, especially the use of concrete pipe known as "Lock Joint" and reviewed the problems of manufacture and the hydraulic characteristics.

Sanitary Division

Three papers were presented at the session of the Sanitary Division held Thursday afternoon. "Improvements in Chlorination at Los Angeles" was the title of a paper by Ray L. Derby, assistant sanitary engineer, Los Angeles Department of Water, which described the chlorination plants in use by the department and the recent changes in design, both as to plant layout and operation.

A symposium was presented on "Sludge Disposal and Odor Control at the Pasadena Activated Sludge Plant," headed by a paper by Harvey W. Hincks, city engineer of Pasadena. This paper describes the design and operation of the plant going into special detail in the filtering, drying and merchandising of the sludge under the name of Nitroganic. After meeting with initial resistance in disposing of this material, the city now has more demand than it can supply.

Other technical divisions which met during the convention were the Power Division, City Planning Division, and the Waterways Division.

The excursions which concluded the five-day convention included a visit to the motion picture studios on Friday morning, a trip to Catalina Island on Saturday and Sunday, July 7, was designated as American Society of Civil Engineers' Day at the San Diego Exposition, and the San Diego Section was host to the group which attended.

Contracts Totaling $2,500,000 Awarded For Sewer Tunnel at Los Angeles

CONTRACTS totaling more than $2,500,000 were awarded by the Los Angeles County Sanitation Districts for tunnel work and submerged pipeline on the outfall sewer of the district extending from the present disposal plant near Harbor City to the ocean at White Point near San Pedro.

On Schedule 1, contract was awarded to the low bidder, Shofner and Gordon. On Schedule 2, the stipulations of the low bidder, according to report, ruled out this bid, and contract was awarded to Shofner and Gordon. On Schedule 3, contract was awarded to the low bidder, United Concrete Pipe Corp. On the submerged pipeline the contract was awarded to Merritt Chapman and Scott.

The bids opened on July 2 were:

Schedule 1—1.72 miles—

Shofner and Gordon	$ 629,967
Morrison-Knudsen Co.	636,790
Broderick & Gordon	654,245
L. E. Dixon Co.	697,505

Schedule 2—2.66 miles—

Broderick & Gordon	$ 897,695
Shofner and Gordon	976,314
L. E. Dixon Co.	1,101,813

Schedule 3—1.72 miles—

United Conc. Pipe Corp.	$ 440,058
Artukovich Bros., Bebek & Brkich	445,405
Shofner and Gordon	524,898
L. E. Dixon Co.	528,406
Morrison-Knudsen Co.	531,170
Broderick & Gordon	614,450

At the same time Merritt Chapman and Scott, San Pedro, submitted the low bids for constructing the 60-in. submerged pipe section of the outfall sewer extending from the ocean shore, where the tunnel contracts terminate. The bids of this company were:

Reinforced concr. pipe	$528,059
Class B cast iron pipe	547,546
Class A cast iron pipe	534,065

The United Concrete Pipe Corp. bid $691,738 for reinforced concrete pipe.

The next bidder putting in a figure for all three alternates was the Pacific Bridge Co.:

Reinforced concr. pipe	$704,808
Class B cast iron pipe	741,198
Class A cast iron pipe	758,352

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

●

Another Tunneling Record Set On Pasadena Bore of Aqueduct

A record advance of 451 ft. during the week ending June 26 was made by Dixon, Bent Bros. and Johnson in driving the Pasadena Tunnel on the distribution system of the Colorado River Aqueduct project. This figure, according to reports, establishes a new record, exceeding the former mark of 382 ft. established two weeks before. Excavation work on this 12,143-ft. tunnel is now 44% completed with 6,777 ft. to be driven.

A. G. C. Plan 'Week' At San Diego Fair

The week of September 15 has been designated "National Construction Week" at the San Diego Fair. Sponsorship for the week is under the direction of the four California chapters of the Associated General Contractors. During this period members of the construction industry are especially invited to visit the exposition and participate in a celebration of the achievements of the construction industry.

The national board of the A. G. C. will meet in San Diego during the week. The tentative program calls for general sessions, of interest to the entire construction industry, on Sept. 16 and 17, followed by special meetings on Sept. 18 and 19 dealing with problems of building, highway, and engineering contracting.

Engineering work of the West is already featured at the exposition with an exhibit indicating the Colorado River development from Boulder Dam to the Metropolitan Water District Aqueduct and the All-American Canal. Highway construction is also shown in exhibits at the exposition by a display entitled "Highways of the Pacific" which includes actual samples of highway construction illustrating the evolution of western highways from the original Oregon trail to the modern high speed highway. The building phase of the construction industry is also represented, not only by the structures housing the exposition itself, but also the display of model homes and the exhibits showing housing features and home conveniences.

●

Small Dam for Phoenix May Be of All-Steel Design

Bids are expected to be called for shortly on a 38 ft. dam in a proposed municipal mountain park in the Bradshaw Mountains, about 50 miles north of Phoenix, Ariz. The dam will store 60 ac. ft. of water. Plans are on file with the state dam engineer relating to three types of construction: masonry arch, all steel frame and rock fill with steel face. As soon as the type is selected, proposals will be issued and bids called. If the all steel frame construction is selected, it will be one of the few structures of this type.

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Denver Adopts Activated Sludge For Sewage Disposal Plant

Denver City officials have decided upon the activated sludge type of sewage disposal plant and are preparing to ask the PWA for a $3,600,000 loan and grant to finance construction. The $2,000,000 bond issue voted at the recent municipal election will be used to obtain the loan, city officials planning that it will be matched by a 45 per cent grant from the federal government.

State Highway Engineers of the West

FOR readers interested in state highway work in the west, either as engineers or contractors the following list of the headquarters staffs and the district engineers in the eleven western states is being published. The information is the result of a recent compilation from official sources.—Editor.

Arizona

T. S. O'Connell
State Highway Engineer
Sid Smyth,
Deputy State Highway Engineer
R. A. Hoffman, Bridge Engineer
E. V. Miller, Engineer of Plans
J. S. Mills, Estimating Engineer
J. W. Powers, Engineer of Materials
H. C. Hatcher, Statistical Engineer
Percy Jones, Jr., Chief Locating Eng.

R. C. Perkins, District Engineer, III
W. R. Hutchins, District Engineer, VI
F. N. Grant, District Engineer, II
Geo. B. Shaffer, District Engineer, I

California

C. H. Purcell, State Highway Engineer
G. T. McCoy,
Assistant State Highway Engineer
J. G. Standley, Principal Asst. Engineer
R. H. Wilson, Office Engineer
T. E. Stanton,
Materials and Research Engineer
Fred J. Grumm,
Engineer of Surveys and Plans
C. S. Pope, Construction Engineer
T. H. Dennis, Maintenance Engineer
F. W. Panhorst (Acting) Bridge Eng.
L. V. Campbell,
Eng. of City Coop. Projects
R. H. Stalnaker, Equipment Engineer

J. W. Vickrey, District Engineer, I
F. W. Haselwood, District Engineer, II
Charles H. Whitmore, District Eng., III
J. H. Skeggs, District Engineer, IV
L. H. Gibson, District Engineer, V
R. M. Gillis, District Engineer, VI
S. V. Cortelyou, District Engineer, VII
E. Q. Sullivan, District Engineer, VIII
S. W. Lowden (Acting),
District Engineer, IX
R. E. Pierce, District Engineer, X
E. E. Wallace, District Engineer, XI

Colorado

Chas. D. Vail, State Highway Engineer
O. T. Reedy, Senior Assistant Engineer
J. E. Maloney, Assistant Engineer
Robert H. Higgins,
Superintendent of Maintenance
J. P. Donovan, Maintenance Engineer
Roy J. Randall, Office Engineer
Paul S. Bailey, Bridge Engineer
John S. Marshall, Chief Draftsman

E. E. Montgomery, Div. Eng., Div., 1
J. J. Vandemoer, Div. Eng., Div., 2
J. R. Cheney, Div. Eng., Div., 3
Jas. D. Bell, Div. Eng., Div., 4
Ernest Montgomery, Div. Eng., Div., 5
H. L. Jenness, Div. Eng., Div., 6
A. B. Collins, Div. Eng., Div., 7

Idaho

J. H. Stemmer, Director of Highways
Roy G. Gartner, Acting Office Engineer
C. A. Kyle, Bridge Engineer
A. C. Waller, Materials Engineer
G. H. Peterson, Right of Way Engineer
James J. Jewell, Equipment Engineer

A. D. Stanley, Dist. Engineer, Dist. 1
J. M. Johnston, Dist. Engineer, Dist. 2
E. A. Johnston, Dist. Engineer, Dist. 3
Lewis Roberts, Dist. Engineer, Dist. 4
J. J. McCreedy, Dist. Engineer, Dist 5

Montana

R. D. Rader, State Highway Engineer
W. O. Whipps, Administrative Engineer
P. G. Poore, Construction Engineer
E. B. Donohue, Maintenance Engineer
B. J. Ornburn, Bridge Engineer
W. O. Kivley, Office Engineer
R. H. Fletcher, Chief Draftsman
E. O. Parsons, Right of Way Engineer
D. L. Cheney, Oiling Supterintendent
Seward Mason, Testing Engineer
A. W. Engel, Maintenance Supt.
M. C. Lockey, Asst. Maintenance Eng.

N. W. Hicks, Division Engineer
R. H. Willcomb, Division Engineer
R. J. Ephland, Division Engineer
S. P. Hart, Division Engineer
H. C. Tilzey, Division Engineer

Note: Since this list was compiled, D. A. McKinnon has been appointed Highway Engineer of Montana.

Nevada

Robert A. Allen,
State Highway Engineer
H. D. Mills,
Assistant State Highway Engineer
W. T. Holcomb, Office Engineer
Frank Silva, Asst. Construction Eng.
Leslie C. Hancock, Division Engineer
August Berning, Division Engineer
J. D. Meacham, Division Engineer
C. C. Boyer, Division Engineer
F. H. Depp, Division Engineer

New Mexico

G. F. Conroy, State Highway Engineer
F. G. Healy,
Assistant State Highway Engineer
F. M. Limbaugh, Construction Engineer
B. G. Dwyre, Maintenance Engineer
R. W. Bennett, Office Engineer
E. B. Van De Greyn,
Bridge Eng. and Chief Draftsman
L. C. Campbell, Materials Engineer
L. D. Wilson, Right-of-Way Engineer
J. P. Church, District Engineer, No. 1
W. R. Eccles, District Engineer, No. 2
Gordon Sumner, District Engineer, No. 3
L. B. Tyson, District Engineer, No. 4
Guy Mayes, District Engineer, No. 5

Oregon

R. H. Baldock, State Highway Engineer
C. B. McCullough,
Bridge Eng. & Asst. Highway Eng.
H. G. Smith, Construction Engineer
Chas. E. Low, Construction Office Eng.
H. N. Hackett, Right-of-Way Engineer
H. W. Libby, Chief Locating Engineer
J. N. Bishop,
Maintenance & Equipt. Engineer
Watson Townsend,
Maintenance Office Engineer
John Beakey, Traffic Engineer
G. S. Paxson, Asst. Bridge Engineer
N. M. Finkbiner, Engineer of Materials
S. H. Probert, Office Engineer
E. A. Skelley, Chief Draftsman

Wm. E. Chandler, Div. Eng. No. 1
E. A. Collier, Division Engineer No. 2
K. D. Lytle, Division Engineer No. 3
W. C. Williams, Division Eng. No. 4

Utah

K. C. Wright, Chief Engineer
E. C. Knowlton, Assistant Engineer
S. L. Cate, Assistant Engineer
H. S. Kerr, Right-of-Way Engineer
M. Housecroft, Chief Bridge Engineer
Levi Muir, Materials Engineer
W. L. Anderson, Chief Draftsman
R. W. Groo, Equipment Engineer

L. W. Beason, District Engineer, Dist. 1
Gwynne Lewis, District Eng., Dist. 2
J. E. Garn, District Engineer, Dist. 3
R. A. Gillis, District Engineer, Dist. 4
Wm. Osborn, District Engineer, Dist. 5

Washington

L. V. Murrow, Director of Highways
J. D. MacVicar, Office Engineer
Jas. A. Davis, Construction Engineer
H. G. Porak, Engineer, Plans & Surveys
J. W. Hamilton, Maintenance Engineer
O. R. Elwell, Bridge Engineer
J. R. Tillman,
Engr. of Secondary Highways
H. W. Pierong, Right-of-Way Engineer
Bailey Tremper, Engineer of Tests

George H. Shearer, Dist. Eng., Dist. 1
John Duff, District Engineer, Dist. 2
R. P. Newland, Dist. Eng., Dist. 3
O. R. Dinsmore, Dist. Eng., Dist. 4
E. C. Simpson, Dist. Eng., Dist. 5
Norman Hill, District Engineer, Dist. 6

Wyoming

Jas. B. True, Superintendent-Engineer
C. C. Warrington, Office Engineer
C. F. Seifried, Engineer of Plans
W. H. Fisher, Bridge Engineer
I. E. Russell, Materials Engineer
J. E. Peirson, Equipment Engineer
J. E. Lloyd, Oil Engineer
Keith Bahrenburg, Special Engineer

J. G. Smith, District Engineer
Talcott Moore, District Engineer
J. R. Phillips, District Engineer
R. C. Kay, District Engineer
R. J. Templeton, District Engineer
G. W. Marks, District Engineer
G. D. Corwine, District Engineer

Uncertain Rules For Highway Work Makes Low Bidder Reject Contract

UNCERTAINTY over the new regulation which requires blanket conformity on the part of contractors to future federal laws and executive orders, dealing with the works program, caused A. Teichert & Son, Inc., Sacramento, to reject a contract for a 7.8 mi. surfacing project in Madera County, Calif., after having submitted the low bid.

At the request of *Western Construction News* Mr. Teichert, Jr., has outlined the reasons for rejection of this about to be let and the policies of the contract and the letter is published in the thought that it might be of interest and value to other western highway contractors. The question is vital to highway construction at this particular time, when a large volume of work is about to be let and the policies of the work relief administration are so undecided. *Western Construction News* would welcome further comments or opinions on this general subject as the initiating of an open forum for the exchange of views from contractors and engineers in the Western States, on matters affecting Western construction.—Editor.

Mr. Teichert's Letter

Sir—We regretted very much to refuse to sign up and construct the surfacing on the California division of highways 7.8-mile surfacing job between Coarse Gold and Oakhurst, Madera County. The reason being that, after the highway commission had advertised this job in the regular way, they received a notice from the Bureau of Public Roads to the effect that the sub-contractor had to abide by the following:

> "The contractor also agrees in the prosecution of work herein proposed, to conform to the requirements of any subsequent federal legislation requiring observance of minimum wages and/or maximum hours of employment and/or limits as to age of employees in the performance of contracts of the federal government. Any provision of this contract in conflict with such subsequent legislation shall be deemed modified to conform thereto, and in the event additional cost or expense is thereby imposed upon the contractor no claim for additional compensation will be allowed or paid by the State of California, Department of Public Works."

As the future federal regulations were unknown, and still are, for that matter, and as we had not figures in any contingency item, we refused to sign a certificate incorporating the above quotation in the contract and were returned our check.

We notice that the new proposals for work to be canvassed on July 3 also contained the above clause and in addition contain one in which the contractor agrees to abide by the 30-hr. week labor regulation, notwithstanding the fact that the provisions of the state law on that subject is ineffective July 1, 1935.

All of these regulations may or may not be of considerable cost and expense to the successful bidder, and in just the last day we have received from the national headquarters of the A. G. C. a letter entitled, Bulletin of June 21, 1935, which sets out what such future federal regulation may be as contained in Senate Bill (U. S.) No. 3055. This bill, in short, provides that the ultimate contractor on any project entailing the use of federal funds agrees that he will police the entire industry as relates to purveyors of materials which may be required for use on that particular job.

This legislation, if carried out, is almost impossible of fulfillment by a contractor out on this end of the string of material and equipment supply dealers because the bill does not say where you are to stop, it may extend the contractor's activities way back into the forests and the mines, and the requiring on his part that he ascertain that everybody along the line has paid the prescribed minimum wages and employed labor not to exceed the maximum hours as specified in the bid, and, further, no person under sixteen years of age has been employed in work along the line. It also goes on to relate any breach of any of these things shall cause the United States, or its representative, to deduct from any progress payments any sums that may be affected, as liquidated damages as such breach.

At the present writing it looks as though the lumber mills were going to take the bone in their teeth and open up their mills regardless of federal mediators, and possibly it would be impossible to buy a stick of lumber on this coast in which federal regulations have been lived up to 100 per cent. This is just one little example of some of the policing that we will have to do as the small contractor out on the end of the limb.

How to estimate the expense that may arise from some of these regulations is impossible. You can guess, but you can't estimate.

Upon looking over some old proposals recently, I was surprised at the number of boys who have fallen by the wayside in the public works contracting field in the last few years. A lot of them were very good men. It seems that the party in power in Washington at the present time are out "to get" the rest of us who are still trying to carry on.

A. TEICHERT, JR.
A. TEICHERT & SON, INC.,
Paving Contractors.
Sacramento, Calif.

Highway Personnel Changes Made in Washington

Changes effecting the organization of several district offices and the staff in Olympia were made recently by Lacey V. Murrow, director of highways of Washington. O. R. Dinsmore, district engineer at Vancouver, has been moved to Olympia to the position of office engineer for the department, and E. C. Simpson, district engineer at Yakima, has been moved to the Vancouver office as district engineer. The office at Yakima will be taken over by Norman Hill, district engineer in the Spokane office and Ralph Newland, district engineer at Olympia has been shifted to a similar position in Spokane. J. D. McVicar, office engineer, will become maintenance engineer replacing J. W. Hamilton who will become district engineer at Olympia. The balance of the engineers in the Olympia office will not be affected by the changes.

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Bids Called For Cajalco Dam

BIDS for the construction of the Cajalco dam, a rolled earth-fill structure which will provide terminal storage at the west end of the Colorado River Aqueduct, have been called by the Metropolitan Water District to be opened August 12. The work has been divided into five schedules and the two largest individual items are the 3,400,000 cu. yd. of earth fill in the main dam and the 4,000,000 cu. yd. of fill for the dike. The dam site is about 10 miles southwest of Riverside, at the west end of the Valverde tunnel.

Schedule 1 includes the driving and lining of the 2,000-ft. diversion tunnel which is 9 ft. in diameter. The tunnel is to be lined with 12 in. of concrete. Schedule 2 is for the construction of the outlet tunnel, 2,565 ft. long and 14 ft. in diameter with a steel cylinder lining backed by concrete and provided with an inner lining of Gunite.

Schedule 3 is for the dam, spillway and appurtenant works. This earth fill has a maximum height of 194 ft., a crest length of 2,584 ft. and a volume of 3,400,000 cu. yd. Excavation for the foundation involves 575,000 cu. yd. of earth and 25,000 cu. yd. of rock. The 8-in, reinforced concrete paving on the upstream face will require 16,000 cu. yd.

Schedule 4 is for the dike, which is an earth fill structure 7,570 ft. long with a maximum height of about 90 ft. It will involve 4,000,000 cu. yd. of earth-fill embankment which will have a concrete paving on the upstream face. Schedule 5 covers the outlet tower, the approach channel and a suspension bridge to the tower.

The specifications state that the schedules will not be awarded separately.

Personally Speaking

Frederick H. Fowler, consulting civil engineer, San Francisco, has been retained by the Flood Protection Planning Committee of Greater Kansas City to make a comprehensive study of the best plan for flood protection in the lower Kaw Valley, including any necessary work along the Missouri River in protecting the Kansas City metropolitan area. **Austin W. Earl,** consulting engineer of San Francisco, has been retained by Mr. Fowler as special expert on railroad and terminal problems.

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Victor L. Streeter, junior engineer with the Bureau of Reclamation in the Denver office, has been awarded the John R. Freeman scholarship for fifteen months of travel and study in Europe in the field of hydraulics. Mr. Streeter is a graduate of the University of Michigan, receiving his doctor's degree in 1934 and has been with the bureau for a year.

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H. W. Pollock, for several years engineer-estimator on public works projects in Seattle, has been appointed engineer of Klallam County, Wash. Mr. Pollock is a graduate of the college of civil engineering, University of Washington, and worked on the Denny Hill regrade project and on the City's Skagit river development. Mr. Pollock will succeed Theodore F. Rixon.

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C. F. De Armond, engineer of Elko, Nev., and **A. M. Smith,** state engineer of Nevada, have been appointed to the Colorado River Commission of the State of Nevada. This commission was authorized by a law recently passed by the Nevada legislature. Mr. Smith will serve as secretary of the commission.

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R. W. Flack, city manager of Durham, North Carolina, has accepted the position of City Manager of San Diego at a salary of $15,000 per year. The appointment is to be confirmed by the city council and Mr. Flack will assume his new position on August 1st.

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G. M. Musick, architect of Denver has been elected president of the Colorado Construction League, made up of twenty-two groups identified with the construction industry in that state.

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Glenn Rood, city engineer of Manhattan Beach, resigned on June 6. He also held the position of street superintendent and building inspector.

Charles F. Swigert

Charles Swigert Dies

CHARLES FREDRICK SWIGERT, dean of Western foundation and bridge contractors, and for many years president of the Pacific Bridge Co. with headquarters in Portland, died in San Francisco, June 24, at the age of 72. He was on a business trip in connection with work on the San Francisco Bay pipe line crossing which is being built by Pacific Bridge Co. His years of work on difficult foundations were recently climaxed by the completion of the south pier for the Golden Gate Bridge, which was generally recognized as one of the most hazardous feats of pier construction in the history of bridge engineering.

Mr. Swigert was born in Ohio in 1863 and came west about 1880, going to work immediately for his uncle, William Gorrill, pioneer contractor of Oakland, who had founded the original organization in 1869. The first work Mr. Swigert did was on one of the first bridges to be built across the Willamette River at Portland. About 1885 Mr. Gorrill retired from active work and Mr. Swigert became president of the company. About that time the main office of the organization was moved to Portland. Since that time Pacific Bridge Co. has done work throughout the entire length of the Pacific Coast from Canada to Central America, including many difficult underwater foundation jobs. During the war, Mr. Swigert was in charge of the shipyard of The Foundation Co., at Portland.

Some of the larger projects carried out in recent years by his organization included: Foundations for the Interstate Bridge across the Columbia River at Vancouver, Washington and the Ross Island Bridge at Portland; a mile of harbor wall construction along the Willamette River at Portland; foundations for the Longview-Rainier Bridge across the lower Columbia River and the Lake Union Bridge at Seattle. The company has also carried out contracts on several large sized submerged pipe lines.

Outstanding in the long list of foundation contracts carried out under the direction of Mr. Swigert, was the $2,935,000 contract for the two main piers for the Golden Gate Bridge. The South Pier, built 1,100 ft. offshore in about 100 ft. of tide and wind swept water in the Golden Gate was probably the most difficult foundation work ever attempted. The story of the building of this pier was fully described in *Western Construction News,* January, 1935. This work was being done at the same time the Transbay Construction Co., of which the Pacific Bridge Co. was a member company, was carrying out the $6,957,000 contract for the west channel piers of the San Francisco-Oakland Bay Bridge. The Pacific Bridge Co. was one of the member companies in the Six Companies Incorporated, which built the Boulder Dam. Mr. Swigert was a member of the American Society of Civil Engineers and also prominent in civic affairs in Portland, having served as president of the Chamber of Commerce.

Obituaries . . . .

Douglas W. Ross, irrigation engineer and examining-engineer for the PWA, died at his home in Berkeley, Calif., June 22, at the age of 70. Mr. Ross came to California in 1910 to take charge of the Kuhn Irrigation project in the upper Sacramento Valley and had lived in Berkeley for 22 years. He was a life member of the American Society of Civil Engineers.

George E. MacVicar, contractor of Glendale, Calif., and member of the firm Hodgman and MacVicar, Pasadena, Calif., died in a hospital in Phoenix, Ariz., June 2, from injuries sustained in an automobile accident, May 28. He was 48 years old. At the time of his death he was in charge of construction work on an Arizona highway project which his firm had under contract.

N. M. Ball, well known highway contractor of Berkeley, Calif., was killed in an automobile accident on July 4 near Salt Lake City. Mr. Ball was 67 years old. He moved from Illinois to Riverside, Calif., in 1889 and entered the contracting business. In 1900 he moved to Porterville and became a partner in the Concrett Pipe & Construction Co. Mr. Ball entered the field of highway contracting about 1917. He was a member and director of the A. G. C.

Charles E. Angilly, engineer in charge of all structural design for the Los Angeles water bureau and an employee of the bureau for 19 years, died May 10, at the age of 46. Mr. Angilly was born in Rhode Island, and graduated from the college of that state, with a degree of civil engineer.

Colorado Plans Water Program

DEFINITE steps toward the planning of a unified state water program for Colorado were initiated at an All-Colorado Water Conference, held in Denver, June 5. The conference resulted in a plan which will place several specific water development projects before the federal administration for financing, and also request a complete survey of the water resources of the state to be made by the Bureau of Reclamation, or some other federal agency, at a cost of $500,000.

Following the first meeting of the conference, a committee was appointed with representatives from all of the drainage basins of the state to work out the details of a state conservation and development program for water resources. George Corlett of Monte Vista was made chairman of this committee.

The committee divided into groups representing the various river basins and studied the particular projects in their areas to decide on the relative feasibility. These groups then reassembled as the committee and considered the state program as a unit. George M. Bull, state PWA engineer, reminded the committee that projects would have to be approved by his office before they would be given attention in Washington and reminded the committee that this would require information and data sufficient to prove the projects feasible. The individual projects on the various water shed areas were relatively simple to determine, but the question of transmountain diversion of surplus supplies from the west to the east side of the continental divide required more detailed attention.

By June 15 the committee had reached agreement on projects totaling $25,420,000 which were to be submitted to the PWA through the state planning commission. At that time the transmountain projects were still under discussion. In this connection, the representatives from the western part of the state were insistent that the rights and future needs of the western area be protected before diversion schemes were considered. However, the reports indicated that the committee was approaching the subject from a state point of view and agreement between the interests of the west and east slopes were much nearer than they had ever been in the past.

Of the projects approved by the committee, the plan would call for $14,720,000 of the work to be financed out of the state's share of the present public works fund. The Caddoa dam on the Arkansas River and the proposed $2,700,000 reservoir on the Pine River were considered to be direct federal projects which should be financed with outright grants. Out of 172 projects originally considered, the committee reduced the improvements which they considered feasable for the immediate program to about 25 projects.

In addition to the list of specific projects recommended for immediate construction, the committee endorsed a request to have the federal government make a survey of the state's water resources at a cost of about $500,000. Also, a request was made for an engineering survey costing about $150,000 to determine the feasability of diverting waters into the Arkansas Valley.

Phoenix Extends Sewer System To Rural Areas

With the completion of about 35 miles of new sanitary sewer lines, the city of Phoenix, Ariz., recently began providing sewage disposal service for an adjacent rural area almost as large as the city itself. Complete cost of the PWA project is expected to be covered by sewer rentals. The city's sewage disposal plant, built in 1930, is large enough to take care of nearly twice the city's present population so no additions were required to provide for the new rural extensions.

Indications are that revenue from the new lines may reach as high as $75,000 per year. More than 500 residents of the rural districts covered have already signed contracts for this service. To facilitate the collection of the sewer rentals and reduce city overhead, these bills will be rendered in connection with water bills.

Besides providing additional revenue for the city, the project constituted an important step toward bettering health conditions throughout the district, since it has made possible the elimination of numerous cesspools. The lines, which connect to the city sewer system at various points, range in size from 8 to 21 in. All vitrified clay pipe was used, with G.K. compound joints. Excavation less than 6 ft. deep was done by hand. Work was done by the Drainage Const. Co.

Summer Shuts Down Concreting On Open Aqueduct Work

Following the specification provisions and the construction program of the Metropolitan Water District, concreting work on open canal and siphons has been suspended until after Oct. 1 on the section of the Colorado River aqueduct east of San Jacinto. This provision is to eliminate the placing of concrete, in the open, during the intense desert heat of the summer months. Other types of construction work, including excavation and tunnel lining will continue through the summer.

These summer shut down periods were taken into account during the programming of the aqueduct and will not effect the final completion date. During the past two summers, aqueduct construction has been principally in tunnel work and this summer shut down period for concreting has not been necessary.

Allotment of $23,000,000 Made To Continue Grand Coulee Project

On June 21, President Roosevelt approved an allotment of $23,000,000 with which the Bureau of Reclamation will carry forward the construction operations on Grand Coulee Dam for another year. The original allotment for this project, made more than a year ago, was for $15,000,000, and the total cost for the present program will be about $60,000,000.

The contractors are now employing about 4000 men on this project, according to the government report, and the expenditures run about $2,000,000 per month. The new allotment will complete the excavation for the dam foundation and provide for the placing of the initial sections of concrete. Excavation work will be completed this fall and the concreting plant is now being assembled.

Progress on the project was reviewed in *Western Construction News*, June, 1935, p. 162.

Changes in U. S. Engineers Office

INCREASING work along the Columbia River and the coast near the mouth of the river has resulted in the formation of a new district office in the North Pacific Division of the Corps of Engineers, according to an announcement from the office of Col. T. M. Robins, division engineer at Portland. There will be no change in the extent of the division and the Seattle district will be continued in its present set-up.

The first district will include work on the Oregon coast, the Columbia River below Vancouver and the Willamette River. Major Milo P. Fox will be the engineer in charge of this district, assisted by Capt. S. L. Damon and Lieut. F. L. Beadle. Civilian engineers for this district will include: R. E. Hickson, in charge of civil engineering and surveys; N. C. Bray, mechanical engineering and W. B. Patterson, drafting.

The second district will include the Columbia River work above Vancouver, including the Bonneville project and the Snake River. Major Charles F. Williams, who has been serving as district engineer at Portland, will be district engineer of the second district. His military assistants will be: Major H. A. Skerry, Capt. J. S. Gorlinski and Lieutenants C. M. Myers and Robert G. MacDonnell. A. L. Darr will be civilian engineer in charge of surveys on the upper Columbia and Snake Rivers. The Bonneville project will continue to be carried out under the supervision of Major Williams with the personnel already assigned to this work.

Report Finds Ferry Terminal Impracticable for Bay Bridge

A PROPOSAL to establish the west terminal of the interurban railway service across the San Francisco-Oakland Bay Bridge at the present ferry Building location, at the foot of Market Street, has been declared impracticable and more expensive than the original plan for the terminal at Harrison Ct., near First Street, according to a report released by C. H. Purcell, chief engineer. This report has been submitted to the California Toll Bridge Authority.

