WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED
WESTERN HIGHWAYS BUILDER

PUBLISHED MONTHLY
VOLUME XV, No. 9

SEPTEMBER • 1940

25 CENTS A COPY
$2.00 PER YEAR

IN THIS ISSUE

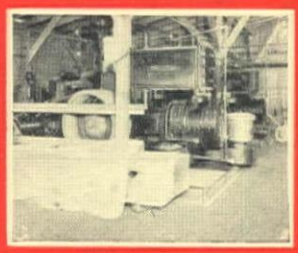
CLEAN FEET insure proper compaction on Green Mountain dam, the second largest and highest structure of rolled earthfill construction, being built by the Bureau of Reclamation on the Blue River in Colorado.

Contractors Report
OUTSTANDING RESULTS

...at Possum-Kingdom Dam Project

THE POSSUM-KINGDOM DAM on the Brazos River near Mineral Wells, Texas. Construction by C. F. Lytle and Al. Johnson, and R. W. Briggs & Co. . . . lubricated by Texaco.

BRIGGS' Allis-Chalmers 40" x 42" Jaw Crusher handled 325,000 yds. of aggregate in 14 months, without a bearing adjustment. *Texaco Marfak* used.



THESE TWO Sullivan Balanced Angle Air Compressors are subjected to heavy loading, yet are always up to maximum efficiency. *Texaco Algol Oil* is given full credit for its part in this performance.

SHOVELS AND TRUCKS operated by R. W. Briggs & Co. are always at peak, lubricated with *Texaco Marfak, Thuban, Crater.*

RUSHING completion of the Possum-Kingdom Dam Project, Mineral Wells, Texas, the C. F. Lytle and Al. Johnson Construction Co., and R. W. Briggs & Co. have enjoyed long, continuous service from their equipment.

Both of these contracting firms freely give credit to the lubricants used . . . TEXACO.

In 14 months, a big jaw crusher has handled 325,000 cu. yds. of concrete aggregate without need of a bearing adjustment. It is lubricated with *Texaco Marfak.*

On shovels, draglines and "Cats" they have had similar success . . . using *Texaco Ursa, Marfak, Thuban,* and *Crater.*

In 3 big air compressors operated by Lytle & Johnson Construction Co., *Texaco Algol Oil* keeps valves active and ports clean, resisting gumming and hard carbon formation. What little carbon forms is soft, fluffy, harmless.

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

The Texas Company, 135 E. 42nd St., New York, N. Y.

•

Texaco Dealers invite you to tune in The Texaco Star Theatre—starring Kenny Baker and Frances Langford—Every Wednesday Night—Columbia Network. 9:00 E.D.T., 8:00 E.S.T., 8:00 C.D.T., 7:00 C.S.T., 6:00 M.S.T., 5:00 P.S.T.

TEXACO

REG. T. M.

TEXACO ALCAID, ALGOL, AND URSA OILS

And now listen— and the last one a Model

EVADA ROCK & SAND CO. INC. Reno, Nevada

NEVADA ROCK & SAND CO., INC.
RENO, NEVADA

THE Nevada Rock & Sand Co., Inc., bought their first Northwest in 1922—the last a Model 20, ¾ yd. shovel. five more—the last a Model 20, ¾ yd. shovel.
The job above shows the excavation of a ditch for a 200 ft. subway, well for the protection of a desert road from it, subway. This was dug in an hour's time while the machine was moving from one part of the job to another.
One out of every three Northwests is a repeat order proving that Northwests are bought on the basis of the satisfaction they give and the profit they earn.

NORTHWEST ENGINEERING COMPANY
1747 Steger Building
28 E. Jackson Blvd., Chicago, Illinois

Makes it

THERE is no better testimonial to the kind of service you are looking for than repeat orders year after year from responsible contractors.

8

NORTHWEST ... and Larger
Built in a Range of 18 SIZES ...

NORTHWESTS

NORTHWEST ENGINEERING COMPANY
1747 Steger Bldg., 28 E. Jackson Blvd.
Chicago, Illinois

NORTHWEST SALES AGENTS

BUILT to help you earn MORE MONEY!

MONTANA
Hall-Perry Machinery Company
802 Iron St., Butte

NEW MEXICO
Contractors Equipment & Supply Company
Springer Bldg., Albuquerque

COLORADO
The Mine & Smelter Supply Co.
1422 17th St., Denver

SHOVELS — CRANES — DRAGLINES — PULLSHOVELS

10

DA Sand and Rock Company knows what rock work
—and they know what Northwests can do. That's why
have been 9 repeat orders for a total of ten Northwests
his well-known western company.

hey are going to prove what a real 1 yard shovel can
ith a new Northwest Model 41. Here is speed, power,
lity, easy upkeep and good appearance in a package that
rd to beat. Northwest features give a bidding advan-
on your competition—the Dual Independent Crowd and
Northwest Welded Boom (and no Northwest Welded Boom
ever failed) make it a real Rock Shovel.

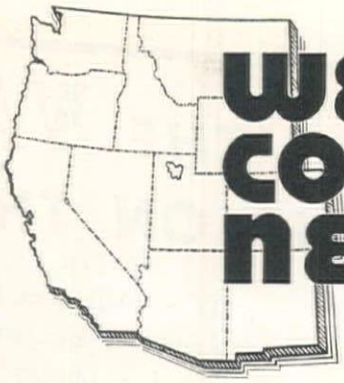
ou are in the market for a 1 yd. shovel, crane or dragline,
sure to find out all about this one.

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

NORTHWEST ENGINEERING COMPANY
1736 Steger Building, 28 East Jackson Boulevard, Chicago, Illinois

OFFICES: 255 Tenth Street, San Francisco, California; 1234 - 6th Avenue, South, Seattle, Washington; 7 Santa Fe Avenue, Los Angeles, California; J. L. Farrell, 2450 So. Milwaukee, Denver, Colorado

ST SALES AGENTS: BALZER MACHINERY CO., 2136 S. E. 8th Ave., Portland, Oregon; ARNOLD MACHY. CO., INC., 149 W. 2nd South St., Salt Lake City, Utah; HALL-PERRY MACHY. CO., 802 Iron Street, Butte, Montana.



WESTERN CONSTRUCTION NEWS

WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

J. I. BALLARD, Editor

Late News...

WARREN Southwest, Inc., Los Angeles, Calif., submitted the low bid of $382,000 to the port manager of Long Beach, Calif., for construction of a 1,300-ft. wharf at the east end of channel No. 3.

•

Puget Sound Construction Co., Seattle, Wash., submitted the low bid of $3,131,606 to the U. S. Engineer office at Bonneville, Ore., for construction of the concrete powerhouse foundation, including intake, retaining walls and cofferdams, for power units 7, 8, 9 and 10 at Bonneville dam east of Portland, Ore.

•

H. Earl Parker, Marysville, Calif., submitted the low bid of $248,964 to the U. S. Engineer office, Sacramento, Calif., for enlarging and setting back levees along the west side of Sutter bypass from the Butte Slough outfall gates to Long Bridge in Sutter County, California.

•

Bids will be opened on Oct. 2, by the California Division of Highways, Sacramento, for construction of a steel truss swing bridge across the Mokelumne River about 5 mi. west of Terminous. Items listed in the proposal include 2,258 cu. yd. of structural concrete, 1,892,000 lb. of structural steel, 37,100 lin. ft. of Douglas fir piles both treated and untreated, and 8,755 lin. ft. of 24-in. precast concrete piles.

•

The Salt River Project Agricultural Improvement and Power District, Phoenix, Ariz., has scheduled a vote on a $2,500,000 bond issue for September 12. The funds would provide for construction of wells, pumps, canals, steam-electric generating plant and transmission line designed to furnish additional water in the Salt River area.

SUBSCRIPTION RATES

The annual subscription rate is $2 in the United States and foreign countries where extra postage is not required. To Canada and to foreign countries where extra postage is necessary the annual rate is $3. Single copies 25 cents.

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ABC

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you can MAKE MORE PROFIT on long hauls WITH TOURNAPULLS

This Revolutionary New Earth-moving Unit Gives You Speed of a Truck . . . Pull of a Tractor

MADE IN THREE SIZES
CAPACITIES FROM 11
TO 45 YARDS HEAPED

One of four C Tournapulls improving Des Moines, Iowa, Airport. These four moved 200 loads of 7 pay yards or better on a 4800-foot round trip haul in 5 hours, 40 minutes.

ALERT CONTRACTORS COUNTRY OVER . . . turn to TOURNAPULLS

One of two C Tournapulls working for D. B. Hill, Wynne, Arkansas. In 10 hours they delivered 193 loads on round trip haul of approximately 8000 feet.

One of two A Tournapulls and Tournatrailers hauling 30 yards per load for Harrison Construction Company at Johnstown, Pennsylvania. These outfits, on a 4300-foot one-way haul, make a complete cycle—load, haul, dump, and return—in 20.8 minutes.

One of five C Tournapulls on A. W. Hodgkiss job at Rapid River, Michigan. On 2.5 mile round trip haul, these outfits averaged 32 trips each 7-hour shift, and maintained a speed of 11.4 m.p.h., including loading and dumping time.

In addition to the above, Tournapulls are now speeding up earthmoving for successful contractors in Oregon, California, New York, Canada, Minnesota, Oklahoma, South Carolina, Tennessee, Colorado, Illinois, Georgia, Florida and Virginia.

Tournapulls take up where tractors leave off—operate with job-proved LeTourneau Carryalls, specially designed for Tournapull operation—travel at speeds that enable you to stretch the profits of scraper operation to long-haul earthmoving.

ELIMINATE COSTLY LOADING EQUIPMENT

Tournapulls get heaping loads quickly with a pusher, haul those loads at truck speeds, spread on the fill in even layers like any LeTourneau Carryall. You save money because there's no need for costly loading or spreading equipment. You save time because there's no waiting in line for a shovel. One fast-moving, self-propelled unit—the Tournapull—loads, hauls, spreads.

EASY TO OPERATE

Operators quickly get the hang of handling Tournapulls. The same positive, quick-acting Power Control Unit that makes Carryall loading and spreading so simple with tractors is used on Tournapulls. Shifting and steering differ but little from tractor operation.

Investigate this new money-making method of moving earth on long hauls. No other method available today moves so much yardage so fast and cheaply. Ask your LeTourneau-"Caterpillar" Dealer about Tournapulls—place your order NOW, make sure of early delivery.

LETOURNEAU

PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

For Lowest Net Cost per Yard-CARRYALL* SCRAPERS, ANGLEDOZERS*, CRANES, BULLDOZERS, POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, ROOTERS*, TREEDOZERS, TOURNAPULLS*, TOURNATRAILERS*. *Name Reg. U. S. Pat. Off.

MARION FEAT

ARE BASED ON YOUR PRE
MATERIAL HANDLING NE

Whether that job calls for a shovel, dragline, clamshell, crane or pull-shovel . . . whether the material to be handled at a profit is rock, shale, clay or dirt . . . Marion machines are designed and built to meet each situation with speed and economy. • MARION features provide every contractor-user and quarry operator with a well balanced, low maintenance, profitable machine. Watch a MARION in action . . . see it travel . . . check its performance and yardage records. This will convince you your next machine should be a MARION. » » » »

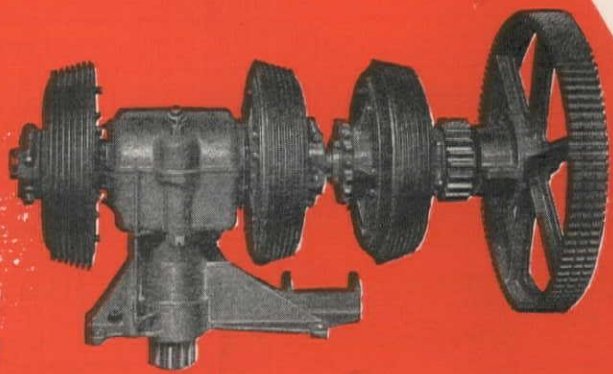
THE MARION STEAM SHOVEL CO.
MARION, OHIO, U. S. A.

MARION

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • PULL-SHOVELS • WALKERS

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

SELF-CLEANING, NON-CLOGGING CRAWLERS positively will not clog in any material or bind when moving over uneven surfaces.



VACUUM CONTROLLED ROTATING CLUTCHES of the cone type assure ease of operation . . smooth setting . . positive contact.

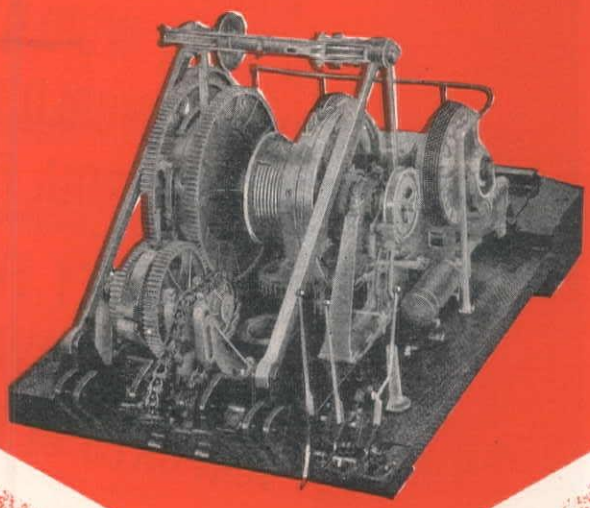
URES

SENT DAY EDS . . .

MODERNIZE with MARIONS

SIMPLE ARRANGEMENT OF GENERAL MACHINERY

Compactness, plus accessibility, ease of maintenance and operating simplicity.

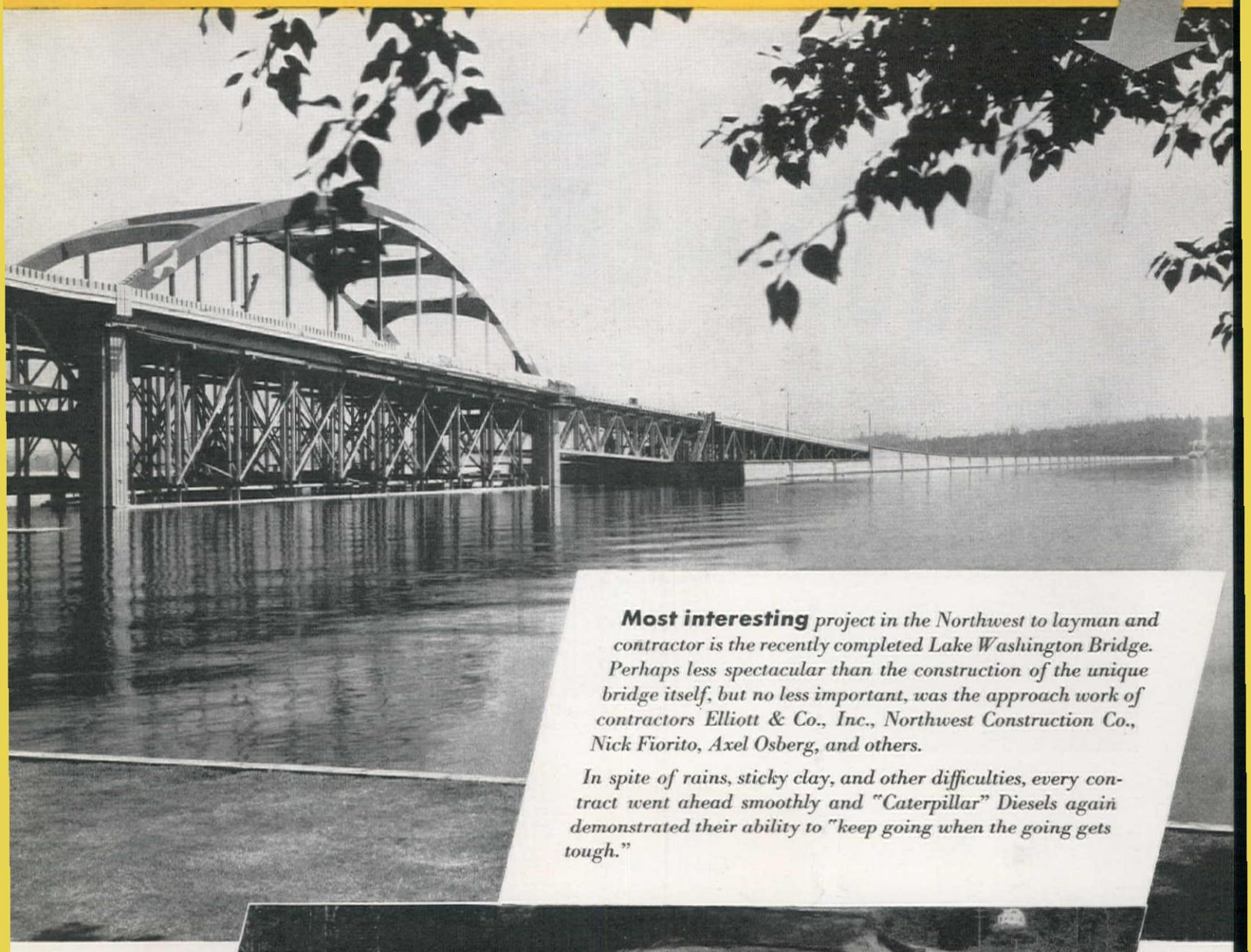


JUST TOUCH THE LEVER AND THE DIPPER TRIPS. Single lever control at the operator's station.

HORIZONTAL PROPELLING SHAFT includes the multiple jaw clutches for controlling the power to the crawler belts and the outside band chock brake that locks the machine against digging thrusts.

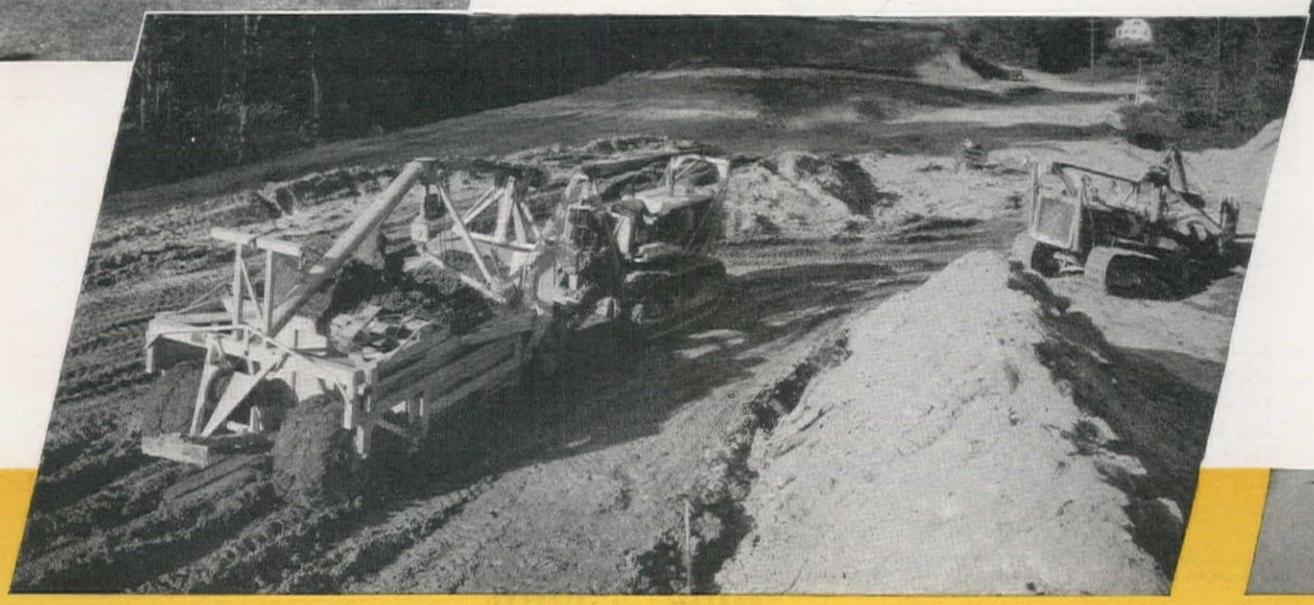
EASY STEERING—FAST TRAVEL

FLOATING BRIDGE



Most interesting *project in the Northwest to layman and contractor is the recently completed Lake Washington Bridge. Perhaps less spectacular than the construction of the unique bridge itself, but no less important, was the approach work of contractors Elliott & Co., Inc., Northwest Construction Co., Nick Fiorito, Axel Osberg, and others.*

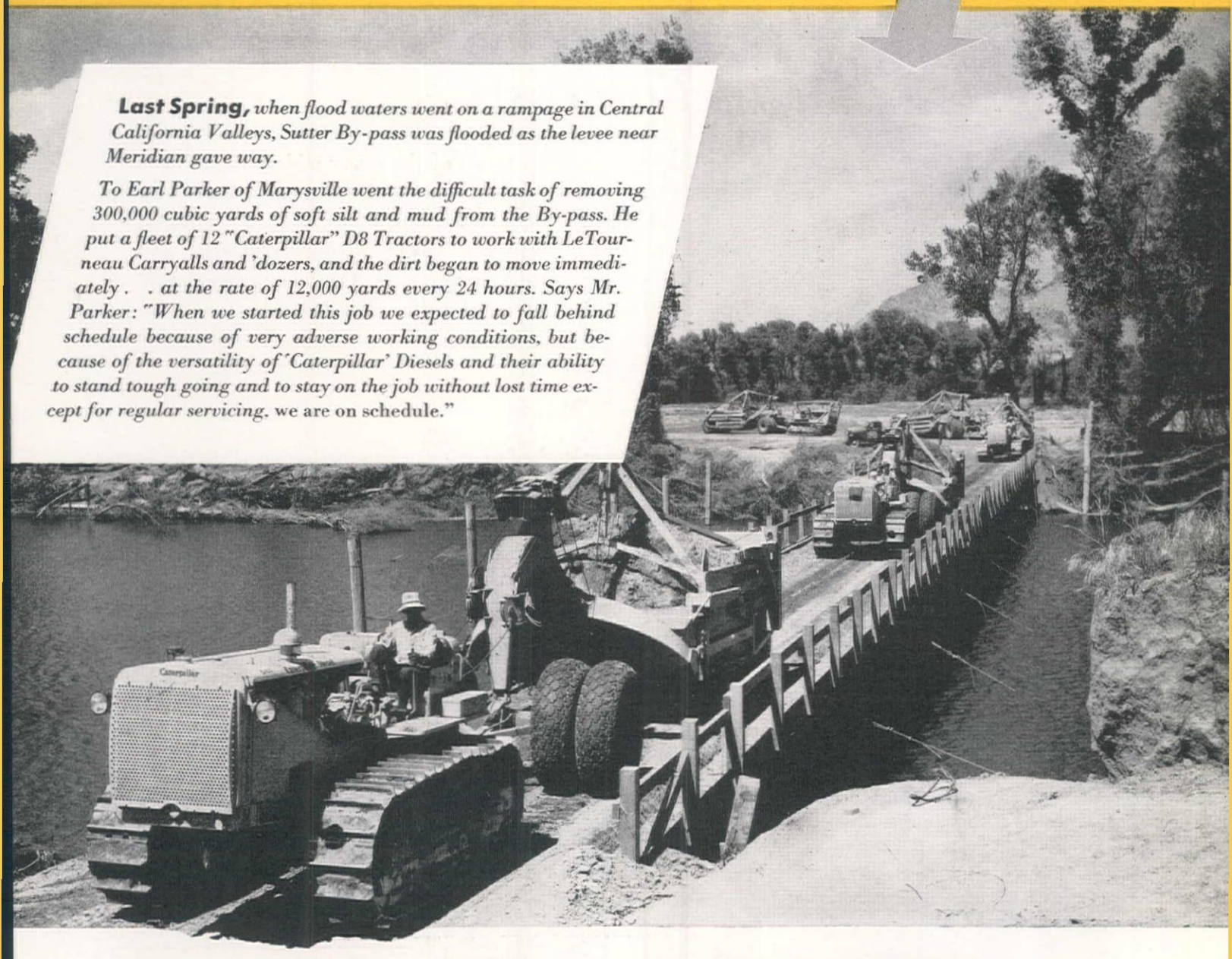
In spite of rains, sticky clay, and other difficulties, every contract went ahead smoothly and "Caterpillar" Diesels again demonstrated their ability to "keep going when the going gets tough."