The report was prepared as a result of a plan advanced by property owners in the lower Market Street area indicating certain advantages existed in the use of the area near the Ferry Building as the interurban terminal. As a result of the extended study made and the report rendered, it appears probable that the original plan for the terminal will not be altered.

Before reporting on the Embarcadero terminal, a careful study of the entire project was made including several alternate designs for a terminal with a loop at the ferry building, so that not only the construction cost, but damages to property could be detailed. On the basis of these layouts, costs were compared with the $15,000,000 existing plan for a terminal and found that the Embarcadero proposal would add $2,000,000 to the original cost and $200,000 per year to the operating cost.

The conclusions in the report follow:

1—The cost, including construction, property, interest and additional equipment, of any of the Embarcadero plans studied will not be less than $2,000,000 greater than for Plan "X".

2—Even with this additional cost, from a structural standpoint the result will not be as satisfactory as the Plan "X" terminal. Foundations at the Embarcadero location equivalent to those at the Plan "X" location could only be secured by deep caissons. The cost of such construction would be prohibitive.

3—Due to the increased mileage of the interurban route, the greater height through which it will be necessary to raise the interurban traffic, the increased cost of maintenance of ways and structures, and the increased cost of maintenance of equipment, the annual operating costs at this location will be about $200,000 per annum more than those for the Plan "X" terminal. Capitalized at five per cent, this is the equivalent of an additional cost of $4,000,000 and will be reflected either in raising transbay fares, or increasing the tolls required to amortize the capital investment of Toll Bridge Authority.

4—With any Embarcadero plan, it is estimated that 50 per cent of the interurban passengers would use local street cars to reach their destination, as against 28 per cent with Plan "X" terminal. On the basis of a five cent fare, this represents an additional average charge of 2.20 cents per day per commuter. The average travel time per passenger would be increased by 3.8 minutes.

5—The water front commerce is an essential part of San Francisco business. In spite of all means that may be taken to prevent interference, the construction of the terminal at this location will adversely effect this commerce.

6—A terminal at this location would make an extension to an uptown station, should future San Fancisco growth and development justify additional uptown terminal facilities, impracticable, except by an extensive loop, which would be very expensive to construct, and would result in increased operating expenses by reason of the large increase in train mileage.

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Code for Heavy Construction Approved Prior to Court Ruling

THREE WEEKS before the United States Supreme Court ruling, declaring the NRA unconstitutional, President Roosevelt approved the code for Heavy Construction and Railroad Contractors, a subdivision of the General Contractors Division of the Construction Industry Code. As officially described, this code is known as the Heavy Construction and Railroad Contracting Subdivision, Subchapter II-B of the General Contractors Division, Chapter II of the Code of Fair Competition for the Construction Industry. The subchapter was submitted to the NRA through the agency of the Associated General Contractors and was revised following the public hearing which was held in Washington, May 21, 1934.

The code contains the same wage-and-hour provisions of the general construction code with a maximum 40-hour week and a 40c minimum wage, with the exception of watchmen and clerks. As defined in the code, this branch of the industry includes the work of any general contractor doing some forty-two specified types of construction work, excluding only building construction and highway work.

Information contained in the letter transmitting the code to the President for his approval stated that the work done by this division annually has been as follows:

1929	$ 663,937,000
1930	1,150,952,000
1931	692,537,000
1932	283,318,000
1933	373,580,000

These figures were stated to indicate the fluctuation in the work done by this group of contractors. The estimates of the amount of heavy construction work performed through the agency of general contractors varies from 60 to 80% of the total, according to the statement contained in the statistics prepared by the Research and Planning Division. Further, it was pointed out that the number of persons employed in this branch of construction is very difficult to determine. Estimates were placed at 211,000 man-years of employment in 1929, with the figure declining to 89,700 man-years in 1932 and rising to 118,200 man-years in 1933.

The wage provision of the code, at a 40c minimum, was estimated to affect about 60% of the workers in this subdivision with a result of increasing hourly wage rates from 5 to 40% for unskilled work. Equipment charges were stated to represent about 23.8% of the total value of construction work performed by this group.

Denver Considering Future Water Sources

CONSIDERATION is being given by the Denver water board to the development of additional water supplies for the city and the South Platte River valley as a regional project for all interested parties in the watershed area. It is generally agreed that when the present Moffat tunnel diversion project is completed, the board will no longer initiate such projects at the sole expense of the city.

In a recent statement, five additional sources of water were mentioned, and the development of these would cost nearly $26,000,000, in addition to several million more needed for regulatory and storage reservoirs. These sources for additional water are: (1) Blue River, where Denver has a right-of-way for a 22-mile tunnel, estimated cost $20,000,000; (2) Williams Fork, where Denver has right-of-way for a 3-mile tunnel, estimated cost about $1,500,000; (3) St. Louis and Elk Creeks, cost of $1,400,000; (4) Ranch Creek, cost of $275,000; and (5) South Park, making water available to South Platte River at estimated cost of $1,250,000. The full development of these water sources would require the construction of the Two Forks reservoir on the South Platte River at an estimated cost of $6,000,000.

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Handbook on Wood Construction Design Prepared by Lumber Manufacturers

A COMPREHENSIVE handbook covering the field of structural design of timber has been prepared by the National Lumber Manufacturers Association. The book was prepared for the purpose of providing engineers and contractors with design data on the use and application of wood, corresponding to familiar handbooks now available on other structural materials. Following a section describing the various properties of wood, its strength, characteristics, and the various terms used in describing timber, the main section of the book consists of elaborate tables on the properties of structural members.

Tables of safe loads for wood beams are given in two general groups: (1) the load is limited by the stiffness or the resistance of the beam to deflection, and (2) by the strength of the beam in bending. These tables give safe loads for many combinations of stress, size, and spans. The tables give the safe uniform loads, both total and per linear foot of span, with a series of factors by which they can be converted to other loading conditions.

Extensive tables of loads for wood columns for different sizes and lengths are given in sequence of length and for representative working stresses. The loads are based on the most recent information on the strength of timber columns developed by the Forest Products Laboratory. Safe loads for plank floors of various thicknesses of different spans are given for representative combinations of working stresses.

Copies of "Wood Structural Design Data" may be obtained from the National Lumber Manufacturers Association, 1337 Connecticut Avenue, Washington, D. C., for $1.00.

DISTRIBUTOR and Manufacturer NEWS

Portland Machinery Dealers Win First Place

A silver trophy for the best decorated float in the wholesale and industrial section of the annual Rose Festival parade held in Portland was won by the Portland Machinery Dealers Association of Portland. Credit for the fine work is due: D. I. Cooper, of Howard-Cooper Corp., chairman; F. E. McBath, Austin-Western Road Machy. Co.; J. R. Phillips, Casey Tractor Appliances Co.; W. Gregory, A. C. Haag Co.; Milo Mack, Feenaughty Machy. Co., and E. A. Finkbeiner, Gordon & Finkbeiner Co.

Wheeled Roller Names Smith-Booth-Usher As Reps.

The Wheeled Roller Corp., of San Antonio, Tex., has recently appointed Smith-Booth-Usher Co., of 2001 Santa Fe Ave., Los Angeles, as Southern California representatives.

Smith-Booth-Usher also announces a new 175-page catalog covering their complete line of construction, road making, and materials handling equipment and supplies. New methods and trends of construction work are brought to mind in looking over the book. A copy of the new release will be sent on request to the company.

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The Lauson Corporation Out of Receivership

The Lauson Corporation, which has been operating under a receivership for the past three years, has now been taken over by The Lauson Company, New Holstein, Wisconsin, incorporated under the laws of Wisconsin.

The officers of the new company are H. L. Wright, Milwaukee, Wisconsin, Industrialist, President; F. H. Edson, New Holstein, Wisconsin, Vice President and Sales Manager; C. O. Piper, New Holstein, Wisconsin, Vice President and Factory Manager; H. D. Wirth, Milwaukee, Wisconsin, Secretary, and H. E. Bruns, Plymouth, Wisconsin, Treasurer.

The Lauson Company manufactures a complete line of vertical air and water cooled engines ranging from ½ to 5 HP., also horizontal models 1½ to 18 HP., electric and gas engine driven pump jacks, replacement feed grinder plates and tractors.

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American Lumber Opens San Francisco Office

The American Lumber & Treating Co. opened offices in San Francisco at 116 New Montgomery St. This office is in charge of Chas. R. Wilson, who will handle sales in Northern California.

This concern is operating two wood preserving plants on the Pacific Coast, one at Wilmington, Calif., and the other at Wauna, Ore. The principal function of this office is to distribute Wolmanized Lumber; however, they are in a position to furnish any forest product of the Pacific Northwest, either treated or untreated.

Wilson has had twenty-one years experience on the Pacific Coast in lumber operations and wood preservation. He is familiar with the characteristics of important woods and is well versed in wood technology.

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Jones Appointed Sales Manager Brown-Bevis Company

W. B. Jones was appointed sales manager of the Brown-Bevis Equipment Co. June 20. He was formerly Northwest District Manager for the Northwest Engineering Co. Six years prior to that time, he was vice-president and sales manager of the A. B. Avery Co., St. Louis, Mo. Previously, Jones was the Chicago manager for the Northwest Engineering Co.

W. S. Long Transferred to Los Angeles

The United States Rubber Products, Inc., announces that W. S. Long, formerly manager Mechanical Sales in the Seattle District, has been transferred to the Los Angeles District as manager of the same division in the Southwest. C. W. Gilmer, formerly salesman in the San Francisco District, has been appointed manager Mechanical Sales, Seattle District.

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Western Road Machinery Co. Reopens in Portland

Edward L. Kropp, well known in Portland machinery and contracting circles, announces the reopening of the Western Road Machinery Co. at 83 S. E. Belmont St. A general line of road making machinery will be carried in stock and the firm is already doing business. Kropp has been in business in Portland for the past 25 years and has wide acquaintance among road contractors and builders.

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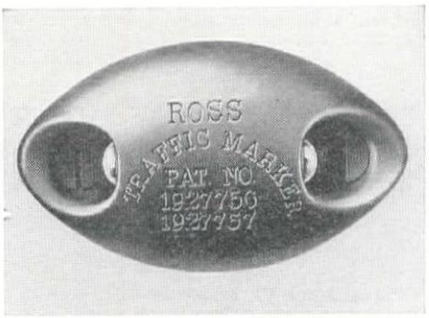


Ross Traffic Markers

Ross Traffic Markers designate the road centerline for automobile drivers at night. The marker, brought into being about two years ago, has been experimented with under various conditions and the modifications and improvements have made it a practical means of insuring safe driving conditions on the highways during the hours of darkness. This is accomplished by defining the centerline of the road ahead as a series of small lights. Reflector lenses contained in the metal housing of the Ross Traffic Markers which effectively return light from the headlights of the approaching automobile to the driver are the means through which this lighted path for the guidance of motorists is formed. The markers appear as a row of tiny electric lights, however, this is not the case and explains why installations of these devices are not costly to install and maintain. They function well in fogs, rainstorms and on other occasions when visibility is poor.

The overall height of the markers, and streamlining makes them no obstacle whatever to the movement of traffic and maintenance equipment. It is manufactured and distributed by the Chicago Manufacturing & Distributing Company, 1928 West 46th Street, Chicago.

NEW Materials and EQUIPMENT

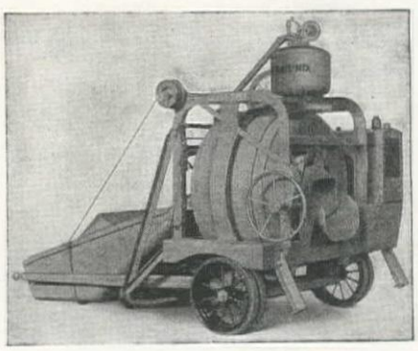
J-M Steeltex for Light Concrete Floors, Roofs

Important structural advantages in light-slab concrete floor and roof construction are to be found in Steeltex floor lath, a combined reinforcement and form, according to a booklet just issued by Johns-Manville, distributors of the material which is manufactured by Pittsburgh Steel Co.

A fabric of 12-gauge cold-drawn electrically welded galvanized steel wire in 3 by 4 inch mesh provides the reinforcing. The mesh is attached to a tough corded backing — which acts as the form — by means of crimp wires. These crimps also space the reinforcement at proper distance from the backing so that concrete completely surrounds and embeds the wires, saving the labor of blocking up or pouring the slab in two operations.

The corded backing, it has been found, is of sufficient strength to support the concrete while it's being poured and, once the fabric has been attached to joists, provide a safe walking surface.

Steeltex is furnished in rolls 4 feet by 125 feet and applied by unrolling over joists and cutting to length. It is then attached to an end or anchored joist, drawn taut by a special stretcher and fastened by clips to intermediate joists.



New Koehring Mixer

The 14-S mixer is light weight for towing on two wheels, gives the contractor a flexibility of equipment, permitting him quick moving and easy spotting for all types of concrete construction work. Transportation costs are reduced, as this machine can be hauled efficiently and quickly from job to job. It is equipped with Koehring Automatic Skip Flow Shaker, which causes the material to be shaken in a direct flow line of the skip. Full spring mounting, multiple "V" belt drive, automatic water tank, self levelling skip, are a few of the many features of this modern concrete mixer. The charging skip is free from obstruction at the front or sides, which permit fast charging directly into the skip without hindrance.

Bulletins of this machine will be mailed upon request to the Koehring Co., 3026 Concordia Ave., Milwaukee, Wisc.

●

New CP-22 Light Sinker Drill

Particularly suited for shallow drilling in soft to medium formations. Small size, light weight and low air consumption make the CP-22 drill suitable for use in restricted quarters, maintenance work around industrial plants, flat or upward drilling, and where air supply is limited. It also has application in soft formation metal mines, coal mines and blockholing in quarries.—Chicago Pneumatic Tool Co., 6 E 44th St., New York.

●

Cedar Rapids Roll Crusher

The Cedar Rapids 16 in. by 16 in. Roll Crusher for all types of secondary crushing such as limestone, gravel, cinders, slate, shells and also for producing sands from stone or gravel. It is a heavy duty machine simple in construction and design. Roll shells can be furnished in manganese steel or chilled hard iron, either in smooth or corrugated facings. The average reduction usually runs approximately 2 to 1, for example 1½-in stone reduced to ¾ in. and likewise ½-in. stone to ¼ in. and smaller. In some cases greater reductions may be made.—Iowa Mfg. Co., Cedar Rapids, Iowa.

●

New "Bantam Weight" Excavators

A new full-revolving ⅜-yard excavator, known as the Model 100, Bantam Weight, is announced by the Harnischfeger Corporation of Milwaukee. Weighing approximately 15,800 pounds, this new machine is fully convertible in a short time for a wide range of uses among contractors, material yards, highway commissions, etc.

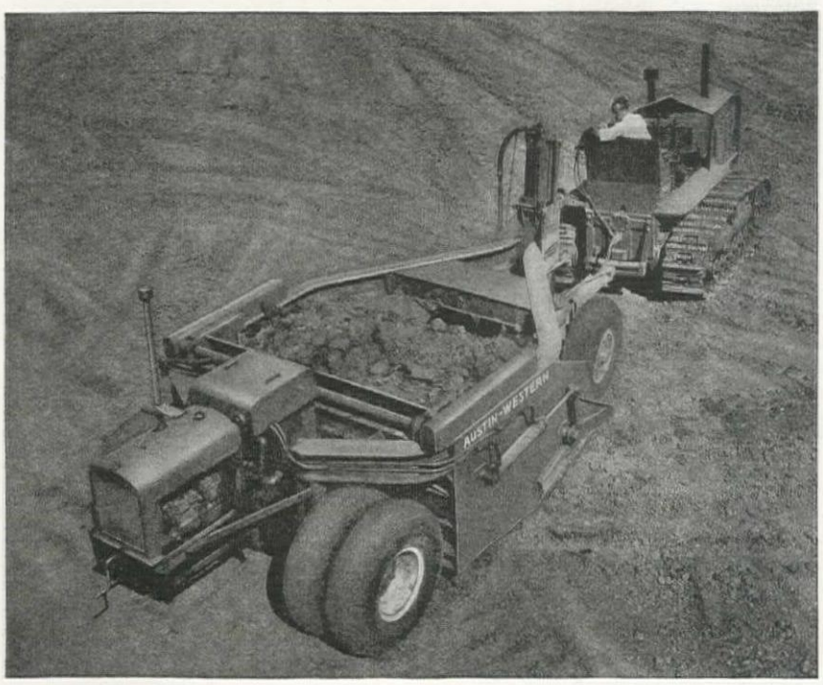
Fast operation with travel speeds from 1½ to 3 miles per hour combine with easy steering, climbing and quick turning. Standard swing speed is 5 RPM with P&H Split Second Clutches for easy control, fast starting and stopping and quick spotting of the dipper. Live boom chain crowd mechanism permits booming up and down without changing length of chain. Short tail swing fits it ideally for working in close quarters, while its light weight assures maximum traction over all types of ground. The full vision cab,

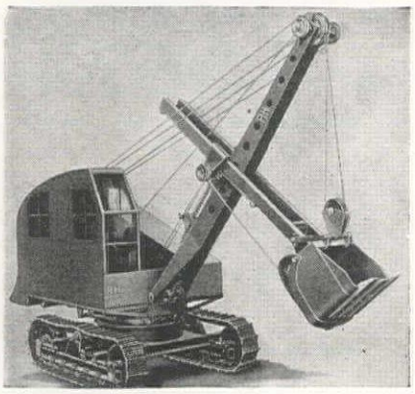
New Austin-Western Hydraulic Scraper

This 12-yd. scraper, which introduces several interesting features of construction, digs roads, hauls and dumps more, at a faster rate, according to the Austin-Western Road Machinery Co., of Aurora, Ill.

Special alloy steel makes it lighter in weight but stronger. This self-contained scraper carries its own motor, hydraulic pump and primary control apparatus. The only connections between tractor and scraper are the drawbar pin and a small electrical cable (with release attachment plug). With this construction and arrangement, the entire output of tractor power is devoted to pulling the scraper; and, tractor can be disconnected for other work in less than two minutes time.

A "remote" form of control, easy to manipulate, is employed. This consists of small electrical push-down switches, positioned at operator's elbow, that actuate hydraulic valves, located on scraper, to control all digging, carrying and unloading. Scraper has open top for loading with shovel or elevating grader if desired.





mounted far ahead of the main machinery, is of modern streamline design permitting an unobstructed visibilty of 210 degrees. It is powered with a Ford V-8 engine.

Ford Truck Mounted Model

A new combination of speed and low cost mobility has been incorporated in the design of the new P&H Bantam Weight Excavator with the Ford V-8 truck chassis.

The upper structure, complete with sub-base and 25-foot boom, weighs only about 11,000 lbs., requiring only the addition of Twin-Flex third axle, equalizing springs and reinforced frame on the standard Ford chassis of 157" wheelbase. This combination results in the lightest truck mounted unit in the industry.

Loads as high as 2¾ tons are safely handled in ordinary operations, and may be increased to 5 tons with the use of outriggers. With simplified attachments, the crane is also easily converted for use as ⅜-yd. truck shovel, dragline or clamshell crane.

Stabilizers on all four rear wheels eliminate spring action when crane is in operation.

Both the machine and truck are powered by identical motors, both of which may be renewed on the Ford replacement plan.

New Line of All-Wheel Drive Trucks Announced

A new and complete line of four and six-wheel-drive motor trucks, ranging in gross capacity from 8,400 to 52,000 pounds, is announced by the Marmon-Herrington Company, Inc., Indianapolis, manufacturers of all-wheel-drive trucks

UNIT BID SUMMARY . . . .

Note: These Units Bids Are Estimated from Our Daily Construction News Service

Dam Construction

Denver, Colo.—City—Dam, Tunnels, and Siphon, Etc.—Boulder County

Contract awarded to A. S. Horner, 2324 Grape St., Denver, Colo., $142,058, low to Board of Water Commissioners, City-County Bldg., Denver, for construction of the South Boulder Diversion Conduit, involving a Diversion Dam, Intake Works, Venturi Flume, Transitions, Tunnels Nos. 1 and 2, and Foundations for Siphon No. 1. Work is located 2½ mi. above Eldorado Springs on South Boulder Creek in BOULDER COUNTY, Colo. Bids from:

(1) A. S. Horner, Denver.....$142,058
(2) Morrison-Knudsen Co., Inc. 172,661
(3) Crook & Henno 189,156
(4) Peter Seerie 190,125
(5) Platt-Rogers, Inc. 192,959
(6) Kirchof-Hanes, Inc. $208,502
(7) Hinman Const. Co. 222,917
(8) Broderick & Gordon 225,006
(9) Engineers estimate 161,238

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1,380 cy. com. exc. (grading)	.75	1.80	1.25	2.35	.50	1.00	3.00	1.00	.75
1,375 cy. rock exc. (grading)	1.50	3.00	2.50	4.15	1.50	2.00	3.00	1.50	2.00
222 cy. com. dry exc. (Divers. Dam)	1.50	3.00	1.25	6.20	1.00	1.00	3.00	3.00	1.50
750 cy. com. wet exc. (Divers. Dam)	5.00	6.50	3.00	8.40	2.00	5.00	5.00	3.25	3.00
765 cy. dry rock exc. (Divers. Dam)	3.50	4.00	1.75	2.95	1.50	2.00	7.00	4.00	3.00
927 cy. wet rock exc. (Divers. Dam)	5.00	8.00	3.50	7.40	5.00	6.00	7.00	5.00	5.00
828 cy. com. exc. wet and dry (founda.)	3.00	2.50	2.00	5.00	2.00	2.00	6.00	3.50	1.50
992 cy. rock exc. wet and dry (founda.)	4.00	5.00	2.75	5.00	2.50	4.00	6.00	5.00	3.00
3,860 cy. exc. Tunnels 1 and 2	9.00	8.00	8.00	10.30	14.50	10.00	9.50	15.00	11.00
32 MFBM tim. Tun. 1 and 2	60.00	30.00	80.00	106.00	100.00	100.00	85.00	80.00	90.00
1,434 cy. concr. (Divers. Dam)	7.50	12.50	17.00	10.00	15.00	20.00	17.00	17.00	11.00
1,704 cy. concr. (Intake Wks)	12.00	18.00	25.00	15.00	18.00	20.00	25.00	22.25	14.50
512 cy. concr. in founda. (siphon)	10.50	15.00	18.00	16.75	18.00	21.00	20.00	20.00	14.50
292 cy. conc. transitions, Tun. 1 and 2	24.00	18.00	20.00	21.80	23.00	21.00	20.00	30.00	14.50
968 cy. conc. tunn. linings, Tun. 1 and 2	12.00	14.00	20.00	21.65	20.00	25.00	21.00	19.00	15.50
96 cy. conc. lining, Tunn. No. 3	14.00	20.00	20.00	24.40	25.00	30.00	30.00	50.00	15.50
10 cy. cem. gunite, Tunnel No. 2	40.00	25.00	23.00	30.50	25.00	75.00	50.00	35.00	30.00
150 1 ft. drill grout holes	1.50	2.00	1.50	1.20	3.00	1.00	2.00	1.50	1.50
160 1 ft. stl pipe for grouting	.50	.50	2.00	2.45	.50	1.00	1.00	1.50	.50
75 cy. grout in Div. Dam and Tun. 1 and 2	30.00	25.00	25.00	18.30	40.00	30.00	50.00	25.00	60.00
156,400 lb. reinforcing steel	.05	.055	.06	.06	.05	.05	.06	.07	.0525
290 1 ft. copper seal or exp. jts	1.00	.90	1.50	1.20	.50	.60	1.00	.60	1.30
39,290 lb. struc. steel (Taintor gates)	.165	.18	.205	.21	.20	.25	.27	.17	.15
L. S. creos. timb. and rubber belt water seal	200.00	300.00	400.00	475.00	150.00	150.00	....	150.00	150.00
26,000 lb. struc. steel (trash rack)	.075	.09	.10	.075	.075	.10	.09	.11	.06
653 1 ft. pipe railings	3.00	1.80	3.00	2.45	2.25	3.00	3.00	3.10	2.25
L. S. Gatings for intake works	250.00	500.00	400.00	460.00	350.00	500.00	375.00	450.00	210.00
L. S. Sluice gates and floor stands	$3000	$6300	$4500	$3900	$2800	$7000	$6250	$7700	$3000
L. S. Vortex orifices	$1200	$2150	$2500	$1800	$1500	$2500	$2000	$1600	$400
L. S. Watertight doors and manh. (transits)	$350	$630	$600	$450	$500	$900	$450	$575	$250
L. S. Gauge house for Venturi flume	$500	$900	$600	$275	$250	$1000	$600	$450	$750
475 cu.yd. boulder riprap	2.00	3.00	3.50	6.00	2.00	3.00	6.00	3.50	5.00

Bridges and Culverts

Phoenix, Arizona—State—Steel Plate Girder—Maricopa County

F. D. Shufflebarger, Albuquerque, New Mexico, $125,338 and $127,755. ALT. low to Arizona State Highway Comm., Phoenix, Arizona, for construction of a steel plate girder bridge resting on concrete timber or steel "H" column piling, across the Hassayampa River at Wickenburg, MARICOPA COUNTY. Bids from:

(1) F. D. Shufflebarger, Albuquerque .....$125,338 ALT. $127,755
(2) Wisconsin Bridge & Iron. 127,145 128,088
(3) George W. Orr, Globe, Arizona .....$137,540 ALT. $137,160
(4) Tanner & Hall 153,221 150,496

Bids received on:	(1)	(2)	(3)	(4)
1,752 cu. yd. struc. excav. unclass.	$5.30	$2.00	$13.50	$14.00
3 cu. yd. Class "AA" concrete	$100	$125	$100	85.00
866 cu. yd. Class "A" concrete	21.50	30.00	25.00	22.00
154 cu. yd. Class "A" tremie pl. conc.	20.50	17.00	25.00	24.00
74,880 lb. reinf. steel	.05	.05	.0525	.05
527,345 lb. structural steel	.065	.065	.055	.06
8,050 lin. ft. untreated timber piles	1.00	1.00	1.35	2.00
150 lin. ft.untreated timber pile cutoff	.75	.75	1.125	1.50
11,645 lin. ft. steel sheet piling	1.85	2.16	2.00	2.50
1,273 sq. ft. 1 grid steel floring	13.50	10.00	8.00	13.00
1,273 sq. yd. plant mix. (wear. surf.)	1.50	2.00	2.00	1.50
Lump sum, electrical equipment	$1,700	$1,200	$1,500	$1,500
Lump sum, dismantling and remove old struc.	$5,000	$6,400	$6,000	$4,000
ALTERNATE, instead of "A" conc. "A" Tremie, Untr. timb. & untr. pile cutoff				
868 cu. yd. Class "A" conc.	21.50	30.00	25.00	22.00
163 cu. yd. Class "A" tremie pl. conc.	20.50	17.00	25.00	24.00
3,648 lin. ft. steel "H" column piles	2.40	2.00	2.25	2.50
2,025 lin. ft. untreated timb. piles	1.00	1.00	1.35	2.50
36 lin. ft. untr. timb. pile cutoff	.75	.75	1.0125	1.875

San Francisco, Calif.—State—Electrical Work—S. F.-Oakland Bay Bridge

Contract awarded to Alta Electrical & Mechanical Co., Inc., and American Building Maintenance Co., 467 O'Farrell St., S. F., $442,939, by S. F.-Oakland Bay Bridge, 500 Sansome St., S. F., for const. of electrical work on the San Francisco-Oakland Bay Bridge and its highway approaches under Contracts 11 and 11A. Bids from:

	Contr. 11	Cont. 11A	Totals
(1) Alta Elec. & Mech. Co. and Amer. Bldg. Mainten. Co., S. F.	$353,324	$ 89,615	$442,939
(2) NePage McKenny & Kenny Bros., San Francisco	356,624	89,221	445,845
(3) Radelfinger Bros., San Francisco	365,373	93,042	458,415
(4) Clinton Const. Co. of California, San Francisco	404,444	93,856	498,300
(5) Newberry Electric Corporation, Los Angeles	405,469	104,117	509,586
(6) Bridge Builders, Inc., San Francisco	522,247	125,530	647,777
(7) C. C. Moore & Co., San Francisco	537,975	113,323	651,298