CATERPILLAR TRACTOR CO. · SAN LEANDRO, CALIFORNIA · PEORIA, ILLINOIS

BROKEN LEVEE

How "Caterpillar" Diesels conquered adverse conditions on two important Western jobs



Last Spring, *when flood waters went on a rampage in Central California Valleys, Sutter By-pass was flooded as the levee near Meridian gave way.*

To Earl Parker of Marysville went the difficult task of removing 300,000 cubic yards of soft silt and mud from the By-pass. He put a fleet of 12 "Caterpillar" D8 Tractors to work with LeTourneau Carryalls and 'dozers, and the dirt began to move immediately . . . at the rate of 12,000 yards every 24 hours. Says Mr. Parker: "When we started this job we expected to fall behind schedule because of very adverse working conditions, but because of the versatility of 'Caterpillar' Diesels and their ability to stand tough going and to stay on the job without lost time except for regular servicing. we are on schedule."

When cuts get slippery and fills become sloppy, it takes the kind of balanced ample weight that is built into "Caterpillar" Diesel Tractors to keep tracks flat on the ground and each grouser pulling its share of the load.

Your "Caterpillar" Dealer will gladly show you how "Caterpillar" Diesels can fit into your work plans, how they can keep your job moving, rain or shine. Call him today . . . there's nothing to lose and there may be much to gain.

CATERPILLAR

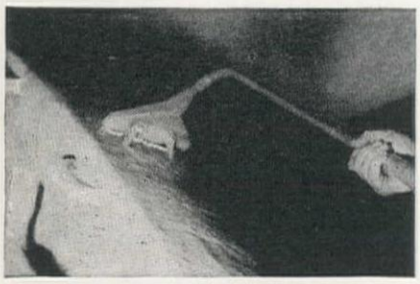
REG. U. S. PAT. OFF.

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

HOW LINDE PRODUCTS AND PROCESSES

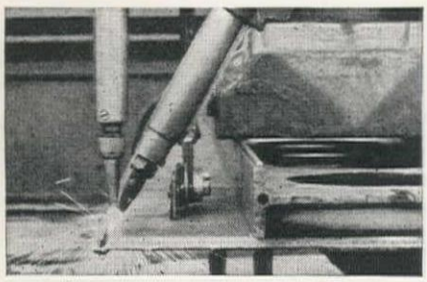
help speed up the job and lower construction costs . . . .

SHOWN HERE are some of the many widely used Linde processes that can help construction contractors speed up work and cut costs on bridges, dams, factories, tunnels, waterworks, highways, power plants, refineries, and many other engineering projects. They may suggest ways in which you can use them to advantage.



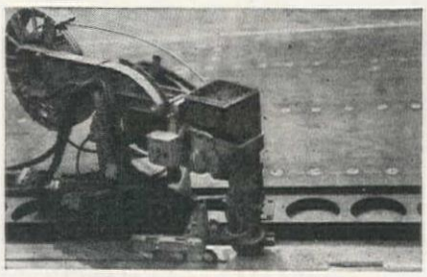
FLAME-CLEANING

Oxy-acetylene equipment can be used to remove scale from structural steel, castings, or forgings—quickly and economically. *Applied to metal before painting, this process helps prevent flaking of the paint at a later date.*



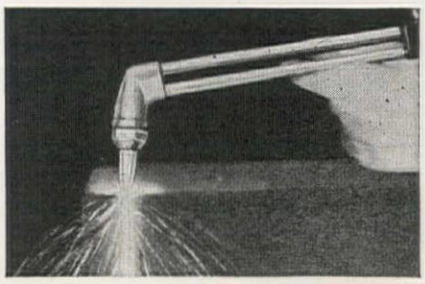
MACHINE FLAME-CUTTING

This process makes possible the rapid and economical production of steel shapes from stock of practically any commercially used thickness—or from stacks of plate. It is effectively used, too, for plate-edge preparation, prior to welding. For work on the job, small portable machines are available. For shop fabrication, larger stationary machines are often used advantageously. *This process is particularly valuable because you can avoid delays by fabricating what you need as you need it from stock steel.*



UNIONMELT WELDING

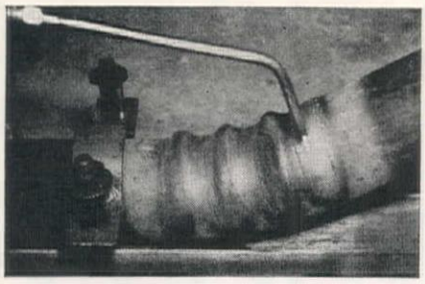
This remarkable electric process—available only from Linde—makes high-quality, one-pass welds in thin or heavy metal at remarkable speeds, with no flash, glare or sparks. It is particularly well adapted to production of derrick booms or other heavy structural members, fabrication of pressure vessels, fabrication of large diameter pipe, and similar work. *The "human element" is removed as a factor in getting good welds with Unionmelt welding, because once started, the weld progresses automatically.*



HAND-CUTTING

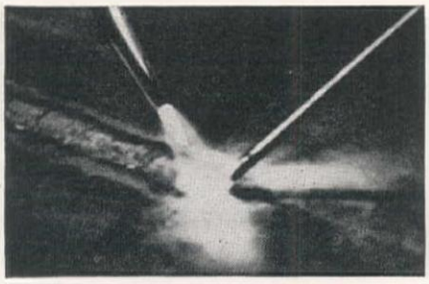
This process is used for cutting structural members to length, for scrapping operations, for cutting off concrete reinforcing bars, for cutting pipe, and for producing small steel parts used in maintenance and fabrication work. *With special nozzles, rivet removal by flame-cutting is made safer, faster, and less expensive.*

LINDE OXYGEN, HYDROGEN, NITROGEN • PREST-O-LITE ACETYLENE • UNION CARBIDE



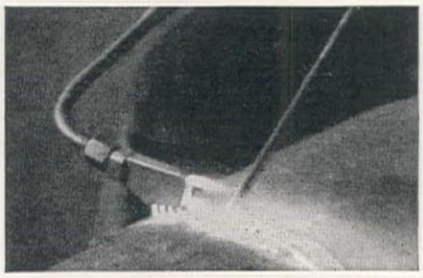
HEATING AND BENDING

The intense, easily-controlled heat of the oxy-acetylene flame makes it valuable for bending, straightening, and forming. *Wrinkle-bending, for example, produces smooth, sweeping pipe bends, without thinning the pipe wall or creating internal obstruction to flow.*



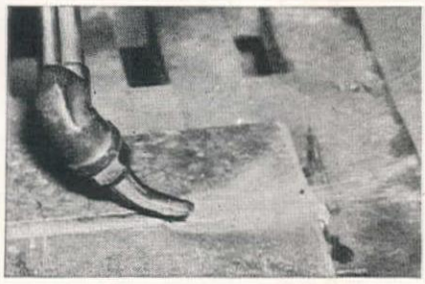
OXY-ACETYLENE WELDING

Because the oxy-acetylene flame is the hottest known, practically any metals—similar or dissimilar—can be joined so that the welds are stronger than the base metals themselves. *This universal process saves hundreds of thousands of dollars annually in maintenance and repair work alone.*



LINDEWELD PROCESS

Pipe or heavy plate can be joined by this process with impressive savings of time and materials. It is applied with an easily learned, special technique, using multi-flame welding heads. *Welds in pipe joined by the Lindeweld process are strong and ductile — stay leakproof and maintenance-free indefinitely.*



GOUGING

This relatively new Linde process rapidly cuts out a "groove" of surface metal, without harm to adjacent areas. It is used for removal of faulty or temporary welds, for correction of structural defects, for alteration of design on forgings or castings, and to provide clearance for moving parts. Applied by machine, gouging nozzles are valuable for plate-edge preparation. *This easily used process saves hours of grinding or chipping and sometimes salvages parts that otherwise would have to be scrapped.*

HARD-FACING

Parts subjected to severe abrasion, impact, or corrosion can be made to *last many times longer by applying Haynes Stellite alloys to the wearing surfaces.*

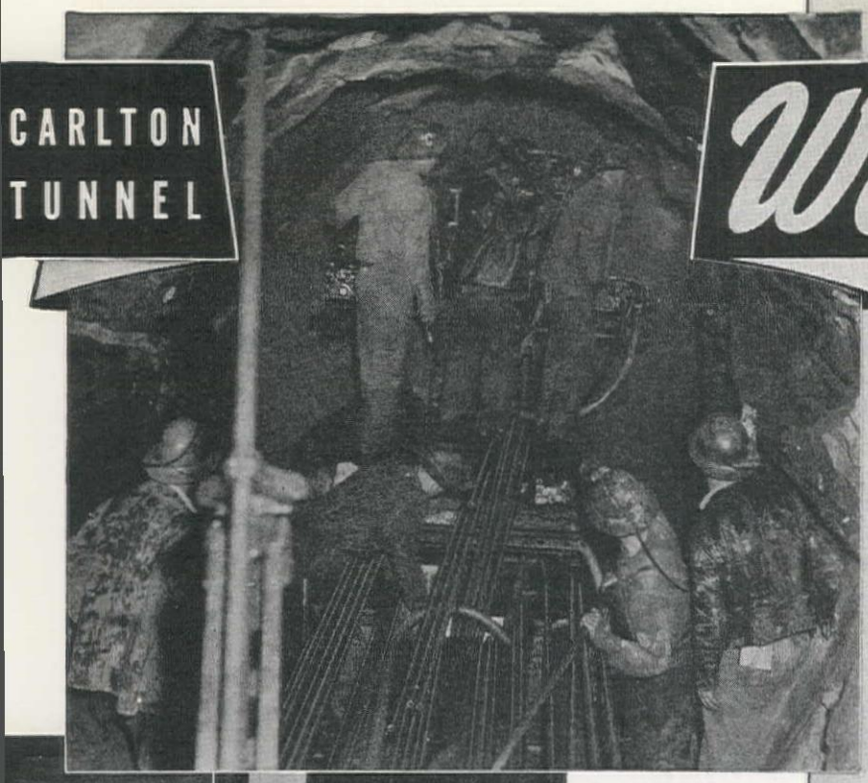
OXYGEN LANCE

To quickly sever extremely heavy sections of iron or steel—to remove gates or risers from heavy castings *—the oxygen lance is used with considerable savings in time and money.*

CARLTON TUNNEL

World's TWO

DRIVEN BY I-R



Two thousand miles apart, two tunnel-driving organizations are taking turns setting new records of progress for underground excavation.

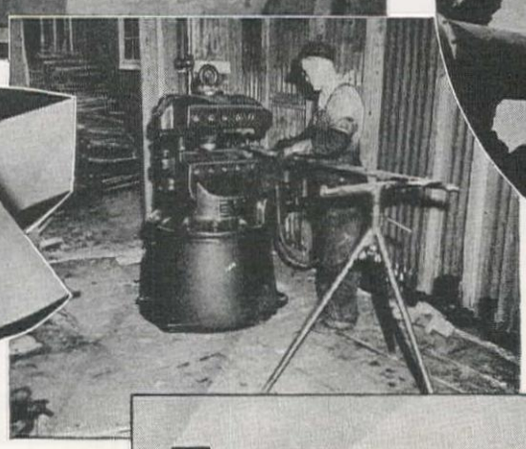
In February, Walsh Construction Company forces advanced a Delaware Aqueduct Tunnel in New York 1,619 feet in sandstone and shale. Crews of the Carlton Drainage Tunnel at Cripple Creek, Colo., countered with 1,735 feet in granite. Back came the Walsh organization with 1,862 feet in 31 consecutive working days. This record went by the boards a month later when the Carlton crews drove 1,879 feet. On May 8th, the last of 31 consecutive working days before holing through, Walsh announced 2,019 feet.

All of these marks are imposing. They were made possible by intelligent direction of splendidly organized and efficient forces using the best mechanical equipment that money can buy.

Both of these tunnels are being driven with Ingersoll-Rand power-feed drifter drills. The Walsh Construction

Above—Drill carriage at heading, showing three of the five DA-35 power-feed drifters, Jackrods and Jackbits. *Left*—Supt. John R. Austin; Vice President A. H. Bebee of the Golden Cycle Corp.; G. O. Rorabaugh, master mechanic for Golden Cycle mines.

Right—Jackbits are heated in a Jackfurnace having automatic temperature control and hardened on I-R quenching fixture. *Bottom Right*—Jackrods are swaged in a No. 54 sharpener. *Below*—Part of a carload of Jackbits in storage.



The Jackbit, one of the prime reasons for record progress.

Portal of 10 x 11-foot bore that has been driven more than 15,000 feet in less than a year.

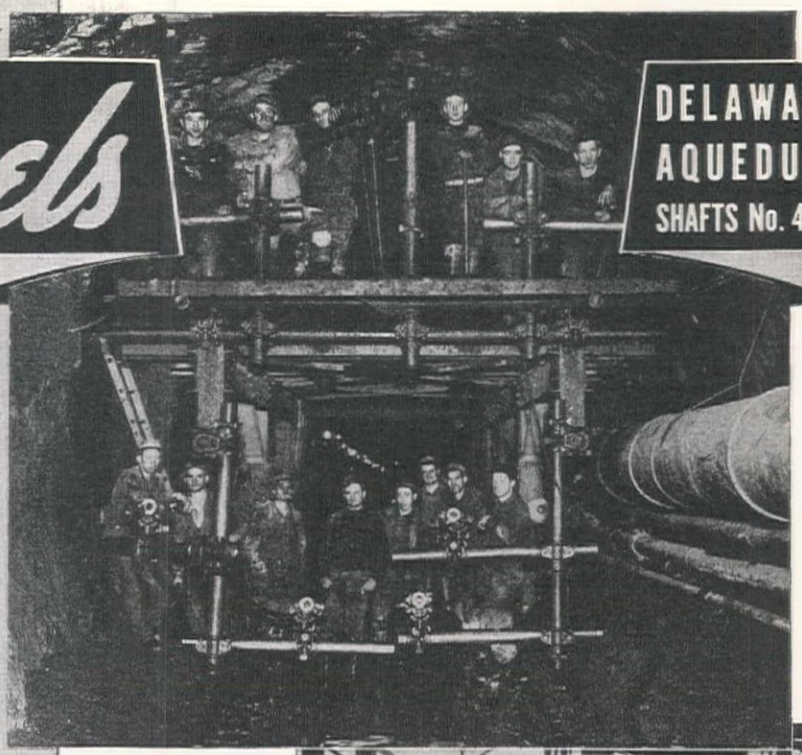
Ingersoll-Rand

11 BROADWAY, NEW YORK, N.Y.

fastest tunnels

DELAWARE AQUEDUCT SHAFTS No. 4 & 5

EQUIPMENT . .

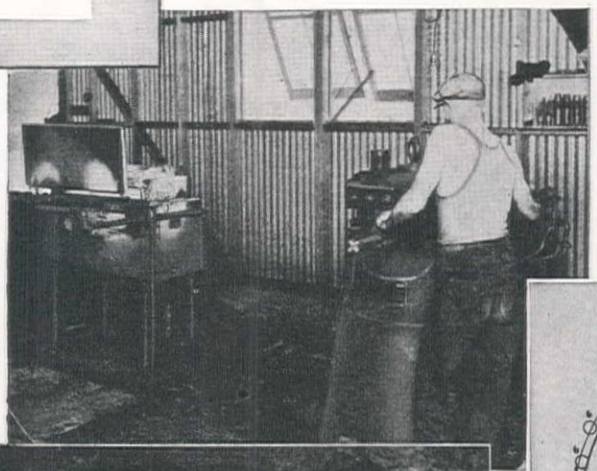


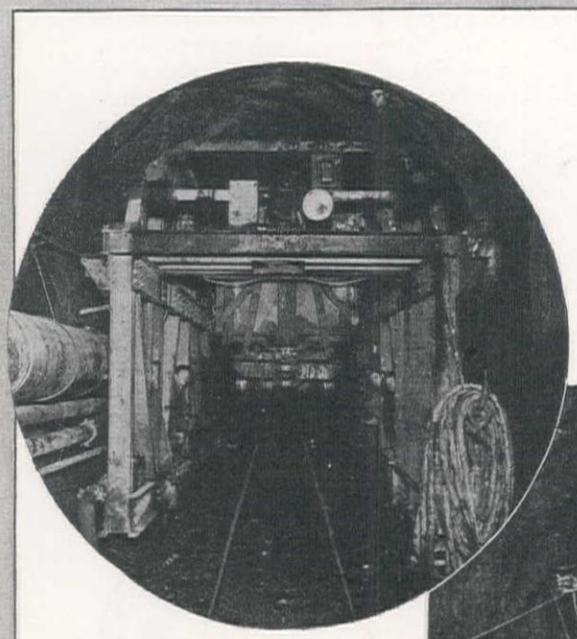
Company, in its two headings, is using two jumbos, each mounting seven I-R S-70 drills. The Carlton bore is being advanced with five I-R DA-35 drills, grouped on a jumbo, and I-R Jackbits are used. They were adapted as standard equipment after extensive tests had proved their superiority.

These outstanding performances were made under the hardest possible conditions that can be imposed upon drilling equipment. Speed is the paramount aim and only drills and associate equipment that will stand up under gruelling service will prove acceptable.

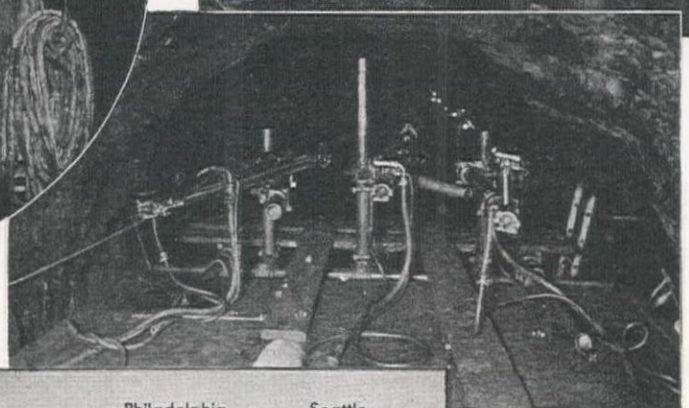
It is significant that two types of I-R drills are eclipsing all previous tunneling records in two different types of rock. These same drills, or equally efficient ones for your particular service conditions, are available to you. Also Jackbits and a complete line of equipment for reconditioning them. Our nearest branch office will gladly give you detailed information.

Above — Drilling crew on carriage in North Heading at Shaft 5, where 2,019 feet was driven in 31 working days. *Right*—Alexander Simpson, superintendent Shaft 5; Richard S. Byers, general superintendent; George Underwood, superintendent Shaft 4.

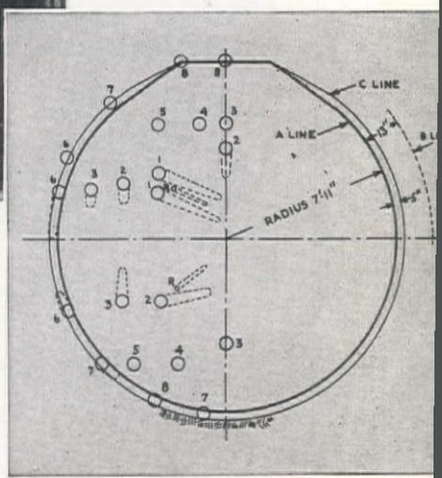




Left—Drilling is done with conventional drill steel, which is reconditioned with the aid of a No. 27 oil furnace and a No. 54 sharpener. *Bottom Left*—Top of drill carriage, showing three of the seven S-70 drifters.



Above—"Cherry Picker" used for transferring empty cars to the head of the muck train.



Above—Tunnel cross section, with location and firing order of holes.