CONTRACT 11—(BRIDGE)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L.S. supply stations	$ 5,137	$ 6,790	$ 6,465	$ 7,000	$ 7,846	$ 8,500	$ 9,320
L.S. substation No. 1	6,213	7,615	8,182	8,300	8,300	12,500	12,240
L.S. substation No. 2	3,714	5,077	5,434	5,700	5,200	8,700	8,430
L.S. substation No. 3	5,906	7,902	8,288	8,800	9,325	12,800	12,950
L.S. substation No. 4	7,117	9,609	9,828	10,600	8,000	14,600	14,750
L.S. substation No. 5	6,828	8,717	9,428	9,700	11,073	13,600	14,240
L.S. battery station	1,778	2,426	2,148	2,600	2,958	3,100	3,540
L.S. control station	3,567	4,285	4,666	6,000	4,827	12,300	6,480
L.S. distribution cable	56,228	49,994	50,539	61,000	57,550	79,505	71,300
L.S. control cable	62,642	60,128	61,087	70,000	67,650	89,600	86,200
L.S. communication equipment	4,863	6,339	6,760	7,500	7,340	12,400	11,800
L.S. comm. equip. wiring	899	732	694	1,000	807	900	1,868
L.S. nav. lgts. & airways beacon equip.	7,839	9,754	9,880	12,300	11,930	12,400	17,800
L.S. nav. lgts. & airw. beacon wiring	19,209	16,470	16,975	20,500	21,035	21,700	35,200
L.S. fog signal equipment	1,299	1,892	1,846	1,300	1,390	2,900	11,360
L.S. fog signal wiring	16,113	11,486	11,180	16,000	14,990	15,700	26,400
L.S. service circuits	18,758	14,393	14,525	21,000	18,634	19,300	27,100
78 ea. lighting standards, Type B	80.00	89.00	93.50	67.00	103.00	121.00	110.40
4 ea. lighting standards, Type C	80.00	96.00	100.00	72.00	110.00	128.00	115.00
32 ea. lighting standards, Type D	90.00	106.00	111.00	85.00	121.00	142.00	132.60
36 ea. lighting standards, Type E	100.00	115.00	122.00	100.00	131.00	154.00	161.30
110 ea. lighting standards, Type F	80.00	94.00	98.00	73.00	106.00	127.00	106.10
48 ea. lighting standards, Type G	80.00	94.00	98.00	73.00	108.00	127.00	121.10
4 ea. lighting standards, Type H	30.00	44.00	45.00	45.00	52.00	64.00	59.70
14 ea. lighting standards, Type J	80.00	95.00	100.00	71.00	107.00	129.00	117.50
2 ea. lighting standards, Type L	80.00	92.00	95.00	70.00	102.00	124.00	115.40
2 ea. lighting standards, Type M	75.00	85.00	89.00	65.00	100.00	117.00	111.60
310 ea. luminaire units, Type B	85.00	110.00	113.00	113.00	122.00	144.00	138.00
14 ea. luminaire units, Type C	85.00	112.00	120.00	121.00	131.00	144.00	149.50
20 ea. luminaire units, Type D	85.00	115.00	116.00	115.00	124.00	143.00	143.00
176 ea. luminaire units, Type E	85.00	112.00	115.00	120.00	123.00	143.00	142.00
64 ea. luminaire units, Type F	85.00	113.00	113.00	117.00	111.00	146.00	138.60
6 ea. luminaire units, Type G	160.00	200.00	212.00	205.00	230.00	273.00	248.50
14 ea. luminaire units, Type J	50.00	92.00	78.00	85.00	83.00	104.00	99.30
4 ea. luminaire units, Type K	80.00	109.00	114.00	120.00	122.00	143.00	136.90
L.S. roadway lighting cable	41,482	27,961	29,056	34,000	31,318	44,000	35,800
L.S. spare equipment	4,882	5,648	6,001	5,800	5,364	7,400	7,230
CONTRACT 11A—(APPROACHES)							
L.S. substation No. 6	3,107	4,032	4,291	4,400	4,235	7,500	7,080
L.S. distribution cable	7,723	5,667	5,840	6,300	11,511	10,300	6,400
L.S. control cable	8,837	7,473	8,456	8,800	8,125	10,700	9,420
L.S. communication equipment	253.00	257.00	271.00	300.00	319.00	550.00	469.00
L.S. communication equip. wiring	148.00	98.00	84.00	100.00	169.00	200.00	162.00
L.S. service circuits	1,352	1,424	1,485	2,350	1,729	2,660	1,896
16 ea. lighting standards, Type A	90.00	111.00	117.00	113.00	124.00	147.00	145.50
32 ea. lighting standards, Type B	80.00	89.00	93.00	67.00	101.00	121.00	119.00
85 ea. lighting standards, Type C	80.00	95.00	100.00	72.00	98.00	128.00	126.40
51 ea. lighting standards, Type K	75.00	87.00	91.00	88.00	99.00	119.00	117.30
16 ea. luminaire units, Type A	65.00	71.00	94.00	78.00	80.00	100.00	92.80
176 ea. luminaire units, Type B	85.00	109.00	114.00	113.00	128.00	144.00	127.30
44 ea. luminaire units, Type G	160.00	200.00	214.00	205.00	254.00	273.00	248.00
29 ea. luminaire units, Type H	160.00	203.00	217.00	210.00	226.00	279.00	252.00
L.S. roadway lighting cable	25 569	17,749	16,942	20,500	17,491	22,900	20,100
L.A. spare equipment	321.00	378.00	407.00	300.00	405.00	500.00	446.00

Dam Construction

Helena, Montana—Cooney Earthfill Dam and Three Weirs

Contract awarded to Utah Construction Co., 1st National Bank Bldg., Ogden, Utah, $470,221, by Montana State Water Conservation Board, Helena, Mont., for constructing the Cooney Dam (earthfill) and three weirs and appurtenant structures, Red Lodge-Rock Creek Project, CARBON COUNTY, Mont. Bids from:

(1) Utah Const. Co., Ogden	$470,221	(6) Morrison-Knudsen Co., Boise	$626,670
(2) Inland Const. Co., Omaha	472,485	(7) S. Birch & Sons, Great Falls	651,312
(3) Leach Bros. & McLaughlin	548,832	(8) Max J. Kuney Co., Spokane	665,818
(4) S. J. Groves & Sons, Red Lodge	580,318	*(9) Stevens Bros., St. Paul	697,594
(5) Lawler Corp. and J. C. Maguire	604,013	*(10) Wachter Oneil Const. Co.	699,941

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
27,000 cy. strip bor. pits	.16	.12	.15	.22	.22	.20	.30	.10
L. S., divers. unwatering	$13,500	$40,000	$3,500	$5,000	$5,000	$8,000	$10,000	$1,000
7 acres clearing	80.00	250.00	200.00	100.00	100.00	150.00	100.00	100.00
98,380 cy. strip dam	.23	.12	.20	.30	.22	.28	.30	.10
18.3 acres plowing	5.00	3.00	5.00	15.00	10.00	20.00	20.00	10.00
38,720 cy. riprap excav.	.70	.75	.265	1.10	.72	.95	.55	.60
335,590 cy. exc. sand & gravel	.21	.25	.265	.28	.29	.29	.35	.34
775,660 cy. earth excav.	.21	.173	.265	.28	.29	.31	.35	.34
7,800 cy. trench excav.	.40	.22	.35	.30	1.00	.50	.30	1.00
1,647 cy. exc. tun. shaft	7.00	5.30	12.00	8.00	6.00	9.00	7.00	8.00
40 MFBM timb. (tun. shaft)	70.00	100.00	80.00	75.00	80.00	100.00	90.00	100.00
57,339 cy. exc. cutoff trench	.40	.22	.60	.35	.75	.40	.28	1.00
35,502 cy. rk. exc. (spw., etc.)	.50	.75	.90	.85	.65	.80	.55	.80
101,779 cy. earth. exc. (spw., etc.)	.23	.26	.265	.35	.29	.35	.35	.40
57,337 cy. cutoff backf.	.35	.26	.40	.28	.60	.40	.33	.40
1,800 ft. drain tiles	1.20	1.00	1.00	1.10	1.00	1.20	2.00	2.00
8,234 cy. backf. (spw., etc.)	.55	.40	.20	.40	.50	.60	1.00	.40
28.164 MFBM lumber	70.00	90.00	80.00	80.00	80.00	100.00	90.00	100.00
L. S. gate house	540.00	375.00	100.00	450.00	800.00	200.00	600.00	300.00
14,971 lb. struc. steel	.12	.15	.12	.10	.11	.12	.125	.15
1,300 lb. struc. iron	.16	.15	.20	.10	.13	.15	.14	.20
L. S. control devices	$16,200	$16,800	$14,210	$12,775	$15,000	$15,000	$16,000	$15,000
462 ft. grout holes	1.50	1.50	1.50	1.06	1.00	2.00	1.00	2.50
216 cu. ft. cem. grout	1.50	1.50	2.50	3.25	2.00	3.00	3.00	2.00
670 sq. yd. grout pav.	2.00	2.50	2.50	2.50	2.50	3.00	4.00	2.00
819 cy. A conc tunnel	15.00	21.00	27.00	20.00	20.00	24.00	22.00	22.00
126 cy. B conc. shaft	22.00	22.00	27.00	20.00	25.00	30.00	22.00	22.00
57 cy. C conc. (portal)	18.00	22.00	27.00	20.00	18.00	30.00	20.50	20.00

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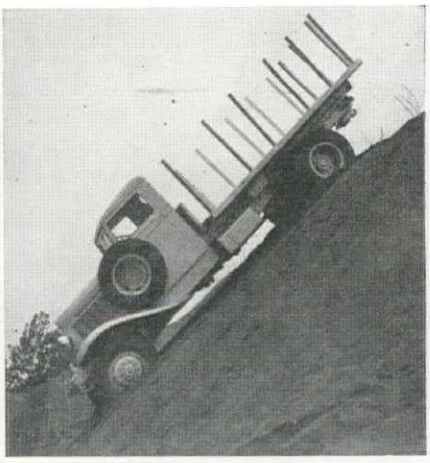


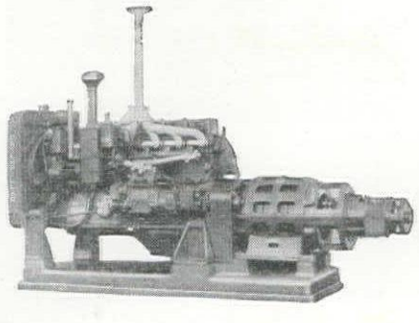
exclusively.

The initial announcement of the line includes twenty-one models. Thirteen of these models are four-wheel-drive vehicles, ten with gasoline engines and three with Diesel engines. The remaining eight models are six-wheel-drive units and of these eight, five have gasoline engines and three Diesel engines. The four-wheel-drive models range in gross capacity from 8,400 to 31,200 pounds and the six-wheel drive models from 26,500 to 52,000 pounds.

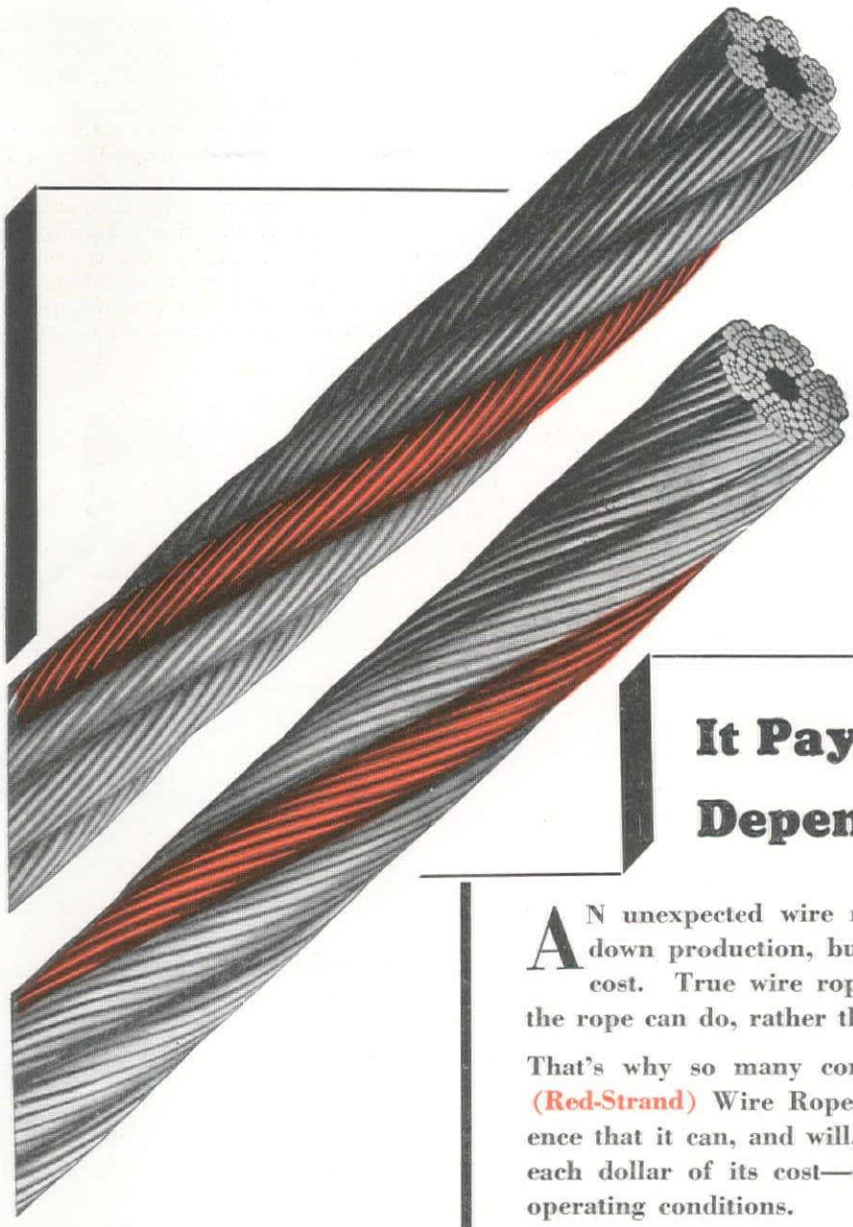
Each model is engineered so that it can be manufactured in two or more wheelbase lengths and equipped with tires of two or more sizes. Each fits a definite purpose by giving the right combination of size, weight and carrying capacity for the job for which it is intended.

Throughout the entire line, both engine size and power have been increased. The Diesel engines which are available on many models are the latest type available and have established records in performance and economy, the manufacturers state. Chasis refinements include: improved front axle design; new low center of gravity; lateral stability and safety of all models. Dual rear tires are standard equipment, while auxiliary as well as standard transmissions are built into all models. Many improvements have also been made in the appearance of each model. A revision in prices is also announced by Marmon-Herrington.

New Diesel Generator Set Introduced



Joint announcement is made by the Harnischfeger Corporation of Milwaukee and the Caterpillar Tractor Company of



Made of
Acid Open Hearth
Steel Wire

It Pays to Use Dependable Rope—

AN unexpected wire rope failure not only slows down production, but it also increases operating cost. True wire rope value depends upon what the rope can do, rather than upon its first cost.

That's why so many contractors use "HERCULES" (Red-Strand) Wire Rope. They know from experience that it can, and will, handle a large tonnage for each dollar of its cost—even under the most severe operating conditions.

"HERCULES" (Red-Strand) Wire Rope is made in Round Strand, Flattened Strand, Steel Clad, Preformed and Non-Rotating constructions to meet all requirements. Be sure of your rope—specify "HERCULES" (Red-Strand) on your next order.

WESTERN DISTRIBUTORS

Billings.....Connelly Machinery Company
Boise.....Olson Manufacturing Company
Glasgow.....Wm. H. Ziegler Co., Inc.
Idaho Falls.Westmont Tractor & Eqpt. Co.
Los Angeles.....Garlinghouse Brothers
Missoula...Westmont Tractor & Eqpt. Co.
Phoenix.....Pratt-Gilbert Hardware Co.
Salt Lake City.....Z. C. M. I.
Seattle.....H. J. Armstrong Company
Spokane.....Nott-Atwater Company

Made Only By

A. Leschen & Sons Rope Company

Established 1857

5909 Kennerly Ave. St. Louis, Mo.

Pacific Coast Office and Warehouse: 520 Fourth Street, San Francisco
Portland Warehouse: P. O. Box 175 — Telephone: Atwater 7425

Backed by 78 Years of Manufacturing Experience

19 cy. "D" concr. (bridge)	16.00	22.00	27.00	20.00	20.00	30.00	20.50	22.00
59 cy. "E" concr. (spillw)	16.00	22.00	27.00	20.00	20.00	30.00	21.00	22.00
81,605 lb. reinf. steel	.06	.06	.055	.05	.055	.06	.068	.06
1,730 cy. struc. excav.	2.00	1.00	1.50	1.25	1.00	1.00	1.50	2.00
Totals Cooney Dam	$458,627	$458,536	$536,632	$568,669	$591,177	$614,342	$635,050	$652,399
375 cy. concrete	15.00	21.00	22.00	20.00	20.00	22.00	24.00	22.00
21,550 lb. reinf. steel	.06	.06	.055	.05	.055	.06	.068	.06
2,210 cy. earth excav.	.80	.50	.25	.50	.50	.35	.50	.50
129 cy. struc. excav.	2.00	2.00	4.00	1.25	1.00	.60	2.00	2.00
786 cy. backfill	.70	.50	.30	.35	.60	.40	1.00	.50
L. S. valves and gates	830.00	200.00	225.00	150.00	500.00	500.00	$1,650	500.00
6,300 lb. iron and fittings	.15	.20	.15	.10	.15	.10	.14	.20
L. S. weir plates, 3 sets	50.00	$1,250	45.00	450.00	700.00	150.00	750.00	100.00
L. S. 3 hook gages	15.00	75.00	45.00	100.00	100.00	100.00	45.00	100.00
80 sq. yd. grout paving	2.00	3.00	2.50	2.50	2.50	3.00	4.00	2.00
Totals—3 weirs	$11,494	$13,949	$12,199	$11,648	$12,835	$12,328	$16,261	$13,419

* Complete units will be sent to subscribers at no cost upon application to WESTERN CONSTRUCTION NEWS, 114 Sansome St., San Francisco.

Street and Road Work

Ogden, Utah—Govt.—Bitum. Surfacing—Kootenai County

Award recommended to Nolan Bros., Inc., 18 N. 2nd St., Minneapolis, Minn., $107,008, by the Bureau of Public Roads, Federal Bldg., Ogden, Utah, for 12.197 mi. bituminous surfacing on North Pacific Highway, Proj. FHEC 7-A4, B3, C4, and D4, in Coeur d'Alene National Forest. Bids from:

(1) Nolan Bros., Inc. $107,008
(2) Woodward Const. Co., Rk. Springs. 116,975
(3) Warren Northw. & Triang. Con. 117,844
(4) Olof Nelson, Logan, Utah. 122,074
(5) Standard Asph. Pav. Co., Spokane. 123,182
(6) G. D. Lyon & J. C. Compton. 123,799
(7) J. C. McLaughlin, Gr. Falls. $127,010
(8) S. Birch & Sons, Gr. Falls. 131,830
(9) J. C. Maguire Const. Co., Butte. 135,520
(10) Reynolds-Ely Const. Co. 152,660
(11) Engineers estimate 112,200

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
2,000 cy. excav.	.50	.50	.50	.50	.30	.25	.75	.75	.50	.50	.45
2,000 sta. yd. overhaul	.02	.05	.05	.05	.01	.05	.02	.04	.05	.03	.05
300 cu. yd. mi. overhaul	.20	.30	.30	.30	.264	.25	.20	.60	.20	.25	.20
23,100 tons cr. run top course	1.13	1.25	.95	1.20	1.20	.985	1.25	1.10	1.35	1.50	.90
L. S. water plant	$50	$100	$50	$100	$600	$600	$200	$500	$250	$500	$500
1,200 M. gallons watering	1.00	1.00	1.50	.50	1.25	3.00	2.50	2.00	2.00	3.00	2.00
200 hrs. roller operation	3.00	3.00	3.00	1.50	3.00	2.00	2.50	2.50	3.00	3.00	2.50
1,700 tons cover material	2.03	1.50	1.50	2.50	2.00	3.00	2.50	3.50	2.00	4.00	2.25
2,500 cy. binder	.25	.30	.40	.30	.30	.40	.25	.40	.25	.50	.25
2,500 cu. yd. mi. binder haul	.20	.20	.20	.20	.132	.25	.20	.40	.20	.25	.20
24,800 tons fine agg. pl. mix	1.67	1.95	2.13	2.18	2.06	2.17	2.00	2.45	2.50	2.50	2.00
7,100 bbl. liq. asph. MC-4	3.83	4.00	4.35	4.00	4.45	4.30	4.00	4.00	4.00	5.00	4.00
1,909 bbl. liq. asph. MC-1	4.77	4.45	4.50	4.20	4.90	4.70	4.50	4.15	5.00	6.00	4.00

Sacramento, Calif.—State—Grading—Siskiyou County

N. M. Ball, Box 404, Berkeley, and Larsen Bros., 5200 21st Ave., Sacramento, $147,903. Low to California Division of Highways, Sacramento, for 8.2 mi. grading between Cougar and 4 mi. N.E. of Grass Lake Sta., SISKIYOU CO. Bids from:

(1) N. M. Ball and Larsen Bros. $147,903
(2) Dunn & Baker, Klamath Falls. 148,542
(3) Bay Shore Const. Co., S. F. 154,248
(4) Peninsula Pav. Co., S. F. $163,081
(5) A. Teichert & Son, Sacto. 181,965

	(1)	(2)	(3)	(4)	(5)
42 acres clearing and grubbing	$150.00	$140.00	$150.00	$115.00	$150.00
59 acres clearing highway	100.00	50.00	50.00	60.00	85.00
157,000 cu. yd. excavation	.55	.57	.68	.70	.81
881,000 sta. yd. overhaul	.015	.01	.006	.011	.01
670 cu. yd. ditch and chan. excav.	1.00	1.00	1.40	.65	1.00
58,000 cu. yd. imported borrow	.40	.50	.36	.40	.37
720 cu. yd. struct. excav.	1.50	1.20	1.50	1.50	1.50
435 sta. finished roadway	7.00	7.00	6.00	7.25	7.50
10,800 lb. reinf. steel	.06	.06	.06	.055	.06
140 cu. yd. "A" concrete	30.00	28.00	25.00	26.00	30.00
76 ft. 12" corr. metal pipe	1.50	1.50	1.50	1.40	1.50
956 ft. 18" corr. metal pipe	2.00	2.00	2.00	1.80	2.00
108 ft. 24" corr. metal pipe	3.00	2.75	3.00	2.75	3.00
52 ft. 30" corr. metal pipe	4.00	3.75	4.00	3.30	4.00
72 ft. 48" corr. metal pipe	8.00	7.75	8.00	7.40	8.00
54 ea. monuments	3.00	3.50	3.00	3.50	4.00

Sewer Construction

San Mateo, Calif.—City—Outfall Sewer and Disposal Plant

Contract awarded to W. J. Tobin, 3701 Balfour Ave., Oakland, $67,772. Sched. 1 (OUTFALL SEWER) and $78,770 (less deduction of $7254). Sched. 2 (SEWAGE PUMPING PLANT) by City Mgr., E. P. Wilsey, City Hall, San Mateo, for constructing an outfall sewer and sewage pumping plant to serve San Mateo and Hillsborough. Bids received from on SCHED. 1:

(1) W. J. Tobin, Oakland. $67,772
(2) Gogo & Rados, Los Angeles. 71,758
(3) Oakland Sewer Const. Co. 74,069
(4) Frederickson & Watson Const. 75,750
(5) MacDonald & Kahn Co., Ltd., S. F. $ 84,971
(6) Charles L. Harney, S. F. 93,028
(7) Eaton & Smith, S. F. 125,886

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
125 lin. ft. 12" vitr. sewer	1.94	2.20	2.00	2.10	6.25	1.50	10.62
1,158 lin. ft. 21" vitr. sewer	3.30	3.30	4.00	3.12	3.60	4.10	5.45
6,980 lin. ft. 24" vitr. sewer	3.85	3.80	4.30	4.00	4.41	5.25	7.89
2,753 lin. ft. 27" vitr. sewer	5.03	6.00	5.20	5.55	6.00	7.50	8.91
776 lin. ft. 36" vitr. sewer	7.40	8.30	8.66	8.85	10.00	10.50	14.62
80 cu. yd. "C" concrete	8.00	8.00	8.00	8.00	8.00	8.00	8.00
24 ea. standard concrete manholes	$110	$90	$150	$90	$170	$122	$137
1 control manhole	$300	$580	$600	$515	$740	$600	$1610
2,730 lin. ft. 20" C. I. force main	4.00	4.50	4.00	5.80	6.00	5.80	6.80
680 lin. ft. 24" woodstave pipe	4.04	3.70	3.50	3.90	4.60	3.90	4.72
2,730 1 ft. 20" woodstave force main (ALT.)	3.10	2.97	3.00	3.45	4.20	3.50	4.45
SUB-TOTAL woodstave alternate	$8463	$8108	$8190	$9418	$11,466	$9555	$12,148

Bids received from the following on SCHEDULE 2:

(1) H. A. Teget, Ontario, Calif.
(2) W. J. Tobin, Oakland.
(3) Fred J. Early, Jr., San Francisco.
(4) MacDonald & Co., Ltd., San Francisco.
(5) Barrett & Hilp, San Francisco.
(6) Charles L. Harney, San Francisco.
(7) Frederickson & Watson Construction Company, Oakland.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
L. S. Sewage pumping plant	$65,550	$78,770	$83,970	$84,616	$85,667	$86,750	$90,622
L. S. Sewage pumping plant, omit. sludge dry beds (ALT)	62,950	73,970	80,970	80,786	83,000	83,880	86,622
Per 1 ft. timb. piles, over 40-ft.	1.25	1.00	2.00	1.60	1.50	1.00	.90

All bids on Schedule 2 have been rejected, and will be readvertised.

Peoria, Illinois, of a co-operative arrangement for building Diesel powered generator sets which will bear the name plate, "Harnischfeger-Caterpillar".

Offered in capacities ranging from 35 to 60 kw. these sets fill all AC and DC current requirements for service in construction camps, municipalities, etc. Generators are of the single bearing type directly connected by link coupling to the Diesel engine and mounted on a cast iron base. Illustrated herewith is a 50 kw. alternator with mounted exciter.

Barber-Greene Announces Loader of New Design

An entirely new Bucket Loader is just being announced by the Barber-Greene Company, Aurora, Illinois. This new loader, the Model 82, has many new and exclusive features embodied in its design.

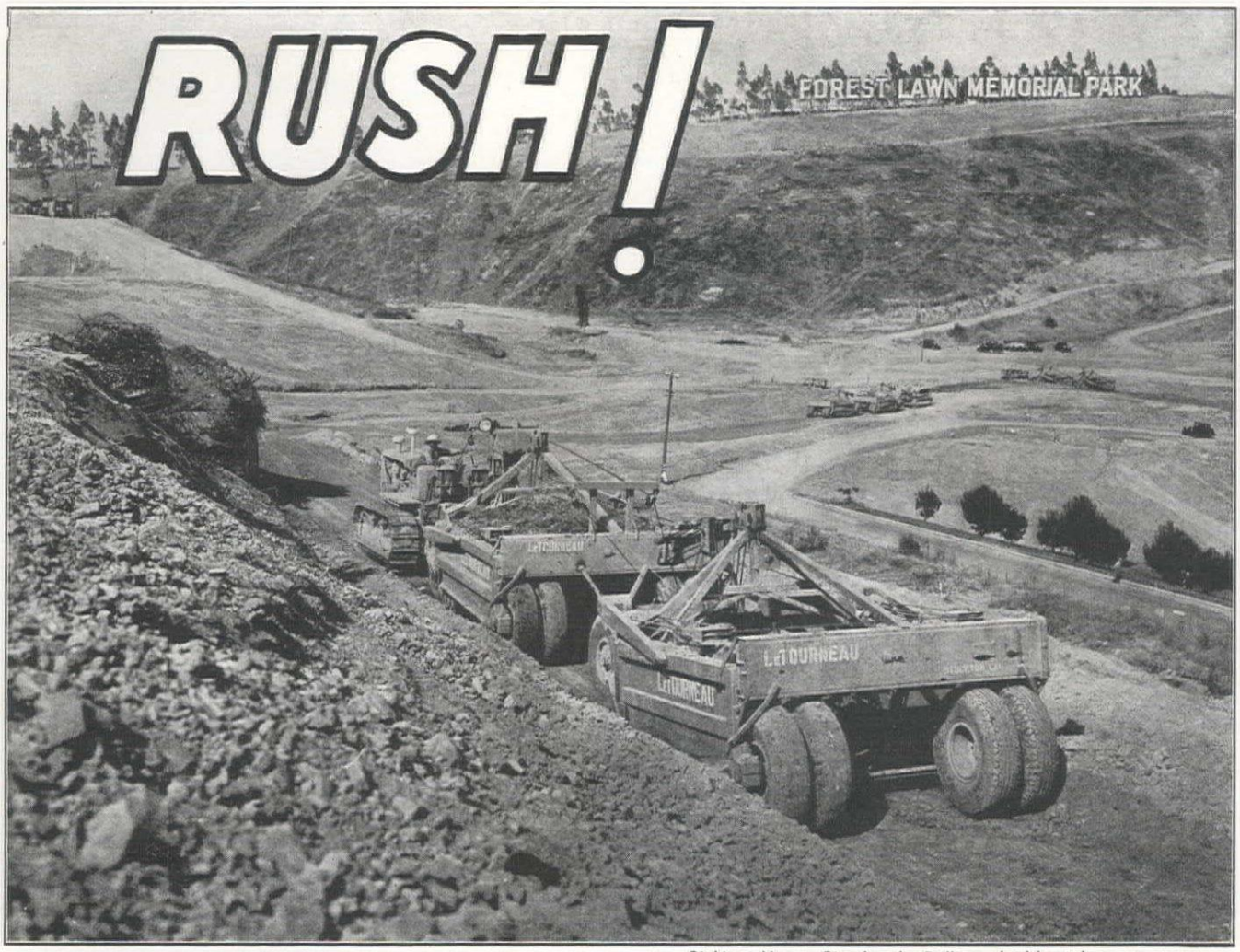
One of the most revolutionary departures from conventional design is the tank-type chassis frame, which eliminates the complicated channel frame and cross bracings, and ties the main frame into a compact unit with resulting strength and accessibility.

Synchronized feeding is attained through a special arrangement of the spiral feeding screws, and increases capacity. A new parallelogram axle together with three point suspension gives knee-action, thus always keeping the two crawlers parallel.

Other features include quick acting self locking swivel spout, welded buckets, high backed buckets, closely spaced buckets, slow crowding speeds, and fast traveling speeds.

New Pipe Coupling Simplifies Joint Making

Several new features are incorporated in a self-contained pipe joint just announced by the S. R. Dresser Manufacturing Company of Bradford, Pennsylvania. To make a connection with this new joint, called the Dresser Style 65 Compression Coupling, nothing is needed



Picking Up a Big Load—Rolling double takes no more tractor power here, but yardage is increased about 60%.

A MILLION YARDS OF LANDSCAPING..

At Forest Lawn Memorial Park, Glendale, California, a million yards of earth must be moved and placed in contour by September 1. Lewis Construction Co., contractor, losing no time, has eight LeTourneau 12-yard Super Carryall Scrapers and a LeTorneau Rooter on the job. Of these eight Carryall Scrapers six are working as tandem rigs, and by so doing increasing the yardage per tractor hour 35 to 60%, cutting the yardage cost 25% and more.

Moving dirt at Forest Lawn Memorial Park is no snap—grades are steep, the material hard. Nevertheless LeTourneau Carryalls are moving such yardages as this:

70 Cu. Yds. per Tractor Hour

The longest haul is 1400 feet one way, with the return empty over a 14% upgrade. Here the LeTourneau Carryall tandem rigs are making a round trip every 14 minutes, placing 70 cubic yards per tractor hour—more than 1500 cubic yards per 22-hour working day. That's moving lots of dirt far and fast!

Our Engineers are at Your Service—Ask them what you can expect LeTourneau Equipment to do on your job.

CONTRACTOR DESIGNED JOB PROVED

When time is limited and big yardages must be moved, it's important to know what your equipment will do. With LeTourneau Equipment there is no "guesstimating," for LeTourneau Units were designed by a contractor to speed his own big contracts and have been proved on hundreds of Western jobs from Forest Lawn Memorial Park to Grand Coulee.

R. G. LeTOURNEAU, Inc.

Stockton, California Peoria, Illinois

Cable address: "Bobletorno"

Manufacturers of: Angledozers, Bulldozers, Buggies, Carryall Scrapers, Rooters, Sheep's Foot Rollers, Power Control Units, Derricks.

LE TOURNEAU

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

(SEWER CONSTRUCTION—Continued)

Los Angeles, Calif.—County—White Point Outfall Sewer

Shofner & Gordon, 1631 N. Main St., Los Angeles, low, $629,967 on Sched. No. 1, Broderick & Gordon, Indio, low, $897,695 on Sched. No. 2, and United Concrete Pipe Corp., Station "H", Box No. 1, Los Angeles, low, $440,058, on Sched. No. 3 to County Sanitation District, Los Angeles, for construction of part of Unit No. 1 of joint outfall sewer extending from the district joint disposal plant near Harbor City to ocean shore near White Point, San Pedro.

SCHEDULE No. 1—1.72 miles in length from Station 49 plus 78 to Sta. 140 plus 50. Bidders:

(A) Shofner & Gordon, L. A.....$629,967
(B) Morrison-Knudsen Co., L. A..... 636,790
(C) Broderick & Gordon, Indio.....$654,245
(D) L. E. Dixon Co., L. A..... 697,505

	(A)	(B)	(C)	(D)
L.S. tunnel access works	$30,000.00	$6,000.00	$5,000.00	$28,300.00
34,000 cu. yds. excav. tunnel	8.45	8.25	10.60	10.95
200 cu. yds. excav. tunnel enlarge.	15.00	10.00	12.00	12.00
120 ft. 60" cast iron pipe	40.00	50.00	83.33⅓	60.00
L.S. manholes	6,000.00	8,400.00	7,500.00	7,200.00
13,000 cu. yds. concrete tunnel	12.25	12.75	12.25	11.00
280 tons steel tun. support	117.00	135.00	100.00	100.00
525 M ft. BM tun. timbers	50.00	85.00	30.00	61.00
1,402,000 lbs. reinf. steel	.041	.045	.035	.04
125 cu. yds. gunite rock	25.00	25.00	15.00	20.00
5,000 ft. drill grout holes	.50	.50	.40	.50
1,000 connections for grouting	2.50	2.00	1.00	1.00
600 cu. yds. mix and place grout	15.00	25.00	20.00	25.00

SCHEDULE No. 2—2.66 miles in length from Station 140 plus 50 to Sta. 281 plus 00. Bidders:

(A) Broderick & Gordon, Indio.....$897,695
(B) Shofner & Gordon, L. A..... 976,314
(C) L. E. Dixon Co., Los Angeles....$1,101,813

	(A)	(B)	(C)
L.S. tunnel access works	$10,000.00	$46,167.00	$78,833.00
50,000 cu. yds. excav. tunnel	9.75	9.50	12.00
300 cu. yds. tunnel enlargement	12.00	15.00	12.00
19,100 cu. yds. concrete, tunnel	12.25	12.55	11.00
365 tons steel tunnel support	100.00	117.00	100.00
1,000 M ft. BM tunnel timbers	30.00	50.00	61.00
2,207,000 lbs. reinf. steel	.035	.041	.04
125 cu. yds. gunite coat rock	15.00	10.00	20.00
5,000 ft. drill grout holes	.40	.50	.50
1,000 connections for grouting	1.00	2.50	1.00
700 cu. yds. mix and place grout	20.00	25.00	25.00

SCHEDULE No. 3—1.72 miles in length from Station 281 plus 00 to Sta. 372 plus 02; bidders:

(A) United Concrete Pipe Corp., L. A....$440,058
(B) Artukovich Bros., Bebek & Brkich, Hynes 445,405
(C) Shofner & Gordon, Los Angeles..... 524,898
(D) L. E. Dixon Co., Los Angeles....$528,406
(E) Morrison-Knudsen Co., L. A..... 531,170
(F) Broderick & Gordon, Indio..... 547,711
(G) S. S. Magoffin, Adrian, Ore..... 614,450

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
L.S. tunnel access works	$6,000	$8,000	$20,000	$1.00	$12,000	$5,000	$21,000
28,000 cu. yds. excav. tunnel	6.00	6.21	8.00	8.90	7.25	10.50	8.00
100 cu. yds. excav. tunnel enlarge.	12.00	9.00	15.00	10.00	10.00	12.00	10.00
960 ft. reinf. conc. conduit	50.00	36.44	35.00	40.00	44.00	42.60	47.50
10,200 cu. yds. tunnel concrete	11.74	9.45	13.57	11.00	12.75	12.35	15.50
105 tons steel tunnel support	100.00	153.00	117.00	100.00	1.35	100.00	150.00
800 M ft. BM tunnel timber	40.00	70.00	50.00	71.00	85.00	30.00	100.00
1,289,000 lbs. reinf. steel	.04	.042	.041	.045	.045	.035	.05
50 cu. yds. gunite coat rock	15.00	30.00	10.00	15.00	25.00	15.00	30.00
500 ft. drill grout holes	1.00	1.50	50.00	.40	.50	.40	.50
100 connections for grout	3.00	3.00	2.50	1.00	2.00	1.00	3.00
50 cu. yds. to replace grout	30.00	50.00	25.00	25.00	20.00	20.00	50.00

SUBMERGED PIPE LINE

Merritt Chapman and Scott, San Pedro, submitted low bids for construction of a submerged pipe line portion of unit No. 1 of joint outfall sewer extending southwesterly from the ocean shore near White Point, west of San Pedro, into the Pacific Ocean. Bids from:

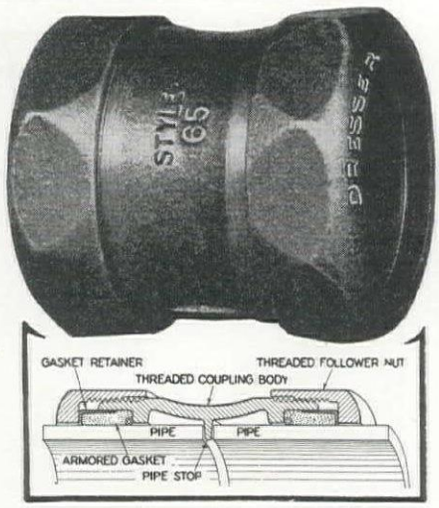
(A) Merritt Chapman and Scott, San Pedro.
(B) United Concrete Pipe Corp., L. A.
(C) Pacific Bridge Co., San Francisco.
(D) Case Construction Co., Alhambra.

	(A)	(B)	(C)	(D)
Lump Sum—cut-off wall	$ 6,694	$ 7,500	$ 6,000	$ 5,700
667 lin. ft. 60" cast iron pipe, "A" dbl. line	231.00	.....	281	415
ALTERNATE class "B"	241.30	.....	290	428
667 lin. ft. 60" reinf. conc. pipe	237.00	374	274	410
1,593 lin. ft. 60" cast iron pipe "A" single line	109.00	.....	158	205
ALTERNATE class "B"	113.15	.....	165	210
1,593 lin. ft. 60" reinf. conc. pipe	110.00	163	150	200
550 lin. ft. 60" cast iron pipe, single line	98.50	.....	107	145
550 lin. ft. 60" reinf. concrete pipe	100.00	116.50	100	139
2,161 lin. ft. 60" cast iron pipe, single line	64.75	.....	107	100
2,161 lin. ft. 60" reinf. concrete pipe	59.00	53.70	100	87
Lump sum—diffuser structure	5,557	2,500	6,000	9,600
TOTAL—Using reinf. concrete pipe	528,059	691,738	704,808	871,827
TOTAL—Using class "B" cast iron pipe	547,546	.....	741,198	931,156
TOTAL—Using Class "A" cast iron pipe	534,065	.....	758,352	914,520

STIPULATIONS—**Morrison Knudsen Co.** will accept either one but not both schedules bid. **United Concrete Pipe Corp.** if low on both schedules bid, prefers submerged pipe line. **Shofner & Gordon** will not accept more than any 2 schedules and will make revision of units as follows for combined awards: Sched. No. 1 and No. 2—Sched. No. 1, item No. 2, $8.45; item No. 7, $10.75; Sched. 2, item No. 2, $9.58; item No. 7, $11.05; Sched. No. 1 and No. 3—Sched. No. 1, item No. 2, $8.45; item No. 7, $10.75; Sched. No. 3, item No. 2, $8; item No. 7, $12.07; Sched. No. 2 and No. 3—Sched. 2, item No. 2, $9.58; item No. 7, $11.05; Sched. No. 3, item No. 2, $8; item No. 7, $11.57.

L. E. Dixon will accept any or all schedules; if awarded combined schedules will make revision of units as follows: Sched. No. 1, 2 and 3—Sched. No. 1, item No. 2, $10.95; item No. 7, $9.50; Sched. 2, item No. 2, $10.72; item No. 7, $9.50; Sched. No. 3, item No. 2, $8.90; item No. 7, $9.50; Sched. No. 1 and No. 2—Sched. No. 1, item No. 2, $10.95; item No. 7, $9.75; Sched. 2, item No. 2, $12; item No. 7, $9.75; Sched. No. 1 and No. 3—Sched. No. 1, item No. 2, $10.95; item No. 7, $10; Sched. 3, item 2, $8.90; item 7, $10; Sched. 2 and 3, Sched. 2, item 2, $10.72; item 7, $9.75; Sched. 3, item 2, $8.90; item No. 7, $9.75.

Case Construction Co. will substitute flexible joint in place of internally cocked joint; will substitute internally cocked joint of American Concrete & Steel Pipe Co. in place of internally cocked joint specified.



except the pipe (plain end), the joint itself and an ordinary wrench. Making the joint simply involves inserting the pipe ends into the coupling (which comes assembled) and then tightening two threaded octagonal nuts.

As the nuts are tightened, two resilient "armored" gaskets are compressed tightly around the pipe, gripping it with tremendous force and giving a positive seal. The principle involved is essentially the same as that used in other Dresser Couplings.

The resulting joint is permanent and absorbs normal vibration, expansion and contraction movements, and permits deflections of the pipe in the joint. These Compression Couplings are supplied, black or galvanized, in standard steel pipe sizes from ⅜" I.D. to 2" I.D. inclusive.

American Lumber Establishes San Francisco Office

The American Lumber & Treating Co. opened offices in San Francisco at 116 New Montgomery St., the latter part of June. This office, in charge of Chas. R. Wilson, will handle sales in Northern California. Wilson has had twenty-one years experience on the Pacific Coast in lumber operations and wood preservation.

The principal product to be handled is Wolmanized Douglas Fir, however, Wilson states they are in a position to furnish any forest product of the Northwest, either treated or untreated.

Gledhill Road Shaper

The Gledhill road shaper is a medium-weight machine which is a balanced load for a 1½-ton truck at speeds up to 35 miles per hour—and it operates most efficiently at the higher speeds.

This shaper levels traffic-bound and similar adjustable surfaces effectively. The two blades being set at opposing angles eliminates side draft. The straight-edges one on each side, keep blades true and even so that roads are shaped to a true level—bumps planed off and ruts and hollows filled, leaving a firm even surface.

CONSTRUCTION

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

WORK CONTEMPLATED

Federal apportionment to the eleven Western States for highways, roads and streets, $29,202,287, and for elimination of hazards at railroad grade crossings, $22,321,061.

Flood control work for Los Angeles County Flood Control Dist. Allocation of $67,152,000 approved by House of Representatives.

Terminals and ferry slips at Wilmington for L. A. Harbor Commission, $6,000,000 P.W.A. loan and grant applied for.

Reservoirs, water and sewer mains, pumps, buildings, etc., for Sacramento, Calif., $1,048,000 P.W.A. loan and grant will be sought.

Sewers, paving, buildings, etc., for Stockton, Calif. $1,000,000 P.W.A. loan and grant being sought.

Extensions to water system for Seattle, Wn. $2,000,000 P.W.A. loan and grant being sought.

Sewage disposal plant for San Gabriel, Calif. $1,450,000 P.W.A. loan and grant being sought.

Toll bridge at Lake Washington betw. Mercer Island and Seattle for King County. $2,750,000 P.W.A. loan and grant is being sought.

BIDS RECEIVED

Steel sheet pile retaining walls for closure section of Ft. Peck Dam for U. S. Engr. Office, Kansas City, Mo., low bids: Frazier-Davis Const. Co., and G. L. Tarlton, St. Louis, $449,275, Sched. 1; and Siems-Helmer, Inc., St. Paul, $469,698, Sched. 2.

White Point joint outfall sewer No. 1, near Harbor City, for L. A. County Sanitation Dist., Shofner & Gordon, L. A., $629,967, Sched. 1; Broderick & Gordon, Indio, $897,695, Sched. 2; and United Conc. Pipe Corp., L. A., $440,058, Sched. 3; lowest bids.

Submerged pipeline, White Point outfall sewer for L. A. County Sanitation Dist., Merritt, Chapman & Scott Corp., San Pedro, $528,059 low on conc. pipe Alternate.

Relocate O. W. R. R. & N. Co.'s railroad and riprap protection of Ruckel Slide, Bonneville Dam Proj. for U. S. Engr. Office, Portland, to Sam Orino, Spokane, $793,191.

Two each, 43,200 kw., 13,800 volts, 60 cycle, 75 r.p.m. alternating current generators for U. S. Engr. Office, Portland, to General Electric Co., Schenectady, N. Y., $1,144,880.

60,000 KVA 60-50 cycle frequency changers for L. A. Water & Power Dept., to Westinghouse Elec. & Mfg. Co., $632,000.

Three weirs and an earth dam on Red Lodge Creek, Mont., for State Water Conservation Board, to Utah Const. Co., Ogden, $470,121.

Fuel oil and Diesel engine oil for U. S. Navy Dept. on West Coast to Texas Oil Co., L. A., $880,000.

South Boulder Diversion Conduit, dam and tunnels for Denver Water Comm., to A. S. Horner, Denver, $142,058.

Gasoline pipeline for North Central Gas Co., Casper, Wyo., to Williams Bros., Tulsa, Oklahoma, $1,000,000.

Electrical work on S. F.-Oakland Bay Bridge and highway approaches, to Alta Elec. & Mech. Co., and American Bldg. Maintenance Co., S. F., $442,939.

Street and Road Work . . . .

CALLS FOR BIDS

PHOENIX, ARIZ.—Bids to 10 a.m., July 18, by Bureau of Public Roads, Phoenix, for 15.448 mi. placing seal coat on Sections B and C of Route 4, the Ashfork-Flagstaff-Angell National Forest Highway, Kaibab National Forest, COCONINO COUNTY, Ariz. Work involves: 180 tons apply asphaltic material, 1500 cu. yd. screenings. 7-5

PHOENIX, ARIZ.—Bids to 10 a.m., July 18, by Bureau of Public Roads, Phoenix, for 31.969 mi. placing a seal coat on Sec. H of Rt. 1, all of Rt. 10, Grand Canyon Natl. Park, and on Secs. A, B, C, D and E of the Cameron-Desert View Approach to Grand Canyon Natl. Park, COCONINO COUNTY, Ariz. Work involves: 372 tons apply asph. material, 2,700 cu. yd. screenings. 7-3

BERKELEY, CALIF.—Bids to 10 a.m., July 16, by City Clerk, Berkeley, for improving Adeline Street between Grove Street and Woolsey Street in Berkeley. Work involves: 5,900 sq. ft. asph. conc. pavement. 7-2

LOS ANGELES, CALIF.—Bids to 2 p.m., July 18, Calif. Div. of Highways, State Bldg., L. A., for 13.7 mi. road mix surf. treatm. to be applied to existing roadbed shoulders and 24.9 mi. bitum. seal coat to treated shoulders betw. Lancaster and Mojave in LOS ANGELES and KERN COUNTIES, involving: 1,240 tons liq. asph. SC-2, and 2,550 tons screenings. 6-25

LOS ANGELES, CALIF.—Bids to 2 p.m., July 25, by Calif. Div. of Highways, State Bldg., L. A., for 1.9 mi. grade and concr. OR asph. concr. pave. betw. Alabama St. and State St. in Redlands, SAN BERNARDINO COUNTY, Calif., involving: 26,000 cu. yd. excav, 26,000 cu. yd. import. borrow; ALT. "A" 9,600 tons asph. concr.; ALT. "B" 4,500 cu. yd. "A" concretet pavement. 7-2

MARYSVILLE, CALIF.—Bids to 10:30 a.m., July 15, by Dist. Engr., Calif. Div. of Highways, Marysville, for 0.4 mi. grad., surf. with cr. run base and armor coat to be applied betw. ½ mi. E. of Steamboat Slough and Steamboat Slough, in SACRAMENTO COUNTY. 7-2

SACRAMENTO, CALIF.—Bids to 2 p.m., July 17, by the Calif. Div. of Highways, Sacramento, for 1.1 mi. grading and crusher run base surfacing and plant mix surfacing at various locations between Carneros and Napa in NAPA COUNTY, Calif. 6-25

SACRAMENTO, CALIF.—Bids to 2 p.m., July 24, by Calif. Div. of Highways, Sacramento, for 20.3 mi. seal coat treatment betw. 1 mi. E. of Corcoran and Tulare and betw. Lindsay and 4.3 mi. west, in KINGS and TULARE COUNTIES, involving: 230 tons liq. asphalt 90-95, 2,750 tons screenings. 7-2

SACRAMENTO, CALIF.—Bids to 2 p.m., July 24, by Calif. Div. of Highways, Sacramento, for: (1) MODOC and SISKIYOU COUNTIES—5.5 mi. grading betw. 2½ mi. S.E. of Tule Lake and Oregon State Line, involving: 39,400 cu. yd. excav., 83,500 cu. yd. import. borrow, 440 cu. yd. A concr. (struc.), 8,610 1 ft. tr. D.F. pile and test piles, 3,668 ft. corr. met. pipe,. (2) MADERA COUNTY—7.8 mi. surf. (pl. mix) on cr. run base betw. Coarse Gold and Oakhurst, involving: 20,600 tons cr. run base, 9,370 tons min. aggregate, 1,035 tons liq. asph. (3) TULARE and FRESNO COUNTIES—34.9 mi. to be treated with

NEWS SUMMARY

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road mix surfacing betw. Visalia and Orange Avenue and betw. Visalia and Woodlake, involving: 620 tons liq. asph. SC 2. 7-2

SACRAMENTO, CALIF.—Bids to 2 p.m., July 24, by Calif. Div. of Highways, Sacramento, for 0.9 mi. grad. and concr. and asph. concr. pave. 38th St. and Moss Ave. betw. Market St. and Broadway in Oakland, ALAMEDA COUNTY, involv.: 4,135 ft. vitrified pipe. ALT "A", 23,700 cu. yd. excav., 11,820 tons imported base material, 12,260 tons asph. concr., 1,090 cu. yd. A concr. pavement. ALT "B", 1,200 tons asph. concr., 6,660 cu. yd. A concr. pavement. 7-2

SACRAMENTO, CALIF.—Bids to 2 p.m., July 24, by Calif. Div. of Highways, Sacramento, for 1 mi. grad. and asph. concr. OR concr. pav. and const. reinf. concr. underpass abutments 1 mi. south of Delano and Delano, KERN COUNTY, Calif., involving: 40,000 cu. yd. excav., 1,705 cu. yd. concrete. ALT "A", 7,840 tons asph. concr. ALT "B", 3,715 cu. yd. A concrete pavement. 7-2

SAN FRANCISCO, CALIF.—Bids to 2 p.m., July 16, by Bureau of Public Roads, S. F., for 4.839 mi. grading Sec. G of Rt. 77, the Mt. Shasta-Mt. Lassen Natl. Forest Highway, Shasta and Lassen Natl. Forests, SHASTA COUNTY, Calif., involving: 5,400 cu. yd. excav., 65,300 cu. yd. excav. for borrow. 6-20

SAN FRANCISCO, CALIF.—Bids to 2 p.m., July 18, by Bureau of Public Roads, S. F., for 10.985 mi. grading and placing subgrade reinforcement on Sections C and D of Rt. 73, the Laguna Natl. Forest Highway, Cleveland Natl. Forest, SAN DIEGO COUNTY, Calif. Work involves: 347,500 cu. yd. excav., 1,141,500 sta. yd. overhaul. 6-26

SAN FRANCISCO, CALIF.—Bids to 2 p.m., July 16, by Bureau of Public Roads, S. F., for 3.661 mi. placing bitum. tr. surfacing (road mix) on Sec. A of Route 11, the Mt. Charleston Natl. Forest Highway, Dixie Natl. Forest, CLARK COUNTY, Nevada. 7-3

SAN FRANCISCO, CALIF.—Bids to 2 p.m., July 25, by Bureau of Public Roads, S. F., for 11.613 mi. placing a bitum. tr. crushed gravel base course on Sec. C1 of Rt. 4, Tioga Road, Yosemite Natl. Park, TUOLUMNE COUNTY, Calif., involving: 11,200 cu. yd. subgrade reinforcement, 35,500 tons untr. base aggregate, 21,000 tons bitum. tr. base aggregate. 7-3

DENVER, COLO.—Bids to 10 a.m., July 17, by the Bureau of Public Roads, 237 Customhouse, Denver, for: (1) CLEAR CREEK CO.—(PROJ. 54-A2 to E2) 13.579 mi. const. or improv. the Mount Evans Forest Highway Route, located in Pike Natl. Forest, Colo., involv.: 13,750 tons aggregate, 159,000 gal. liq. asph. RC-4. (2) ROUTT, JACKSON AND GRAND COUNTIES—(PROJ. 19-A4, B2, C2) 20.705 mi. const. or improv. the Rabbit Ears Pass Forest Highway, located in the Routt Natl. Forest, Colo., involving: 154,000 gal. liq. asph. SC-2. 7-5

DENVER, COLO.—Bids to 10 a.m., July 19, by Bureau of Public Roads, Denver, for 11.67 mi. surf. Proj. 33-E1, F1, G1 of the Loveland Fremont Pass Forest Highway Rt. located in Cochetopa Natl. Forest, LAKE COUNTY, Colo., involving in the main: 27,400 tons crusher-run surf., 70,000 gal. liq. asph. SC-2. 7-5

OGDEN, UTAH—Bids to 10 a.m., July 22, by Bureau of Public Roads, Ogden, for 5.856 mi. surf. the North Pacific Highway, Proj. NR 7-C5, located in the Coeur d'Alene Natl. Forest, KOOTENAI COUNTY, Idaho, involv.: 194,000 cu. yd. excav., 193,000 cu. yd. excav. borrow, 578,000 sta. yd. overhaul, 10,300 tons cr. run bottom course, 10,300 tons cr. run top course. 7-5

OLYMPIA, WN.—Bids to 10 a.m., July 23, by Director of Highways, Olympia, for: (1) KITTITAS CO. (FAP 114-C and 114-F), 8.3 mi. concr. paving on St. Road No. 2, Kachess River to Nelson, Wn. (2) GRAYS HARBOR CO. (FAP 54-F), 8.1 mi. concr. paving on St. Road No. 9, Montesano to Aberdeen, Wn. (3) COWLITZ CO. (NRH 32, 1935), grading and constructing a 240-ft. steel span with two 60-ft. concrete girder approach spans on State Road No. 1, Toutle River Bridge (near Castle Rock), involving in the main: 14,310 cu. yd. excav., 1,731 cu. yd. concrete, 660,000 lb. struct. steel 7-5

OLYMPIA, WN.—Bids to 10 a.m., July 23, by Director of Highways, Olympia, Wn., for: (1) PACIFIC and WAHKIAKUM CO.—14.2 mi. miner. aggreg. on State Road No. 12, Palix River to Johnson's Landing, Sec. 1, Pacific County; 17.9 mi. surf. and produc. miner. aggreg., Johnson's Landing to Grays River, Sec. 2, in Pacific and Wahkiakum Counties; and 6.6 mi. produc. miner. aggreg. on Sec. 3, Bear River to Illwaco, in Pacific County, Wn. (2) WHITMAN CO. (PWP 1358)—0.16 mi. concr. paving on State College of Wn. campus, Sec. 2, in front of Mines Bldg., College Hall and Wilson Hall, at Pullman, Whitman County. 7-5

CHEYENNE, WYOMING—Bids to 10 a.m., July 17, by State Highway Comm., Cheyenne, Wyo., for: (1) CONVERSE COUNTY (FAP 209 A-R)—15.844 mi. oil tr. by road mix method on Douglas-Gillette Road. involv.: 37,700 tons gravel surf., 272,400 gal. oil asph. MC2. (2) BIG HORN COUNTY (FAP 211-A-A)—10.315 mi. oil tr. by road mix method on Lovell-Kane road, involving: 27,700 tons gravel surf., 197,500 gal. oil asph. SC-3. (3) HOT SPRINGS CO. (FAP 213 A-R)—7.706 mi. oil tr. by road mix method on the Thermopolis-Meeteetse road, involv.: 19,000 tons gravel surf., 140,400 gal. oil asph. MC2. (4) WESTON CO. (FAP 214 R)—7.920 mi. oil tr. by road mix method on Newcastle-Custer Road, involving: 22,000 tons gravel surf., 169,000 gal. oil asph. MC2. 7-5

CHEYENNE, WYOMING—Bids to 10 a.m., July 17, by the State Highway Comm., Capitol Bldg., Cheyenne, Wyoming, for: (1) CARBON CO. (NRH 164-F and FLHP 8)—10.627 mi. oil treatm. by road mix method on Casper-Rawlins road, involving: 214,500 gal. oil asph. SC-3. (2) CAMPBELL CO. (FAP 66 B-R)—8.777 mi. oil tr. by road mix method on Gillette-Arvada road, involving: 30,100 tons gravel surf. (3) GOSHEN and NIOBRARA CO. (FAP 150-F-R and No. 40-B-R)—24.305 mi. oil tr. by road mix method on Lingle-Lusk and Lusk-Newcastle roads, involving: 40,100 tons cr. rock surf., 352,500 gal. oil. asph. RC-2. (4) FREMONT CO. (FAP 162-A-R and 162-C-R)—23.708 mi. oil tr. by road mix method on Lander-Muddy Gap road, involv.: 62,600 tons gravel surf, 596,200 gal. oil asph. distrib. SC-3. (5) PLATTE CO. (FAP 204-A-R)—4.641 mi. oil tr. by road mix method on Bosler-Wheatland Road, involving: 22,900 tons gravel surf., 78,500 gal. oil asph. MC-3. 7-5

CHEYENNE, WYOMING—Bids to 10 a.m., July 16, by State Highway Comm., Cheyenne, for: (1) ALBANY CO. (NRS 29-B)—5.167 mi. grad., drain, base course surf. and const. 2 tr. timb. bridges and 1 reinf. conc. culvert on Laramie-Woods Landing Road, involving: 71,500 cu. yd. excav., 13,600 tons gravel surfacing. (2) LARAMIE CO (NRH 73-A, NRM 73 BR and NRM 46-B, comb.)—.845 mi. const. sidewalk on Cheyenne-South and Cheyenne-Laramie roads, involving: 2,393 tons gravel surfacing, 15,000 gal. oil asph, distrib. MC2. 6-20

CHEYENNE, WYOMNG—Bids to 10 a.m., July 16, by State Highway Comm., Cheyenne, for: (1) FREMONT CO. (NRH 52-A)—(Unit 2) 2.7 mi. grading and base course surf. on Shoshoni-Riverton road, involving: 51,215 cu. yd. excav., 6,900 tons gravel surf. (2) LINCOLN and UINTA CO. (St. Proj. 1220)—Const. 6120 lin. ft. wire cable guard fence on Kemmerer-Sage, Kemmerer-Granger and the Evanston-Lyman Road. (3) LINCOLN CO. (St. Proj. 1215)—Constructing 175 lin. ft. retaining wall on the Kemmerer-Sage road. 6-20

BIDS RECEIVED

PHOENIX, ARIZ.—J. A. Casson, 319 Warren St., Hayward, $126,932, low to Bureau of Public Roads, Phoenix, for 14.605 mi. bitum. tr. cr. rock surfacing on Sections A1 and A2 of Rt. 1, all of Rt. 2 and on headquarters service roads, Grand Canyon Natl. Park, COCONINO COUNTY, Ariz. 7-1

PHOENIX, ARIZ.—Arizona Sand & Rock Co., Box 1522, Phoenix, Ariz., $18,580 low to Bureau of Public Roads, Phoenix, for 15.448 mi. plac. seal coat on Secs. B and C of Rt. 4, the Ashfork-Flagstaff-Angell Natl. Forest Highway, Kaibab Natl. Forest, COCONINO COUNTY, Arizona. 6-25

LOS ANGELES, CALIF.—Osborn Co., 1570 San Pasqual St., Pasadena, $22,075 low to Board of Superv., L. A., for improv. Santa Anita Road from Longden Ave. to Huntington Park in San Marino and San Gabriel, a distance of 0.71 mi. under Cash Contract No. 478. 6-18

REDDING, CALIF.—Dunn & Baker, Klamath Falls, Oregon, $9,975, low to Dist. Engr., Calif. Div. of Highways, Redding, Calif., for 13.7 mi. Class B seal coat applied betw. 0.4 mi. east of Mt. Hebron and Dorris in SISKIYOU COUNTY, Calif. 7-2

SACRAMENTO, CALIF.—C. F. Frederickson & Sons, Lower Lake, Calif., $22,632 low to Calif. Div. of Highways, Sacramento, for 59.4 mi. liq. asph. treatment betw. Route 29 and Alamor Dam and betw. South end of Govt. Sec. and Rt. 21 on Plumas 83, B, C and D, and betw. Keddie and Quincy and betw. Blairsden and Delleker and betw. Quincy and Meadows Valley-Plumas 21 C and F in PLUMAS COUNTY, Calif. 7-3

SACRAMENTO, CALIF.—Union Paving Co., Call Bldg., S. F., $59,869, low to Calif. Div. of Highways, Sacramento, for 1.2 mi. widen and conc. and asph. concr. pav. in Santa Rosa, betw. College Ave. and South city limits, in SONOMA COUNTY, Calif.