Atlanta
Birmingham
Boston
Buffalo
Butte
Chicago
Cincinnati
Cleveland
Dallas
Denver
Detroit
Duluth
El Paso
Hartford
Houston
Kansas City
Knoxville
Los Angeles
Newark
New Orleans
New York
Philadelphia
Picher
Pittsburgh
Pottsville
Salt Lake City
San Francisco
Scranton
Seattle
St. Louis
St. Paul
Tulsa
Washington

936-5

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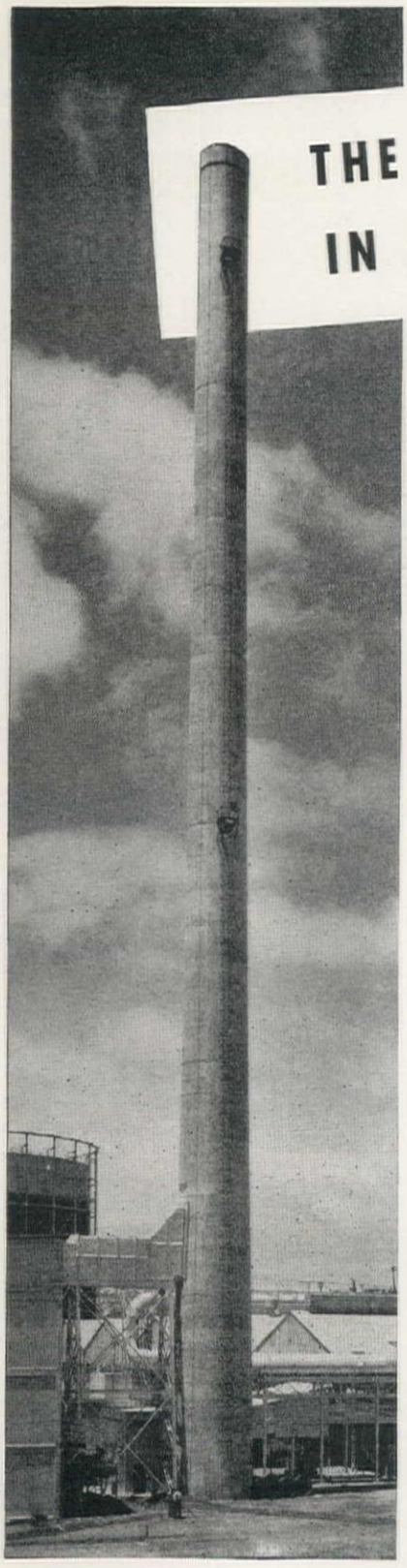


THE TALLEST SMOKE STACK IN SAN FRANCISCO . . .

Stands firmly on a safe foundation of U·S·S Steel Bearing Piles

300 ft. high—outside diameter 19′ 1″ at the base, 11′ 2″ at the top—this reinforced-concrete stack has just been completed at the plant of the Federal Metals Division of the American Smelting and Refining Company.

The footing proper is 36′ in diameter, and is anchored and supported by 72 U·S·S Steel Bearing Piles set radially as illustrated. Driven in lengths of from 17′ to 31′ to refusal, these piles easily carry the total dead load of 1200 tons. Notice the cap plates through which the anchor bars project; they are 12 inches square by ⅞ inch thick, and are welded to the pile flanges. (Stack foundation piles were driven by Healy Tibbitts Co., Contractors, who also drove the U·S·S Steel Bearing Piles which support the 4-story reinforced-concrete Bag House adjacent to the stack. Stack built by the Custodis Chimney Construction Co., Chicago.)

More than 4,000,000 lineal feet of U·S·S Steel Bearing Piles are now in use on more than 400 projects. In foundations under buildings, bridges, viaducts, dams, piers and docks of all kinds, their lasting safety and permanent economy have been thoroughly demonstrated.

Strong, easily-driven, these money saving Piles can be readily handled in the field by ordinary equipment, are easy to splice, withstand rough handling, eliminate jetting. Their capacity for high unit loads, both vertical and horizontal, permits fewer piles, and fewer driving operations for a given superimposed load.

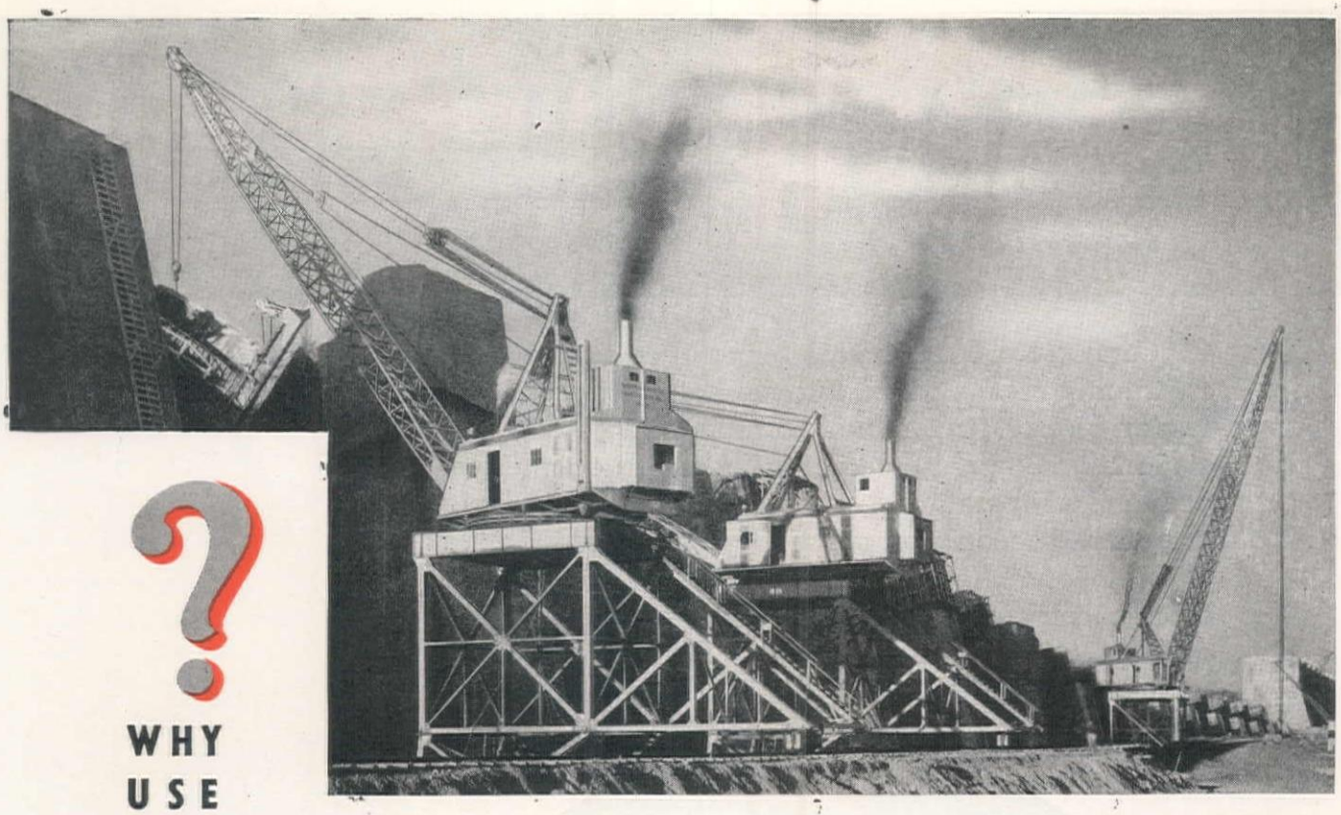
We believe it will pay you to investigate U·S·S Steel Bearing Piles for your projects—especially where conditions are unusual.

U·S·S STEEL BEARING PILES

COLUMBIA STEEL COMPANY, San Francisco, *Pacific Coast Distributors of U·S·S Steel Bearing Piles*
Manufactured by
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
United States Steel Export Company, New York

USS

UNITED STATES STEEL



WHY USE A HUNDRED THOUSAND DOLLAR INSTALLATION WHEN A TWENTY THOUSAND DOLLAR ONE WILL DO THE JOB?

For Dam construction there is no comparison between the cost of the original installation of cableways and AMERICAN REVOLVERS of Equal Capacity. In addition to their much lower first cost, AMERICAN REVOLVERS insure more accurate concrete placement. That means fewer dollars expended in vibrating the concrete into place.

There is a constant demand for used AMERICAN REVOLVERS. Look ahead to the re-sale value when you buy dam building machinery.

Get all the facts about AMERICAN REVOLVERS before you do anything on the dotted line.

AMERICAN HOIST & DERRICK CO.

NEW YORK SAINT PAUL, MINNESOTA CHICAGO

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

USE A DROP FORGED STEEL CLIP TO FASTEN YOUR STEEL WIRE ROPE

Write for a copy of "WITH AN EYE TO SAFETY"

STANDARDIZE *on the Genuine* CROSBY CLIP *for Safety*

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

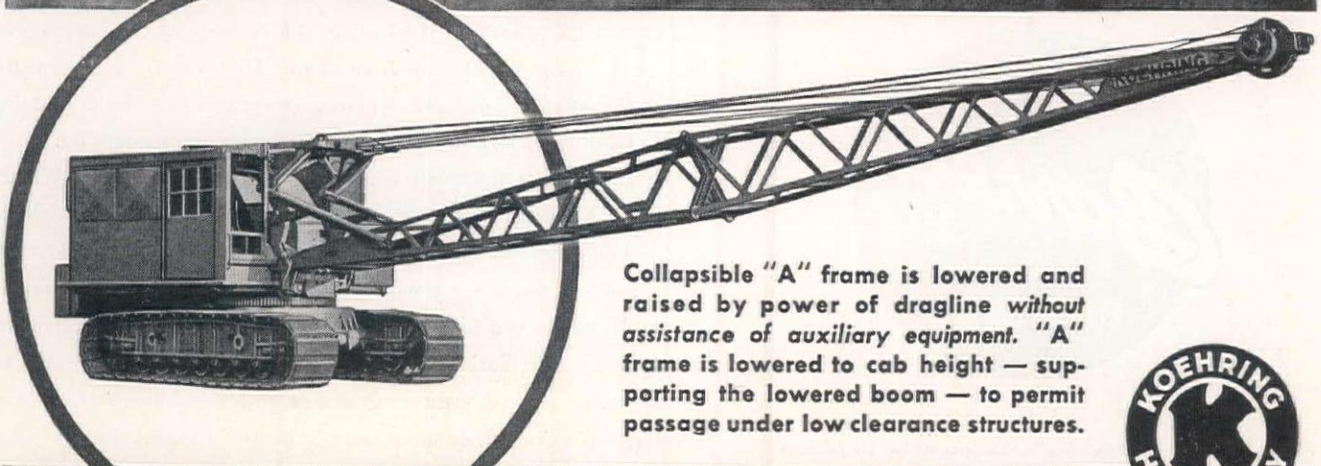
When writing to AMERICAN HOIST & DERRICK CO., *please mention Western Construction News*

LONG REACH ★ HIGH LIFT FOR LOW COST STRIPPING

Extra long reach and high lift **of Koehring 703 — 803 Dragline-Cranes, reduce the number of moves on large stripping projects. Overburden material can be placed in high and wide spoil banks, safely away from the excavation. Large and wide crawlers provide a substantial footing and low ground pressure — for travel and operation on soft or spongy ground. High "A" frame, supporting the rigid high strength boom, provides stability and balance for all operations. Large sheaves and drum barrels reduce cable friction and bending stresses to a minimum. Koehring swiveling boom point fairlead permits the sheave to follow the cable lead, regardless of the bucket position.**

KOEHRING COMPANY
MILWAUKEE, WISCONSIN

Placing excavated material high on the spoil bank by a Koehring Long Reach, High-lift 703 Dragline on large coal-stripping project in southern Illinois. Long and wide crawlers provide sure footing and low ground pressure.

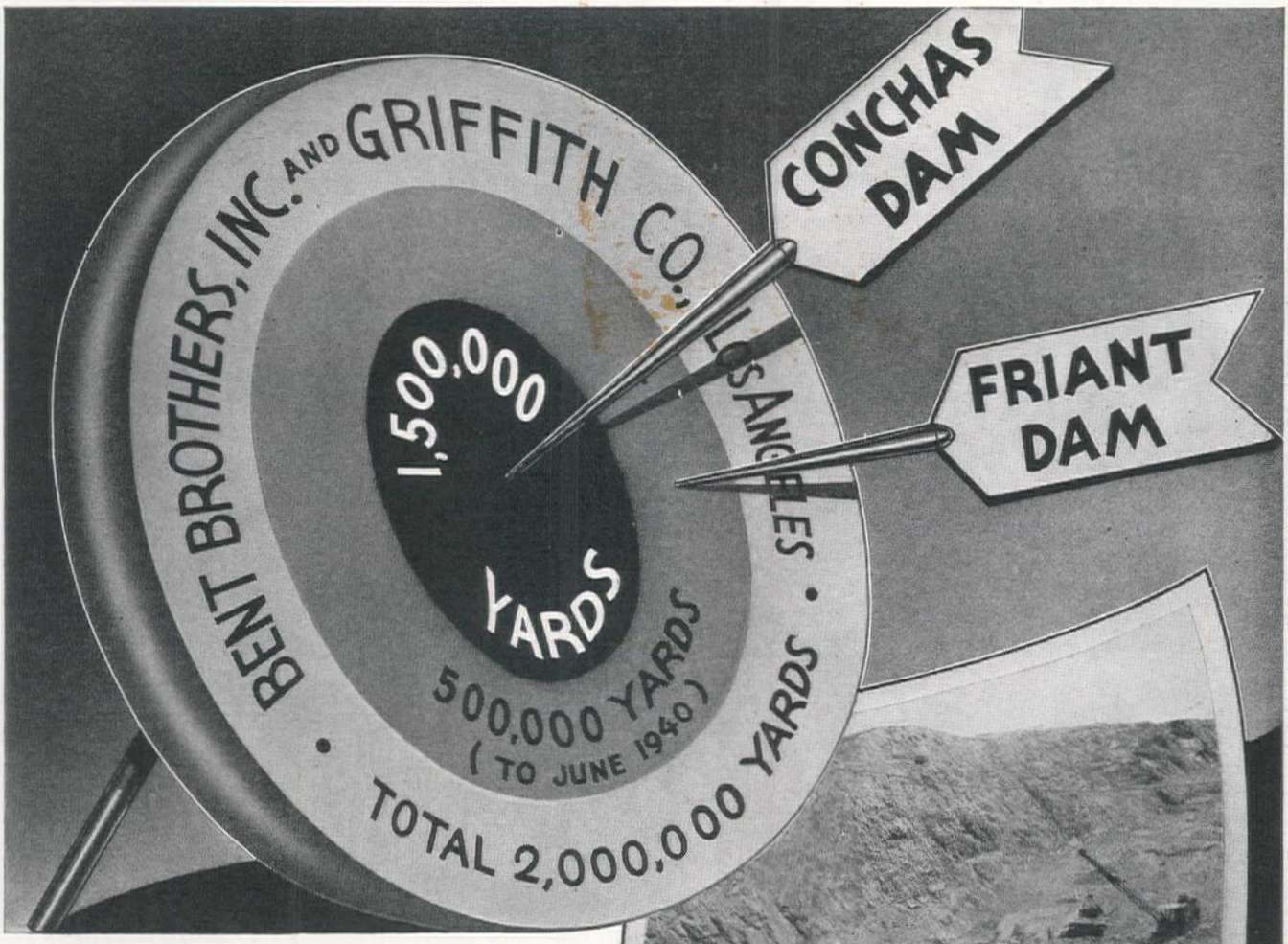


Collapsible "A" frame is lowered and raised by power of dragline *without assistance of auxiliary equipment.* "A" frame is lowered to cab height — supporting the lowered boom — to permit passage under low clearance structures.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

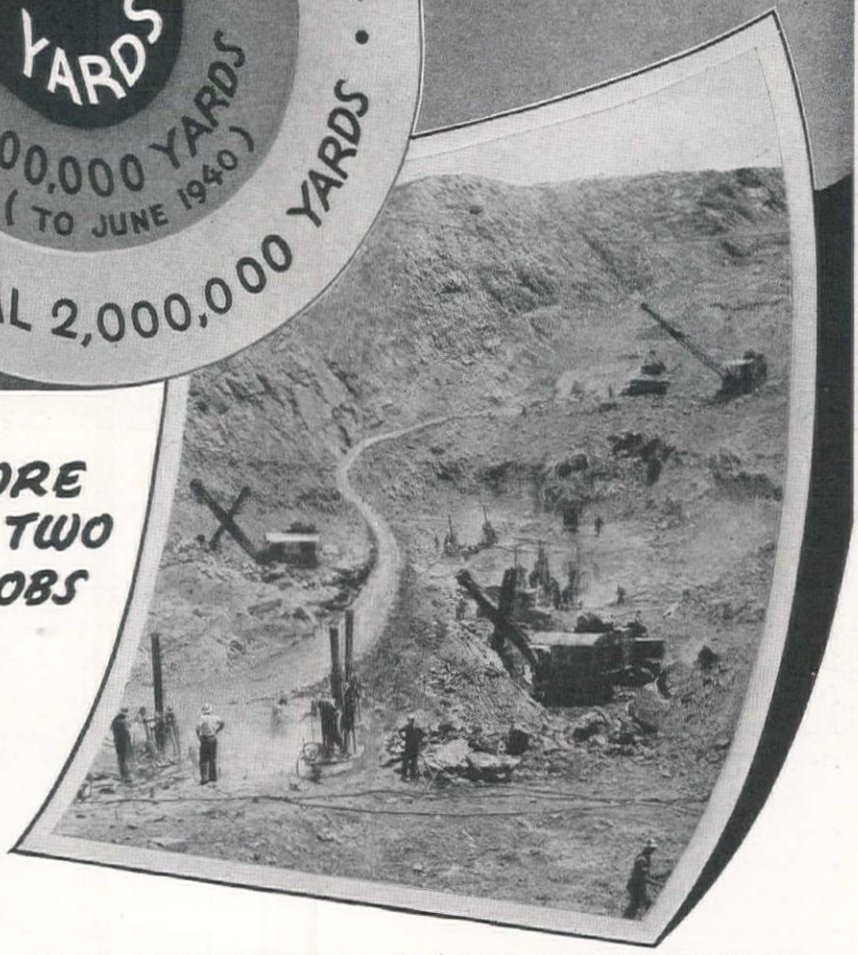
HARRON, RICKARD & McCONE CO., San Francisco-Los Angeles • L. A. SNOW CO., Seattle-Spokane • EMPIRE EQUIPMENT CO., Billings
CONTRACTORS EQUIPMENT CORP., Portland • LUND MACHINERY CO., Salt Lake City • NEIL B. McGINNIS CO., Phoenix, Ariz.



3 LIMAS SCORE HIGH TOTAL ON TWO OUTSTANDING JOBS

Mr. Stanley Bent of Bent Brothers, Incorporated, & Griffith Company, Los Angeles, California, writes "after moving over two million cubic yards of excavation on the Conchas Dam and Friant Dam, our three LIMAS are still in very good condition and going strong." Continuous operation in hard digging can be expected of LIMA excavators because their design is right and they have the power and ruggedness to make big yardage possible under all conditions.

Write for free bulletin TODAY



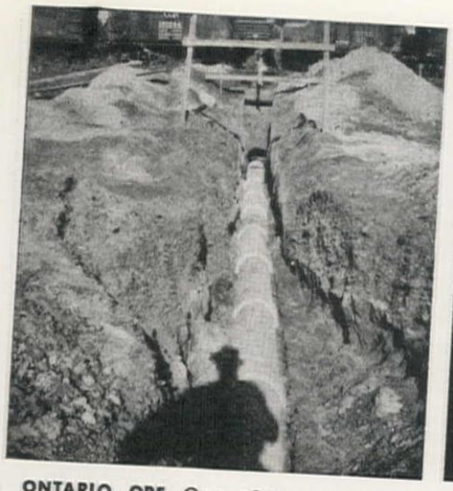
LIMA LOCOMOTIVE WORKS, INCORPORATED
SHOVEL and CRANE DIVISION - - - - - - - LIMA, OHIO

See list below for your nearest LIMA Distributors

LIMA SHOVELS DRAGLINES CRANES

LIMAS ARE BUILT IN ¾ YARD CAPACITY and LARGER

Western Distributors—Seattle: Branch Office, 1932 1st Ave. So. Spokane: General Machinery Co., E. 3500 Block, Riverside. Portland: Feenaughty Machinery Co., 112 S. E. Belmont St. Boise: Feenaughty Machinery Co., 600 Front. San Francisco: Garfield & Co., 1232 Hearst Building. Los Angeles: Smith-Booth-Usher Co., 2001 Santa Fe. Denver: F. W. McCoy Company, 956 Cherokee St. Phoenix: Smith-Booth-Usher. Helena, Mont.: Steffeck Equipment Company, Main and Cutter Streets.



ONTARIO, ORE. One of hundreds of American communities where thousands of feet of Johns-Manville Transite Pipe are keeping water-transportation costs low . . . efficiency high.

YONKERS, N. Y. No large bell holes are needed at joints when J-M Transite Pipe is installed. This means that trenches can be narrower and more economical and that damage to pavements is minimized.

MARTINEZ, CALIF. Simplex Couplings are quickly assembled, even by unskilled crews. They provide unusually tight, flexible joints that *stay* tight in service . . . keep leakage at the minimum.

PALO ALTO, CALIF. On the job, crews can lay J-M Transite Pipe as fast as the trench is opened. Transite's long lengths and simple, rapid assembly method assure unusually low installation costs.

FIRCREST, WASH. Fittings and service connections may be cut into J-M Transite Pipe quickly and easily, for this modern material can be readily cut, sawed or drilled with ordinary tools.

OAKLAND, CALIF. J-M Transite Pipe is non-metallic and inorganic . . . cannot tuberculate under any conditions. As a result, carrying capacity (C-140) stays high, pumping costs low.

AT LOWER COST—

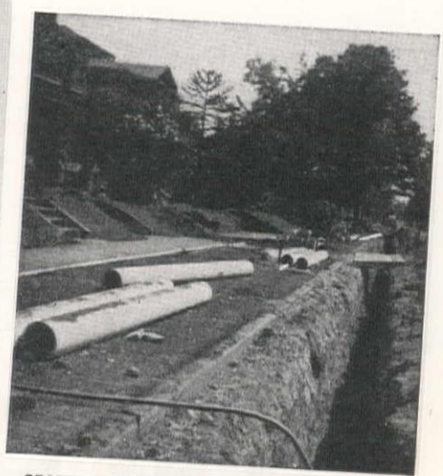
high flow coefficient of C-140 *can never be reduced by tuberculation*. In many cases, this means that smaller pipe can be specified for water lines, for it is not necessary to allow for a steadily decreasing carrying capacity caused by formation of tubercles.

* * *

Under all kinds of operating conditions, waterworks engineers find that J-M Transite Pipe provides better, lower-cost water service. For complete information, write for brochure TR-11A. And for facts on how J-M Transite Sewer Pipe helps you make important savings on sewer-line costs, send for brochure TR-21A. Address Johns-Manville, 116 New Montgomery Street, San Francisco, Calif.

PIPE The MODERN Material for Water and Sewer Lines

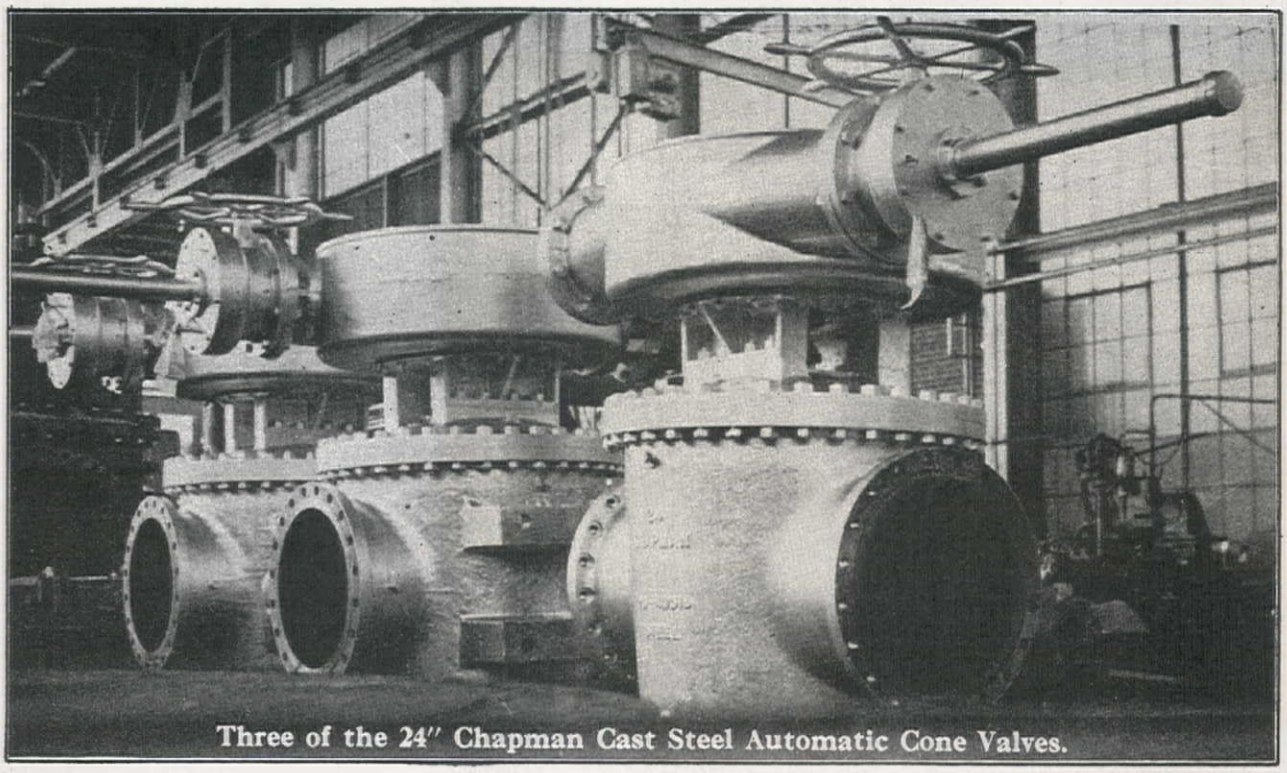
HONOLULU, T. H. Long, light, 13-foot lengths of Transite Pipe reduce handling costs. Smaller trucks carry large loads to location. No mechanical equipment is needed for loading and unloading.



SEATTLE, WASH. Transite's tough, rugged asbestos-cement structure provides exceptional durability and uniform strength . . . safely withstands soil stress and the weight of heavy earth loads.

Chapman Valves

control important lines in the new LAKE MICHIGAN - GRAND RAPIDS WATER PROJECT



Three of the 24″ Chapman Cast Steel Automatic Cone Valves.

ITEMS OF INTEREST
LAKE MICHIGAN PROJECT

Estimated Cost — $4,100,000.
Intake Line — 5200′ of 54″ Steel Pipe.
Main Transmission Line — 31 Miles of Reinforced Concrete Pipe.
Two Pumping Stations.
Three Storage Reservoirs.
175 Chapman Valves — Iron, Bronze and Steel: Sluice Gates, Gates, Globes, Checks and Automatic Cones, ranging in size from ¾″ to 54″.

Completion this year of the Lake Michigan Water Project fulfills the dream of several generations for a permanent, pure and plentiful water supply for the City of Grand Rapids. Chapman valves were used extensively and include a wide range of types, sizes and metals. Notable in the list are thirty-one Chapman Cone Valves, including twenty-six 24″ Cast Steel Automatic Cones, three of which are shown above. Selection of Chapman valves for projects of this importance and character is a tribute to the quality and dependability of Chapman products and service.

THE CHAPMAN VALVE
MANUFACTURING COMPANY
INDIAN ORCHARD, MASS.

When writing to CHAPMAN VALVE MFG. CO., *please mention Western Construction News*

MEN AT WORK constructing a cast iron line are building for the ages. Generations yet unborn will benefit from ir labors and the long life of cast iron pipe. In recent years, th laying methods and pipe manufacturing processes have en materially improved. The service to be counted on from pperly laid U. S. pit cast pipe or U. S. Super-de Lavaud *chill-*e centrifugally cast pipe is greater than ever.

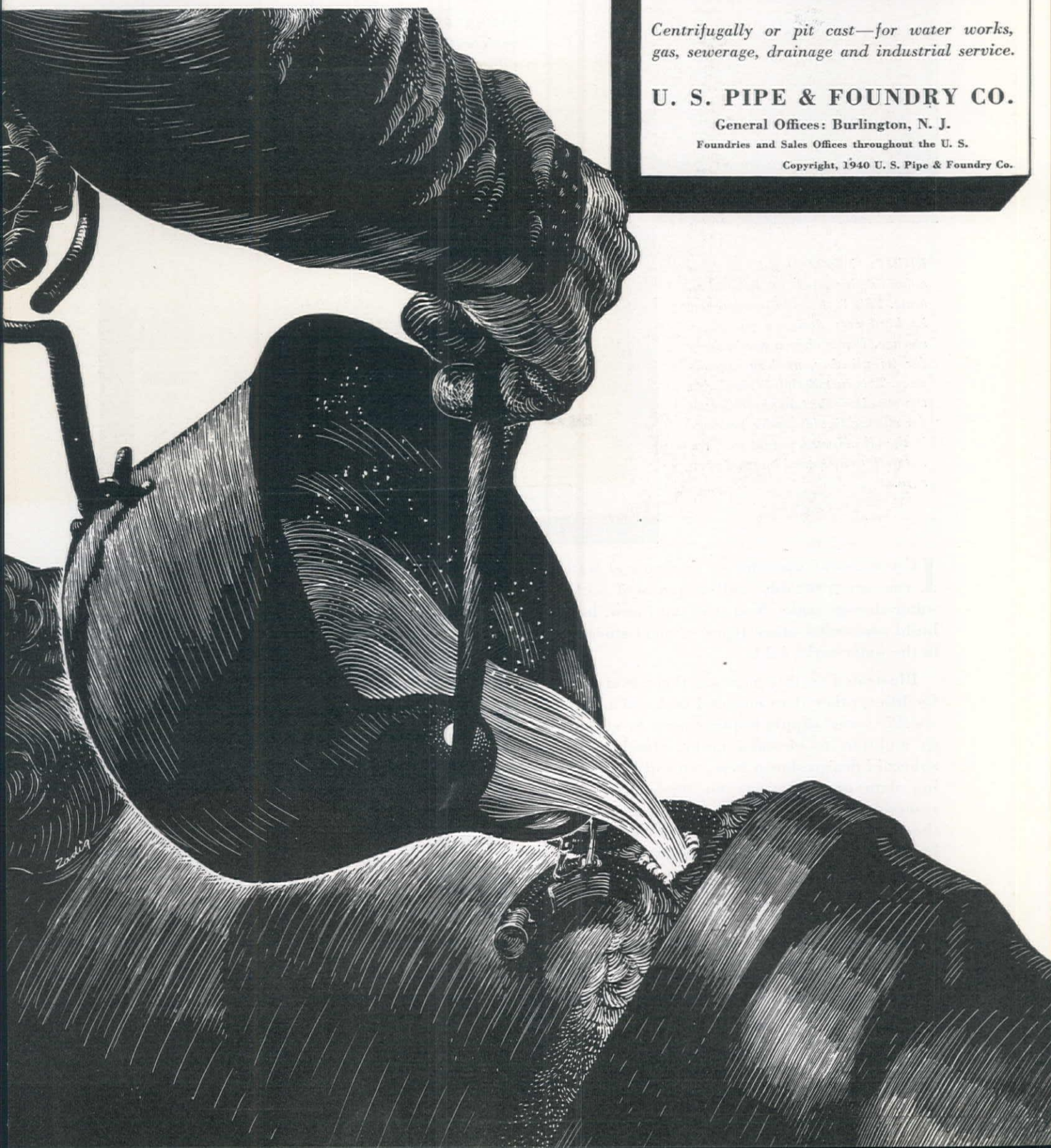
U.S. cast iron PIPE

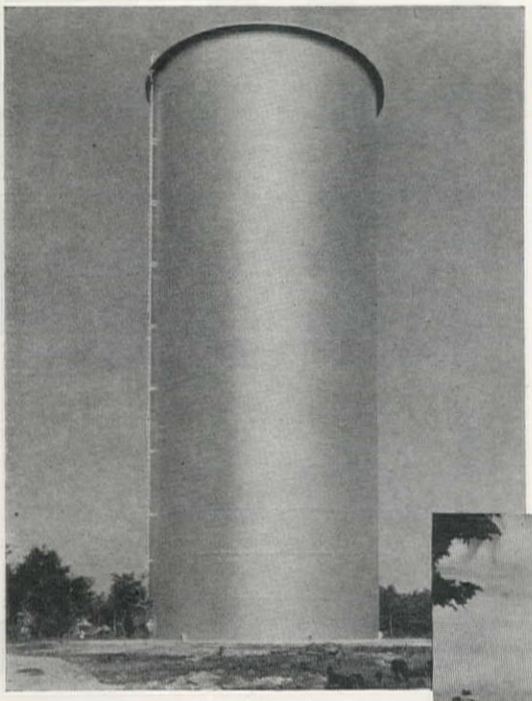
Centrifugally or pit cast—for water works, gas, sewerage, drainage and industrial service.

U. S. PIPE & FOUNDRY CO.

General Offices: Burlington, N. J.

Foundries and Sales Offices throughout the U. S.



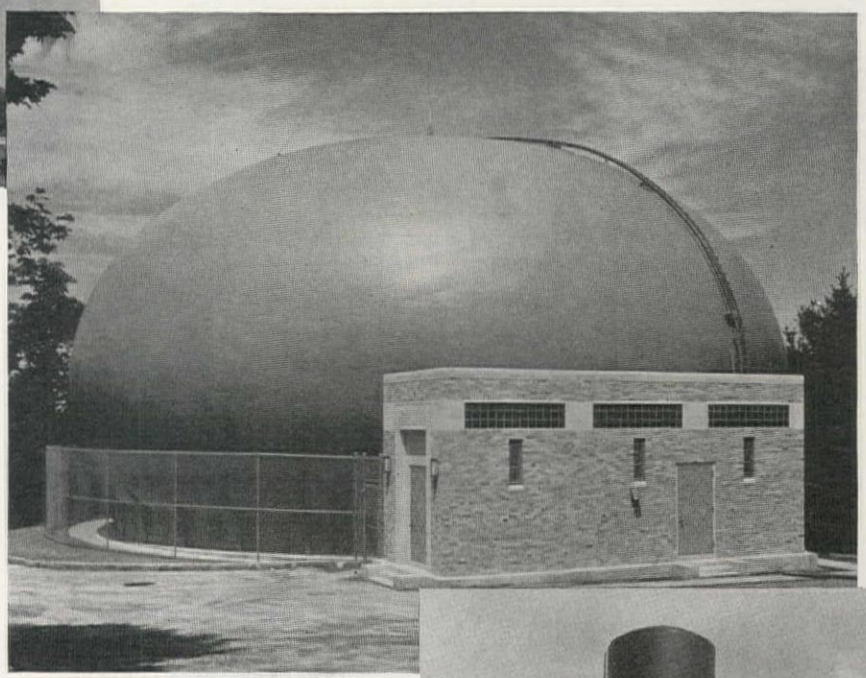


Steel Standpipes and Reservoirs for Water Supply Systems

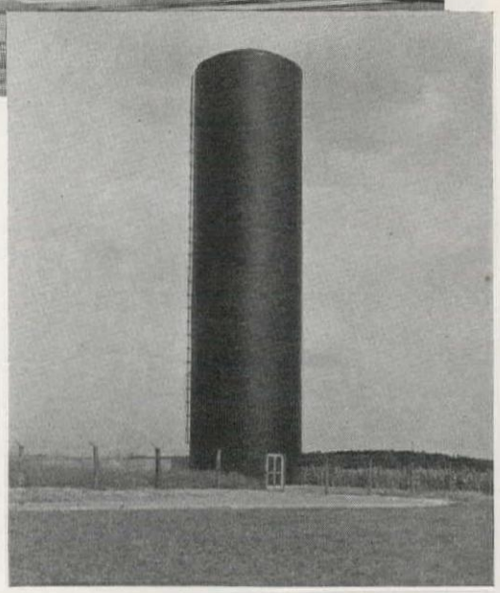
UPPER LEFT: New steel standpipe of all-welded construction recently installed for water storage in an Eastern municipality. It is 4½ ft. in diameter by 100 ft. high.

• • •

LOWER RIGHT: This 300,000-gal. standpipe provides ample water storage for two adjacent municipalities, which utilize a centrally located water supply.



RIGHT: 1,600,000-gal. Hortonspheroid installed at Brookline, Mass. This is the only structure of its kind ever designed for water storage. It was chosen particularly for its pleasing, modern appearance. This installation is similar to the standard Hortonspheroid used for storing liquids under pressure in the oil industry, except that it is not built to withstand internal pressure.



IF you are an operator or designer of water supply systems, you are probably well acquainted with Horton elevated water storage tanks. You may not know, however, that we also build numerous other types of steel storage tanks for service in the waterworks field.

Illustrated on this page are three examples of water storage facilities, other than elevated tanks, that are supplied to meet specific water supply requirements in all parts of the country. In addition to elevated tanks, standpipes, and the Hortonspheroid design shown here, we will be glad to furnish estimating data or quotations on flat-bottom storage tanks, steel reservoirs, welded steel pipe, penstocks, washwater tanks—all these and many "special" designs are available to help you in solving your water supply problems.

CHICAGO BRIDGE & IRON COMPANY

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

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

WESTERN CONSTRUCTION NEWS
WITH WHICH IS CONSOLIDATED WESTERN HIGHWAYS BUILDER

September, 1940 Vol. 15, No. 9

An Inspector's Life Can Be Worse

MOST BE-DEVILED individuals in the construction game are the inspectors, but it might be some slight consolation to this conscientious group to know that their problems are relatively simple as compared to those of their fellow-inspectors in the aircraft building industry. For the most part the plans and specifications which constitute the "Inspector's Bible" remain fairly constant during the life of a construction project. By comparison the life of an aircraft industry inspector consists of trying to find out which are the latest instructions, and how they differ from the orders under which he was inspecting on the previous day. At the present rate of change in aircraft design and construction, the most definite factor known at the beginning of manufacturing operations is that the design will be changed many times during the turning out of the model. Specifications are altered so fast they frequently are contradictory, which doesn't help any, and the pressure of time does not allow a stop for clarification, with the manufacturer demanding decisions on disputed points. Small consolation—but it appears that there are worse inspecting jobs than those in the construction industry.

Spreading "Merit System" Benefits

MANY western state highway departments do not operate under any definite system of personnel management which recognizes the merits of the individuals of the organization in matters of classification, salary or promotion. In most of these situations the condition is entirely beyond the control of those in the highway department, who appreciate the value of establishing and maintaining the organization as a going-concern, filled with properly selected personnel who are given an incentive to grow with the department and make some phase of highway construction or maintenance their life work. Before any appreciable change can take place in these organizations, a program of education is essential to indicate what other departments are doing. An article in this issue outlines the system which has been used for six years in the Washington Department of Highways, and supplements a similar review of the Oregon merit system which appeared in the July issue. Study of this information by personnel of several western state highway departments might well lead to starting action—which would lift the work of these organizations to their rightful position in the field of public service.

A Flood of Vehicular Traffic Is Threatening San Francisco

A FLOOD of vehicular traffic is beginning to descend on San Francisco which will make its present traffic problems seem as elementary as those of the village in the horse era. While the municipality has been ineffectually toying with proposals which would institute a comprehensive approach toward a solution, the pending deluge has been in the making. Today, three factors—immediate and approaching—are producing a traffic torrent which may be beyond the power of the city to absorb, with a result that the business section will disintegrate, and reestablish itself in the satellite communities.

Older than other western cities and with peculiar problems resulting from water barriers, San Francisco grew up with a well established pattern of rapid-transit transportation—both train and ferry. During the past few years, dating specifically from the completion of the two bridges this pattern has been changing.

Today, the traffic pattern is changing with such rapidity that it is doubtful if anything can be accomplished in time to prevent snarls and eddies that will seriously affect municipal growth and functioning. The three main factors are: (1) a sharp decline in the toll rate on the Bay bridge during the last few months, which is producing a sharp swing from train to auto transportation, adding this vehicular traffic to the business streets during rush hours; (2) abandonment of the train and ferry service from Marin County and the substitution of bus transportation into the downtown district, and (3) the most recent decision of the Division of Highways to improve the Bayshore Highway from the peninsula communities to provide a high-speed, convenient freeway directly to the city, which will produce a marked effect on commuter traffic from this territory.

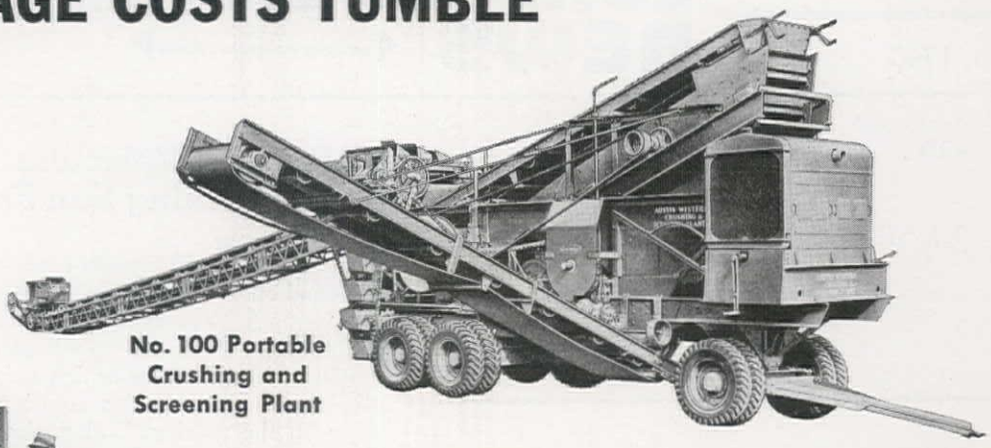
These factors will so change the traffic picture within the next few years that only an immediate start on a comprehensive traffic solution designed to provide adequate facilities for this traffic to get into and circulate through the city will save the municipality from tending to disintegrate from internal traffic pressure.

No Relics; No Foundation

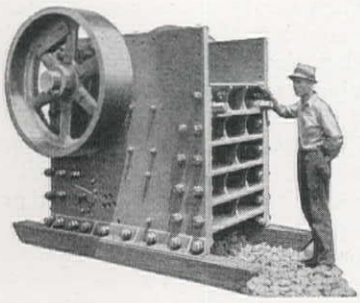
"The bridge is located near the present structure on a slightly different alignment chosen by the railroad archeologists, who studied the earth formation to determine the best location in relation to the troublesome San Andreas fault." Watsonville (Calif.) Parjaronian.

ACCORDING to this newspaper reporter's slightly confused story about a Southern Pacific Company bridge project, the railroad engineers have set a new standard for intensity of foundation exploration and study. Readers of the Watsonville paper will probably vision the bridge engineers basing their determination of foundation adequacy upon the discovery of a particular type of ancient pottery, arrowheads or even a prehistoric skeleton or two. Small wonder that the general public gets such peculiar ideas of the work of civil engineers.

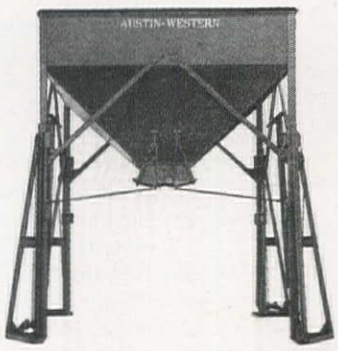
...ENGINEERED TO MAKE YARDAGE COSTS TUMBLE



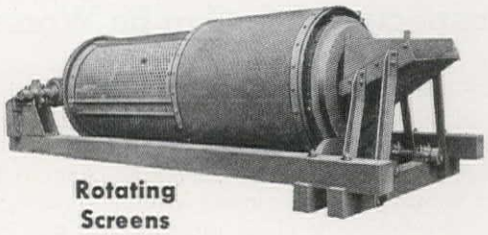
No. 100 Portable Crushing and Screening Plant



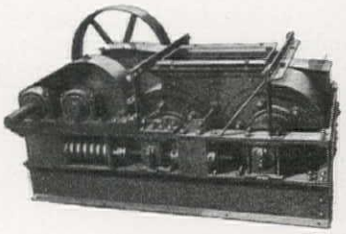
No. 1838 Heavy Duty Crusher



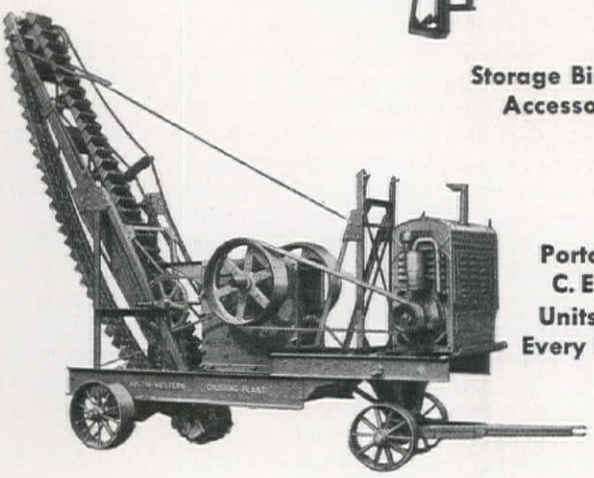
Storage Bins and Accessories



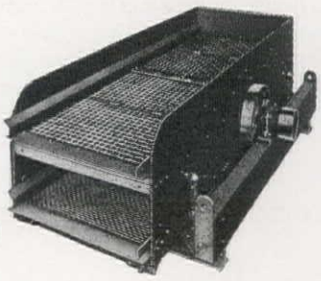
Rotating Screens



No. 3018 Roll Crusher



Portable C. E. P. Units for Every Need



Two-Deck Gyrating Screen

Austin-Western Crushing, Screening and Storage Equipment . . . built to the exacting specifications of experienced crusher engineers . . . includes sizes and types best suited to every location, operating condition, and capacity requirement.