SACRAMENTO, CALIF.—N. M. Ball, Box 404, Berkeley, and Larsen Bros., 5200 21st Ave., Sacramento, $147,903, low to Calif. Div. of Highways, Sacramento, for 8.2 mi. grading betw. Cougar and 4 mi. N.E. of Grass Lake Sta. SISKIYOU CO., Calif. 7-3

SACRAMENTO, CALIF.—Union Paving Co., Call Bldg., S. F., $95,324, low to Calif. Div. of Highways, Sacramento, for 4.5 mi. grad. and road mix surf. betw. .8 of a mi. N. of Newman and .2 mi. S. of Crows Landing in STANISLAUS COUNTY, Calif. 7-3

SAN FRANCISCO, CALIF.—Charles L. Harney, Call Bldg., S. F., $35,284, low to Public Utilities Comm., S. F., for repaving street or sidewalk openings where pavement has been removed for fiscal year ending June 30, 1936. 7-1

STOCKTON, CALIF.—Lamb's Transfer Co., 828 Cowles St., Long Beach, $7544, low to Dist. Engineer, Calif. Div. of Highways, Stockton, for 21.1 mi. liq. asph. treatm. betw. Hump Siding and Sonora Pass in TUOLUMNE COUNTY, Calif. 6-24

STOCKTON, CALIF.—Lee J. Immel, 1031 Evelyn Ave,. Berkeley, $7,845, low to Dist. Engineer, Calif. Div. of Highways, Stockton, for 21.9 mi. liquid asphalt treatment betw. Cooks Station and Picketts in AMADOR and ALPINE COUNTIES, Calif. 6-25

SALT LAKE CITY, UTAH—Corbett & Price, Provo, Utah, $33,235, low to State Road Comm., Salt Lake City, for 2.916 mi. gravel surfacing road betw. Sunset and Hooper (Project NRS 160-A, 1935), in DAVIS COUNTY, Utah. 6-8

CONTRACTS AWARDED

JUNEAU, ALASKA—To Custard, Meadows and Ojy, Juneau, Alaska, who bid $44,425 to the Bureau of Public Roads, Juneau, Alaska, for clearing and grubbing on the Wrangel highway, F.H.E.C. Project, 16 E.F., Alaska. 7-5

JUNEAU, ALASKA—To Gastineau Construction Co., Juneau, Alaska, $23,947 by City Clerk, Juneau, Alaska, for paving Lower Front St., from the City dock to the A. J. Tramway, and Calhoun and Fourth to Main St. 6-22

JUNEAU, ALASKA—To Wright & Stock, Lowman Bldg., Seattle, $65,627 by Bureau of Public Roads, Alaska, for 2.6 mi. grading and surf. on the Mitkof Highway, Falls Creek Landing Section, Tongass Natl. Forest, Alaska. 7-3

PHOENIX, ARIZ.—To Borderland Const. Co., Tucson, Ariz., $125,884 by Ariz. State Highway Comm., Phoenix, for 10½ mi. grad., drain roadway and furn. and place aggreg. base course and road oil plant mix on Ajo-Tucson Highway, PIMA COUNTY, NRS 110-B, Arizona. 6-15

PHOENIX, ARIZ.—To Ken Hodgman, 714 Plymouth Road, Pasadena, $54,119 by Arizona State Highway Comm., Phoenix, Ariz., for 6 1/5 mi. grading, draining roadway and furn. and plac. aggreg. base course from Safford south, on the Safford-Bowie Junction Highway, GRAHAM COUNTY, Ariz., Proj. NRS 115-A. 6-28

LOS ANGELES, CALIF.—To Geo. R. Curtis, 2440 E. 26th St., L. A., $77,357 by Bd. of Superv. L. A. for 1.61 mi. improv. Mission St. and Pasadena Ave. from Fair Oaks Ave. to west city boundary of South Pasadena at Arroyo Verde Road, under Cash Contract 474. 6-24

LOS ANGELES, CALIF.—To C. O. Sparks, 2309 E. 9th St., Los Angeles, $39,433, ALTERNATE "B", by Calif. Div. of Highways, State Bldg., Los Angeles, for 1.4 mi. grading and concr. or asph. concr. paving betw. Anaheim and Mirashores in ORANGE COUNTY, Calif. 6-13

MARYSVILLE, CALIF.—To E. F. Hilliard, 1355 43rd St., Sacramento, $11,620, by Dist. Engr., Calif. Div. of Highways, Marysville, for approx. 41 mi. liquid asphalt treatment betw. Sta. 570 and 756 (But-21-B Feather River Highway); betw. Miners Ranch and Berry Creek (But-21-B "R"); betw. mile posts 22 and 31 (But-21-C "R"); betw. 2.95 mi. and 9.55 mi. north of Yolo County Line (Col-88-A); and betw. Ord Bend and Hamilton City (Gle-88-C) in BUTTE, COLUSA, and GLENN COUNTIES, Calif. 7-1

OAKLAND, CALIF.—To Ransome Co., 4030 Hollis St., Oakland, $8,590 on Items 1, 2 and 3, and to Independent Const. Co., 46th and Clement St., Oakland, $8,210 on Item 4, by East Bay Municipal Utility Dist., Oakland, for street paving repairs for year ending June 30, 1936, under Spec. L. S. 149. 6-20

OAKLAND, CALIF.—To W. H. Larson, 432 Michigan Ave., Berkeley, $.439 per sq. yd. to City Clerk, Oakland, for 3 mi. surf. portions of Snake Road and Skyline Blvd., involv.: 20,730 sq. yd. penetration macadam surfacing. 6-19

OAKLAND, CALIF.—To A. Soda & Son, Inc., 1077 65th St., Oakland, $71,620 to County Clerk, Oakland, for constructing approaches to Park Street Bridge. 6-12

PASADENA, CALIF.—To Osborn Co., 1570 San Pasqual, Pasadena, $12,224 by City Clerk, Pasadena, for resurfacing North Fair Oaks Ave., betw. Colorado and Washington Sts., Pasadena. 6-19

RICHMOND, CALIF.—To Union Paving Co., Call Bldg., S. F., $22,666 by City Clerk, Richmond, for improvement of MacDonald Blvd. betw. Garrard Blvd. and 23rd St., Richmond. 6-26

SACRAMENTO, CALIF.—To C. W. Caletti & Co., P. O. Box 243, San Rafael, $148,980 by Calif. Div. of Highways, Sacramento, for 0.7 mi. grading and cr. run grav. base and road mix surf. and constr. 2 timber bridges with concr. decks at Red Mountain Creek and McCoy Creek in MENDOCINO COUNTY, Calif. 6-18

SACRAMENTO, CALIF.—Awards as follow by Calif. Div. of Highways, for: (1) MONO COUNTY—To Kennedy Const. Co., 1140 Chatham Road, Oakland, $36,202 for 2.1 mi. grading and bitum. tr. selected material surf. betw. 1 mi. north of Bodie Road and Point Ranch. (2) MERCED COUNTY—To Valley Paving & Const. Co., P. O. Box 1349, Fresno, $44,036 for 1 mi. grading and asph. concr. paving betw. southerly boundary and "R" Street in Mercer. 6-10

SAN FRANCISCO, CALIF.—Award recommended to W. W. Clyde & Co., Springville, Utah, $48,824 by Bureau of Public Roads, S. F., for 18.381 mi. bitum. surf. treatm. (road mix) on Secs. A and B of Rt. 12, the Midland Trail (Current Creek) Natl. Forest Highway, Nevada Natl. Forest, and on Sec. C of FLHP No. 1 (part of Midland Trail), Ely-Tonopah Highway, WHITE PINE and NYE CO'S, Nevada. 7-3

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

DENVER, COLO.—To J. L. McLaughlin, Great Falls, Montana, $10,890 to Bureau of Public Roads, Denver, for drainage improvements on Grand Loop Highway, Yellowstone National Park, Wyoming, PEC 1-H-1. 6-12

DENVER, COLO.—Award recommended to Leach Bros., 1508 Lincoln St., Denver, Colorado, $81,566 by Bureau of Public Roads, Denver, for 4.061 mi. earth graded and drained highway on Project 9-H of the Dayton-Kane Forest Highway Route. 7-2

DENVER, COLO.—To J. H. & N. M. Monaghan and F. M. Kenney, 332 S. Race St., Denver, Colo., $71,065 by State Highway Dept., Denver, for 6.351 mi. grav. surf. betw. Hudson and Tonville on St. Highway No. 81, NRM 285-F, NRH 285-G and NRH 285-I, in WELD COUNTY, Colorado. 6-29

BOISE, IDAHO—To Max J. Kuney, Hutton Bldg., Spokane, Wn., $87,862 to Comm. of Public Works, Boise, for 16.445 mi. constructing road mix bituminous mat and shoulder construction on the North and South Highway betw. Grangeville and Cottonwood, known as Reconstruction Project 385 in IDAHO COUNTY, Idaho. 6-10

BOISE, IDAHO—Awards as follow by Comm. of Public Works, Boise: (1) NEZ PERCE and LEWIS CO.—To Max J. Kuney Company, Hutton Bldg., Portland, Oregon, $80,333 for 15.514 mi. const. road mix bitum. mat and cr. rock shoulders on North and South Highway betw. Craigmont and Culdesac Hill. (2) BANNOCK CO.—To W. C. Burns, Idaho Falls, Idaho, $22,676 for furnishing cr. grav. or rock surfacing material and cover coat material in stockpiles near Bennington in BEAR LAKE COUNTY, near Soda Springs, in CARIBOU COUNTY, near Pebble in BANNOCK COUNTY, and near Malad in ONEIDA COUNTY, Idaho. 6-10

BOISE, IDAHO—Awards as follow by the Commissioner of Public Works, Boise, Idaho, for: (1) BONNER COUNTY (NRH 19-AC, 1935)—To F. H. DeAtley & Co., Lewiston, Idaho, for 8.346 mi. grad., drain., placing pit run subbase and surf. with cr. rock or grav. on North and South Highway from Colburn to Bonner County Line. (2) IDAHO COUNTY (NRH 9-1)—To Interstate Engr. & Const. Co., Newport, Wn., who bid $68,605 (USING RESILIFLEX) for const. bridge over Salmon River N. of Riggins, consisting of 259 ft. steel superstruc. on concr. piers, 2 concr. appr. spans and 1074.8 ft. roadway approaches on North and South Highway, known as Goff Bridge. 7-5

MISSOULA, MONT.—Award recommended to J. C. Maguire Const. Co., Butte, Mont., $52,966 to Bureau of Public Roads, Missoula, for const. or improving the Butte-Boulder and Pipestone Pass Highways, bitum. road mix project FHEC 26-A2 and NR-24-A2, located in Deer Lodge Natl. Forest, JEFFERSON COUNTY, Montana. 7-3

CARSON CITY, NEV.—To U. B. Lee, 1059 Carpenter Ave., San Leandro, $13,789 by Nev. State Highway Comm., Carson City, for 8.54 mi. asph. road mix surf. from Wabuska to 8.5 mi. N., Rt. 2B, Sec. B, LYON COUNTY. 6-28

CARSON CITY, NEV.—Awards as follow by Nev. State Highway Comm., for: (1) ELKO CO.—To C. F. Frederickson & Sons, Lower Lake, $121,751 for 67.95 mi. oiling betw. Wells and Nevada-Idaho State line, Rt. 13, Sec. C (asph. road mix surf.). (2) DOUGLAS CO.—To U. B. Lee, 1059 Carpenter Ave., San Leandro, $7,212 for 3.86 mi. asph. road mix surf. from California-Nevada State line to 4 mi. S. of Minden, Rt. 37, Sec. A. (3) ESMERALDA CO.—To U. B. Lee, San Leandro, Calif., $41,527 for 23.20 mi. asph. road mix surf. from 4 mi. W. of Millers to Coaldale, Rt. 3, Sec. D and E. (4) WHITE PINE CO.—To Dodge Const., Inc., Fallon, $15,569 for 7.35 mi. asph. road mix surf. betw. Preston and Junction with St. Rt. 4, Rt. 38, Sec. B. (5) LANDER CO.—To Dodge Const., Inc., Fallon, Nev., $68,473 for 12.41 mi. grad., grav. and oil from Austin Cemetery to a point 12 mi. E. of Austin, Rt. 2, Secs. D and E. 6-26

SANTA FE, N. M.—Awards as follow by State Highway Engineer, Santa Fe., for: (1) McKINLEY CO. (NRH 75)—To L. R. Allison, Albuquerque, $254,500 for 18.557 mi. grading, minor drainage struc., 11 concr. box culverts over 20-ft. clear span, one double 40-ft. span concr. and steel bridge, and base course surf. betw. Los Lunas and Gallup, U. S. Highway Rt. 66. (2) SAN JUAN CO. (NRH 203 C and E)—To W. E. Bondurant, Roswell, $27,267 for 1.307 mi. grading, surfacing, minor drainage structures; 1 tr. timber bridge, consisting of 10 25-ft. spans near Bloomfield, St. Rd. No. 55. Next 2 low: Kirchhof Hanes, Albuquerque, $33,455; Cook & Ransome, Ottawa, $33,482. (3) CHAVES CO. (NRS 206 C)—To Armstrong & Armstrong, Roswell, $41,842 for 1.856 mi. grading, minor drainage struc. and base course surfacing on State Road No. 82, betw. Artesia and Elk. 7-1

SANTA FE, N. M.—Contract awarded conditionally (on approval of Bureau of Public Roads) to Wheeler Carrico & Silver, Albuquerque, $11,152 by State Highway Engr., Santa Fe, N. M., for landscaping in BERNALILLO COUNTY, on St. Road No. 6, betw. Albuquerque and Laguna, involving approx. 0.772 mi. long. 7-1

PORTLAND, ORE.—To Harold Blake, 3043 S. E. Carlton St., Portland, Ore., $88,461 by Oregon State Highway Comm., Portland, Ore., for 4.91 mi. grading on the Klamath Falls-Midland Section of Klamath Falls-Weed Highway, KLAMATH COUNTY, NRH 205-C, (1935). 6-10

PORTLAND, ORE.—To Warren Northwest, Inc., P. O. Box 5072, Portland, Oregon, $29,640 by U. S. Engineer Office, Portland, for const. of asph. concr. paving on permanent roads, driveways and walks, at Bonneville, Oregon, Bonneville Power Navigation Project, located on the Columbia River, 42 mi. east of Portland, Oregon. 6-24

PORTLAND, ORE.—To Coos Bay Const. Co., Portland, Ore., $59,635 by Bureau of Public Roads, Portland, for constructing or improving the John Day-Burns Reconstruction Grading project NR-35-A3, National Forest Road Project, located in the Malheur Natl. Forest, GRANT COUNTY, Oregon. 6-25

PORTLAND, ORE.—To Babler Brothers, 2407 N. W. 28th, Portland, Ore., $14,868 to Bureau of Public Roads, Portland, for 4.412 mi. constructing or improv. the McMinnville-Tillamook bitum. surf. treatment project FHEC 1-A3, B1, located in the Siuslaw National Forest, TILLAMOOK CO., Oregon. 6-25

PORTLAND, ORE.—Awards recommended to Theo. Arenz, 10509 N. E. Sandy Blvd., Portland, Ore., $83,417 to Bureau of Public Roads, Portland, for 15.237 mi. constructing or improving the Willamette Highway subgrade reinforcement project FHEC 21-E3, F3, G1, Natl. Forest Road Project, located in Willamette Natl. Forest, LANE CO., Ore. 6-28

OGDEN, UTAH—To W. C. Burns, Idaho Falls, Ida., $63,974 by Bureau of Public Roads, Ogden, for 6.981 mi. const. or improv. the Victor-Irwin National Forest Road Project, FHEC 37-A1, B1, St. 0-00 to 431-61.2 located in the Targhee Natl. Forest, BONNEVILLE COUNTY, Idaho. 6-25

OGDEN, UTAH—To B. D. Palfreyman, Provo, Utah, $44,950 by Bureau of Public Roads, Ogden, for 2.581 mi. const., surf. or improving the Big Cottonwood-Brighton Highway, located in Wasatch National Forest, Utah. 6-25

OGDEN, UTAH—Awards as follow by Bureau of Public Roads, Ogden, for: (1) CLARK CO. (FHEC 33-A5, B1)—To Olof Nelson, Logan, Utah, $79,815, for 15.184 mi. const. bitum. surf. or improving the Dubois-Monida Natl. Forest Road Proj. located in Targhee National Forest, Ida. (2) To Utah Const. Co., Ogden, Utah, $44,954, for 3.194 mi. const. or improving the Warren Wagon Road, located in Idaho Natl. Forest, Idaho. 6-26

OGDEN, UTAH—Awards recommended as follows by Bureau of Public Roads, Ogden, for: (1) KOOTENAI COUNTY—Nolan Bros., Inc., Minneapolis, Minn., $107,008, low for 12.197 mi. bitum. surf. North Pacific Highway, Natl. Forest Road Project FHEC 7-A4, B3, C4, D4 in Coeur d'Alene National Forest. (2) SEVIER COUNTY—Floyd S. Whiting, Kaysville, Utah, $26,319, for 2.205 mi. const. or improv. the Salina-Emery Road Project 9-B2, located in Fishlake National Forest. 6-27

SALT LAKE CITY, UTAH—To Gibbons & Reed, 165 E. 4th South, Salt Lake City, Utah, $16,196, to Utah State Road Comm., for 1.146 mi. gravel surfaced road betw. 23rd East St. and Parley's Canyon, NRH 97-D, SALT LAKE COUNTY, Utah. 6-29

SALT LAKE CITY, UTAH—To Olof Nelson, Logan, Utah, who bid $52,136 to the State Road Commissioners of Utah, State Capitol, Salt Lake City, Utah, for 4.237 miles gravel surfacing road between Fish Lake and State Road No. 24, near Kooaharem in SEVIER COUNTY, Utah. 7-5

OLYMPIA, WN.—Awards as follows by Director of Highways, Olympia, Wn., for: (1) LEWIS CO.—To Warren, Northwest, Inc., Box 5072, Portland, $40,834, for 2.9 mi. oil rk. and const. light bitum. surf. tr. on Mayfield road to Klickitat Creek, Sec. 1; 3.5 mi., Morton to West Fork, Sec. 2; and 29.8 mi. from Kosmos to Packwood. (2) MASON, KITSAP & JEFFERSON CO.—To Diesel Oil Sales Co., 2155 N. Lake Ave., Seattle, $35,359, for 4.3 mi. non-skid tr. on St. Rd. 21; 12.7 mi. on St. Rd. 21; 3.9 mi. bitum. retread on St. Rd. 14; 3.8 mi. non-skid seal coat on St. Rd. No. 9; and 8.6 mi. light bitum. surf. on State Road No. 14. 7-5

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) KING & SNOHOMISH CO.—To Diesel Oil Sales Co., 2155 N. Lake Ave., Seattle, $9,322, for 8.6 mi. produc. oil rock and const. light bitum. surf., Money Creek to Halford Sec. 1; on 7 mi. Index to Goldbar, Sec. 2; and on .6 of a mi., Sultan Hill, Sec. 3. (2) YAKIMA CO.—To Mathieson Const. Co., Sunnyside, Wn., $64,604, for 15.7 mi. grad. and surf. on State Road No. 5, Tieton Canal intake to Naches River. (3) KLICKITAT CO.—To J. C. Compton, McMinnville, $43,444, for 4.1 mi. prod. oil rock and const. bitum. retread surf. on Centerville Junc. to Goldendale, Sec. 1; produc. oil rock and const. bitum. retread surf. on 19.5 mi., Goldendale to Satus Creek, Sec. 2. 7-5

CHEHALIS, WN.—To T. D. Hendricks, Chehalis, Wn., $6961, by Lewis County Comm., Chehalis, Wn., for 1.8 mi. clearing, grubbing, grading, draining and surfacing of Secondary Road Project No. 21 near Toledo, Wn. 6-17

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) LINCOLN, SPOKANE & GRANT CO.—To F. R. Hewett, 420 W. 22nd Ave., Spokane, $101,545, for producing mineral aggregates (oil rock) and a non-skid seal treatment on various highways in Lincoln, Spokane and Grant Counties; (2) SNOHOMISH & SKAGIT CO.—To L. J. Dowell, Inc., 1437 Elliott Ave., W., Seattle, Wn., $78,005, for 4.4 mi. grad., drain. and const. a tr. pile and timber trestle on St. Rd. No. 1, Conway-South. (3) KITTITAS CO.—To J. F. Forbes, 110 E. Union Ave., Olympia, Wn., $68,646, for 19.9 mi. bitum. retread surf. on St. Rd. 3, Teanaway to Ellensburg, Sec. 1; const. non-skid seal treatm. on about 10.0 mi. of St. Rd. No. 7; Ellensburg to Highline Canal, Sec. 2; and const. bitum. macadam Class D penetr. type surface on about 8.9 mi. of St. Rd. No. 7, Alkali Ikes to Vantage Ferry Bridge, Sec. 3. (4) KITSAP & MASON CO.—To Independent Asphalt Paving Co., Seaboard Bldg., Seattle, Wn., $57,178, for 8.6 mi. surf. with cr. stone and stockpiling cr. stone and min. aggreg. (oil rock) on State Road No. 14, Tidewater Creek to Union River, Unit 1. 6-13

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) OKANOGAN CO.—To John C. Wachter Co., Stevenson Wn., $31,142, for 1.3 mi. grading and surfacing with cr. stone on Methow Valley Highway, Methow Vicinity, Section 2. (2) WHITMAN CO.—To Clifton, Applegate & G. D. Lyon, Hutton Bldg., Spokane, Wn., $128,870, for 6.4 mi. grad. and surf. with cr. stone and const. a tr. timb. trestle on State Road No. 3, Dusty East. 6-13

OLYMPIA, WN.—Awards as follow by Director of Highways, Olympia, Wn., for: (1) WHATCOM CO. (PWP 7756)—To N. Fiorito, Inc., 844 W. 48th St., Seattle, $111,491, for 4.0 mi. conc. pav. on St. Rd. 1 (Lake Samish Br.) Lake Samish to Lake Padden Road. (2) CHELAN CO. (PWP)—To Babler Bros., 2407 N. W. 28th Ave., Portland, $71,944, for 20.4 mi. bitum. macad. Cl. D-Penetration Type surf. on St. Rd. No. 2 end of pavement at Peshastin Creek to Blewett Pass. (3) WHITMAN, PEND O'REILLE & FERRY CO.—To Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, Wn., $67,344, for 9.4 mi. bitum. retread surf. tr. on St. Road No. 3; 23.7 mi. bitum. surf. tr. on St. Road No. 6; and 27.7 mi. producing min. aggreg. and bitum. retr. surf. on State Road No. 3. (4) CHELAN AND OKANOGAN CO (PWP 7745)—To Standard Asphalt Paving Co., 603 Chronicle Bldg., Spokane, $82,792, for 99.5 mi. constructing a bitum. retread surf. on State Road No. 10, Chelan to British Columbia Line and Chelan to Chelan Falls, Unit 2. 6-28

POMEROY, WN.—To J. W. Poe & Co., Clarkston, Wn., $29,519, to the County Comm., Pomeroy, Wn., for 6.3 mi. grading, draining and surfacing with cr. rock on the North Deadman road, Secondary Project No. 12. 6-6

PORT ORCHARD, WN.—To Diesel Oil Sales Corp., 115 Belmont, North, Seattle, Wn., $4,566, by Kitsap County Commissioners, Court House, Port Orchard, Wn., for constructing 1.4 mi. light bituminous oil treatment, a ¾" surface of an aggregate of gravel and oil beginning at the north terminus and extending toward the North Kitsap highway, on Marine Dr., the Ammunition Depot road, the Port Orchard-Annapolis road and another section near Port Orchard and North Callow Street. 6-21

WENATCHEE, WN.—To Fred G. Redmon, 3038 5th Ave., Yakima, Wn., $24,137, by County Comm., Wenatchee, Wn., for resurf. Secondary Highway No. 16 at Leavenworth. 6-28

Bridges and Culverts . . . . . .

WORK CONTEMPLATED

SEATTLE, WN.—The Board of County Commissioners of King County, Seattle, Wn., have given authority to the Puget Sound Bridge & Dredging Co., 2929 16th Avenue, S. W., Seattle, to design and supervise construction of a toll bridge at Lake Washington, connecting Mercer Island with Seattle at Seward Park. Application will be made to P. W. A. for $2,750,000 to finance the project. 6-28

CALL FOR BIDS

SAN FRANCISCO, CALIF.—Bids to 2 p.m., July 26th, by S. F.-Oakland Bay Bridge, 500 Sansome St., S. F., for construction of Administration Building and Toll Plaza for the San Francisco-Oakland Bay Bridge, under Contract No. 10. Work involves: 17,500 cu. yd. excavation, 660 ea. drive timber piles, 4,250 cu. yd. concrete, 600,000 lb. reinf. and miscell. steel, 2,000 tons asphalt concrete, L.S. Administration Bldg. (Gen. Const.), L.S. toll booths and canopies (Gen. const.), L.S. heating and plumbing, L. S. electrical work, L.S. administration Bldg. steel furniture, L. S. 2 flag poles, 2,000 bbl. extra cement and other items. 7-2

SACRAMENTO, CALIF.—Bids to 2 p.m., July 24th, by Calif. Div. of Highways, Sacramento, for const. undergrade crossing under S.P.R.R. 1½ mi. south of Agnew consisting of 2 concr. abutments with wingwalls and approx. 0.29 mi. grad. and concr. paving roadway in SANTA CLARA CO., inv.: 28,000 cu. yd. excav., 1,365 cu. yd. A conc. (stand. pavement), 3,080 cu. yd. B conc. (thick pavement), 870 cu. yd. A concrete (struc.), 340 cu. yd. B concrete (struc.), 6,960 ft. creos. Doug. fir piles and T. P. and other items. 7-2

CHEYENNE, WYO.—Bids to 10 a.m., July 17th, by State Highway Comm., Cheyenne, Wyo., for a timber bridge and bank protection on 0.026 mi. of the Lovell-Kane Road in BIG HORN CO., Wyo., FAP 211-A-R, involving: 48.7 MBM untr. timber, 1220 lin. ft. tr. timber piling. 7-5

BIDS RECEIVED

EVERETT, WN.—Acme Construction Co., 428 McGilvra Blvd., Everett, Wn., $9,265, low to County Comm., Everett, Wn., for construction of a 100-ft. steel span and 25 lin. ft. of trestle approach over the Pilchuck River on the Granite Falls-Lake Roesiger Road. 6-7

CONTRACTS AWARDED

PHOENIX, ARIZ.—To F. D. Shufflebarger, Albuquerque, N. M., $125,338 to Arizona State Highway Comm., Phoenix, for steel plate girder bridge resting on concr. piers supported by either untr. timber or steel H column piling located across Tassayampa River at Wickenburg, MARICOPA COUNTY, Arizona. (See Unit Bid Summary) 7-2

PHOENIX, ARIZ.—To M. M. Sundt Const. Co., Phoenix, Ariz., $112,997 and ALT. $123,803, by Arizona State Highway Comm., Phoenix, for a reinf. concr. underpass and appurtenances betw. Toole Ave. and 6th Sts., within the city limits of Tucson on Stone Ave., PIMA COUNTY. 7-1

AUBURN, CALIF.—To Lord & Bishop, Native Sons Bldg., Sacramento, $3,400, to the County Clerk, Auburn for erecting a 65-ft. steel through plate girder span on steel H pile foundations, located 8 miles northwest of Roseville, Placer County. 7-2

LOS ANGELES, CALIF.—To J. B. McIntosh & Walker Martin, 1842 Gardena Ave., Glendale, $9,105, by Dist. Engineer, Calif. Div. of Highways, Los Angeles, for construction of reinf. concrete culvert on Foothill Blvd. at Hall Beckley Canyon Wash, in LOS ANGELES COUNTY, Calif. 6-10

SACRAMENTO, CALIF.—To Peninsula Paving Co., 9 Main St., San Francisco, who bid $88,683, to the Calif. Div. of Highways, Sacramento, for const. 2 timber bridges—one across Lime Kiln Creek consisting of one 126 ft. deck truss span; three 40 ft. steel beam spans; and approx. 165 ft. trestle spans, and one across Vicente Creek, consisting of one 126 ft. deck truss span, two 40 ft. steel beam spans and approx. 137 ft. trestle spans betw. 38 and 43 mi. north of San Simeon in MONTEREY COUNTY, Calif. 6-25

SACRAMENTO, CALIF.—Awards as follow by Calif. Div. of Highways, Sacramento, for: (1) MONTEREY CO.—To E. T. Lesure, 87 Ross Circle, Oakland, $92,728, for 2 redw. timb. bridges, 1 across Pfeiffer Canyon, consist. of one 76 ft. and one 57 ft. deck truss span and nine 19 ft. trestle spans; and one across Torre Canyon, consisting of one 126 ft. deck truss span and approx. 288 lin. ft. trestle span. (2) SIERRA CO.—To Charles Kuppinger, Box 356, Lakeport, $35,458, for reinf. concr. bridge across N. Fork of N. Fork of Yuba River at Downieville, consisting of two 40 ft., two 31 ft. and two 9 ft. spans on concrete piers, to be constructed and road approaches graded. 6-10

SAN FRANCISCO, CALIF.—To Alta Electrical & Mechanical Co., Inc., and American Building Maintenance Co., 467 O'Farrell St., San Francisco, $442,939, by S. F.-Oakland Bay Bridge, San Francisco, for const. of electrical work on the San Francisco-Oakland Bay Bridge and its highway approaches under Contracts 11 and 11A. (See Unit Bid Summary) 7-1

STOCKTON, CALIF.—To John Hachman, Box 206, Stockton, $66,000, by County Clerk, Stockton, for const. a 204 lin. ft. steel drawbridge over Honker Cut betw. King Island and the Empire Tract in Road District No. 2. 6-17

PORTLAND, ORE.—To Hoffman Const. Co., 715 S. W. Columbia Blvd., Portland, Ore., $89,901, to Oregon State Highway Comm., Portland, for constructing an undercrossing of the O. W. R. R. & N. Co. Railway in La Grande, in La Grande Undercrossing Section of Walloway Lake Highway, UNION COUNTY, Oregon. 6-10

Water Supply Systems . . . . .