Performance records under the widest variety of pit and quarry conditions have demonstrated the money-saving value of the design and construction advantages of A-W Equipment. All units are engineered to operate smoothly and economically at higher speeds—to produce a larger output of accurately sized stone. As a result, users everywhere report substantial savings over equipment formerly used.

Operators of both stationary and portable plants will find it decidedly worth while to investigate the cost-saving A-W design and construction features . . . and to draw on the broad experience of A-W engineers in planning a plant layout that will assure delivery of accurately sized material at the job at the lowest possible cost. The Austin-Western Road Machinery Co., Aurora, Illinois.

AUSTIN-WESTERN

KNOX-HALE MACHINERY CO.
San Francisco, Calif.

COLUMBIA EQUIPMENT CO.
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SMITH BOOTH USHER CO.
Los Angeles, Calif., and Phoenix, Ariz.

MOTOR EQUIPMENT CO.
Albuquerque, N. M.

LIBERTY TRUCKS & PARTS CO.
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THE LANG COMPANY
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C. D. ROEDER COMPANY
Reno, Nevada

WILSON EQUIPMENT & SUPPLY CO.
Cheyenne, Wyo.

EMPIRE EQUIPMENT CO.
Billings, Mont.

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

WESTERN CONSTRUCTION NEWS

SEPTEMBER, 1940

Progress at Mud Mountain Dam

A box canyon site and adverse climatic conditions present severe construction problems—Diversion tunnel, abutment stripping and spillway excavation complete

Design Changed to Rock Fill

DOWN THE CHUTE flows concrete from the mixing plant at the top of the canyon to be remixed in an agitator before being taken by train into the tunnel for placing behind the lining forms.

ADVERSE climatic conditions and a box-canyon site presenting severe access problems, are the outstanding factors affecting the construction operations being carried forward by the Guy F. Atkinson Co. at Mud Mountain dam, which is being built under the direction of the Corps of Engineers on the White River for flood protection at Tacoma, Wash., and vicinity. The official name of the project is Stevens Dam, so named in honor of Washington's first territorial governor. Since the $5,344,605 contract was awarded a year ago, the operations at the site have included: (1) the construction of camp and facilities; (2) building of an access tramway to the diversion tunnel location; (3) driving of the 2,000-ft. diversion tunnel, with concrete lining well advanced; (4) excavation of about 1,000,000 cu. yd. from the spillway; and (5) stripping of the abutment walls.

In its original design the structure represented a new world's record for the height of rolled earthfill dams—425 ft. above bedrock. A recent change in design provides for dumped rock fill in the slopes of the dam (Zones 1 and 3) with steeper side slopes, but does not affect the other features of the project. The composition of the rolled earthfill central core remains unchanged. The revised design, covered in a supplemental agreement with the contractor, is indicated in the note accompanying this article, which is confined to a description of construction progress. A review of the original design plans and the general features of the project appeared in *Western Construction News*, August, 1939. Complete unit bids received from the two bidders were published in the issue of October, 1939.

Location and conditions

Mud Mountain dam will create a storage reservoir of 130,000-ac. ft. capacity on the White River to protect the river valley and the industrial section of Tacoma. The dam has been designed to handle a flood peak of 40,000 sec. ft., which is nearly 50% larger than the 1933 flood which caused damage estimated at more than $900,000. The reservoir will have an area of about 1,200 ac., and will be 5½ mi. long. Elevation of spillway crest will be 1,215 ft. and the drainage area behind the dam is 402 sq. mi.

The dam site proper is located in a narrow box-canyon, with almost vertical rock cliffs for a height of 230 ft. above the river. From a width of 90 ft. at stream bed elevation, the canyon widens to about 150 ft. at the top of the rock walls, and then spreads more gradually in glacial till material to a crest length of about 700 ft. Bedrock at the site is classified as andesite agglomerate.

Situated in the Puget Sound area, the climatic conditions at the dam site include annual rainfall averaging about 51 in. This precipitation extends over a period of at least eight months during the year, and during a 6-month period, the rainfall occurs with such regularity as to keep ground conditions thoroughly moistened. These climatic conditions have resulted in problems affecting construction operations, both as to the handling of equipment and the general efficiency of working conditions. Up to the present time, no fill has been placed, and the effect of precipitation on these operations has not been demonstrated. The program for handling material from borrow pit and quarry to the dam, which will involve about 2,100,000 cu. yd., has not been definitely determined.

The spillway is located on the north side of the site and has a capacity of 139,000 sec. ft. The spillway will be uncontrolled, and will be concrete lined. The 23-ft. diameter diversion tunnel will later be fitted with three 8 ft. 3 in. penstocks and 96-in. control valves for regulating storage in the reservoir. A smaller 9-ft. diameter tunnel, uncontrolled by valves, will handle normal river flow.

Camp and facilities

The site is located about 3 mi. from an existing state highway, and the U. S. E. D. constructed an access highway to the site prior to the award of contract. At the site, the Corps of Engineers has erected modern camp facilities, with attractive buildings, water supply system, and an observation point for visitors.

The contractor has built a modern construction camp, including 32 bunk houses of 10 or 12-man capacity. Some of these houses have been partitioned into single rooms. Total housing capacity at the contractor's camp is 300. The other buildings contain the usual office, hospital, shops and warehouses. There is also a mess hall, seating 180 men, and equipped with all modern kitchen facilities. Because of the nearness to the

town of Enumclaw, the contractor has not provided for the housing of supervisory and administrative personnel at the site.

The present crew on the project totals about 700, with nearly 200 staying in the camp. The bulk of the crew has obtained residence in Enumclaw and other nearby communities. Peak employment up to the present time has been about 800 on the contractor's payroll.

Charges for board and room to employees of the contractor have been established at $1.00 a day for meals and 25 cents a day for lodging in the bunkhouses, or 40 cents a day for accommodations in the single rooms.

Diversion tunnel

The driving and lining of the diversion tunnel have provided the main features of the construction program during the past year. Because of the narrow canyon site, it is impossible to do any work in the bottom of the dam site until the diversion program has been completed.

Access to the downstream portal of the diversion tunnel was a problem of unusual difficulty. The solution was a tramway extending from the camp elevation to river level, a vertical distance of about 450 ft. While this tramway was under construction, an access road was being excavated from camp level to cut the tramway at an elevation at midpoint, where the grade broke sharply to the final steep decline on about 60 deg. Because the upper part of the tramway was difficult to maintain in the relatively soft material, supplies and equipment for tunnel driving were moved by truck on the construction road to the tramway station, and then lowered the remaining distance into the canyon.

At the bottom of the tramway, which is located several hundred feet downstream from the tunnel portal, tracks were laid to the portal and downstream to a dumping area.

The tunnel has been driven with a rail-mounted jumbo containing seven drills, designed to provide for full-face advance in the 23-ft. finished diameter tunnel. The driving introduced no unusual construction features, with drilling averaging about 95 holes per round, which pulled on the average of 5 to 6 ft. Timbering with 12 x 12-in. sets on 4-ft. centers was used almost the entire 2,000 ft. in the tunnel, with the bottom spreaders placed first and the set built up to horseshoe shape, including a 5-segment arch. Timber lagging was used behind the sets, and this lagging partially was removed prior to placing of concrete lining.

Although the size of tunnel was large, all loading of blasted material has been carried out by mucking machines, handling nearly 150 cu. yd. per round. Rock was loaded into 4 and 5-yd. cars, hauled by battery locomotive. These motors were changed to trolley operation outside the tunnel. Switching at the face was carried on by a vertical air-lift hoist which was provided in the frame of the drill jumbo.

The rock did not provide any special problems in heavy ground or excessive pressures, and there were no water problems of significance. Ventilation was provided by blower with a 24-in. metal pipe extended to the heading.

Concrete lining

The delivery of concreting materials or mixed concrete from the elevation of the camp to the tunnel portal provided the next serious problem. This was solved by the use of a covered metal chute extending from the concrete mixing plant at camp elevation for a drop of nearly 450 ft. to portal level. This chute (see first page illustration) was suspended from cables extending across the canyon. Permission was granted by the engineers for this method of handling the concrete provided it was agitated after the trip through the chute. This was accomplished by mounting an agitator body near the discharge end of the chute. After agitating, it was loaded into 2-yd. buckets for moving into the tunnel. This method of handling has been used for the 15,000 cu. yd. of concrete used for the tunnel lining.

In accordance with usual procedure, the first step in tunnel lining was the pouring of footings along either side. The concrete-placing jumbo was designed to provide an electric hoist for raising the 2-yd. concrete buckets off the train, permitting them to be discharged through a hopper onto a short section of shuttle belt conveyor which could be used to place this concrete into the two footing sections. Each of these sections is represented by 0.75 cu. yd. of concrete per lineal foot.

The steel forms for the completion of the arch ring moved on steel rails set on curb sections. This form provided for a 24-ft. length of pour, and was of heavy but rather standard type of construction. It includes the installation of a 2-yd. pneumatic gun for handling the concrete, and also provides necessary jacks for aligning the form and dropping it for moving ahead. The pour for a 24-ft. section of tunnel has averaged about 35 cu. yd. for the curb and 200 cu. yd. for the arch; pours were carried out in about 7 hr. under normal procedure.

In order to advance the diversion system as rapidly as possible, lining operations were started before the completion of tunnel driving, and have been synchronized as well as possible, so that there would be minimum delay or interference between driving and lining operations.

The design calls for a minimum of 21 in. of concrete lining inside the timber, and no reinforcing is specified.

The concrete is placed with the aid of vibrators, and as much as possible, men are used behind the form. Following the completion of the arch lining, final clean-up is carried out on the bottom of the tunnel, and the concrete invert is placed to complete the lining.

Tunnel driving operations were started in November, 1939, and it was holed through on May 14, 1940. Tunnel lining was started Feb. 28 and was completed in August.

In the meantime, beginning from the upstream and working behind a timber crib and rockfill cofferdam, the driving has been started for the 9-ft. diameter tunnel which parallels the diversion bore and will provide for handling the uncontrolled flow of the stream during low-flow season.

When the diversion tunnel has been completed, a short cross-river cofferdam near the upstream end will complete this diversion system.

BOX CANYON site presented unusual access problems in getting work started at this location for the downstream portal of the diversion tunnel.

Data on Mud Mountain Dam

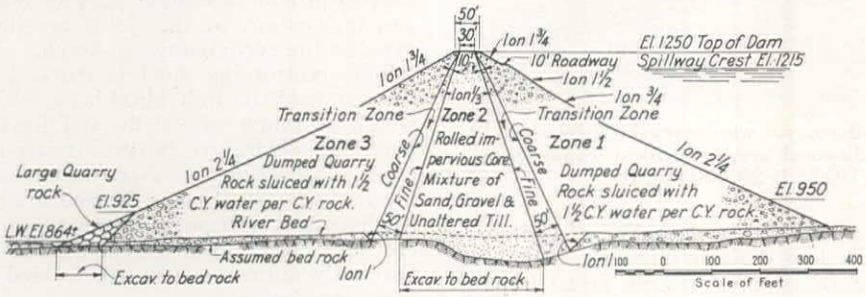
Drainage area	402 sq. mi.
Elevation above sea level— top of dam	1,250 ft
Elevation—spillway crest	1,215 ft.
Lowest elevation of bedrock	825 ft.
Length of reservoir	5½ mi.
Storage capacity of reservoir	130,000 ac. ft.
Maximum flood of record (1933)	28,000 cu. ft. per sec.
Spillway design capacity	139,000 cu. ft. per sec.
Outlet capacity	16,000 cu. ft. per sec.
Height of dam above bedrock	425 ft.
Length at crest (excluding spillway)	700 ft.
Width at crest	50 ft.
Width at base	2,200 ft.
Volume of fill	2,109,000 cu. yd.

Design of Mud Mountain Dam Changed to Rock Fill

ON JULY 1, the design of the Mud Mountain dam was changed by the U. S. Engineer Office from a rolled earthfill to dumped rockfill with a central, rolled earthfill core. The change resulted from the determination that the proposed borrow pit area contained a small percentage of colloidal clay which was found to affect the stability of the shell material. This change in design will tend to simplify some of the construction problems resulting from the high moisture content of this available material and the duration of the rainy season at the site. Mechanical drying may be resorted to for core material, and since the rock fill may be placed during wet weather, it is expected that construction operations can be carried on practically the year round.

The original contract of the Guy F. Atkinson Co. has been modified by the U. S. Engineer Office by deletion of the items referring to the embankment, but remains in force in all other respects. For the construction of the rockfill and the rolled earth core a supplemental agreement was made on the basis of cost plus a fee.

A cross section of the revised design indicates the extent and slopes for the dumped quarry rock in Zones 1 and 3, which is required to be sluiced with 1½ cu. yd. of water per cubic yard of rock. Estimated quantities are: Zone 2—427,000 cu. yd. of rolled impervious core; transition zones—143,000 cu. yd.; Zones 1 and 3—1,539,000 cu. yd. of dumped quarry rock.



Spillway excavation

The excavation of more than 1,150,000 cu. yd. of material to form the spillway on the north side of the dam site provided one of the first operations which could be undertaken by the contractor. This excavation work was started immediately following the completion of the camp, and during the first month was carried out by shovels loading into trucks for disposal into areas established by the engineers for this purpose.

At the beginning of the winter season, it became evident from the condition of the hauling roads that disposal by truck for the 2 to 4-mi. haul would not be feasible during the months of wet weather. As a result, the contractor located, and built, about 3 mi. of standard gauge railroad line extending from the spillway site to the disposal areas. Following the completion of this railroad, and the installing of four Shay locomotives and cars, the main hauling has been carried out by this method. More than 918,000 cu. yd. of material have been excavated from the spillway site. The contract includes the placing of about 26,000 cu. yd. of concrete for the lining of the spillway.

Preparation of the dam site

In the glacial till section above the level of the bedrock, the contractor has been permitted to use sluicing operations to carry out the preliminary preparations of the site.

In the box-canyon proper, below the elevation of bedrock, the preparation of the site has involved the extensive operations of using scaling crews for jackhammer drilling. Working from the top of the bedrock, these crews have carried out the necessary scaling of the site into solid rock, with material falling into the stream bed, to be removed with the excavation that will follow stream diversion.

Preparation of the site has involved two unusual precautions: (1) the rounding of the contact between glacial till and bedrock in order to eliminate an abrupt angle in the rolled earthfill at its junction with the abutment; and (2) the backfilling with concrete of those smaller areas of canyon wall which are under-cut, to eliminate the need for placing earthfill in this difficult position.

Scaling operations were carried forward under a rigid program of safety, and in spite of the fact that these operations extended through the winter months, when rocks, safety ropes and equipment were constantly wet with slippery clay, only one fatality was experienced during that period.

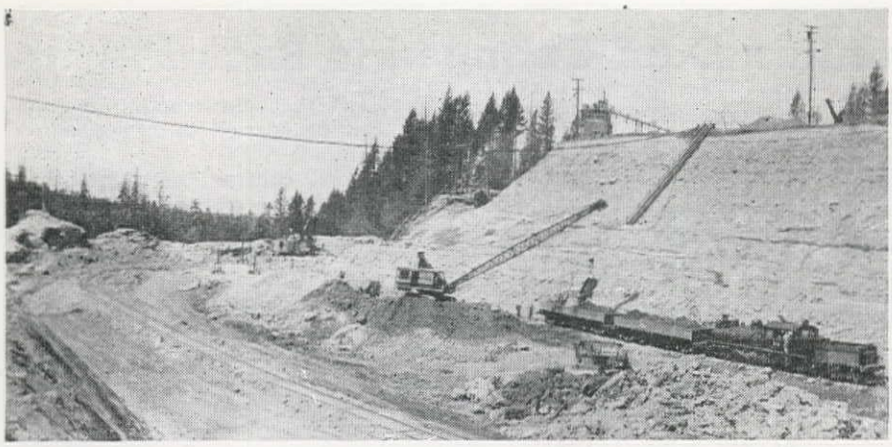
Two small creeks enter the dam site on the south abutment, and plans call for building of small dams on these creeks, and the diversion of the flow, outside of the embankment area. Excavation which has been required on the south abutment near the upstream por-

Principal Items of Equipment

2 Northwest 80D 2½-yd. diesel shovels
1 Bucyrus-Erie 54B 2½-yd. diesel shovel
1 Thew 75A 1¼-yd. diesel shovel
1 Lorain 40 ¾-yd. diesel shovel
10 Caterpillar D-8 tractors
1 Caterpillar D-4 trackson shovel
1 Caterpillar Motor Patrol
2 Conway tunnel muckers
1 Stiff-leg derrick with 150-ft. boom
6 Western 14-yd. dump trucks with Cummins diesel engines
Sterling 20-yd. trucks with Cummins diesel engines*
4 Shay 55 to 80 ton locomotives
13 Western and Magor 30-yd. air-dump cars
5 Owen Buckets

*These trucks were used during the early stage of the excavation work before the railroad was established for the main hauling from the spillway excavation.

SLOPPY GOING during the months of a long wet season has affected all phases of transportation work. A railroad was constructed for handling spillway excavation.



IN THE SPILLWAY where more than 1,150,000 cu. yd. were excavated by shovel and dragline and hauled by railroad train to disposal areas. Spillway capacity is 139,000 sec. ft.; the maximum flood of record (1933) is 28,000 sec. ft.

tal of the diversion tunnel, has been particularly difficult since there were no transportation facilities for getting this material out of the canyon. To solve this problem, the contractor erected a stiff-leg derrick with a 150-ft. boom, mounted near the contact between till and bedrock, and with this derrick has lifted excavated material by clamshell bucket for a vertical distance of about 200 ft. and transferred it to trucks for disposal.

Detailed plans have not yet been completed for the method to be used in moving the 2,100,000 cu. yd. of embankment material from the borrow pits and quarry into the dam site.

Organization

Design of the Mud Mountain Dam was prepared in the office of Col. John C. H. Lee, division engineer, North Pacific Division, Portland, Ore. Preparation of plans was carried out under the supervision of C. I. Grimm, head engineer.

Construction of the project is being carried out under the direction of Col. L. E. Atkins, district engineer, Seattle, Wash.

Operations of the Guy F. Atkinson Co. are under the direction of Ray H. Northcutt as resident manager. D. E. Root is general superintendent; D. O. Nelson is office engineer and W. A. Stancer is safety engineer. A more complete list of the contractor's supervisory personnel appeared in the October 1939 issue of *Western Construction News,* page 359.

Welding 2-in. sq. Bars for the Pit River Bridge Piers

Splicing reinforcement with butt welds of special design—Specifications require pre-heating of bar ends

PLACING and welding the two-inch square bars for the reinforced concrete piers of the Pit River Bridge represents one of the most interesting construction features on this important structure being built by the Bureau of Reclamation for the railroad relocation work required by the present Shasta Dam project. The work includes the setting of the heavy bars in an exact position in the tall piers, the spacing of the beveled ends at exactly 3/16-in. clearance, the clamping of the bars in this specified position, heating the ends of the bars to a 500-deg. F. temperature, and welding the spliced joints. More than 8,200 of these spliced welds are required in the reinforcing steel on the piers of this record-breaking bridge structure.

The design of the bridge, including the two main piers which are more than 350 ft. high, was reviewed in *Western Construction News,* Feb., 1940, and the general features of the structure will not be described in this article. Complete unit bids for the substructure were published in *WCN,* Nov., 1939. The contract is being carried out by the Union Paving Co. of San Francisco, on its bid of $1,138,288. The following paragraphs describe the procedure of placing the reinforcing steel and the specification requirements for the welded splices.

The abutments and piers of the bridge structure involve almost 11,000,000 lb. of reinforcing bars which are furnished by the U. S. Government. The placing of this reinforcing steel is covered as a separate item in the bid schedule, and the low and second bidder each bid $0.02 per lb. for this item. The low bidder's unit price for welds was $2.20.

The pier designs call for single, double, triple (Pier 3) and quadruple (Pier 4) layers of the 2-in. sq. reinforcing bars in the several piers, of which two have a height of 350 ft. Specifications require that this steel be welded to form continuous reinforcing without lapping the joints. After an extensive series of experiments to determine the most satisfactory design for the welded joint, the Bureau of Reclamation specifications provide a 45-deg. joint, with the end of one bar double-beveled at 30 deg. to provide a double V. The shape and dimensions of this joint are indicated in the accompanying sketch.

This reinforcing steel is trucked to the site, and the individual bars, which weigh as much as 800 lb. and have a length of 60 ft., are hoisted into position. An interior timber framework, supported by steel posts, is used to hold the bars in proper position prior to concreting. The splices are staggered so that only alternate bars are welded at the same elevation.

A most difficult feature in making the splices is the maintaining of the 3/16-in. required clearance between the ends of the bars, and the maintaining of the bars in correct position prior to making the start of the weld. For this purpose a clamp was devised by the reinforcing steel contractor which is indicated in the accompanying illustration. The clamp consists of U-shaped yokes provided with tapered steel pins which are driven to hold the reinforcing bar tight in the clamp. The upper bar is then lowered into position and the 3/16-in. clearance is secured by inserting a steel wedge of proper dimensions. The back of the clamp is provided with a copper backing-up strip to prevent fusion with the weld. As soon as the splice has been tack-welded, the spacing wedge can be removed, leaving the splice accessible for the placing of the weld metal in the double V.

Specifications require that "the ends of the bars shall be heated with a blow torch or some other suitable means to a temperature of approximately 500 deg. F. immediately before welding is commenced, and shall be maintained at such temperature during the welding operations." This requirement was met by the use of an especially designed butane torch that is clamped into place on the bars to be pre-heated. A double burner is provided to heat the bars the required 9 in. on each side of the splice, and the type of frame is so regulated to spread the flame uniformly over area to be heated.

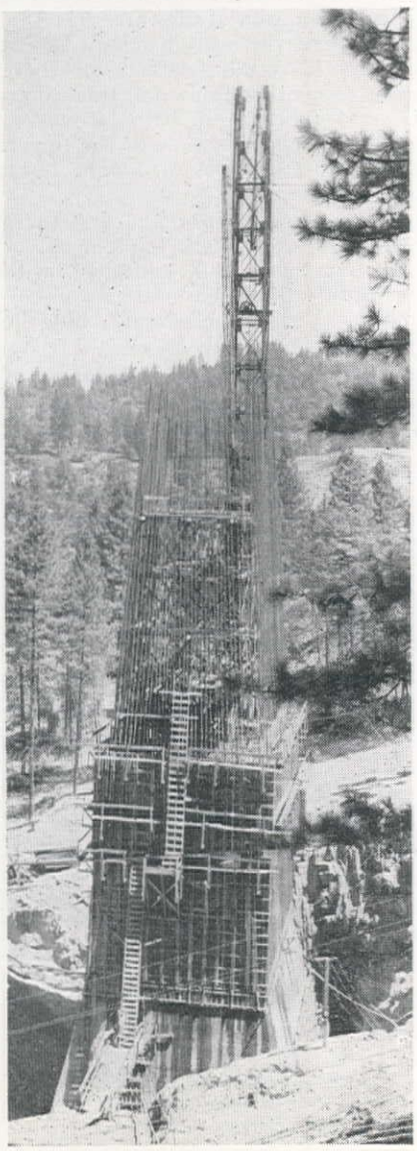
Welding, according to specifications, is required to be done by the electric arc method, using coated electrodes, providing a shielded arc to exclude atmosphere from the molten metal.

The weld material is deposited in the double V in successive layers, with proper peening and brushing between passes. Seven or eight passes are required to complete each V. After the V welds are filled, the specifications require that the weld deposit be continued to a ¼-in. thickness beyond the dimensions of the bar for a total vertical distance of 1½ in. The complete weld re-

quires as many as twenty 3/16 x 14-in. welding rods.

Specifications include the usual statement concerning inspection and approval of each weld, with defects to be chipped out and refilled. Welders are required to undergo an examination, involving the welding of two test bars of 2-in. reinforcing similar to that used on the job. The ends of the test bars are cut in the same manner as the bars to be spliced, and are welded with the same procedure and the same electrodes as are used on the job. The breaking strength and yield point of these test welds is required to be not less than 80% of the specified minimum tensile strength and yield point of the metal in the bars. The welder is required to have both of these test welds meet the strength requirement before he is certified for the job. However, specifications provide that if one of the test welds is inadequate, the welder is permitted to make two additional test bars, and if these two bars meet requirements, he is to be certified for welding on the job.

FOREST of 2-in. sq. reinforcing steel, weighing as much as 800 lb. per bar, required to be set in position and butt welded for continuity. Two of these concrete piers are 350 ft. high.

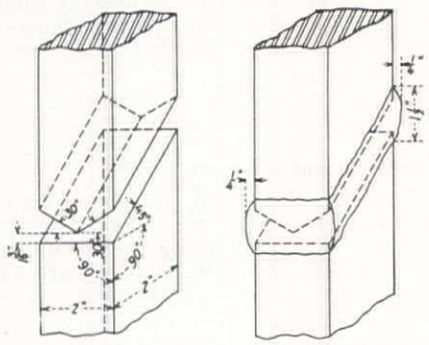


In addition, each welder is required to make one regular test weld for every one hundred welded joints made in the field. The Government specifies the right to call for and witness the making of test welds by any welder at any time, and to witness the testing any time.

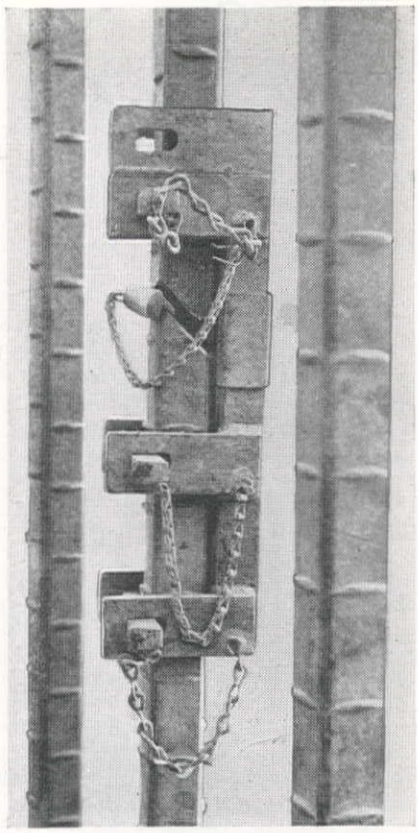
At the present time, about 15% of the splicing welds have been completed on the job. Test failures to date have occurred in the initial tests only; inferior welds have been apparent because of the welder's inability to control the arc with resultant gas pockets, slag craters and poor fusion. These welds have not been subjected to the strength tests.

This work is being carried out by a crew of 4 welders who have been certified for the job, but will be increased to 8 welders immediately due to welding operations in Piers 3 and 4. The average results of the test welds made by these welders indicate a strength of about 85% of the regular bar strength. Of the 18 welders taking the tests for certification, 90% passed their welding tests.

EXTENSIVE tests resulted in this design for the butt-weld joints in the 2-in. vertical steel of the piers. Note the 30 deg. bevels on the upper bar and the extra thickness of weld metal completely surrounding the joint.



The Pit River bridge is being built as part of the Shasta Dam railroad relocation, under the general direction of Ralph Lowry, construction engineer for the Kennett Division. Walker R. Young is supervising engineer for the Central Valley Project. R. M. Snell is in charge of the railroad relocation work, and C. M. Jackson is resident engineer on the Pit River bridge substructure work.



CLAMP developed by the reinforcing steel contractor to hold the bars in required position before and during welding. The key between the ends of the bars provides the 3/16-in. space required by the specifications. After the first tack weld this key is removed, and the double-V is filled.

The operations of the Union Paving Company are being carried out under the direction of Alec Cochran as general superintendent, with L. W. Hunt, office engineer.

The placing of the reinforcing steel is being carried out by the Soule Steel Co. of San Francisco, and the clamps described in this article were developed by this organization. Welding of the spliced joints is being carried out by the J-K Welding Co. of Long Island City, N. Y., with Al Klevens supervising the work.

Crane Prairie Dam Completed in Oregon

THE Crane Prairie Dam on the Deschutes project, Oregon, was finished last month. Completion of the dam will create a reservoir which will provide a capacity of 50,000 ac. ft. of much needed supplementary water supply for 47,500 ac. of land near Bend, Ore.

Lands to receive the supplemental supply are in the long-established irrigated areas of the Central Oregon Irrigation District, the Arnold Irrigation District, and the Crook County Improvement District No. 1. These districts built their own irrigation system years ago but have developed and grown beyond the capacity of the system so that the farmers were unable to obtain a sufficiently large enough share of the available water supply to take care of crops.

The contractor's price for the dam, erected under the supervision of Bureau engineers, was approximately $104,000. Crane Prairie dam is an earth-fill structure with rock facing, 40 ft. high, 200 ft. thick at the base, and 280 ft. long at the crest. It has a volume of 28,000 cu. yd. Water was stored behind Crane Prairie dam for the first time on July 10, about 10 days before the dam was brought to full height. At the beginning of August the Crane Prairie reservoir held 3,795 ac. ft.

Friant Dam — Aggregate Features Simplicity and

Four screw-type classifiers produce two sizes of sand —Special processing plant recovers gold from gravel— Tractors and scrapers excavate pit material and haul to field hoppers for conveyor delivery to plant

COMPACTNESS, efficiency and simplicity are the outstanding features of the aggregate plant which will produce about 3,500,000 tons of sand and gravel required for the concrete of Friant Dam. Material in the gravel deposit is good in both physical properties and gradation, thus presenting no particular problems to be solved by the plant. The sand classifying equipment installation is unusual in that screw or spiral classifiers are being used for the first time on so large a plant, and for the first time on a Government project. Instead of the usual three sizes of sand, only two are being produced.

Friant Dam is being constructed on the San Joaquin River about 20 mi. northeast of Fresno, Calif., as a unit of the Central Valley Project. The Bureau of Reclamation is directing all of the work with Griffith Co. and Bent Co. of Los Angeles as contractors for Friant Dam, including preparation of concrete aggregates. The dam is to be a concrete gravity structure about 300 ft. high above bedrock, 3,430 ft. long at the crest, and containing about 2,200,000 cu. yd. of mass concrete. Previous articles in *Western Construction News* have described the design of the dam and the contractor's progress with excavation. (See issues of July and August, 1939, and April, 1940.) This article deals exclusively with the preparation of concrete aggregates.

Gravel deposits

Material for the concrete aggregates is being taken from a deposit on the south bank of the San Joaquin River about 3 mi. downstream from the dam site. All required sizes of both coarse and fine aggregate are available in more than sufficient quantities, and in well graded, relatively clean, deposits. Oversize material (plus 6-in.) constitutes only about 1½% of the material. Some excess material in the finer sizes is being segregated and specially treated for use in sand blasting at the dam.

Overburden of the gravel deposit, amounting to about 600,000 cu. yd. of material, has been removed by a fleet of seven tractors and 14-yd. scrapers, and the same equipment is engaged in excavating the raw aggregate and moving it to the field hoppers. About two-thirds of the aggregate material with a maximum depth of 40 ft. below ground level lies below the water table level. When it becomes necessary to remove this material, the contractor contemplates the use of draglines to move the material above water level, where it can be picked up by the scrapers and moved to the hoppers. The use of dragline, however, will be delayed as long as possible by pumping to lower the water table.

Two 36-in. field conveyors extend into the pit at an angle of 90 deg. to each other. The loading device at the pit end of each consists of a double bin hopper covered by heavy steel grating, over which the tractors and scrapers can move and dump their loads directly into the hoppers. Double reciprocating plate feeders transfer material from the hoppers to the belt at a rate of 600 tons per hour. Below the water table elevation, the hoppers, plate feeders and conveyors are protected by calked timber cribs, or caissons. Riveted steel-plate conduits, 7 ft. in diameter, protect the conveyors from the cribs to ground level. One field conveyor is 900 ft. long and the other is 1,000 ft. long.

The two field conveyors meet in a common junction point, delivering their material through a simple drop transfer onto a 42-in. conveyor, 296 ft. long, leading to the raw storage pile. Live storage of about 3,500 tons is maintained in the raw stockpile.

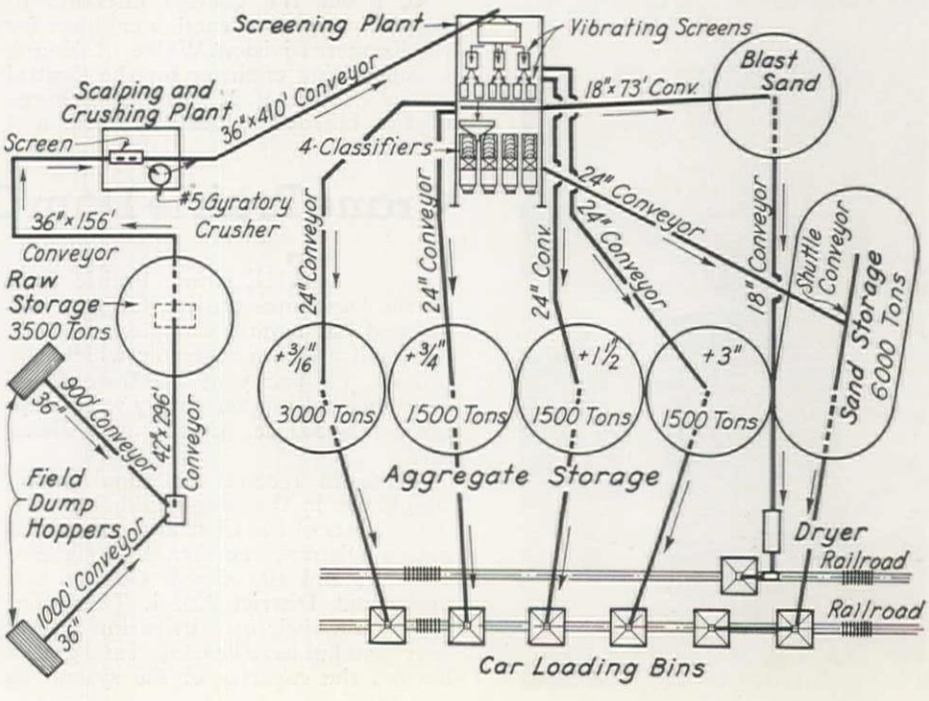
Crushing and screening

As previously noted, little crushing is required. A double reciprocating plate feeder in the reclaiming tunnel under the raw stockpile delivers material to a 36-in. x 156-ft. belt, which takes it to a 5 x 10-ft. heavy duty scalping screen with 6-in. clear openings. Passing material drops onto a 36-in. x 410-ft. belt and goes to the top of the screening and washing tower, while rejects are bypassed to a No. 5 gyratory crusher which reduces the material to about 3 in. and passes it directly to the 410-ft. belt. The capacity of the belt, and of the plant, is about 600 tons per hour.

At the top of the 90-ft. steel frame, open, screening and washing tower, material drops into a 50-ton divided hopper with three outlets controlled by three single reciprocating plate feeders. On the second deck of the tower are located three heavy duty 4 x 12-ft. double-deck screens, equipped with water sprays operating under about 70-lb. pressure. The top screen on each of the three has 3-in. openings, and the bottom screen 1½-in. openings. Material retained on these screens drops through small track hoppers onto short 24-in. belts, moves to transfer points at the side of the tower, and goes to stockpiles on longer 24-in. belts.

Passing material from the first three screens drops onto six triple-deck vibrating screens, also equipped with water sprays. The material is not collected from all three screens, but the

FLOW DIAGRAM of the aggregate plant indicates the straight line flow and absence of closed and return circuits. Two of the secondary screens have been fitted with smaller mesh to produce the sand required for blasting the surface of the concrete pours.



Plant Design Efficiency

product of each screen is divided and passed directly to two screens below. Four of the six screens are equipped with decks of ¾-in., ¼-in. and No. 4 screens, while the other two screens have a No. 4, second, and a No. 14, third, to remove sand for blasting purposes. Material from the ¾-in. screen is sent to stockpile through track hoppers and belts in the same manner as the larger material. Aggregate retained on the ¼-in. and No. 4 screens is combined in another compartment of the same hoppers, and is stockpiled as the smallest size of coarse aggregate.

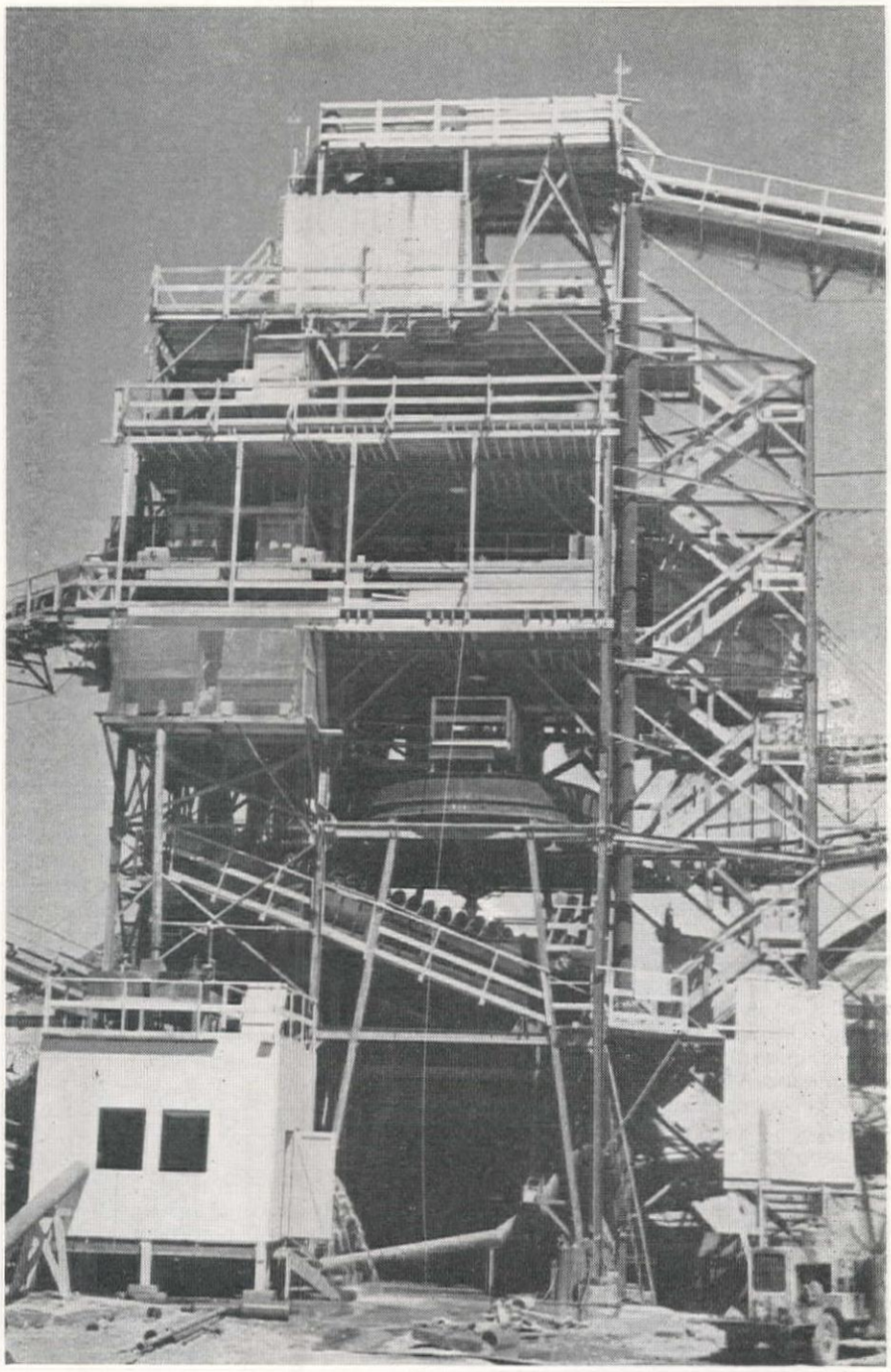
Fine aggregate processing

All material passing the screens, with which is combined all of the washing water from the screens, is sent directly to a 20-ft. hydroseparator on the next lower deck. Here some of the silt and impurities are washed out in the surplus water, and wasted. Sand is drawn off the bottom of the hydroseparator into two double-pitch primary screw classifiers, where the coarse sand is removed and the remaining water and fines bypassed to two single-pitch secondary screw classifiers.

One of the most unusual machinery installations, for a plant of this type, is the classification system of four screw classifiers used instead of the common rake type. Screw classifiers are common equipment in the mining field, having been used in ore concentration plants for many years, but all of the large aggregate plant installations, including Boulder, Grand Coulee and Shasta, have used rake classifiers.

In brief, the screw classifier consists of a steel screw or spiral operating in a steel trough slightly larger than the diameter of the screw. At one end of the trough is an adjustable weir which controls the water depth, and at the other end is an opening through which the classified sand is discharged. The trough is mounted at an angle with the horizontal, water entering the lower end and sand being discharged at the upper end. Gradation of the sand reclaimed by the classifier is regulated by the depth of the water, slope of the trough, speed of the screw, and pitch of the screw. For coarse sand, a smaller pitch is used than for fine sand. Sand dropping out of suspension in the trough is picked up by the screw and pushed up to the discharge opening by the motion of the screw. Unwanted fines and impurities are discharged over the weir.

At the Friant plant, four 60-in. x 26-ft. screws are in operation. Sand and water from the hydroseparator is divided and sent to classifiers 1 and 2, where the coarse sand is removed. The weir discharge of classifier 1 is bypassed to No. 4, and that of No. 2 to No. 3, where the fine sand is reclaimed and the remaining water and fines wasted.



WASHING AND GRADING of all aggregate takes place in the 90-ft. open steel frame screening tower. The decks, from top to bottom, are: (1) receiving hoppers, (2) three primary screens, (3) six secondary screens, (4) 20x3-ft. hydroseparator, (5) four screw classifiers, and (6) sand-blending feeders.

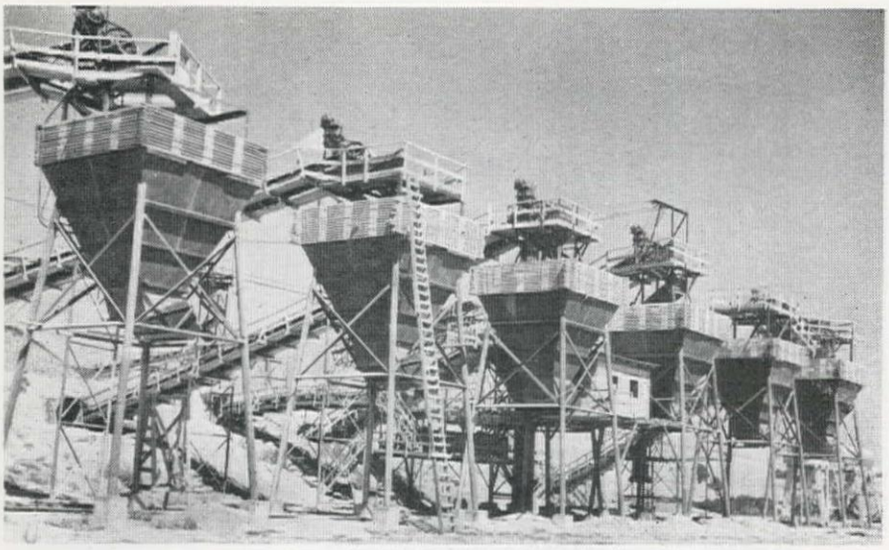
From the classifiers, the two sizes of sand are chuted to bins of two constant weight feeders on the lowest deck of the tower. Here the two grades are automatically blended to produce an aggregate with an average fineness modulus of about 2.75. Blended sand drops directly onto a 24-in. belt which takes it to a shuttle conveyor above the combination drainage and storage pile. Live storage of about 6,000 tons of sand is provided.