WORK CONTEMPLATED

WATSONVILLE, CALIF.—City Engineer, Watsonville, Calif., has been empowered to seek a P. W. A. loan and grant of $75,000 to finance const. of a new water service line to serve residents on the East Corralitos Road and for replacements to the present city distribution system. 6-13

AMITY, ORE.—A grant of $11,045 from Federal Works fund has been made to Amity, Oregon, for improvements to waterworks system. 7-5

PRICE, UTAH—Bonds were voted by Price, Utah, in amount of $120,000 to finance construction of replacements to present city water distribution system. Total est. cost, $155,600. 6-18

SEATTLE, WN.—City Water Supt. H. D. Fowler, Seattle, Wn., has prepared an application to the P. W. A. for a grant of $900,000 and a loan of $1,100,000 to finance extensions to city water system along the east shore of Lake Washington and to supply suburban north end areas. Work involves 27 miles of mains and reservoirs as follows: 42" pipeline from Cedar River pipeline No. 3 at Renton to the north end of Lake Forest Park to reservoir at E. 195th St., $320,000. Two 20,000,000 gal. concrete reservoirs estimated cost, $320,000. 20" pipeline from Foy plant to new reservoir at E. 125th St., $35,000. Hydraulic turbine driven pumps at each proposed reservoir, $165,000. 6-14

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 a.m., July 17th, by Board of Public Works, L. A., for furn. and installing gas, hot and cold water piping systems at Terminal Island Sewage Treatment Plant, Terminal Island, San Pedro, P. W. A., Project 5633, Unit 3-D. 6-20

SAN FRANCISCO, CALIF.—Bids to 2:30 p.m., July 17th, by Dept. of Public Works, San Francisco, for installation of Section "B" of Embarcadero Extension to the Auxiliary Water Supply system. Est. cost, $14,000. 7-3

BIDS RECEIVED

LOS ANGELES, CALIF.—Case Construction Co., 905 Westminster, Alhambra, $58,975, low to Metropolitan Water Dist., L. A., for const. of the Copper Basin siphon and surge tank of the Colorado River Aqueduct, under Spec. 101. 6-21

SACRAMENTO, CALIF.—C. C. Moore & Co., 450 Mission St., San Francisco, $9,267, low to State Architect, Sacramento for furn. and inst. water softeners, Boiler Plant Building, Camarillo State Hospital, Camarillo, California. 6-26

SAN FRANCISCO, CALIF.—Pacific States Construction Co., Call Bldg., San Francisco, $33,307, low to Public Works Dept., S. F., for constructing the Sunset Extension to the Auxiliary Water Supply system. 6-26

SAN FRANCISCO, CALIF.—M. J. Lynch, Barneveld and Oakdale St., San Francisco, $43,694, low to Dept. of Public Works, S. F., for installation of Sec. B of the Park-Presidio Extension to the Auxilary Water Supply System, under Spec. No. 18,845. 7-3

JACKSONVILLE, ORE.—Consolidated Supply Co., 139 S. W. Stark St., Portland, Ore., who bid $5,616, low on ALT "A" (MATERIALS ONLY) to City Clerk, Jacksonville, Ore., for improvements to waterworks system. 6-29

PRAIRIE CITY, ORE.—Eugene Ruedy Co., Sherlock Bldg., Portland, Oregon, $12,464, low to City Council, Prairie City, for improvements to waterworks system involving 2¼ miles 4" pipeline and const. a 217,000 gal. concrete reservoir. 6-29

SEATTLE, WN.—A. Scarsella, 947 26th South, Seattle, $8,582, low to Board of Public Works, Seattle, Wn., for constructing watermains and hydrants on 56th Avenue, Southwest, Hillcrest Ave., West Genesee St., and West Dakota St., under Ordinance No. 65384, Local Improvement District No. 5376. 6-24

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Consolidated Steel Corp., 6500 E. Slauson Ave., Los Angeles, $1,784, to County Board of Supervisors, Hall of Records, Los Angeles, for furnishing and erecting new 48" riser for elevated water tank at dairy at Rancho Los Amigos at Hondo. 6-26

SACRAMENTO, CALIF.—To Walter S. Leland Co., Walnut Creek, Calif., $10,385, to State Architect, Sacramento, for erection and completion of one 300 h.p. water tube boiler and equipment, at Folsom State Prison, Represa, Calif. 6-21

SAN FRANCISCO, CALIF.—To MacDonald & Kahn Co., Ltd., Financial Center Bldg., S. F., $96,575, by the Dept. of Public Works, S. F., for const. of Section "C" of Marina Extension to Auxiliary Water Supply System, under Specification No. 18,843. 6-19

SAN FRANCISCO, CALIF.—To Lowrie Paving Co., 1540 16th St., San Francisco, $58,094, to Dept. of Public Works, S. F., for installation of Sec. "A" of Park-Presidio Extension to the Auxiliary Water Supply System under Spec. No. 18,844. 6-28

DENVER, COLO.—To A. S. Horner, 2324 Grape St., Denver, Colo., $142,058, by Board of Water Comm., Denver, for const. the South Boulder Diversion Conduit, involving a Diversion Dam, Intake Works, Venturi Flume, Transitions, Tunnels Nos. 1 and 2, and Foundations for Siphon No. 1. Work is located 2½ mi. above Eldorado Springs on South Boulder Creek, BOULDER COUNTY, Colo. (See Unit Bid Summary) 6-20

EMERYTON, UTAH—Awards as follow by City Clerk, Emerytown, Utah, for water improvements: (1) To Waterworks Equipment Co., 149 W. 2nd St., S., Salt Lake City, $8,835 for pipe and fittings. (2) To Davies Const. Co., Spanish Fork, Utah, $5,020 for installation. 6-12

ORANGEVILLE, UTAH—Awards as follow by City Clerk, Orangeville, Utah, for water works improvements: (1) To Waterworks Equipment Co., 149 West 2nd Street, South, Salt Lake City, Utah, $10,500 for pipe and fittings. (2) To Davies Construction Co., Spanish Fork, Utah, who bid $8,064 for installation. 6-12

Sewer Construction . . . . .

WORK CONTEMPLATED

EL MONTE, CALIF.—Special election will be held July 23 by electors of El Monte, for voting $27,500 bond issue to remodel and reconst. sewage disposal plant. Est. cost, $60,000. 6-12

HUNTINGTON BEACH, CALIF.—Currie Engrg. Co., Andresen Bldg., San Bernardino, has been authorized by City of Huntington Beach, as consulting engineers to assist city engineer to prepare plans and specifications for constructing a sewage disposal plant to supersede present septic tank and ocean outfall sewage system. Est. cost, $75,000. 6-8

RIVERSIDE, CALIF.—Plans have been prepared by City Engineer, Riverside, for construction of a complete sewage system and a sewage disposal plant at an estimated cost of $808,720, as follows: North Side system, $146,870, North Side outfall, $54,850, Magnolia Center, Washington St. and Casa Blanca, $315,640, Arlington outfall, $41,140, main outfall, $103,300, disposal plant, $146,920. 6-25

SAN GABRIEL, CALIF.—The City Council, San Gabriel, has authorized City Attorney to apply to the P. W. A. for a loan and grant of $450,000 to finance construction of a sewage disposal plant. 6-22

POCATELLO, IDAHO—A grant of $19,636, from Federal Works Fund has been made to Pocatello, Idaho, for constructing a sanitary trunk and storm sewer. 7-5

CALL FOR BIDS

CAMARILLO, CALIF.—Bids to 2 p.m., July 30th, by State Architect, Sacramento, for const. a complete sewage disposal plant at Camarillo State Hospital, Camarillo, Calif. Est. cost, $100,000. 7-3

BIDS RECEIVED

LOS ANGELES, CALIF.—Bids received as follows by L. A. County Sanitation Dist., Law Bldg., L. A., for part of Unit 1 of Jt. Outfall sewer from Dist. Disposal plant near Harbor City to ocean shore near White Point, San Pedro: SCHED. No. 1—Shofner & Gordon, 5670 Wilshire Blvd., L. A., $629,967 low. SCHED. No. 2—Broderick & Gordon, Indio, $897,695 low. SCHED. No. 3—United Concrete Pipe Corp., Box 1, Sta. H, L. A., $440,058 low. (See Unit Bid Summary) 7-2

LOS ANGELES, CALIF.—Merritt, Chapman & Scott Corp., Box 698, San Pedro, $528,059 (Reinf. concr.), $547,546 (Cl. B CIP), and $534,065 (Cl. A CIP), low on all alternates to Co. Sanit. Dist., L. A., for const. submerged pipeline, Unit 1, Jt. Outfall sewer extend. into Pacific Ocean W. of San Pedro. (See Unit Bid Sumgmary) 7-2

LOS ANGELES, CALIF.—Joe Sutalo, 476 Camulos St., Los Angeles, $18,681, low to Board of Public Works, L. A., for sewer in Mt. View Ave., and Venice Blvd. Sewer District. 6-6

LOS ANGELES, CALIF.—Fred W. Weber, 8442 Calif. Ave., South Gate, $12,500, low (Rensselaer valves, cast iron pressure pipe) to Board of Pub. Works, L. A., for fur. and install. pumping plant pumps and piping and sludge piping system for the Terminal Island Sewage Treatment Plant, P. W. A. Proj. 5633, Unit No. 3B. 6-20

GRANTS PASS, ORE.—Bids received as follows by the City Recorder, City Hall, Grants Pass, Ore., for const. a sewage disposal plant and for furn. and placing the necessary equipment in the plant: SCHED. 1 (General Contract)—Warren Northwest, Inc., P. O. Box 5072, Portland (low), rectangular tanks, $28,197; round tanks, $27,565. SCHED. 2 (Glassover for Sludge Bed)—Greenhouse Mfg. Co. (only bid), $4,983. SCHED. 3 (Settling Tank Mechanism)— Link Belt Co., 200 Paul Ave., San Francisco (low), $3,350. SCHED. 4 (Sludge Pump)—Palmer Supply Co., 222 Westlake, North, Seattle, Wn. (low), $504. SCHED. 5 (Heating Equipment)—Consolidated Supply Co., 139 S. W. Stark, Portland (low), $473. SCHED. 6 (Chlorinator)—Pac. W. W. Supply Co., Inc., Atlantic St. Dock, Seattle (low), $937. 7-1

MEDFORD, ORE.—R. I. Stuart & Sons, Medford, Ore., $102,993, low to Medford, Ore., for construction of a sewage disposal plant, to be activated sludge type with primary clarifiers, aerator, final clarifier, blowers, plain digester, sludge pumps, and sewage circulation pumps. 6-13

CONTRACTS AWARDED

AVENAL, CALIF.—To Stroud Bros. & Seabrook, Union Avenue at Subway, Bakersfield, by Standard Oil Co., San Francisco, for furnishing and installing 9000 lin. ft. 6" vitrified pipe for sewer collection system at Avenal, Kings County, Calif. 6-14

LOS ANGELES, CALIF.—To E. S. and N. S. Johnson, 424 N. Lake Ave., Pasadena, $8,390, to Board of Education, Los Angeles, for const. of a storm drain at the Westwood Jr. High School, located on easterly side of Selby Ave., betw. center lines at Holms and Massachusetts Ave., Westwood. 6-15

LOS ANGELES, CALIF.—To Merritt, Chapman & Scott, San Pedro, $9,999, to Board of Public Works, Los Angeles, for constr. work trestle extension over North Outfall Sewer, Sec. 1, Ocean Outfall at Hyperion Sewage Treatment Plant. 6-18

SAN FRANCISCO, CALIF.—To Union Paving Co., Call Bldg., San Francisco, $58,893, to Dept. of Public Works, S. F., for constructing a reinf. concrete sewer in 18th St. and in Folsom Street, under Spec. No. 18,737. 6-12

SAN MATEO, CALIF.—To W. J. Tobin, 3701 Balfour Ave., Oakland, $78,770 (less deduction of $7254) by City Mgr., E. P. Wilsey, City Hall, Burlingame, for const. a complete sewage pumping plant. 6-27

SAN MATEO, CALIF.—To W. J. Tobin, 3701 Balfour Ave., Oakland, $67,772. SCHED. 1 (OUTFALL SEWER) by City Manager, San Mateo, for constructing an outfall sewer to serve San Mateo and Hillsborough. 6-20

SEATTLE, WN.—To L. Coluccio & Co., 103 Securities Bldg., Seattle, Wn., $244,394, by Board of Pub. Works, Seattle, for const. concrete sewer, centrif. cast pipe on all alternates and wood siphon known as the Ballard Trunk Sewer. 6-24

River and Harbor Work .....

WORK CONTEMPLATED

LAGUNA BEACH, CALIF.—City Council, Laguna Beach, has instructed City Engineer to prepare a cost estimate and apply to the Public Works Administration for funds to finance the construction of a pier at Laguna Beach. 6-8

LOS ANGELES, CALIF.—Board of Harbor Commissioners, Los Angeles, will apply to the Public Works Administration for a loan of $3,250,000 on the necessary $6,000,000 for harbor improvements and the balance in the form of a 45% grant totaling approximately $2,750,000. Projects contemplated include acquisition of the San Pedro water front from 1st to 14th Streets, construction of terminals and ferry slips, and miscellaneous projects for the Wilmington water front. 6-8

NEWPORT BEACH, CALIF.—City Council, Newport Beach, will be asked by petition of electors of Newport Beach, to construct a $125,000 sea wall to encircle Balboa Island. 6-18

SANTA BARBARA, CALIF.—City of Santa Barbara has been granted $30,000 for development of beaches by dredging 400,000 cu. yd. of sand from the 45-acre beach west of the breakwater. Dredging project will commence August 1st. 7-1

VANCOUVER, WN.—The Port Commission, Vancouver, Wn., has applied to the P. W. A. for a grant to aid in construction of 1000 ft. dock to cover 100,000 sq. ft. floor space. Bonds totaling $190,000 have been voted. 6-12

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 3 p.m., July 22nd, by U. S. Engineer Office, Los Angeles, for furnishing all labor and materials and performing all work for constructing a composite type breakwater approx. 2,000 ft. long in Los Angeles-Long Beach Outer Harbors, Calif. 7-2

LOS ANGELES, CALIF.—Bids to 3 p.m., August 5th, by U. S. Engineer Office, L. A., for dredging 13,190,000 cu. yd. in San Diego Bay, constructing retaining dike and making fill of dredged material involving: SECTION "A"—4,540,000 cu. yd. dredging; SEC. "B"—4,720,000 cu. yd. dredging; SEC. "C"—4,030,000 cu. yd. dredging. 7-5

COCO SOLO, C. Z.—Bids to 11 a.m., August 7th, by Bureau of Yards & Docks, Navy Dept., Washington, D. C., for extension to earth filled steel sheet pile pier with timber fender system, concrete curbs, service piping, and fittings at the Naval Submarine Base, Coco Solo, C. Z., under Spec. No. 8013. 7-5

PORTLAND, ORE.—Bids to 3 p.m., July 17th, by U. S. Engineer Office, Portland, Ore., for dredging material from channel in Columbia River, extending from the Interstate Highway Bridge at Vancouver, Wn., to the mouth of Willamette River, Oregon. Work involves: 1,000,000 cu. yd. dredging. 7-5

PORTLAND, ORE.—Bids to 3 p.m., July 18th, by U. S. Engineer Office, Portland, Ore., for const. about 5,360 ft. of pile dikes in Columbia River at six different sites located one to four miles above Vancouver, Wn., under Invit. No. 698-36-2. Work involves: 120,000 ft. piles, 6,000 ft. cutoff piling, 3,800 cu. yd. stone, shore rock, 9,000 cu. yd. stone, water rock. 7-5

SEATTLE, WN.—Bids to 3 p.m., July 16th, by U. S. Engineer Office, Seattle, Wn., for placing 80,000 tons of stone for rebuilding part of the south jetty, const. of an unloading wharf, trackage connecting the wharf with base of jetty, tramway on enrockment of old jetty, and furnishing and installing two derricks, one track scales, a scale-house and garage, for the first unit of the Grays Harbor jetty project. 7-1

BIDS RECEIVED

LOS ANGELES, CALIF.—Merritt, Chapman & Scott Corp., San Pedro, Calif., $32,320, low to U. S. Engineer Office, Los Angeles, for repairs to breakwater at San Luis Obispo. 6-27

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To Pan Pacific Piling & Constr., San Pedro, $4,175, to Harbort Dept., L. A., for timber wharf extension at Berth 145, under Spec. 942. 6-20

NEWPORT BEACH, CALIF.—To San Francisco Bridge Co., 503 Market St., San Francisco, by The Irvine Co., for dredging upper Newport Harbor to a depth of from 7 to 8 ft. Two areas will be dredged; the first unit south of the state highway and east of the channel leading to the upper bay; the other unit is lower in the bay east of Balboa Island. 6-18

SAN DIEGO, CALIF.—To C. & F. W. Steffgen, 2015 Bay Front, San Diego, $13,400 by 11th Naval Dist., San Diego, for repairs to Ways of Marine Railway at San Diego, Calif., under Spec. 7938. 6-24

SAN DIEGO, CALIF.—To C. & F. W. Steffgen, 2015 Bay Front St., San Diego, $79,670, by 11th Naval District, San Diego, for constructing two concrete runways for seaplanes at Naval Operating Base (Air Station) San Diego, under Spec. No. 7994. 7-3

SAN FRANCISCO, CALIF.—To American Dredging Co., 255 Calif. St., San Francisco, $8,057, by U. S. Engineer Office, San Francisco, for 104,102 cu. yd. dredging in San Rafael Creek, between Beacon 3 and Upper End of Gooseneck Bend. 6-12

SANTA MONICA, CALIF.—To Rohl-Connolly Co., 4351 Alhambra Ave., L. A., $8,200 by City Council, Santa Monica, for reconditioning and repairing of the breakwater in the Santa Monica Yacht Harbor. 7-3

BELLINGHAM, WN.—To R. C. Sisson, 1818 Franklin St., Bellingham, Wn., $14,975, to Indian Irrigation Service, Bellingham, for repairs to dikes in the Lummi Bay District. Work involves: piling, ditching and a small bridge. 6-29

Irrigation and Reclamation

WORK CONTEMPLATED

CHANDLER, ARIZ.—A grant of $47,250 from Federal Works Fund has been made to Chandler Heights Citrus Irrigation Dist., Chandler, Ariz., for purchase of existing irrigation facilities; installation of new pipe mains, laterals, and domestic power lines; and const. of a booster pumping station. 7-3

CALDWELL, IDAHO—A grant of $45,000 from Federal Works Fund has been made to Caldwell, Idaho, for constructing a 6-mile drainage ditch and clearing and deepening 65 miles of existing drainage canals. 7-3

CHEYENNE, WYO.—A grant of $218,045 from Federal Works Fund has been made to the Bear River Irrigation District, Wyoming, for const. of a storage reservoir, diversion works and supply and distribution canals. 7-3

CALL FOR BIDS

ONTARIO, ORE.—Bids to 10 a.m., July 15th, by Bureau of Reclamation, Ontario, Oregon., for constructing structures, North Canal laterals N. C. 25.4 to 25.4-4.8, Mitchell Butte Division, Owyhee Project, Oregon-Idaho, under Spec. No. 694-D. Work is located near Dunaway, Ore. 6-20

CONTRACTS AWARDED

ONTARIO, ORE.—To J. P. Brumbach, Parma, Idaho, $16,550 to Bureau of Reclamation, Ontario, Oregon, for construction of earthwork, North Canal, Laterals 25.4 to 27.8-0.7, Mitchell Butte Division, Owyhee Project, Oregon-Idaho, located near Dunaway and Nyssa, Oregon, under Spec. No. 679-D. 6-14

ONTARIO, ORE.—To Winters & Ashcroft, Nyssa, Oregon, $7,469, on SCHED. 1, and to Fife & Co., Nyssa, Oregon, $13,274 on SCHED. 2, by Bureau of Reclamation, Ontario, Oregon, for construction of structures, North Canal laterals, Mitchell Butte Division, Owyhee Project, Oregon-Idaho, under Spec. No. 681-D. 6-14

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 a.m., July 23rd, by Metropolitan Water District, 306 W. 3rd St., Los Angeles, for constructing the Monrovia No. 4 and the San Rafael Nos. 1 and 2 tunnels and appurtenant works, under Spec. No. 1074. The Monrovia No. 4 tunnel is located in the San Gabriel Mountains in the northerly part of the City of Monrovia, LOS ANGELES COUNTY. The San Rafael Nos. 1 and 2 tunnels are located in the southerly portion of the San Rafael Hills, between Linda Vista Ave. and Glenoaks Blvd., in cities of Glendale, Pasadena and Los Angeles. The work consists

of excavating and lining 3 circular water supply pressure tunnels. The San Rafael tunnels and the east portion of the Monrovia No. 4 tunnel are to be lined with reinf concr. and will have a finished interior dia. of 10 ft. For the west portion of the Monrovia No. 4 tunnel, bids may be submitted on a lining of welded steel cylinders, backed with concrete and lined with gunite; and on a lining of precast concrete pipe, backed with concr. and reinf. steel cylinders. The gunite-lined section will have an interior dia. of 9 ft. 9 in.; the precast pipe, 9 ft. 6 in., involving 146,500 cy. tunnel excav. 6-21

LOS ANGELES, CALIF.—Bids to 10 a.m., July 30th, by Metropolitan Water Dist., L. A., for const. concr. lined tunnels and precast concrete pipelines and appurtenant work of the Colorado River Aqueduct Distribution system between Sta. 2887-00 and 2951-50 and betw. Sta. 3061-00 and 3117-14 of the Upper Feeder, under Spec. 110. Work involves excavation and lining of water supply pressure tunnels with approaches of jointed cast in place pipe, 10 ft. internal diam., and const. of precast concrete pipeline of 9 ft. 10 in. diam. 6-27

Dam Construction . . . . .

CALL FOR BIDS

LOS ANGELES, CALIF.—Bids to 1 p.m., Aug. 12th, by Metropoltian Water District, Los Angeles, for constructing Cajalco Dam and Dike and appurtenant features of the Cajalco storage reservoir, under Spec. No. 112. Work is located about 10 miles S.W. from the City of Riverside, RIVERSIDE COUNTY. Work comprises excavation and lining of diversion and outlet tunnels 9 and 14 ft. in diameter, and 2000 and 2565 ft. in length, respectively; construction of an earthfill dam crest length 2584 ft. and a maximum height of about 194 ft; an earthfill dike with a crest length of 7,574 ft. and maximum height of about 90 ft., spillway, outlet tower and bridge supports; excavation of an approach channel to the outlet tower. 7-3

CASPER, WYOMING—Bids to 10 a.m., July 15th, by Bureau of Reclamation, Casper, Wyo., for const. of the Alcova Dam, to be located on the North Platte River about 30 mi. southeast of Casper, Wyo. Dam is to be earth and rockfill type, about 235 ft. high, crest length 900 ft., and crest width of 40 ft., involving: 1,651,300 cy. open cut excav., 935,300 cy. earthfill embankment, 388,000 cy. rockfill and other items. 6-10

CASPER, WYOMING—Bids to 10 a.m., July 22nd, by Bureau of Reclamation, Casper, Wyo., for const. of the Seminoe Dam and Power Plant to be located about 33 mi. northeast of Rawlins, Wyo., on North Platte River, Casper, Wyo., Alcova Proj. Dam to be massive concr. arch type, 260 ft. high, 540 ft crest length, 89 ft. thick at base and 15 ft thick at top. Spec. No. 630. Work is located near Casper, Wyo. Detailed quantities involve: 541,500 cu. yd. open cut excav., 22,000 cu. yd. tunnel excavation, 190,340 cu. yd. concrete, 29,600 cu. ft. pressure grouting, 2,550,000 lb. reinf. bars and fabric (plc), 397,000 lb. met. pipe and fittings (install), 1,022,000 lb. gates and appurten. (install),, 339,000 lb. power penstock and outlet pipes (install), 1,542,000 lb. needle valv. and misc. metal work (install), L.S. furn., install, and operate a concr. cooling plant. 6-20

CONTRACTS AWARDED

LIKELY, CALIF.—To J. P. Brennan, Redding, Calif., $98,907, by South Fork Irrigation District, Likely, Modoc County, Calif., for constructing a 65 ft. high, rolled earthfilled dam and a 2 mile supply ditch on West Valley Creek, Modoc County, Calif. 6-14

HELENA, MONT.—To Utah Construction Co., Ogden, Utah, $470,121, by Secretary, State Water Conservation Board, Helena, Mont., for constructing three weirs and an earth dam and appurtenant structures on Red Lodge Creek in CARBON COUNTY, Montana, at Rock Creek. (See Unit Bid Summary) 6-17

Flood Control Work . . . . .

WORK CONTEMPLATED

NOGALES, ARIZ.—The P. W. A. has appropriated $106,700 to City of Nogales, Ariz., for extension of a concrete covered flood control channel. This is the 3rd section of channel, first having cost $500,000 and the second section $25,000. 6-13

LOS ANGELES, CALIF.—Flood Control Committee of the House of Representatives, Wash., D. C., has approved an allocation of $67,-152,000 to LOS ANGELES COUNTY to finance the following flood control projects: Upper L. A. River, $8,118,000; L. A. River tributaries in San Fernando Valley, $6,569,000; Verdugo Foothills, $4,-115,000; Arroyo Seco and tributaries, $3,846,000; Nigger Slough, $4,232,000; San Gabriel Basin Streams: W. of San Gabriel Valley, $2,405,000; E. of San Gabriel Valley, $4,352,000; San Jose Creek and trib., $4,232,000; Ballona Creek, $6,190,000; Lower L. A. River, $1,513,500; Lower San Gabriel River, $2,717,500; Big Tujunga, $5,770,000; Compton Creek, $3,125,000; Rio Hondo, $1,998,000; Eaton Wash, $1,293,500; La Crescenta-Montrose area streams, $4,150,000. 6-8.

BIDS RECEIVED

LOS ANGELES, CALIF.—Hoagland Engrg. Co., Los Angeles, $31,576. SCHED. 1 and Contracting Engineers, Inc., 2310½ W. Vernon Ave., L. A., $31,645. SCHED. 2, low bids to County Board of Supervisors, L. A., for constructing concrete lined channel on Verdugo Wash, from debris dam to point 1700 ft. southerly. 6-10

LOS ANGELES, CALIF.—Bids received as follows by County Bd. of Superv., L. A., for the following projects: (1) Bannister Field Co., Ltd., 4101 Goodwin Ave., L. A., $138,480. low for constr. concr. conduit in Halls Canyon Channel from Debris Basin to Verdugo Wash. (2) Contracting Engineers, Inc., 2310½ W. Vernon Ave., L. A., $44,445, low by (rolling) and Case Constr. Co., Inc., 905 Westminster Ave., Alhambra, $44,291, low by (flooding) for const. concr. conduit in Pickens Canyon Channel from Debris Basin to Verdugo Wash. 6-24

LOS ANGELES, CALIF.—L. E. Dixon, 609 S. Grand Ave., L. A., $25,756, on SCH. 1, and Lovrich & Konjevod, 606 N. Kings Rd., L. A., $28,738, low bids to Bd. of Superv. L. A. for const. a conc. lined channel on Verdugo Wash, from debris dam to pt. 1700 ft. southerly. 7-1

CONTRACTS AWARDED

LOS ANGELES, CALIF.—Award recommended to L. E. Dixon, 609 S. Grand Ave., Los Angeles, $73,351, to County Board of Supervisors, Los Angeles, for construction of a concrete conduit on Verdugo Wash from Del Valle Ave., to existing conduit, 800 ft. about Mountain Street. 6-19

LOS ANGELES, CALIF.—Award recommended to Geo. J. Bock, 1120 N. Las Palmas, L. A., $37,401, to County Supervisors, Los Angeles, for construction of the Hall Beckley Debris Basin, near Montrose. 7-1

LOS ANGELES, CALIF.—Award recommended to R. A. Wattson, 1026 Los Angeles, for const. of a concrete conduit in Pickens Canyon S. McCadden Place, Los Angeles, $119,861, to County Supervisors, Channel from the Debris Basin to Verdugo Wash. 7-1

LOS ANGELES, CALIF.—Award recommended to Gogo & Rados, 10024 S. Figueroa St., L. A., $66,899.70, by County Supervisors, L. A., for const. a concrete conduit on Verdugo Wash, from Kenilworth Ave., to L. A. River. 7-1

Power Development . . . . .

WORK CONTEMPLATED

NOGALES, ARIZ.—City of Nogales will ask Public Works Administration for funds to finance the construction of a municipal power plant. 6-11

ALAMEDA, CALIF.—The City of Alameda has applied for a P. W. A. loan and grant to finance construction of a new sub-station to be located on Buena Vista Avenue between Hibbard and Grand Streets. Estimated cost of building is $30,000 and equipment $69,400. 6-28

SALEM, OREGON—Election will be held July 20 to vote on forming the Wickiup People's Utility Dist. of Clatsop County, Ore., embracing an area of 50 sq. mi. If District is formed $60,000 will be spent in constructing a transmission and distribution system. 6-8

CALLS FOR BIDS

LOS ANGELES, CALIF.—Bids to 10 a.m., August 20, by Metropolitan Water District, Los Angeles, for constructing approximately 237 miles of 230 KV transmission line. Work is located between the Boulder Dam Power Plant and the Colorado River Aqueduct pumping plants, designated as Iron Mountain, Eagle Mountain, Hayfield and Gene. Bids will be received on: SCHEDULE 1—With hollow copper conductors, the Distr. to furn. the steel for towers. SCHEDULE 2—With steel reinf. aluminum conductors, the District to furnish steel for towers. SCHEDULE 3—With hollow copper conductors, Contractor to furn. the steel for towers. SCHEDULE 4—With steel-reinf. aluminum conductors, the Contractor to furnish steel for towers. 6-19

LOS ANGELES, CALIF.—Bids to 10 a.m., August 20, by Metropolitan Water Dist., L. A., for furn. steel towers for use in const. of a 230-kv. transmission line, under Spec. 105, involving furn. of fabr. steel for towers and tower foundations and approx. 237 mi. of 230 kv. transmission line to be built betw. Boulder Dam and Colorado River Aqueduct pumping plants. 6-25

LOS ANGELES, CALIF.—Bids to 10 a.m., Aug. 27, by Metropolitan Water Dist., L. A., for const. telephone lines under Spec. 106. Work is located in Clark County, Nev., and in San Bernardino and Riverside Counties, and comprises the const. of approx. 140 mi. telephone trunk line and the conversion of approx. .8 mi. exist. spur line to trunk line construction. 6-28

IDAHO FALLS, IDAHO—Bids are now being received by the City Clerk, Idaho Falls, Idaho, for furnishing a complete new power unit for City's Upper Power Plant. Est. cost $45,000. 6-26

BIDS RECEIVED

PORTLAND, ORE.—The Electric Machine and Manufacturing Co., Minneapolis, Minn., $61,473 low to U. S. Engineer Office, 2nd Portland District, 627 Pittock Block, Portland, Ore., for furnishing one 4000 K.W. alternating current generator and installing a complete generating unit at the Bonneville dam power plant; generator to have 2400 volts, 60 cycles, 257 r.p.m., under Spec. 694-35-20. 6-20

CONTRACTS AWARDED

COOLIDGE, ARIZ.—To Del Webb Const. Co., Phoenix, $9,943 to U. S. Indian Irrigation Service, Coolidge, Ariz., for construction of a diesel engine power plant for the San Carlos Project. 6-20

LOGAN, UTAH—To Busch-Sulzer Bros. Diesel Engine Co., St. Louis, Mo., who bid $88,000 to City Clerk, Logan, Utah, for furn. and installing a new Diesel engine and enlarging present plant. 7-2

Pipe Line Construction . . . . .