Stockpiles and loading

Storage in the coarse aggregate stockpiles is 1,500 tons of each size, except the 3/4-3/16-in. which has 3,000 tons of storage. Rock ladders at the delivery end of each belt are set in Gunite-lined pits which not only reduce the amount of dead storage, but provide efficient drains to carry away surplus water from the stockpiles.

Reclaiming tunnels of laminated timber construction house the belt feeders under the stockpiles, from which material is delivered to car hoppers. The car hoppers are of 50-ton capacity (one carload), and are spaced along the railroad spur at car-length distances. Two sand hoppers and one hopper for each aggregate size are provided so that a six-car train may be loaded in less than one minute by spotting the train under the hoppers and opening all chutes at once.

A 3-mi. railroad was constructed by



SIX CAR HOPPERS, each having a capacity of one car load, are spaced along the railroad track at car-length intervals. By spotting a six-car train under the hoppers and opening all gates simultaneously the train can be loaded in less than one minute. A separate hopper for blasting sand is located on another spur.

the contractor to transfer the finished aggregates from the track hoppers to storage at the dam site. While a portion of the track is located on Southern Pacific right-of-way, it is owned and operated by the contractor. Two diesel-electric locomotives and six 50-ton bottom dump railroad cars are used to transport the aggregate.

Blasting sand coming off two of the secondary screens is moved to a combination drainage and stockpile over an 18-in. belt. From storage, it is reclaimed, and before going into the car hopper is passed through an oil-fired drier of a type commonly used with bituminous mix plants. After passing through the drier, the sand, which ranges from No. 4 to No. 14 screen material, goes to a car hopper similar to those used for aggregate, but located on a separate spur. This material is hauled to the dam in bottom dump buckets which can be handled by the trestle cranes.

The belting installation on conveyors consists completely of cord construction, embodying the use of longitudinal cords instead of conventional belting fabrics, and with transverse cord breakers floated in rubber covers. This innovation has been compared with the far-reaching change from fabric to cord construction tires in automotive supply.

Water and power

Water for the plant is taken directly from the San Joaquin River, a few hundred feet above the plant, by three 2,000-g.p.m. pumps powered by 200-hp. electric motors. The water use at the plant is about 5,000 g.p.m., and with all valves open, a pressure of about 70 lb. is maintained on the highest sprays. Waste water from the hydroseparator, classifiers and stockpiles is taken by underground pipes to an open channel at the east edge of the pit, and returned to the river.

Power is supplied from the commercial line serving the equipment at the dam site. Electric motors supply power to all units of equipment through speed reducers and V-belts. All motors and drives are well guarded to reduce accidents.

Gold and pumicite

Under a special agreement with the Bureau of Reclamation, the contractor has installed a gold reclaiming plant, which, at the present time, is still in the experimental stage. Three systems are being tried simultaneously in an effort to determine the most practicable method. Riffles, jigs and screens are all being tried before the final installation is made.

IN THE PIT, raw material is excavated by scrapers and hauled to field hoppers at the ends of the two 1,000-ft. conveyor belts. Water-tight bulkheads and 7-ft. steel tubes protect the feeders and the lower ends of the conveyors which are below water level.

The experimental plant is processing about one-third of the minus No. 4 material which is passing through the plant. Under the agreement, the first gold recovered will pay for the equipment, after which the profit will be split evenly between the Government and the contractor. Reclaimed gold may run about 3½c per yard.

Not a part of the aggregate plant proper, but still a preliminary to the mixing of concrete, is the production of pumicite, which is used as an admixture in the mass concrete (see *WCN*, Sept., 1939). About 3 mi. upstream from the dam site, there is a deposit of pumicite located within the reservoir area purchased by the Government. Both fine pumicite and pebble pumice are included in the deposit which had been previously worked to some extent.

Only the fine pumicite is being used for the concrete, but under the Government agreement with the owner of the deposit, the contractor is excavating and stockpiling above the maximum reservoir elevation about 100,000 cu. yd. of the pebble pumice. All work at the deposit is being carried on by Griffith Co. and Bent Co. under a change order, since the original contract for the construction of Friant Dam contemplated that pumicite would be delivered to the contractor at the dam site.

A tractor, equipped with an overhead shovel, loads the material into trucks which take it to the south abutment of the dam site. Dumped into a hopper, the pumicite passes through a belt-fed roll crusher set at ½ in. to break up the lumps, and then goes over a covered screw conveyor to a 300-ton steel silo for storage. Because of the extreme fineness of the pumicite, all men working at the deposit are required to wear respirators, and all handling equipment at the dam is completely enclosed.

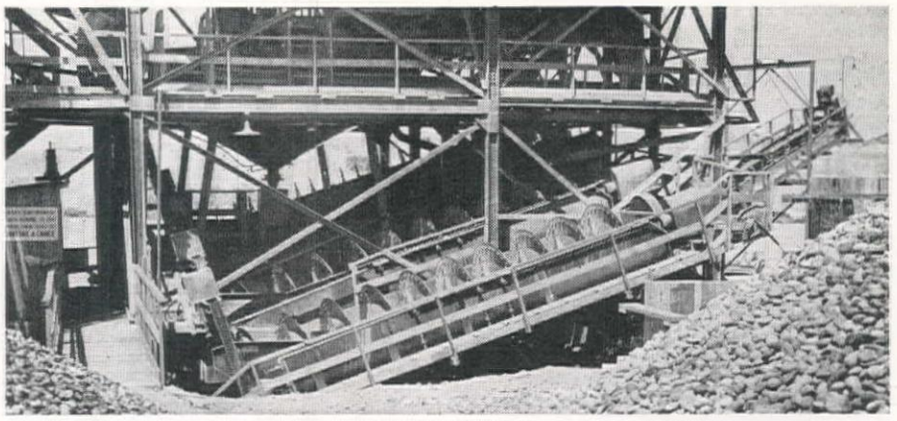
Organization

Design and construction of Friant Dam is being carried out by the Bureau of Reclamation. John C. Page is commissioner of the Bureau; S. O. Harper is chief engineer and J. L. Savage is chief design engineer. Walker R. Young is supervising engineer of the Central Valley Project, of which Friant Dam is a part, and R. B. Williams is construction engineer in charge of the Friant Division. J. H. Warner is resident engineer for Friant Dam. A. S. Hartley is in

charge of the field office of the Bureau at the aggregate plant.

Griffith Co. and Bent Co. operations are under the direction of H. Stanley Bent as project manager, and M. H. Slocum, general superintendent. E. L. Causey is engineer for the contractor. F. A. Backman was superintendent of the aggregate plant during the construction period, and P. O. Hayes is now in charge of operations at the plant.

The aggregate plant was designed and constructed by Stephens-Adamson Manufacturing Co. of Los Angeles, Calif. H. K. Herrick was engineer on the plant design. Most of the plant equipment is Stephens-Adamson, including screens, conveyor rolls, speed reducers and feeders. B. F. Goodrich Co. furnished all cord construction conveyor belting for the plant. The gyratory crusher was built by The Austin-Western Machinery Co., San Francisco, provided the hydro-separator and the four screw classifiers and controls. The sand blending equipment consists of two Hardinge Co. Constant Weight Feeders. In the pit, seven Caterpillar D8 tractors with 14-yd. LeTourneau Carryalls have done all stripping and excavation. Motors and controls in the plant are largely General Electric with Stephens-Adamson speed reducers and belt drives.



SCREW CLASSIFIERS are used for the first time on a major project of the Bureau of Reclamation for producing graded concrete sand. From these classifiers the sand moves through weighing feeders for automatic blending to a 2.75 modulus.

Cost - Plus - A - Fixed - Fee - Contracts

What Are They?

What Are "Costs"?

What Rules Govern?

Answers to questions concerning the new regulations formulated by the U. S. Army for this type of National Defense work

By ARNOLD KRUCKMAN
Washington, D. C.

THE Judge Advocate General of the U. S. Army recently clarified the "Cost-Plus-A-Fixed-Fee" construction uncertainties by causing definite contracts to be drafted for the contractor and the subcontractor. The substance of these contract provisions is presented in the following series of questions and answers:

Q—What is the Cost-Plus-A-Fixed-Fee Construction Contract?

A—Normally, the Federal Government invites public competition, and awards contracts to the lowest bidder. In the national emergency, the time required for development of design and plans is eliminated, and work begins immediately under a negotiated agreement, and construction proceeds concurrently with each successive step of design as the designs are reduced to working plans. Cost, roughly, is determined by negotiation, and the fixed-fee is the result of agreement, limited by the percentage of the cost—7% maximum—fixed by law.

Q—How is the Cost-Plus-A-Fixed-Fee Construction Contract formally designated?

A—As C. P. F. F. Form No. 1.

Q—Is there a separate Cost-Plus-A-Fixed-Fee Construction Contract for Subcontractors?

A—Yes. It is known as C. P. F. F. No. 2, approved by the Assistant Secretary of War in August.

Q—What does Form No. 1 cover?

A—Article 1 expressly provides the "contractor does NOT guarantee the correctness of either" the estimate of the total cost of construction work or the estimate of time within which the work will be completed. This qualification is due to the fact that the Government may make changes, additions, or require omissions; and such changes, if material, shall warrant the contractor seeking an adjustment in the amount of his fixed fee. Title to all work completed or in course of construction, and to all materials, tools, machinery, equipment, and supplies, for which the Government eventually would pay, upon delivery at site of work or storage, after inspection and written acceptance, immediately is vested in Government.

Q—What is included as "cost" in the Government schedule?

A—Subject to approval by the Army's representative, the contractor is paid for all labor, material, tools, machinery, equipment, supplies, services, power and fuel; machinery or equipment valued at less than $300 are classed as tools and charged directly to the work. The Government pays all rentals for derricks, concrete mixers, boilers, clamshells or other buckets, electric motors, drills, hammers, hoists, mechanical shovels, locomotive cranes, power saws, engineers levels, transits. When rental equals cost, plus 1% per month while used, rent ceases and title passes to the Government.

The Government will pay for loading and unloading the construction plant, for transportation of the plant; for installation and dismantling; for repair and spare parts. Government pays all transportation on materials and supplies; transportation charges and traveling expenses of field forces; expenditures for procuring labor and expediting production and transportation of materials and equipment. Government pays salaries of resident engineers, superintendents, accountants, purchasing agents timekeepers, foremen and other field employees. All chief officials and their salaries must be approved by the Government.

The Government pays for temporary rights in land, for buildings and equipment required for field offices, commissary, hospitals, and other facilities, including telephone services, telegrams, expressage and postage. The Contractor pays all expense of operating and maintaining the commissary. Government pays all insurance charges, and for losses and expenses not covered by in-

surance, and the cost of rebuilding and replacing any work destroyed or damaged, not covered by insurance.

Government pays Social Security taxes, state and local taxes, fees and charges of all kinds the contractor is obliged to pay on personnel, plant, equipment, process, supplies, organization, for licenses, permits, and royalties in patents, including those owned by the contractor. Government pays hotel expenses of officials and employees of the contractor; and Government pays for work done in the general home headquarters offices of the contractor, chargeable to the job. Government also will include items of cost not otherwise anticipated or scheduled.

Contractor must take advantage of all discounts, rebates, credits, commissions, salvage, etc., and deduct the saving from gross costs he must also apply all revenue from hospitals and similar facilities in reduction of cost of the work.

Q—How is the contractor reimbursed for costs?

A—Labor and salary costs are reimbursed upon presentation of certified and verified payrolls. Costs for materials are repaid upon presentation of original paid invoices or similar original papers.

Q—When are costs repaid?

A—Weekly, and even more frequently if required.

Q—How are rental charges paid?

A—Monthly, upon presentation of vouchers.

Q—How is the fixed-fee paid?

A—Defined as full compensation for all services, profits and general overhead, the fixed fee is paid monthly, in instalments of 90% as it accrues, based upon estimates of completion of the work. Upon completion and final acceptance any unpaid balance is paid. If the contract is terminated due to the contractor's fault no additional fee payment is made. The contractor's delinquent labor or material bills may be paid by the Government, and unpaid balances deducted in the final settlement.

Q—Must all subcontracts be made in writing?

A—Subcontracts in excess of $2,000 must be made in writing, in the name of the contractor, must not bind the Government, but must be assignable to the Government. Purchases costing over $500 require Government approval.

Q—How is subcontract defined?

A—As a contract by the contractor with others which involves performance of some part of the work at the site of the work. No subcontract is valid except in the form prescribed by the Secretary of War and unless approved by the Government.

Q—May Government require dismissal of any objectionable employee?

A—Yes.

Q—How may contract be terminated?

A—Whenever Government gives written notice the contractor must immediately cease all work and cancel all orders and terminate subcontracts and surrender premises and plant and materials, etc., to the Government. Usual provisions are made for assumption by Government of pending obligations, reimbursement for legitimate claims and unpaid balances.

Q—What special preferences are prescribed?

A—Materials and articles originating in the U. S., if they are available in reasonable commercial quantities and satisfactory quality.

Q—What materials are exempt?

A—Ark Wood, Asbestos, Balsa Wood, Tung Oil, Chromium, Cork, Jute, Kaurigum, Lac, Nickel, Monel Metal, Platinum, Rubber, Silk, Sisal, Teak Wood, Tin. All supplies containing mercury, antimony, tungsten, mica, of foreign origin, may be used if the supplies chiefly consist of materials originating in the U. S.

Q—What are the Wage Regulations?

A—Prison labor is forbidden; all workers must be paid once a week, at a rate established by the Secretary of Labor, regardless of any existing contract between the contractor and the workers. The contract may be terminated if the worker is underpaid; if the worker is overpaid the increase is wholly at the expense of the contractor. Workmen's compensation laws of a specific state apply locally.

Q—May members of Congress share in benefits under these contracts?

A—No; unless they are stockholders in a corporation.

Q—May the contractor employ a person to secure or solicit a contract on commission, percentage, brokerage or contingent fee?

A—No. Contract must guarantee he has not employed such help; breach of the guarantee automatically terminates the contract. The prohibition does not apply to selling agencies maintained regularly by the contractor.

Q—How are disputes settled?

A—By the contracting officer of the Army, subject to written appeal by the contractor within 30 days to the Chief of the Branch of the Army concerned. His decision is final when the amount is $15,000 or less. When it is more, after the Chief's decision, the contractor, within 30 days more, may appeal to the Secretary of War, whose decision is final.

Q—What else must the contractor do?

A—He must furnish a detailed chart showing minutely the organization of his executive and administrative units; also a chart covering all field personnel, together with a statement of the duties and rate of pay of each person in all branches of the organization, wherever located and however employed.

Q—What is the effect of the Cost-Plus-A-Fixed-Fee construction subcontract?

A—It applies in substance the terms of the contract between the Government and the contractor to the relations between the contractor and the subcontractor, and recognition of these relations by the Government.

Q—How are Cost-Plus-A-Fixed-Fee contractors selected?

A—The so-called Hogan Committee, composed of members of the Associated General Contractors, the Construction League of America, American Institute of Architects, American Society of Civil Engineers, and American Engineering Council, which passes on national defense construction programs, submits the names of three contractors to the Secretary of War. These names are selected from a list of 2,000 whose qualifications have been verified by the Blossom Committee, an Advisory Council, under the chairmanship of Maj. A. F. Harvey, Construction Division, Quartermaster Corps, Munitions Building, Washington, D. C.

Idaho Project Wasteway Contract

AWARD of a contract for construction of two wasteways on the lateral system of the Black Canyon Canal which will serve the new Payette Division of the Boise project in Idaho has been made to Vernon Brothers Co. of Boise on its bid of $84,572.50. Contract covers earthwork and structures for the Graveyard Gulch and the Langley Gulch wasteways, involving the excavation of 356,000 cu. yd. of materials, the construction of concrete drops and chutes, canal, highway and railroad crossings, bridges, drains, inlets and other miscellaneous structures.

The Black Canyon Canal, with an initial capacity of 1,909 sec. ft. heads at the Black Canyon Dam and runs west for a distance of about 30 mi. Its route follows the southern edge of the Payette Valley, first through the orchards on the Emmett Slope and then along a steep hill near Plymouth, where it crosses the Payette-Boise summit. There the canal divides into two branches, the "A" Line and "D" Line canals, which continue westward along the Boise and Payette Slopes. The Graveyard Gulch wasteway extends north from the Black Canyon Canal just before it branches and crosses the Payette Valley Branch of the Union Pacific Railroad. The Langley Gulch wasteway extends north from the "A" Line canal to a point near New Plymouth.

Work on the main canal is completed and construction of the lateral system is under way. This new Payette Division will add 47,000 ac. to one of the oldest and largest Federal Reclamation projects.

Washington Merit System For Highway Employees

For six years the state department of highways has used this method for recognizing individual ability and experience in matters of salaries and promotions

By LAWRENCE R. TURNBULL
Engineer of Personnel and Accounts
Washington Department of Highways

IN 1934, the engineering organization of the Washington Department of Highways initiated the use of a merit system "to insure to its personnel proper recognition of individual effort and ability," and in 1937 the plan was accorded legal status by legislative action, which expanded the program to include all employees of the State Highway Department. The system is based on the maintaining of service records for all employees, indicating education, previous experience, service within the department, and general qualifications, with this information kept up to date through annual reports filed in the personnel office of the Department. Every year, each individual receives an efficiency rating based on the appraisal of his immediate superior, checked by the district engineer and the headquarters office, and to this efficiency rating are added the "service credits," based on the individual's years of work in the Department. So far as is practicable, all promotions, increases in salary, lay-offs, and other changes are made in conformity with the resulting "seniority rating." Applicants for employment are given a corresponding rating, based on information obtained from previous employers and personal interview to determine their fitness.

The annual rating of each employee is based on 100 possible points as a total, which include the major factors of (1) education, (2) experience, and (3) skill, plus a group of seven other minor items. The summation of these points provides the efficiency rating.

A total of 20 points is allowed for education, and is evaluated as follows: High school education, 6 points; two years of an engineering course, 12 points; and a B. S. Degree in Engineering, 20 points. To insure uniformity, graduation in any engineering course receives the full 20-point rating. Graduation in any college course other than engineering is arbitrarily rated at 12 points. Operation of the system includes recognition for correspondence courses and other home study, although difficulty in applying fixed rules for this type of educational effort makes the subject one of individual interpretation. Those making the ratings are instructed to secure full information as to such educational effort and its equivalent rating in college work.

A total of 30 points is allowed under the general head of Experience, which is subdivided into (1) length of service, 20 points, and (2) kind of work, 10 points. For three years of work in any employment classification (E-1, E-2, E-3, E-4, and E-5), the allowance is the full 20 points in the experience column, with 14 points allowed for two years of experience in the classification, and 8 points allowed for one year. Experience obtained in classifications below the employee's present rating is not considered in determining the points allowed for experience.

Credit is also given for the variety of highway work in which the employee has been engaged. Thus, 2 points are allowed for each two or more seasons which the employee has spent on any of the following: location, grading, paving, bridges, and oiling, totaling 10 points for this complete diversification in highway engineering experience. One point is given for one season's experience in any one type of work. The word "season" is defined as being at least two months, and if it includes only this minimum time, the service must have embraced work on a project from inception to its completion, so that the employee has secured a familiarity with all phases of this type of work. Not more than two credits for diversity of experience are allowed a year.

For experience obtained outside of the Washington State Highway Department, experience credits are discounted from 10 to 50%, depending on the type of organization, and the standard of performance which was required during such service.

The remaining items in the rating schedule include the following: judgment, personality, dependability, initiative, ambition, physical fitness, and citizenship. These characteristics are defined as follows:

Judgment

By judgment is meant ability to thoroughly grasp a situation and draw the

EMPLOYEES' MERIT RATING

Name of Employee.....Classification.....Dist. No.....

Permanent Address.....

Married or Single.....Number of Dependents (incl. wife).....

Education.....
(If college education, show school, course and degree, or number of years credit)

Names of any relatives in state employ, relationship and department.....

.....

	Total Possible Points	FIRST RATING	SECOND RATING	FINAL RATING
1. EDUCATION	20			
2. EXPERIENCE Length of Service	20			
Kind of Work: Location.....; Grading.....; Paving.....; Bridge.....; Oiling.....	10			
3. SKILL	20			
4. JUDGMENT	8			
5. PERSONALITY	6			
6. DEPENDABILITY	4			
7. INITIATIVE	3			
8. AMBITION	3			
9. PHYSICAL FITNESS	3			
10. CITIZENSHIP	3			
EFFICIENCY RATING	100			
SERVICE CREDITS				
SENIORITY RATING				

First Rating is to be made by employee's immediate superior; Second by the district engineer, and Final by the reviewing board in the headquarters office.

Ratings are to be made to nearest point or half point.

Follow carefully the Classification and Rating Schedule.

correct conclusions. Does the employee profit by experience? Does he exercise common sense and evidence a proper understanding of proportions and relative values, not only as regards his actual work but in all his contacts with the public?

Personality

Under the heading of personality should be considered an employee's personal appearance, his ability to contact the public, his personal habits, sobriety, tact, poise, courtesy, diligence, leadership and co-operativeness. There should also be considered the employee's ability to get along harmoniously and at the same time to inspire confidence and respect among his fellow workers, the contractor's organization and the public.

Dependability

By dependability we mean truthfulness, honesty, straightforwardness, loyalty, reliability and obedience — those qualities in an employee that give his employer an assurance that he will always conduct himself in a creditable manner, and that he can be relied upon to carry out an assignment according to instructions regardless of any obstacles which may present themselves.

Initiative

By this is meant the employee's resourcefulness, aggressiveness, adaptability and constructive thinking. Is he capable of using all his technical knowledge when meeting unusual situations, or does he have to depend on his superior's advice in all but purely routine work? Is he adept in planning his work?

Ambition

By ambition is meant the earnest desire of an employee for betterment and the attainment of a higher and more responsible position in the engineering profession, coupled with a desire for the advancement of the interests of the department. Ambition should be manifest by the employee taking such steps as are necessary to acquire additional knowledge and experience essential to the realization of his desire. In other words, merely the wish without the effort to bring about the desired result does not constitute ambition.

Physical fitness

Under this term we would indicate an employee's physique, health, strength, hearing, vision, age and agility insofar as they would affect the employee's efficiency for any position in the classification in which the rating is made.