WORK CONTEMPLATED

SAN DIEGO, CALIF.—The City of San Diego has signed a contract with the Federal Government for a loan and grant of $219,000 to be augmented by $341,000 from Municipal funds to finance completion of the El Capitan pipeline and road project. 6-22

CONTRACTS AWARDED

CASPER, WYOMING—To Williams Brothers, Tulsa, Oklahoma ($1,000,000 approximate cost), by North Central Gas Company, Casper, Wyoming, for constructing a gasoline pipeline between Clayton, Wyoming, and Bridgeport, Nebraska. Work will start about August 1. 6-26

LIGHTING SYSTEMS . . . . . .

BIDS RECEIVED

FT. SHAFTER, T. H.—H. H. Walker, 1323 Venice Blvd., Los Angeles, $10,125, only bid to Quartermaster, Ft. Shafter, T. H., for constructing night lighting installation at Luke Field, T. H. 6-18

CONTRACTS AWARDED

LOS ANGELES, CALIF.—To W. H. Rumble, 6507 Haas Ave., Los Angeles, $4037 to Board of Public Works, L. A., for ornamental lighting system in east side of Los Feliz Blvd., betw. L. A. River and Riverside Drive, involving installation of 12 Marbelite posts. 6-8

MARCH FIELD, CALIF.—To A. Soda & Son, 1077 65th St., Oakland, $2,660 on installation and $1807 for additional installation to Constructing Quartermaster, March Field, for additions to night lighting installaiton at March Field, Riverside, under Spec. No. 70 and 17. 6-7

SAN FRANCISCO, CALIF.—To R. Flatland, 1899 Mission St., San Francisco, $3,250 to Public Utilities Comm., S. F., for installing ornamental street lighting system on Embarcadero from Market St. to Howard St. (L & P Contr. No. 7) in San Francisco. 6-28

Miscellaneous . . . . .

WORK CONTEMPLATED

SACRAMENTO, CALIF.—The City Council, City Hall, Sacramento, has approved an application to the P.W.A. for $1,048,000 to finance the following: 2 conc. reservoirs (3,000,000 gal. each), $300,000; Extension of water mains, $125,000; 10,000,000 gal. filt. water tank, $100,000; Filtration plant pumps, $90,000; Storm sewer mains, $155,000; Fire alarm system and central office, $230,000; Addition to Library, $30,000; Const. Pound Bldg. and lethal chamber, $11,000; Pedestrian underpass (Freeport Blvd.), $7,000. 6-8

STOCKTON, CALIF.—The City of Stockton, Calif., contemplates applying to the P.W.A. for $1,000,000 to finance the following improvements: Sewer trunk line and repairs and enlargement of the North and South Outfall Plant, $156,639; Paving West Washington St., $40,000; Enlarge cotton compress, $59,610; four warehouse units, $110,062; High School buildings, $400,000; additional street work, $400,000. 6-11

CALL FOR BIDS

HAYWARD, CALIF.—Bids to August 7 (tentative date) by City Clerk, City Hall, Hayward, Calif., for construction of a Municipal Natatorium. Est. cost $67,000. 7-3

OAKLAND, CALIF.—Bids to 10:30 a.m., July 16, by County Clerk, Oakland, for furn. and const. yielding barriers and spring bumpers for the Park Street Bridge. Est. cost $15,000. 6-25

STOCKTON, CALIF.—Bids to 2 p.m., July 16, by Ohm & Raab, 109 E. Weber Ave., Stockton, for leveling, ditching and checking about 196 acres of land, located about 17 mi. S. of Stockton, for Pac. States Saving & Loan Co. This is a tractor job, but will require some Fresno Scraper Work. 7-3

PORTLAND, ORE.—Bids to 3 p.m., June 24, by U. S. Engineer Office, Portland, for furn. and delivering at Government Moorings No. 8010 N.W. St. Helens Road, Portland, Ore., one 28-ft. wooden runabout hull, under Invit. No. 698-35-685. 6-20

BIDS RECEIVED

GLASGOW, MONT.—Identical low bids of $120,000 submitted by Tomlinson-Arkwright Const. Co., 312 1st National Bank Bldg., Great Falls, Mont., and David Levison, Glasgow, Mont., to Division Engineer, Missouri River Division, Kansas City, Mo., for loading 500,000 cu. yd. stone from stockpiles into railroad cars. 6-17

CONTRACTS AWARDED

MONTEREY, CALIF.—To Wm. A. Degen, 2055 Santa Clara Ave., Alameda, $5232 to Signal Corps Officer, Presidio of Monterey, Calif., for installation of underground telephone conduit system at Presidio of Monterey. 6-8

SAN FRANCISCO, CALIF.—To Piombo Bros. & Co., 1571 Turk Street, San Francisco, $123,880 to Public Utilities Comm., San Francisco, for constructing field fill for extension of Landing Field at San Francisco Airport, under Contract No. 34. 6-12

MARE ISLAND, CALIF.—To Fred W. Snook Co., 596 Clay Street, San Francisco, $17,792, by Navy Yard, Mare Island, Calif., for furn. and inst. necessary apparatus to equip 4 boilers, Nos. 11 to 14 inclusive, to natural gas operation and for furnishing (but not installing) necessary apparatus to equip two boilers Nos. 9 and 10 for natural gas operation, all in Central Power Plant Bldg., 121, Mare Island, under Spec. No. 7920. 6-17

BERKELEY, CALIF.—To Ransome Co., 4030 Hollis St., Emeryville, $6202 by Bd. of Regents, Univ. of Calif., Berkeley, for const. 6 tennis courts on U. C. Campus, consist. of asph. concr. base course and sheet asph. playing surface. 6-25

EQUIPMENT and MATERIALS SECTION

This is a directory of products made by manufacturers whose advertisements appear in this issue of *Western Construction News*. If you do not find what you want, write for further information to *Western Construction News*, 114 Sansome Street, San Francisco, California.

On the following pages will be found the "Where to Buy in the West" section; and an alphabetical index of advertisers is on the last page of this issue.

Asphalt
Union Oil Co. of Calif.

Backfillers
Austin-Western Road Mchy. Co.
Harnischfeger Corp.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Batchers, Concrete Aggregates
Western Pipe & Steel Co.

Bins, Storage and Hopper
Chain Belt Co.
Western Pipe & Steel Co.

Bits, Rock Drilling
Ingersoll-Rand Co.

Blades, Grader and Scraper
Adams, J. D., Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.
Galion Iron Works & Mfg. Co.

Blasting Supplies
Apache Powder Co.
Atlas Powder Co.
Halafax Explosives Co.
Trojan Powder Co.

Bridges
Columbia Steel Co.

Buckets
Bucyrus-Erie Co.
Electrical Steel Foundry Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Northwest Engineering Co.
Page Engineering Co.
Wellman Engineering Co.

Bulldozers
Austin-Western Road Mchy. Co.
LeTourneau, R. G., Inc.

Cableways
Columbia Steel Co.
Leschen, A., & Sons Rope Co.

Castings Steel, and Alloy Steel
Electric Steel Foundry Co.

Cement
Pacific Portland Cement Co.
Portland Cement Association

Cement Pumping Equipment
Fuller Co.

Cement, Tan
Pacific Portland Cement Co.

Chemicals
Great Western Electro-Chemical Co.

Chlorinators
Wallace & Tiernan Co., Inc.

Chlorine
Great Western Electro-Chemical Co.

Clarifiers, Water
Hardinge-Western Co.
Link-Belt Co.

Commissaries
Threlkeld Commissary, Inc.

Compressors, Air
Ingersoll-Rand Co.

Conveyors, Belt
Jeffrey Manufacturing Co.
Link-Belt Co.

Cranes, Diesel, Electric, Gas and Steam
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Byers Machine Co.
Harnischfeger Corp.
Industrial Brownhoist Corp.
Koehring Co.
Lima Locomotive Works, Inc.
Link-Belt Co.
McKiernan-Terry Corp.
Northwest Engineering Co.
Thew Shovel Co.

Crushers
Austin-Western Road Mchy. Co.
Iowa Manufacturing Co.

Culverts
Austin-Western Road Mchy. Co.
Western Pipe & Steel Co.

Derricks, and Derrick Fittings
Harnischfeger Corp.
McKiernan-Terry Corp.

Drills, Rock
Ingersoll-Rand Co.

Dynamite
Apache Powder Co.
Atlas Powder Co.
Halafax Explosives Co.
Trojan Powder Co.

Elevators, Bucket
Jeffrey Manufacturing Co.
Link-Belt Co.

Engines, Diesel, Gasoline and Steam
Caterpillar Tractor Co.
Ingersoll-Rand Co.
International Harvester Co. of Am.

Equipment, Rebuilt
(See Opportunity Section)

Equipment for Rent
(See Opportunity Section)

Equipment, Used
(See Opportunity Section)

Excavators, Ditching and Trench
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Byers Machine Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Excavators, Dragline
Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Byers Machine Co.
Harnischfeger Corp.
Lima Locomotive Works, Inc.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Explosives
Apache Powder Co.
Atlas Powder Co.
Halafax Explosives Co.
Trojan Powder Co.

Ferric Chloride
Great Western Electro-Chemical Co.

Flumes, Metal
Western Pipe & Steel Co.

Flumes, Wood Stave
Federal Pipe & Tank Co.

Forms, Concrete
Western Pipe & Steel Co.

Gasoline
Union Oil Co. of Calif.

Generators, Electric
General Electric Co.

Generators, Turbine
Pelton Water Wheel Co.

Graders, Road
Adams, J. D., Co.
Allis-Chalmers Mfg. Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.
Galion Iron Works & Mfg. Co.

Gravel Plant Equipment
Austin-Western Road Mchy. Co.
Iowa Manufacturing Co.
Link-Belt Co.

Hoists, Diesel, Gas, Electric and Hand Power
Chain Belt Co.
Harnischfeger Corp.
Ingersoll-Rand Co.
Link-Belt Co.
McKiernan-Terry Corp.
Wellman Engineering Co.

Hoppers, Steel
Link-Belt Co.
Standard Steel Works

Hospital Service
National Hospital Association

Lighting Plants
General Electric Co.

Liner Plates
Western Pipe & Steel Co.

Loaders, Power, Truck and Wagon
Austin-Western Road Mchy. Co.
Galion Iron Works & Mfg. Co.
Link-Belt Co.

Locomotives
Fate-Root-Heath Co.
(Plymouth Locomotive Wks)

Lubricants, Oils and Greases
Union Oil Co. of Calif.

Lumber
Baxter, J. H., & Co.

Lumber, Redwood
California Redwood Assn.

Lumber, Treated
Baxter, J. H., & Co.
Reilly Tar & Chemical Corp.

Medical Service
National Hospital Assn.

Meters
Neptune Meter Co.

Mixers, Concrete
Chain Belt Co.
Koehring Co.

Motors, Electric
General Electric Co.

Paints, Protective
Barrett Co.
General Paint Corp.

Paving Breakers
Ingersoll-Rand Co.

Penstocks
Western Pipe & Steel Co.

Pile Drivers
Harnischfeger Corp.
Industrial Brownhoist Corp.
McKiernan-Terry Corp.

Piling, Creosoted
Baxter, J. H., & Co.

Piling, Steel
Columbia Steel Co.
Pacific Coast Steel Corp.

Piling, Wood
Baxter, J. H., & Co.

Pipe, Cast Iron
Pacific States Cast Iron Pipe Co.

Pipe, Riveted Steel
Western Pipe & Steel Co.

Pipe, Steel
Columbia Steel Co.
Western Pipe & Steel Co.

Pipe, Welded Steel
Columbia Steel Co.
Western Pipe & Steel Co.

Pipe, Wood
Federal Pipe & Tank Co.

Powder
(See Explosives)

Pumps
Chain Belt Co.
Layne & Bowler Co.
Pelton Water Wheel Co.
Pomona Pump Co.

Rails and Rail Specialties
Columbia Steel Co.

Reinforcing, Steel Bar and Fabric, for Concrete
Columbia Steel Co.

Road Oils
Union Oil Co. of Calif.

Rollers, Compacting
LeTourneau, R. G., Inc.

Rollers, Road
Austin-Western Road Mchy. Co.
Galion Iron Works & Mfg. Co.

Rope, Wire
Columbia Steel Co.
Leschen, A., & Sons Rope Co.

Scarifiers
Adams, J. D., Co.
Austin-Western Road Mchy. Co.
Caterpillar Tractor Co.
Galion Iron Works & Mfg. Co.
LeTourneau, R. G., Inc.

Scrapers
Adams, J. D., & Co.
Austin-Western Road Mchy. Co.
LeTourneau, R. G., Inc.

Tramways, Aerial

Columbia Steel Co.
Leschen, A., & Sons, Rope Co.

Trucks, Motor

International Harvester Co. of America
Marmon-Herrington Co., Inc.

Turbines

General Electric Co.
Pelton Water Wheel Co.

Valves, Gate

Pelton Water Wheel Co.

Vibrators, Concrete

Electric Tamper & Equipment Co.

Wagons and Trailers

Austin-Western Road Mchy. Co.
Koehring Co.
LeTourneau, R. G., Inc.

Water Wheels

Pelton Water Wheel Co.

Welding and Cutting Equipment

Adams, J. D., Co.
Harnischfeger Corp.

Screens, Sand and Gravel

Austin-Western Road Mchy. Co.
Iowa Manufacturing Co.
Link-Belt Co.
Standard Steel Works

Second Hand Equipment

(See Opportunity Section)

Sewage Disposal Apparatus

Chain Belt Co.
Link-Belt Co.
Wallace & Tiernan Co., Inc.

Sharpeners, Drill

Ingersoll-Rand Co.

Shovels, Power

Austin-Western Road Mchy. Co.
Bucyrus-Erie Co.
Byers Machine Co.
Harnischfeger Corp.
Koehring Co.
Lima Locomotive Works, Inc.
Link-Belt Co.
Northwest Engineering Co.
Thew Shovel Co.

Steel, Hollow Drill

Columbia Steel Co.
Ingersoll-Rand Co.

Steel, Reinforcing

Columbia Steel Co.
Pacific Coast Steel Corp.

Steel, Structural

Western Pipe & Steel Co.

Tanks, Metal

Western Pipe & Steel Co.

Tanks, Wood

Federal Pipe & Tank Co.

Tar

Barrett Co.
Reilly Tar & Chemical Corp.

Timber, Creosoted

Baxter, J. H., & Co.

Tires, Rubber

Goodrich, B. F., Co.

Tools, Pneumatic

Ingersoll-Rand Co.

Tractors

Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.
International Harvester Co. of America

. . . to Solve Your Equipment Problems . . .

The Equipment and Materials section of WESTERN CONSTRUCTION NEWS was designed for just that purpose. No matter what your needs may be, you are sure to find the solution to your problem among the products listed here. If you do not, let us know, for we welcome inquiries . . . it's a part of our service to you. Use these columns frequently . . . make it your market place. Remember . . . only reliable products can be advertised continuously.

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

WHERE TO BUY IN THE WEST

A directory of distributors and branch offices of the manufacturers whose advertisements appear in this issue of *Western Construction News*. Because of space limitations only the principal centers of the west are listed. If you do not find what you want, or the firm you want, write for further information to *Western Construction News*, 114 Sansome Street, San Francisco, California. In communicating with distributors or branch offices, please mention *Western Construction News*.

A directory of equipment and materials and an alphabetical index of advertisers will be found on the last pages of this issue.

Arizona

Phoenix

Arizona Cedar Rapids Co.,
401 North 1st St.
3-8205
Iowa Manufacturing Co.

Arizona Tractor & Equipment Co.,
138 South First Ave.
3-1146
Bucyrus-Erie Co.
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Fuller, W. P., & Co.,
117 East Jackson St.
4-2123
Reilly Tar & Chemical Corp.

General Electric Company,
441 West Madison St.
3-6139

Goodrich, B. F., Co.,
2nd St. and Van Buren
3-6168

McGinnis, Neil B., Company,
1401 South Central Ave.
4-1493
Adams, J. D., Co.
Allis-Chalmers Mfg. Co.
Mall Tool Co.
Northwest Engineering Co.

Mine & Smelter Equipment Co.,
110 South 3rd Ave.
3-6418
Link-Belt Co.
Page Engineering Co.

Motor Supply Co.,
315 North Central Ave.
4-1153
Homestead Valve Manufacturing Co.

Pratt-Gilbert Hardware Co.,
701 South Seventh St.
3-5145
Apache Powder Co.
Ingersoll-Rand Co.
Koehring Co.
Leschen, A., & Sons Rope Co.

Southwest Equipment Co.,
528 West Jefferson St.
3-2986
Marmon-Herrington Co., Inc.

Stapley, O. S., Company,
723 Grand Ave.
4-1116
Austin-Western Road Machinery Co.
International Harvester Co. of America

Torson Construction Co.,
220 South 7th Ave.
Electric Tamper & Equipment Co.

Union Oil Co. of Calif.,
Grand Ave. at Six Points
3-1181

Western Pipe & Steel Co.,
611 South Dunlap Ave.
3-5602

Tucson

Baum & Adamson,
296 North Stone Ave.
4050
Goodrich, B. F., Co.

Corbett, J. Knox, Lumber & Hdw. Co.,
340 North Sixth Ave.
2140
Austin-Western Road Machinery Co.

Fuller, W. P., & Co.,
219 East Congress St.
2278
Reilly Tar & Chemical Corp.

Ronstadt Hdw. & Mchy. Co.,
92 East Broadway
680
Galion Iron Works & Mfg. Co.
International Harvester Co. of Am.

Steinfeld, Albert, & Co.,
119 North Stone Ave.
882
Apache Powder Co.

Threlkeld Commissary, Inc.,
P. O. Box 1881

Union Oil Company,
901 East 16th St.
799

California

Los Angeles

Adams, J. D., Company,
1202 Mateo Street
TRinity 8381
Adams, J. D., Co.
International Harvester Co. of Am.

Atlas Powder Co.,
805 Title Guarantee Bldg.
MIchigan 8896

Austin-Western Road Mchy. Co.,
4400 District Boulevard
KImball 4156

Barrett Co.
1136 South Hayworth Ave.
YOrk 1559

Bevis Machinery Co.,
3649 Santa Fe Ave.
KImball 4149
Industrial Brownhoist Corp.
Marmon-Herrington Co., Inc.

Brown-Bevis Equipment Co.,
4900 Santa Fe Ave.
JEfferson 5221
Chain Belt Co.
Electric Tamper & Equipment Co.
Ingersoll-Rand Co.
Page Engineering Co.

Chain Belt Co.,
1414 Santa Fe Ave.
TRinity 6237

Collins, Harry C., Machinery Co.,
1919 Santa Fe Ave.
Fate-Root-Heath Co.
Link-Belt Co.

Crook Company,
2900 Santa Fe Ave.
KImball 5137
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.

Electric Steel Foundry Co.,
2205 Santa Fe Ave.
JEfferson 4191

Fuller Company
1041 South Olive St.

Fuller, W. P., & Co.,
135 North Los Angeles St.
TRinity 0711
Reilly Tar & Chemical Corp.

Garlinghouse Bros.,
2416 East 16th St.
JEfferson 5291
Byers Machine Co.
Leschen, A., & Sons Rope Co.
Mall Tool Co.
McKiernan-Terry Corp.

General Electric Company,
5201 Santa Fe Ave.
LAfayette 0961

General Paint Corp.,
544 Mateo St.
TRinity 4941

Goodrich, B. F., Co.,
1000 East 8th St.
TRinity 1075

Halafax Explosives Co.,
810 South Spring St.
TRinity 8528

Harnischfeger Sales Corp.,
2025 Santa Fe Ave.
MAdison 2444

Harron, Rickard & McCone Co.,
2205 Santa Fe Ave.
JEfferson 4191
Electric Steel Foundry Co.
Harnischfeger Corp.—Welders
Koehring Co.
Wellman Engineering Co.

Ingersoll-Rand Co.,
1460 East Fourth St.
ANgelus 6761

International Harvester Co. of Am.,
734 Lawrence St.
TRinity 5132

Layne & Bowler Corp.,
900 Santa Fe Ave.
TRinity 2543

Link-Belt Company,
361 South Anderson St.
ANgelus 6171

Neptune Meter Company,
701 East Third St.
TRinity 2879

Northwest Engineering Co.,
3707 Santa Fe Ave.
JEfferson 2196

Pacific Portland Cement Co.,
633 East Gage Ave.

Portland Cement Association
816 West 6th St.
MIchigan 9897

Reilly Tar & Chemical Corp.,
Architects Building
MUtual 0433

Rix Company, Inc., The,
810 Santa Fe Ave.
TRinity 4134
Page Engineering Co.
Thew Shovel Co.

Shepherd Tractor & Equipment Co.,
150 West Jefferson St.
PRospect 0247
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Smith Booth Usher Company
2001 Santa Fe Ave.
TRinity 6911
Galion Iron Works & Mfg. Co.
Homestead Valve Mfg. Co.
Iowa Manufacturing Co.
Lima Locomotive Works, Inc. (Shovel and Crane Division)
Page Engineering Co.

Standard Steel Works,
5001 Boyle Ave.
LAfayette 1138

St. John, A. S., Co., Inc.
126 West Third St.
VAndike 8865

Apache Powder Co.
Stevenson Chemical Co.,
641 Gibbons St.
Gt. Westn. Electro-Chemical Co.

Threlkeld Commissaries, Inc.
720 North Spring St.
MIchigan 0856

Victor Welding Equipment Co.,
2032 Santa Fe Ave.
JEfferson 6246
General Electric Company

Wallace & Tiernan Company,
3923 West Sixth St.
FEderal 6823

Western Pipe & Steel Co.,
5717 Santa Fe Ave.
JEfferson 3131

Oakland

Allis-Chalmers Mfg. Co.,
(Tractor Division)
2533 Peralta Ave.
GLencourt 2530

Bates, Sam, Co.,
1925 Dennison St.
ANdover 4327
Page Engineering Co.

Fuller, W. P., & Co.,
259 10th St.
GLencourt 0167
Reilly Tar & Chemical Corp.

Goodrich, B. F., Co.,
254 23rd St.
GLencourt 1803

Industrial Equipment Co.,
Outer Harbor
GLencourt 5909
Bucyrus-Erie Co.
Chain Belt Co.

International Harvester Co. of Am.,
1640 East 12th St.
ANdover 5700

Link-Belt Co.,
526 Third St.
HIgate 4286

Mall Tool Co.,
2308 Webster St.
TEmplebar 6878

Pacific Electric Motor Co.,
10th and Oak Sts.
GLencourt 1844
General Electric Co.

Robinson Tractor Co.,
1705 East 12th St.
FRuitvale 2485
Caterpillar Tractor Co.

Union Oil Co. of Calif.,
516 18th St.
GLencourt 6440

Sacramento

Fuller, W. P., & Co.,
1013 12th St.
Main 6890
Reilly Tar & Chemical Corp.

Goodrich, B. F., Co.,
12th and I Sts.
Main 454

Sacramento Tractor & Equipment Co.,
1730 16th St.
Capitol 1065
Allis-Chalmers Mfg. Co.

Threlkeld Commissary, Inc.,
420 M Street
Capitol 2622

Union Oil Co. of Calif.,
Calif State Life Bldg.
Capitol 2400

Weaver-Rye Tractor Co., Inc.,
1715 2nd St.
Main 4100
Caterpillar Tractor Co.

Western Pipe & Steel Co.,
c/o Sutter Club ... ...
Main 217

Where to Buy in the West

San Diego

Fuller, W. P., & Co.,
803 7th Ave.
Main 0181
Reilly Tar & Chemical Corp.

General Electric Co.,
206 W. Market St.
Main 4288

Goodrich, B. F., Co.,
7th and Market Sts.
Franklin 6258

Hazard-Gould & Co.,
Fifth and K Sts.
Main 6174
Allis-Chalmers Mfg. Co.

International Harvester Co. of Am.,
1482 Broadway
Franklin 1550

San Diego Tractor & Equipment Co.,
701 First Ave.
Main 6151
Caterplilar Tractor Co.

Southern Machinery Co.,
666 State St.
Franklin 6388
Ingersoll-Rand Co.

Union Oil Co. of Calif.,
1521 National Ave.
Franklin 3144

San Francisco

Adams, J. D., Co.,
230 Utah St.
UNderhill 5120
Adams, J. D., Co.
International Harvester Co. of Am.

Associated Equipment Co., Ltd.,
355 Fremont St.
KEarny 1181
Thew Shovel Co.

Atlas Powder Co.,
1 Montgomery St.
GArfield 8640

Austin-Western Road Mchy. Co.,
435 Brannan St.
DOuglas 2183

Bacon, Edward R., Co.,
17th and Folsom Sts.
HEmlock 3700
Allis-Chalmers Mfg. Co.
Byers Machine Co.
Homestead Valve Mfg. Co.
Iowa Mfg. Co.
Mall Tool Co.
McKiernan-Terry Corp.
Page Engineering Co.

Bucyrus-Erie Co.,
989 Folsom St.
GArfield 8192

California Redwood Association,
Financial Center Bldg.
EXbrook 7880

Chain Belt Co.,
909 Harrison St.
GArfield 1438

Fuller Co.,
742 Phelan Bldg.

Fuller, W. P., & Co.,
301 Mission St.
EXbrook 7151
Reilly Tar & Chemical Corp.

Garfield & Co.,
Hearst Bldg.
SUtter 1036
Fate-Root-Heath Co.
Industrial Brownhoist Corp.
Link-Belt Co.

General Electric Co.,
235 Montgomery St.
DOuglas 3740

General Paint Corp.,
2627 Army St.

ATwater 5100
Goodrich, B. F., Co.,
11th and Howard Sts.
UNderhill 1801

Great Western Electro-Chemical Co.,
9 Main St.
GArfield 8323

Harnischfeger Sales Corp.,
82 Beale St.
DOuglas 2313

Harron, Rickard & McCone Co.,
2070 Bryant St.
ATwater 2202
Electric Steel Foundry Co.
Koehring Co.
Wellman Engineering Co.

Ingersoll-Rand Co.,
350 Brannan St.
GArfield 6330

International Harvester Co. of Am.,
201 Potrero Ave.
HEmlock 6681

Jenison Machinery Co.,
900 Tennessee St.
VAlencia 1710
Chain Belt Co.
Galion Iron Works & Mfg. Co.

Knapp, J. E., Co.,
593 Market St.
GArfield 4783
Ingersoll-Rand Co.

Kratz & McClelland, Inc.,
522 Bryant St.
SUtter 6807
Electric Tamper & Equipment Co.

Leschen, A., & Sons Rope Co.,
520 Fourth St.
GArfield 8134

Link-Belt Co.,
400 Paul Ave.
DElaware 6400

Neptune Meter Co.,
320 Market St.
GArfield 8144

Northwest Eigineering Co.,
255 Tenth St.
HEmlock 5060

Pacific Pipe Co.,
207 Folsom St.
EXbrook 6255

Pacific Portland Cement Co.,
111 Sutter St.
GArfield 4100

Pacific States Cast Iron Pipe Co.,
Rialto Bldg.
KEarny 5075

Portland Cement Association
564 Market St.
SUtter 8159

Robinson Tractor Co.,
1175 Howard St.
MArket 8020
Caterpillar Tractor Co.

Thew Shovel Co.,
355 Fremont St.
KEarny 1181

Threlkeld Commissary, Inc.,
720 Matson Bldg.
DOuglas 0330

Union Oil Co. of Calif.,
220 Montgomery St.
SUtter 1400

Victor Welding Equipment Co.,
844 Folsom St.
GArfield 5727
General Electric Co.

Wallace & Tiernan Co., Inc.,
171 Second St.
KEarny 5072

Welding Service, Inc.,
954 Howard St.
DOuglas 3292
Harnischfeger Corp.—Welders

Western Machinery Co.,
760 Folsom St.
EXbrook 4167
Ingersoll-Rand Co.

Western Pipe & Steel Co.,
444 Market St.
GArfield 6788

Western Traction Co.,
355 Fremont St.
KEarny 1181
Marmon-Herrington Co., Inc.

Young, A. L., Machinery Co.,
26 Fremont St.
SUtter 5736
Lima Locomotive Works, Inc.

Colorado

Denver

Atlas Powder Co.,
401 Midland Savings Bldg.
Bostwick, Frederick H.,
Denver Natl. Bank Bldg.
TAbor 5744

Western Pipe & Steel Co.
Cederberg, C. R.
5531 East 14th Ave.
YOrk 0604
Wallace & Tiernan Co., Inc.

Clinton & Held Co.,
1637 Wazee St.
TAbor 3291
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Corson, Ray, Machinery Co.,
1646 Wazee St.
KEystone 6632
Bucyrus-Erie Co.
Chain-Belt Co.
Page Engineering Co.

Denver Metal & Machinery Co.,
130 Larimer St.
TAbor 6178
Ingersoll-Rand Co.

Fair, Elton T., Co.,
1646 Wazee St.
TAbor 1685
Adams, J. D., Co.

Fitzgerald, Paul,
U. S. Natl. Bank Bldg.
TAbor 1841
Fate-Root-Heath Co.
Harnischfeger Corp.—Welders

General Electric Co.,
650 17th St.
KEystone 7171

Goodrich, B. F., Co.,
14th and Glenarm Sts.
KEystone 0175

Hendrie & Bolthoff Mfg. & Supply Co.,
1639 17th St.
KEystone 4111
General Electric Co.

Hoskins Beatty Motor Co., Inc.,
1147 Broadway
MAin 3271
Marmon-Herrington Co., Inc.

Ingersoll-Rand Co.,
1637 Blake St.
KEystone 2245

International Harvester Co. of Am.,
2308 15th St.
GAllup 0138

Leschen, A., & Sons Rope Co.,
1554 Wazee St.
MAin 1366

Liberty Trucks & Parts Co., Inc.,
615 East 18th Ave.
MAin 3241
Austin-Western Road Machinery Co.

Link-Belt Co.,
Boston Bldg.
MAin 0231

Mine & Smelter Supply Co.,
1422 17th St.
KEystone 3111
McKiernan-Terry Corp.
Northwest Engineering Co.

Moore Hardware & Iron Co.,
1529 15th St.
TAbor 2251
Harnischfeger Corp.—Welders

Moore, H. W., Equipment Co.,
Sixth and Acoma Sts.
TAbor 1361
Galion Iron Works & Mfg. Co.
International Harvester Co. of Am.
Iowa Manufacturing Co.
Thew Shovel Co.
Wellman Engineering Co.

Neptune Meter Co.,
1700 15th St.
MAin 3221

Pacific States Cast Iron Pipe Co.,
1921 Blake St.
MAin 0697

Rocky Mountain Equipment Co.,
1620 Wazee St.
Byers Machine Co.

Steinbarger, Herbert N., Co.,
1711 Market St.
MAin 3460
Lima Locomotive Works, Inc.

Threlkeld Commissary, Inc.,
1427 16th St.
TAbor 6869

Wilson Machinery Co.,
1936 Market St.
TAbor 0135
Allis-Chalmers Mfg. Co.

Idaho

Boise

Bunting Tractor Co.,
926 Front St.
2649
Caterpillar Tractor Co.

Feenaughty Machinery Co.,
9th and Grove Sts.
1333
Galion Iron Works & Mfg. Co.
Thew Shovel Co.

General Electric Co.,
906 East Bannock St.
368

Intermountain Equipment Co.
Broadway and Myrtle St.
171
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Chain Belt Co.
General Electric Co.
Ingersoll-Rand Co.
LeTourneau, R. G., Inc.
Page Engineering Co.

Jeter, F. A.,
1116 North 18th St.
2612
Austin-Western Road Machinery Co.

Northwest Machinery Co.,
710 Front St.
38
Marmon-Herrington Co., Inc.

Olson Mfg. Co.,
214 South 5th St.
4277
Leschen, A., & Sons Rope Co.

Stockton-Regan, Inc.,
10th and Grove Sts.
78
Goodrich, B. F., Co.

Montana

Billings

Allis-Chalmers Mfg. Co.,
25th and Fourth Aves.

Austin-Western Road Mchy. Co.,
2413 First Ave. N.

Connelly Machinery Co.,
2706 Montana Ave.
Bucyrus-Erie Co.
Byers Machine Co.
Caterpillar Tractor Co.
Homestead Valve Mfg. Co.
Leschen, A., & Sons Rope Co.
LeTourneau, R. G., Inc.

Freeman Auto Service
Goodrich, B. F., Co.

International Harvester Co. of Am.,
20 South Broadway

Midland Implement Co.,
2300 Montana Ave.
Koehring Co.
Page Engineering Co.

Petrie, D. R.,
11 North 29th St.
Iowa Manufacturing Co.

Butte

Atlas Powder Co.,
412 West Broadway
2-4868

Daugherty, H. H.,
420 South Idaho St.
3884
Bucyrus-Erie Co.

General Electric Co.,
20 West Granite St.
5479

Hall-Perry Machinery Co.,
812 East Iron St.
6376
Chain Belt Co.
Galion Iron Works & Mfg. Co.
Marmon-Herrington Co., Inc.
Page Engineering Co.
Thew Shovel Co.

Ingersoll-Rand Co.,
420 E. Iron St.
2-3903

Lowney & Williams,
202 South Montana St.
3352
Goodrich, B. F., Co.

Montana Hardware Co.,
823 South Montana St.
2-1295
Ingersoll-Rand Co.

Wright, S. P., & Co., Inc.,
48 East Broadway
2-3221
Lima Locomotive Works, Inc.

Great Falls

Connelly Machinery Co.,
315 2nd Street S.
Bucyrus-Erie Co.
Byers Machine Co.
Caterpillar Tractor Co.
Homestead Valve Mfg. Co.
Leschen, A., & Sons Rope Co.
LeTourneau, R. G., Inc.

International Harvester Co. of Am.,
422 Second St. S.
7621

Northwest Equipment Co., Inc.,
Great Northern Tracks
3982
Koehring Co.

Taylor Chevrolet Co.,
802 Central Ave.
8467
Goodrich, B. F., Co.

Viles, Fred M.,
1003 2nd Ave. N.W.
4755
Allis-Chalmers Mfg. Co.

Missoula

Mountain States Tractor & Mchy. Co.
Allis-Chalmers Mfg. Co.

Star Garage
Goodrich, B. F., Co.

Wells, Walker J.
Austin-Western Road Machinery Co.

Westmont Tractor & Equipment Co.,
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Leschen, A., & Sons Rope Co.
LeTourneau, R. G., Inc.
Wellman Engineering Co.

Where to Buy in the West

Nevada

Reno

Bell, O. C.,
649 John Fremont St.
Reno 4043
Adams, J. D., Co.

Collier Tractor & Equipment Co.,
502 East Fourth St.
Reno 6107
Caterpillar Tractor Co.
Harnischfeger Corp.
LeTourneau, R. G., Inc.

Flanigan Warehouse Co.,
408 Eureka St.
Reno 3852
Western Pipe & Steel Co.

Hinckley Tire Service, Inc.,
145 West 2nd St.
Reno 6792
Goodrich, B. F., Inc.

Scott Hall Motor Co., Ltd.,
South Virginia and Ryland Sts.
Reno 4126
Allis-Chalmers Mfg. Co.

Union Oil Co. of Calif.,
107 East 4th St.
Reno 3661

New Mexico

Albuquerque

Calhoun Independent Oil Co.,
1801 North 4th St.
3516
Goodrich, B. F., Co.

Harrison, R. L., Co., Inc.,
211 North 4th St.
3300
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Chain Belt Co.
Iowa Manufacturing Co.
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Wellman Engineering Co.

McChesney-Rand Equipment Co.
Adams, J. D., Co.
Thew Shovel Co.

Morrow & Co.,
1025 North 4th St.
4017
Galion Iron Works & Mfg. Co.
Marmon-Herrington Co., Inc.

Santa Fe

Santa Fe Motor Co.
Goodrich, B. F., Co.

McChesney-Rand Equipment Co.
Adams, J. D., Co.
Thew Shovel Co.

Oregon

Klamath Falls

Locke Motor Co.,
522 South 6th St.
49
Goodrich, B. F., Co.

Lorenz Co.,
Sixth and Broad Sts.
371
Ingersoll-Rand Co.

Miller Tractor & Equipment Co.,
719 Market St.
314
Caterpillar Tractor Co.

Union Oil Co. of Calif.,
Sixth and Market Sts.
776-W

Portland

Allis-Chalmers Mfg. Co.,
(Tractor Division)
106 Citizens Bank Bldg.
EAst 1181

Atlas Powder Co.,
833 Pacific Bldg.
BEacon 2845

Balzer Machinery Co.,
1636 S.E. Sixth Ave.
EAst 5609
Byers Machine Co.

Chain Belt Co.,
215 S.W. First Ave.
ATwater 0091

Clyde Equipment Co.,
1631 N.W. Thurman St.
BRoadway 5561
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Electric Tamper & Equipment Co.

Cramer Machinery Co.,
Lewis Bldg.
ATwater 3852
Iowa Manufacturing Co.
Koehring Co.

Electric Steel Foundry Co.,
2458 N.W. York St.
BEacon 6344

Feenaughty Machinery Co.,
112 S.E. Belmont St.
EAst 2187
Galion Iron Works & Mfg. Co.
LeTourneau, R. G., Inc.
Page Engineering Co.
Thew Shovel Co.

General Electric Co.,
621 S.W. Alder St.
ATwater 0281

General Paint Corp.,
838 S.W. 2nd Ave.
ATwater 5205

Goodrich, B. F., Co.,
Union and Stark Sts.
EAst 4148

Gordon & Finkbeiner Co.,
112 S.W. Pine St.
ATwater 9401
Ingersoll-Rand Co.

Haag, A. C., & Co.,
931 S.E. Sixth Ave.
EAst 2388
Adams, J. D., Co.

Haseltine, J. E., & Co.,
115 S.W. Second Ave.
ATwater 7511
General Electric Co.

Howard-Cooper Corp.,
307 S.E. Hawthorne Ave.
EAst 8188
International Harvester Co. of Am.
McKiernan-Terry Corp.

Industrial Pressure Cleaners, Inc.,
N.W. 29th and Nicolai
BEacon 9100
Homestead Valve Mfg. Co.

International Harvester Co. of Am.,
56 S.E. Belmont St.
EAst 6158

Leschen, A., & Sons Rope Co.,
Foot of S.W. Sheridan St.
ATwater 7425

Link-Belt Co.,
1637 N.W. 14th Ave.
ATwater 6481

Loggers & Contractors Machinery Co.,
211 S.E. Madison St.
EAst 4128
Caterpillar Tractor Co.
Chain Belt Co.
Fate-Root-Heath Co.
Wellman Engineering Co.

National Hospital Association,
400 Mohawk Bldg.
ATwater 5291

Neptune Meter Co.,
1519 N.W. Johnson St.
BRoadway 0100

Pacific Portland Cement Co.,
701 Lewis Bldg.
ATwater 6656

Pacific States Cast Iron Pipe Co.,
Spaulding Bldg.
ATwater 5465

Threlkeld Commissary, Inc.,
Couch Bldg.
BRoadway 6195

Union Oil Co. of Calif.,
Yeon Bldg.
ATwater 9521

Western Loggers Mchy. Co.,
302 S.W. 4th Ave.
ATwater 7491
Harnischfeger Corp.—Welders

Western Steel & Equipment Co.,
734 N.E. 55th Ave.
TAbor 2370
Lima Locomotive Works, Inc.

Texas

El Paso

Car Parts Depot, Inc.,
810 Texas St.
Main 9000
Harnischfeger Corp.—Welders
Ingersoll-Rand Co.

General Electric Co.,
109 North Oregon St.
Main 5500

Goodrich, B. F., Co.
501 Texas St.
Main 262

Industrial Motor Service Co.,
2227 Texas St.
Main 167
Allis-Chalmers Mfg. Co.

Ingersoll-Rand Co.,
1015 Texas St.
Main 1617

International Harvester Co. of Am.,
409 Main St.
Main 2314

Momsen-Dunnegan-Ryan Co.,
800 East Overland St.
Main 7100
Apache Powder Co.

Sheehan & Co.,
1530 East Missouri St.
Main 305
Byers Machine Co.

Threlkeld Commissary, Inc.,
106 Kemp St.
Main 147

Tri-State Equipment Co.,
500 East Overland St.
Main 1507
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Chain Belt Co.
Iowa Manufacturing Co.
LeTourneau, R. G., Inc.
McKiernan-Terry Corp.
Wellman Engineering Co.

Zork Hardware Co.,
309 North El Paso St.
Main 1040
Leschen, A., & Sons Rope Co.

Utah

Salt Lake City

Ambler & Ritter,
Kearns Bldg.
Wasatch 1132
Thew Shovel Co.

Arnold Machinery Co.,
149 West Second South St.
Wasatch 8973
Byers Machine Co.
Chain Belt Co.
Northwest Engineering Co.
Page Engineering Co.

Atlas Powder Co.,
822 Continental Natl. Bank Bldg.
Wasatch 4027

Eastern Iron & Metal Co.,
634 South Fourth West St.
Wasatch 1118
Ingersoll-Rand Co.

Galigher Company,
228 South West Temple St.
Wasatch 900
General Electric Co.

General Electric Co.,
200 S. Main St.
Wasatch 735

Goodrich, B. F., Co.,
131 East First South St.
Wasatch 5024

Ingersoll-Rand Co.,
51 West South Temple St.
Wasatch 8682

International Harvester Co. of Am.,
435 West Fourth South St.
Wasatch 1617

Jones, C. H., Co.,
134 Pierpont Ave.
Wasatch 2580
Galion Iron Works & Mfg. Co.
Lima Locomotive Works, Inc.

Landes Tractor & Equipment Co.,
245 West South Temple St.
Wasatch 4020
Caterpillar Tractor Co.
Harnischfeger Corp.—Welders and Hoists
LeTourneau, R. G., Inc.

Where to Buy in the West

Lang Company, The,
267 West First South St.
Wasatch 6693
Austin-Western Road Machinery Co.
International Harvester Co. of Am.

Lund Machinery Co.,
49 North Second West St.
Wasatch 5581
Adams, J. D., Co.
Iowa Manufacturing Co.
Koehring Co.

National Equipment Co.,
101 West Second South St.
Wasatch 1722
Wellman Engineering Co.

Smoot Machinery Co.,
165 East Fourth South St.
Wasatch 1050
Marmon-Herrington Co., Inc.

Waterworks Equipment Co.,
149 West Second South St.
Wasatch 2465
Neptune Meter Co.
Pacific States Cast Iron Pipe Co.

Western Machinery Co.,
260 South Sixth West St.
Wasatch 3907

Ingersoll-Rand Co.
Z. C. M. I.,
351 Z. C. M. I. Ave.
Wasatch 1010
Leschen, A., & Sons Rope Co.

Washington

Seattle

Armstrong, H. J., Co.,
2244 First Ave. S.
ELliott 5940
Leschen, A., & Sons Rope Co.
Lima Locomotive Works, Inc.
Page Engineering Co.

Atlas Powder Co.,
1320 Jos. Vance Bldg.
MAin 5110

Chain Belt Co.,
530 First Ave. S.
MAin 7051

Clyde Equipment Co.,
3410 First Ave. S.
MAin 1235
Allis-Chalmers Mfg. Co.
Bucyrus-Erie Co.
Electric Tamper & Equipment Co.

Cox, A. H., & Co., Inc.,
1757 First Ave. S.
MAin 1121
Austin-Western Road Machinery Co.
Chain Belt Co.
Fate-Root-Heath Co.
Homestead Valve Mfg. Co.
Link-Belt Co.
Wellman Engineering Co.

Electric Steel Foundry Co.,
2724 First Ave. S.
ELliott 1084

Federal Pipe & Tank Co.,
5332 24th Ave. N.W.
SUnset 5878

Feenaughty Machinery Co.
1028 Sixth Ave. S.
ELliott 7808
Galion Iron Works & Mfg. Co.
LeTourneau, R. G., Inc.
Page Engineering Co.
Thew Shovel Co.

General Electric Co.,
821 Second Ave.
MAin 9790

General Paint Corp.,
1406 Dearborn St.
PRospect 7600

Goodrich, B. F., Co.,
535 First Ave. S.
MAin 8080

Harnischfeger Sales Corp.,
2911 First Ave. S.
MAin 5576

Haseltine, J. E., & Co.,
440 Holgate St.
SEneca 0626
General Electric Co.

Howard-Cooper Corp.,
1520 Fourth Ave. S.
ELliott 0740
International Harvester Co. of Am.
McKiernan-Terry Corp.

Ingersoll-Rand Co.
526 First Ave. S.
MAin 2436

International Harvester Co. of Am.,
916 Maynard Ave.
MAin 7337

Larrabee, B. C., & Co.,
1st and Hudson Sts.
GLendale 2805
Iowa Manufacturing Co.

Lima Locomotive Works, Inc.,
(Shovel and Crane Division)
2244 First Ave. S.
ELliott 5940

Link-Belt Co.,
820 First Ave. S.
ELliott 5554

Mall Tool Co.,
202 Office Appliance Bldg.

Pacific Hoist & Derrick Co.,
3200 Fourth Ave. S.
ELliott 1860
Marmon-Herrington Co., Inc.
Northwest Engineering Co.

Pacific Portland Cement Co.,
1871 16th Ave. S.W.
ELliott 4033

Portland Cement Association,
903 Seaboard Bldg.
SEneca 0916

Purcell, Hugh G., Co.,
Colman Bldg.
MAin 6835
Industrial Brownhoist Corp.

Reilly Tar & Chemical Corp.,
Central Bldg.
SEneca 1191

Rental Machinery Co.,
1531 Utah St.
MAin 1123
Ingersoll-Rand Co.

Service Equipment Co.,
1036 Sixth Ave. S.
MAin 2882
Byers Machine Co.

Snow, L. A., Co.,
1032 Sixth Ave. S.
ELliott 4188
Koehring Co.

Union Oil Co. of Calif.,
2901 Western Ave.
MAin 1251

Wallace & Tiernan Co., Inc.,
917 Terminal Sales Bldg.
MAin 0201

Western Tractor & Equipment Co.,
2230 First Ave. S.
MAin 5180
Caterpillar Tractor Co.

Spokane

Adams, J. D., Co.,
E. 14 Main St.
Main 3995

Allis-Chalmers Mfg. Co.,
S. 151 Madison St.
Main 4226

Atlas Powder Co.,
1131 Old Natl. Bank Bldg.
Main 4733

Austin-Western Road Mchy. Co.,
N. 1405 Ash St.
Broadway 1294

Bucyrus-Erie Co.,
1805 Ninth Ave.
Construction Equipment Co.,
1118 Ide
Broadway 5076
Chain Belt Co.
Fate-Root-Heath Co.
Wellman Engineering Co.

Feenaughty Machinery Co.,
N. 715 Division St.
Broadway 5606
Galion Iron Works & Mfg. Co.
Page Engineering Co.
Thew Shovel Co.

General Electric Co.,
421 Riverside Ave.
Main 5201

General Machinery Co.,
E. 3501 Riverside Ave.
Lakeview 1134

General Paint Corp.,
715 First St.
Main 2166

Goodrich, B. F., Co.,
829 Second St.
Riverside 0064

Harnischfeger Sales Corp.,
S. 1314 Bernard St.
Main 6805

Howard-Cooper Corp.,
134 Spokane International Rt. of Way
Main 1812
International Harvester Co. of Am.
McKiernan-Terry Corp.

Hofius-Ferris Equipment Co.,
728 Mallon Ave.
Broadway 1954
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

Hughes & Co.,
S. 119 Howard St.
Main 4277
Neptune Meter Co.
International Harvester Co. of Am.,
S. 121 Monroe St.
Main 1271

Nott-Atwater Co.,
S. 157 Monroe St.
Main 4377
Leschen, A., & Sons Rope Co.

Snow, L. A., Co.,
S. 151 Madison St.
Main 4226
Allis-Chalmers Mfg. Co.
Koehring Co.

Union Oil Co. of Calif.,
Chronicle Bldg.
Main 3266

Washington Mchy. & Supply Co.,
9 Cataldo St.
Broadway 0390

Tacoma

General Electric Co.,
1019 Pacific Ave.
MAin 2882

Goodrich, B. F., Co.,
21st and Pacific Ave.
Main 9173

International Harvester Co. of Am.,
102 Puyallup Ave.
BRoadway 2423

Union Oil Co. of Calif.,
2907 South Ainsworth St.
BRoadway 3215

Wyoming

Cheyenne

Allied Equipment Co.,
608 West 18th St.
Allis-Chalmers Mfg. Co.

Carrolls, Geo., Scout Super Service,
202 East Lincoln Highway
4312
Goodrich, B. F., Co.

International Harvester Co. of Am.,
701 West 17th St.
3343

Moss, Glenn,
423 West 19th
Austin-Western Road Machinery Co.

Wortham Machinery Co.,
410 West 19th St.
4649
Caterpillar Tractor Co.
LeTourneau, R. G., Inc.

OPPORTUNITY SECTION

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.

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

OPPORTUNITY SECTION

OFFICIAL BIDS

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Public Roads

Placing Bituminous Treated Crushed Gravel, Tioga Road, Yosemite National Park

San Francisco, California, July 3, 1935.

Sealed bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p.m. on July 25, 1935, for placing a bituminous treated crushed gravel base course on Section C1 of Route 4, Tioga Road, Yosemite National Park, Tuolumne County, California, involving major items of approximately 2,000 cubic yards unclassified excavation, 1,500 cubic yards unclassified excavation for structures, 1,000 cubic yards hauling unclassified excavation, 5,000 lineal feet 8 inch underdrain pipe, 1,100 cubic yards crushed rock or gravel for backfill, 1,100 square yards underdrain backfill seal, 11.613 miles fine grading subgrade and shoulders, 11,200 cubic yards subgrade reinforcement, 32,600 cubic yard miles hauling subgrade reinforcement, 1,700 M. gals. watering, 35,500 tons untreated base aggregate, 21,000 tons bituminous treated base aggregate, 1,200 tons stone screenings, 470 tons supplemental base aggregate, 145 tons liquid asphaltic material Type M.C. 2, 950 tons liquid asphaltic material Type M.C. 4 or M.C. 5, 95 tons liquid asphaltic material Type R.C. 2. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for intermediate labor and 60 cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the *subletting* and *assignment* of the contract and to the *alternate* bids which must be submitted in case the bidder desires to offer any *foreign* articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California. C. H. SWEETSER, District Engineer.

UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Reclamation

(Federal Emergency Administration of Public Works Project)

Construction of Seminoe Dam and Power Plant, Casper-Alcova Project

Washington, D. C., June 15, 1935.

Sealed bids (Specifications No. 630) will be received at the office of the U. S. Bureau of Reclamation, Casper, Wyoming, until 10 a. m., July 22, 1935, and will at that hour be opened for furnishing labor and materials and performing all work for the **construction of Seminoe dam and power plant, Casper-Alcova** project, Wyoming. The work is located near Casper, Wyoming. The principal items of work and estimated quantities involved are as follows: 541,500 cubic yards of all classes of open-cut excavation; 22,000 cubic yards of tunnel excavation; 5,600 cubic yards of back fill; 1,000 cubic yards of riprap; 330 cubic yards of rubble masonry; 190,340 cubic yards of concrete; 90 cubic yards of porous concrete; 29,600 cubic feet of pressure grouting; drilling 28,100 linear feet of grout; drainage, weep, and anchor bar holes; placing 2,550,000 pounds of reinforcement bars and fabric; constructing 610 linear feet of 4-inch to 12-inch diameter sewer pipe drains; manufacturing and placing 7,000 linear feet of porous concrete drain-tile; installing 397,000 pounds of metal pipe and fittings; installing 1,002,000 pounds of gates and appurtenances; installing 339,000 pounds of power penstock and outlet pipes; installing 1,542,000 pounds of needle valves and miscellaneous metalwork; installing 8,400 square feet of asphalt-saturated felt roofing; installing 25,700 linear feet of electrical conduit; installing 10,000 linear feet of electrical cable for testing apparatus; furnishing, installing, and operating a concrete cooling plant; and transporting 30,000 hundredweight of freight for the Government. This invitation for bids does not cover the purchase of materials which are to be furnished by the Government. Materials to be furnished by the contractor and those furnished by the Government are described in the specifications which will be a part of the contract. The work must be completed within 950 days. 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 $5.00, not returnable. For particulars, address the Bureau of Reclamation, Casper, Wyoming; Denver, Colorado; or Washington, D. C.

ELWOOD MEAD, Commissioner.

OFFICIAL BIDS

230-Kv Transmission Line

Los Angeles, California

Subject to the conditions set forth in the official Notice Inviting Bids dated June 20, 1935, a copy of which may be obtained at the address herein stated, sealed proposals for constructing approximately 237 miles of 230-kv transmission line will be received by The Metropolitan Water District of Southern California at its office building, 306 West Third Street, Los Angeles, California, until 10:00 a.m., August 20, 1935. The work is located between the Boulder Dam power plant and the Colorado River aqueduct pumping plants designated as Iron Mountain, Eagle Mountain, Hayfield and Gene.

Bids are invited for constructing the line under one of four alternative schedules as follows:

Schedule 1—With hollow copper conductors, the District to furnish the steel for towers in accordance with District's design.

Schedule 2—With steel reinforced aluminum conductors, the District to furnish the steel for towers in accordance with the District's design.

Schedule 3—With hollow copper conductors, the Contractor to furnish the steel for towers in accordance with the Contractor's design.

Schedule 4—With steel-reinforced aluminum conductors, the Contractor to furnish the steel for towers in accordance with the Contractor's design.

The amount of the certified or cashier's check that must accompany each proposal shall be $50,000.00 for proposals including bids on Schedules 1 and 2 only, and $100,000.00 for proposals including bids on Schedules 3 or 4. The amount of the faithful performance bond required of a bidder to whom contract is awarded should be not less than 50 per cent of the estimated aggregate amount of the payments to be made under the contract. A bidder to whom contract is awarded must also furnish a materialmen and laborer's bond as required by the California Statutes, and pay not less than the prevailing rates of per diem wages set forth in the Notice Inviting Bids referred to above.

Printed copies of plans and specifications for the work may be purchased from the District, express charges prepaid, for $5.00 per copy, which payment will in no event be refunded.

THE METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

By F. E. WEYMOUTH,
General Manager and Chief Engineer.

UNITED STATES DEPARTMENT OF AGRICULTURE

Bureau of Public Roads

Grading Section B, Route 81, Mammoth Lakes Nat. Forest

San Francisco, California, July 8, 1935.

Sealed Bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California until 2:00 o'clock p. m. on July 30, 1935, for grading Section B of Route 81, the Mammoth Lakes National Forest Highway, Inyo National Forest, Mono County, California. The length of the project is 2.200 miles. The principal items of work are approximately as follows: 16 acres clearing, 40,800 cu. yds. unclassified excavation, 650 cu. yds. unclassified excavation for structures, 29,000 cu. yds. unclassified excavation for borrow, 22,000 sta. yds. overhaul, 10,300 cu. yd. miles borrow haul, 2.190 miles finishing earth graded road, 95 cu. yds. concrete, 17,900 lbs. reinforcing steel, 377 cu. yds. cement rubble masonry, 916 lin. ft. corrugated metal pipe, 1 each spillway inlets, 1 each steel grates, 50 cu. yds. hand-laid riprap, 500 cu. yds. hand-laid rock embankment, 450 lin. ft. log guardrail, 135 lin. ft. log rail for bridge, 110 lin. ft. log stringers, 725 lin. ft. protection ditch, 28 each culvert markers, 4 each right of way monuments. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for intermediate labor and 60 cents per hour for un-

OPPORTUNITY SECTION

OFFICIAL BIDS

skilled labor. The attention of bidders is especially directed to the provisions covering the *subletting* and *assignment* of the contract; and to the *alternate* bids which must be submitted in case the bidder desires to offer any *foreign* articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

UNITED STATES DEPARTMENT
OF AGRICULTURE

Bureau of Public Roads

Grading Section A, Route 81, Mammoth Lakes Nat. Forest

San Francisco, California, July 8, 1935.

Sealed Bids will be received at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California, until 2:00 o'clock p. m. on July 30, 1935, for grading Section A of Route 81, Mammoth Lakes National Forest Highway, Inyo National Forest, Mono County, California. The length of the project is 6.823 miles and involves major items of approximately: 27 acres clearing; 133,400 cubic yards unclassified excavation; 1,700 cubic yards unclassified excavation for structures; 29,600 cubic yards unclassified excavation for borrow; 255,000 station yards overhaul; 16,200 cubic yard miles borrow haul; 6.812 miles finishing earth graded road; 167 cubic yards concrete; 20,530 pounds reinforcing steel; 307 cubic yards cement rubble masonry; 2,918 lineal feet corrugated metal pipe; 9 each spillway inlets; 10 each steel grates; 87 cubic yards hand-laid riprap; 400 lineal feet log guardrail; 150 lineal feet log rail for bridge; 120 lineal feet log stringers; 2,650 lineal feet protection ditch; 102 each culvert markers; 26 each right of way monuments. The minimum wage paid labor employed on this project shall be in accordance with the classified labor rates attached to the specifications of which the minimum is $1.00 per hour for skilled labor, 68 cents per hour for intermediate labor and 60 cents per hour for unskilled labor. The attention of bidders is especially directed to the provisions covering the *subletting* and *assignment* of the contract and to the *alternate* bids which must be submitted in case the bidder desires to offer any *foreign* articles, materials or supplies. Where copies of plans and specifications are requested a deposit of $10 will be required to insure their return. If these are not returned within 15 days after opening of bids the deposit will be forfeited to the Government. Checks should be certified and made payable to the Regional Fiscal Agent, U. S. Forest Service. Plans, specifications and proposals may be obtained at the office of the Bureau of Public Roads, 807 Sheldon Building, 461 Market Street, San Francisco, California.

C. H. SWEETSER, District Engineer.

UNITED STATES DEPARTMENT
OF THE INTERIOR

Bureau of Reclamation

(Federal Emergency Administration
of Public Works Project)

Structural Steel Transmission Towers for Boulder Power Plant

Washington, D. C., July 2, 1935.

Sealed bids (Specifications No. 634) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 2 p.m., August 2, 1935, and will at that hour be opened, for furnishing and delivering f.o.b. cars at the shipping point or f.o.b. cars at Boulder City, Nevada; structural steel transmission towers and switchyard structures for circuits nos. 2, 4, and 5 at the Boulder Power Plant, Boulder Canyon Project, Arizona-California-Nevada. The structures will be erected by the Government. No charge for specifications to prospective bona fide bidders; to others, $2.00, not returnable. For particulars, address the Bureau of Reclamation, Denver, Colorado, or Washington, D. C.

ELWOOD MEAD, Commissioner.

METROPOLITAN WATER DISTRICT

Construction of Cajalco Dam and Dyke

Los Angeles, California, July 6, 1935.

Bids will be received until 1 p.m., August 12, by Metropolitan Water District, 306 W. 3rd St., Los Angeles, for constructing Cajalco Dam and dyke and appurtenant features of the Cajalco storage reservoir, under Spec. No. 112.

Work is located about 10 miles S.W. from the City of Riverside, RIVERSIDE COUNTY.

Work comprises excavation and lining of diversion and outlet tunnels 9 and 14 ft. in diameter, and 2000 and 2565 ft. in length, respectively; construction of an earthfill dam crest, length 2584 ft. and a maximum height of about 194 ft.; an earthfill dyke with a crest length of 7574 ft. and maximum height of about 90 ft., spillway, outlet tower and bridge supports; excavation of an approach channel to the outlet tower.

Specifications obtainable from Metropolitan Water District.

UNITED STATES DEPARTMENT
OF THE INTERIOR

Bureau of Reclamation

(Federal Emergency Administration
of Public Works Project)

Structural Steel Towers, Switchyard Structures, Boulder Dam

Washington, D. C., July 2, 1935. Sealed bids (Specifications No. 634) will be received at the office of the Bureau of Reclamation, Denver, Colorado, until 2 p.m., August 2, 1935, and will at that hour be opened, for furnishing and delivering f.o.b. cars at the shipping point or f.o.b. cars at Boulder City, Nevada; structural steel transmission towers and switchyard structures for circuits Nos. 2, 4 and 5 at the Boulder Power Plant, Boulder Canyon Project, Arizona-California-Nevada. The structures will be erected by the Government. No charge for specifications to prospective bona fide bidders; to others, $2.00, not returnable. For particulars, address the Bureau of Reclamation, Denver, Colorado, or Washington, D. C.

ELWOOD MEAD, Commissioner.

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