Citizenship

Under this term we attempt to evaluate an employee's standing in the community and his attitude toward civic, educational, social, moral, benevolent and other community interests. Is his attitude merely one of passive indifference, or does he seek through personal effort to better conditions among his neighbors and in the community in which he lives? In financial matters, is he always prompt and reliable in meeting his obligations, and is he careful not to incur debts beyond his ability to satisfy?

For those positions calling for a specialized type of work, such as in the materials laboratory or in the design office, the element of diversification is not extended over such items as location, grading and paving, but is confined to various types of laboratory or design work as may be determined by the department head. On the other hand, if an employee in these departments is transferred into another classification, or promoted to a different type of work in a higher classification, the matter of experience and skill is to be considered as applicable to the provisions required for all engineering employees.

How the system functions

A service record is kept at the headquarters office for all employees, and this information is kept up to date by reports furnished the headquarters office monthly from the district engineers on forms which are provided for the purpose. These monthly reports indicate the personnel employed in each district, and in case an individual's service is terminated, the report indicates the reason.

Requests for engineering and certain other personnel are made to the headquarters office by the district engineer (except in emergency), indicating the type of work and the probable duration of the position. If the district engineer so desires, the names of several applicants are submitted to him for his consideration.

All employment of engineering personnel is handled through the personnel division at the Olympia office, except for emergency periods of not more than two weeks duration when temporary employees may be appointed by the district engineers. The employment of laborers and other maintenance personnel is, for the most part, handled by the district engineers. There is, however, a complete service record maintained in the personnel office for each such employee.

The policy of the Washington State Highway Department is to fill vacancies by promotion whenever practicable. These promotions are generally made on the basis of seniority rating, and are not limited to the district where the vacancy occurs.

Salary changes may be made on April 1 and October 1, and district engineers may make recommendations to the headquarters office for such changes in salary ratings among employees as may be consistent with the service of the employee and the seniority rating. Within the classification, salary rates are intended to be based on the seniority rating of the employee. Inexperienced men, promoted from lower to higher classifications, begin at the minimum salary of the new classification.

At the close of the calendar year, each employee of the Washington Highway Department receives a new "Employee's Merit Rating." These ratings, as indicated by the accompanying form, are first made by the immediate superior of the employee, and a second rating is then made by the district engineer, with a re-rating or final standing made at the headquarters office. The work of rating at the headquarters office is designed particularly to provide uniformity, and eliminate inequalities due to personal characteristics in the rating made by the district engineers.

To these efficiency ratings are automatically added the service credits based on one-half point for each complete year's service in the department, which determines the seniority rating of the employee.

Lacey V. Murrow is director of highways for the State of Washington.

Motor Vehicle Registration Figures

THE UNITED STATES increased its number of motor vehicles in use by more than a million in 1939 over the preceding year to reach an all-time high in automobile registration for the nation, Public Roads Commissioner Thomas H. MacDonald reports. A total of 31,009,870 motor vehicles was registered in 1939, according to reports of state agencies to the Public Roads Administration. This included 30,615,087 private and commercial vehicles, an increase over 1938 of 1,129,407. In addition, there were 121,270 vehicles owned by the Federal Government and 273,513 owned by state, county and municipal governments. Thirty-six of the states reported an all-time high registration in 1939, and all but one of them, Nebraska, reported increases over 1938.

The United States averaged one vehicle for each 4.3 persons in the country during 1939. This compares with one vehicle for each 4.4 persons in 1938 and for each 10.4 persons in 1921.

California had more motor vehicles per capita than any other state, with an average of one vehicle for each 2.4 persons. Fewest vehicles per capita were in Alabama where there was one vehicle for each 9.1 persons.

The following table for the eleven western states gives the vehicle registration and the percentage of change in total registrations compared with the previous year.

	Vehicles Registered	Per Cent Increased
Arizona	136,037	2.0
California	2,642,006	3.8
Colorado	345,884	3.2
Idaho	156,820	11.2
Montana	185,327	5.2
Nevada	42,296	6.1
New Mexico	123,549	3.4
Oregon	376,736	3.4
Utah	135,935	4.6
Washington	546,435	2.4
Wyoming	84,990	2.6

Bituminous Mixes Used in Oregon Maintenance Work

Five mixes designed to meet requirements of different service conditions—Mobile patching plants used in seasonal operations

By N. M. FINKBINER
Engineer of Materials
Oregon State Highway Commission

SINCE the policy of the Oregon State Highway Commission is to maintain all roads under its jurisdiction in the same condition, as nearly as possible, as when they were accepted from the contractor, much emphasis has been laid on the method and procedure for maintenance operations. A special feature of this work has been the design of mixes to be used with the patching plants which have been developed for carrying out the maintenance operations. The following paragraphs review the various mixes which are being used for maintenance work and the equipment for the application of this material.

Operations of the oiling crews do not form a part of this review, but may be mentioned briefly by stating that this work involves the re-oiling of those sections of bituminous macadam which are too small to let by contract and the laying of a ¾-in. surface coat at those locations on the older bituminous surfaces which have become too smooth for efficient traction. These operations are carried on with five oiling crews during the summer months.

Maintenance operations are concerned with the following types of surfaces: (1) concrete, (2) bituminous concrete (plantmix), (3) bituminous macadam (penetration), and mixed-in-place (roadmix). Patching of these types of highway surfacing is carried out in the dry, warm months of the summer using a battery of portable plants, whose operations are described later in this article.

The mixes used in these maintenance operations are established by the laboratory, using samples submitted from the aggregate stock piles by the district maintenance superintendents or by the foreman of the patching plant. Each week two samples of the bituminous mixture are sent from each plant to the laboratory for checking purposes. The laboratory estimates the amount of asphaltic cement to be used in the mix, leaving the exact amount to be determined by the foreman, based on weather conditions and other factors unknown to the laboratory.

The specified mixes are indicated in the accompany table and a brief description of the use of each follows:

Mix 1

This mix is to be used as base or top course having a thickness greater than 1 in. However, it is not to be laid in courses having a greater thickness than 3 in. All the aggregate above the No. 10 sieve must be composed of crushed particles; below the No. 10, crushed material is optional.

CHARACTERISTICS OF MAINTENANCE MIXES FOR PATCHING PLANTS

Screen Size		Mix 1	Mix 2	Mix 3	Mix 4	Mix 5
Passing	Retained	(Allowable Range of Per Cent)				
1¼ in.	¾ in.	16-24	.....	.....	.....	.....
¾ in.	¼ in.	24-36	30-42	45-55	.....	.....
½ in.	¼ in.	.....	.....	.....	40-50	.....
¼ in.	No. 10	12-20	18-28	30-36	30-40	50-80
No. 10	No. 200	20-28	20-36	8-14	8-20	20-36
No. 200		3-6	3-5	0-2	0-2	1-3
Asphalt						
61-70 Pen.		4.5-6.5				
RC4 or 61-70		.....	5-7	.....	.....	.....
RC4		.....	.....	4-6	4-6	4-6

Mix 2

This mix is to be used when a water-tight top is required, and should be used when thickness of course is more than ¾ in. It must contain all crushed particles above the No. 10 sieve; below the No. 10, crushed material is optional.

Mix 3

This is essentially a three-quarer-inch, non-skid top. It should be used when thickness of course is greater than ¾ in. It must contain all crushed material; no natural sand permitted. It must be placed only on a water-tight base or in an arid region.

Mix 4

This mix can be used on city streets and must be placed on a water-tight base or may be used in an arid region on an open base. It must contain all crushed particles; no natural sand permitted.

Mix 5

This mix is more suitable than Mix 4 for city streets. It must be placed on a water-tight base, or may be used on an open base in arid region. It must contain all crushed material; no natural sand is permitted. The asphaltic cement content in this mix must be carefully regulated because, in an open mix, the cement content becomes more critical as the maximum size of aggregate decreases.

Maintenance operations, using these mixes are carried out in the summer months using a battery of portable plants which can be erected ready to operate in about two hours. Each of these plants—eight in use at the present time—is capable of producing from 75 to 125 tons of mixture in an eight-hour day. Itineraries are planned in the office of J. N. Bishop, maintenance engineer, and cover the 4,536 mi. of surfaced highways in the Oregon state highway system during the season.

The tonnage required on the sections to be patched is estimated by the district maintenance superintendents who also order the requisite amount of the various materials to be delivered to the sites at which plants are to be set up.

The plants are all similarly equipped and are as simple and mobile as it is possible to make them. Besides the usual complement of small tools, each unit is made up as follows:

PORTABLE PLANTS prepare maintenance mixes from convenient stock piles. Asphalt content is estimated by materials laboratory, with the exact amount determined in the field based on local conditions.

PORTABLE hot mix plants are used by Oregon maintenance forces in surface repair work. These plants, of which there are eight, consist of two drum heaters with a pug-mill type of mixer placed between them. They have a capacity of about 175 tons per 8 hr., running batches of 1,000 lb.

The mixer consists of dual rotary drums into which the materials are measured. In the smaller plants the measurements are by volume; in the larger plant, by weight. Before the addition of the asphaltic cement, the aggregate is dried and heated in the drums by pressure burners using stove oil. Mixing is generally accomplished after the flame is removed, and the mixture is then hauled to the road in dump trucks. The batches weight 750 lb. each, and six batches comprise a load. There is one larger plant which consists of two drum heaters with a pug-mill type of mixer between them. This plant is used at those locations where a greater tonnage is required, and has a capacity of 175 tons of mixture in an 8-hr. run. The batches in this plant weigh 1,000 lb. each, and four batches comprise a load.

There are three asphalt kettles. A large one at the plant is equipped with a small auxiliary gasoline motor for raising the asphalt drums or barrels to the deck of the kettles. A smaller kettle is used on the road for preparing asphalt when flush-coating is necessary. Another small kettle is used ahead of the main crew to prepare asphalt for "painting" the old pavement preliminary to the spreading of the hot mixture.

There are two tank trailers, one for fuel, which is stationed at the plant, and one for water on the road. (The water is used in sprinkling the patches preparatory to flush-coating, thus enabling a light flush-coat to be applied.)

Seven dump trucks are used for hauling the mixture from the plant to the road, and for moving the equipment. One roller—a six-ton tandem—is used for rolling the patches, and is transported on a flatbed trailer. A trailer house is located at the plant for use as a combination tool house and timekeeper's office. Each unit also has one or two light cars or pickups for the use of the foreman and timekeeper.

The average yearly cost per ton for the operation of these pavement-patching plants during the past eighteen years follows:

1923	2,163	tons at	$15.72
1924	6,389	" "	13.29
1925	17,959	" "	11.89
1926	15,720	" "	13.08
1927	9,416	" "	12.86
1928	14,574	" "	10.62
1929	31,034	" "	9.35
1930	41,000	" "	8.82
1931	35,218	" "	7.43
1932	17,312	" "	6.81
1933	23,063	" "	6.85
1934	32,416	" "	7.19
1935	39,709	" "	6.96
1936	56,127	" "	6.45
1937	66,037	" "	6.10
1938	60,020	" "	6.14
1939	62,643	" "	5.78
1940 (to July 19)	46,400	" "	5.38

These costs include cost of materials and supplies, labor, and rental on equipment. Equipment rental includes charges to cover obsolescence and repairs.

A more complete review of the operations of these patching plants appeared in *Western Construction News,* August, 1939.

Operations of the Oregon State Highway Department are under the general direction of R. H. Baldock, state highway engineer and C. B. McCullough, assistant state highway engineer. J. N. Bishop is maintenance engineer and the author is engineer of materials.

California Highway to Be Modernized as a Freeway

Bayshore Highway south from San Francisco will be rebuilt to six-lane divided roadway with complete grade separations under a 10-year construction program

A TEN-YEAR program of reconstruction designed to transform 27 mi. of the Bayshore highway south of San Francisco from a four-lane undivided road to a six-lane divided freeway has been recommended to the California Highway Commission by the Division of Highways. The report and tentative plans have been approved by the commission, and it is expected that the next biennial budget will contain funds allocated to the project. No complete cost estimates have been released, but it is believed that the ultimate cost will run nearly into eight figures.

The Bayshore highway is an important trunk for through traffic but its most important function is the serving of commuter traffic between San Francisco and the suburban area on the San Francisco Peninsula and as far south as San Jose at the south end of San Francisco Bay. The first section of the highway was opened to traffic 16 years ago, and since that time one unit has been completed every two years until it now extends as far as San Jose. Since the first section was opened, traffic has increased from zero to a daily average of about 30,000 vehicles.

Forecasts of daily traffic at the South San Francisco underpass indicate weekday averages of 34,000 vehicles in 1950 and 41,000 vehicles in 1965 while the maximum capacity of the present facilities is 32,000. The older sections of the Bayshore have four 10-ft. lanes with 10-ft. shoulders. Nearly all of the surfacing is portland cement concrete on crusher run base. With expanded facilities the traffic has been estimated at 38,000 and 55,000 vehicles per week-day in 1950 and 1965 respectively.

The recommendations made to the Highway Commission by the Division of Highways include the following:

"1—The construction of the Bayshore to consist of a six-lane highway of the freeway type.

"2—The highway to be declared a freeway from Third Street in San Francisco to Oregon-Embarcadero Road in Santa Clara County.

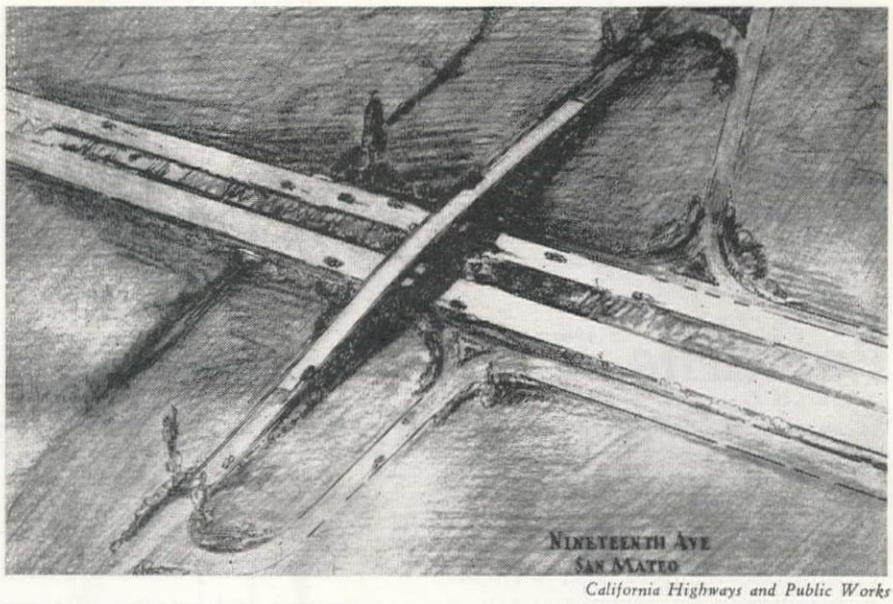
"3—The 6.6-mi. section from immediately south of South San Francisco underpass, to and including Peninsula Avenue, Burlingame, to be started and proceed by stages as the first unit. Surveys and design to proceed so right-of-way negotiations may start and this project may be advertised for construction as soon as funds are available.

"4—An allotment of funds for acquisition of right-of-way on the preceding section and acquiring key parcels for protection where required between San Francisco and San Mateo.

"5—Surveys and design to be started in San Francisco, toward acquisition of rights-of-way, by agreement, with ¼c gas tax funds for state highways in San Francisco.

"6—Request co-operation of cities and county in protection of existing set-backs, establishment of additional set-backs where required, and financial assistance in acquiring key parcels if necessary to avoid building and other improvements, where required on the entire project."

The proposed route of the freeway is 27 mi. in length, extending from the intersection of Third Street in San Francisco to the intersection of Oregon-Embarcadero Road south of Palo Alto. In cross-section the freeway will have two 35-ft. interlanes providing three lanes of 12, 11 and 12 ft. for traffic in each direction. The two interlanes will be separated by median strips varying in width from a minimum of 6 ft. in built-up areas to 40 ft. in open country. In many cases where the present alignment and grade are satisfactory and right-of-way conditions permit, the existing highway will serve as one interlane and a second will be constructed on one side or the other. In some locations the present highway will be abandoned or left for local traffic and a new and improved location utilized.

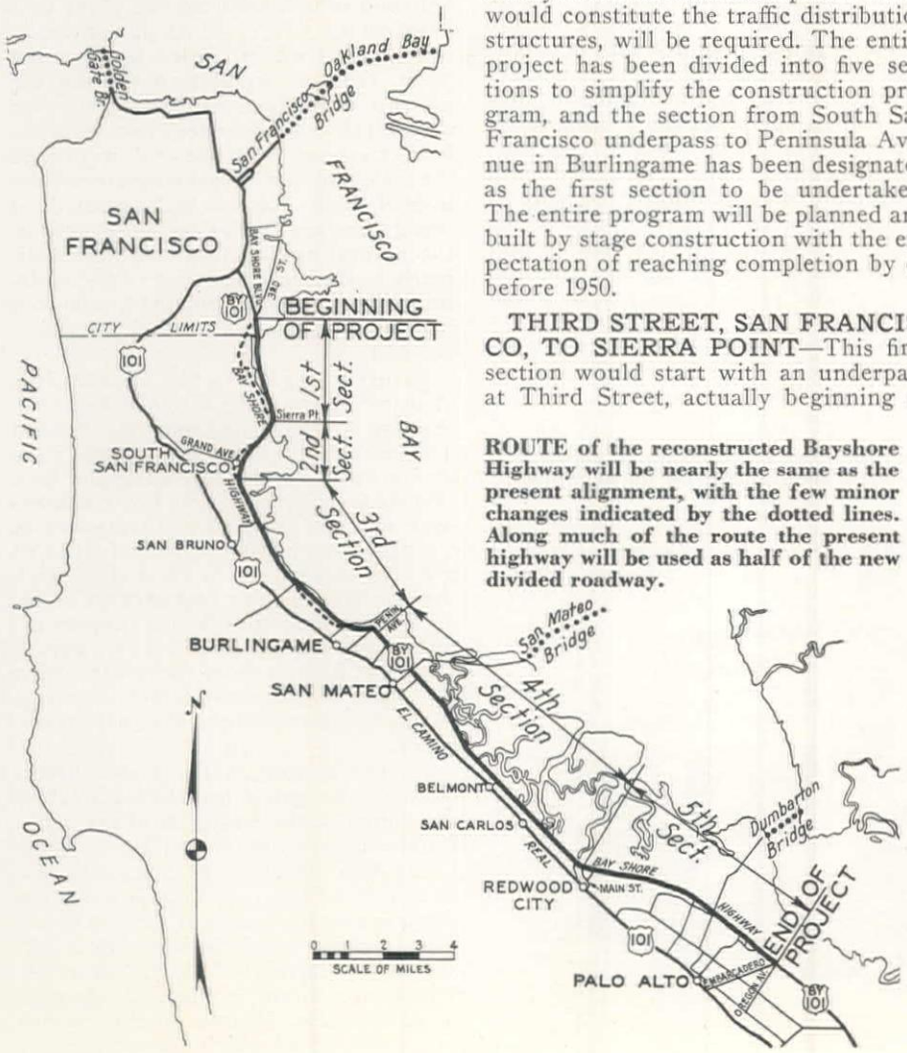


California Highways and Public Works

GRADE SEPARATIONS will be constructed at all intersections along the freeway, as indicated by this sketch of a typical structure, although the first stage of construction will be the divided roadway, with major structures left for later stages.

In addition to the freeway proper, acceleration and deceleration lanes of 11-ft. widths will be provided at access points. Twenty-five major structures, chiefly overheads and underpasses which would constitute the traffic distribution structures, will be required. The entire project has been divided into five sections to simplify the construction program, and the section from South San Francisco underpass to Peninsula Avenue in Burlingame has been designated as the first section to be undertaken. The entire program will be planned and built by stage construction with the expectation of reaching completion by or before 1950.

THIRD STREET, SAN FRANCISCO, TO SIERRA POINT—This first section would start with an underpass at Third Street, actually beginning at Salinas Street, and continuing south over a new location across the shallow water of the bay to Sierra Point with an overhead across the Southern Pacific tracks. Access points would be constructed at Blenken Street and Sierra Point in addition to Third Street. Length of the section is 3.8 mi.



ROUTE of the reconstructed Bayshore Highway will be nearly the same as the present alignment, with the few minor changes indicated by the dotted lines. Along much of the route the present highway will be used as half of the new divided roadway.

SIERRA POINT THROUGH SOUTH SAN FRANCISCO — Grand Avenue and the Southern Pacific tracks in South San Francisco would be overpassed by one structure east of the present underpass. Access points would be provided at the north city limits of South San Francisco, Grand Avenue and south of the existing underpass. Length of section is 1.8 mi.

SOUTH SAN FRANCISCO UNDERPASS TO PENINSULA AVENUE, BURLINGAME — The existing road will be utilized as the east lane and a new west lane constructed as far as Millbrae Road where the new line will have a new location directly to the present connection with Broadway in Burlingame. There, a transition will place the new lane on the east for the remainder of the entire project. Access points will be provided at San Bruno Avenue, Mills Field, Millbrae Road, Broadway and Peninsula Avenue. The first stage of construction will be the dual roadway with grade separations planned as ultimate developments. Recommended as the first section to be undertaken, it has been estimated to cost about $2,300,000. Length of the section is 6.6 mi.

PENINSULA AVENUE, BURLINGAME, TO MAIN STREET, REDWOOD CITY—A new north-bound roadway will be constructed east of the present highway which will be used for south-bound lanes. Ultimate grade separation structures are proposed at Third Street, San Mateo; Nineteenth Avenue, San Mateo; Ralston Avenue, Belmont; Holly Avenue, San Carlos; and Jefferson Street, Redwood City. Outer lanes

to serve local traffic in adjacent business and residential districts will be necessary from Peninsula Avenue to Tenth Street in San Mateo. Length of the section is 8.7 mi.

MAIN STREET, REDWOOD CITY, TO EMBARCADERO ROAD SOUTH OF PALO ALTO—Construction of the roadway will follow the same general plan as in the previous section. Grade separations are planned at Chestnut Street, Redwood City; Fifth Avenue, opposite Fair Oaks; Dumbarton Subway; Willow Road and University Avenue, East Palo Alto; and Embarcadero south of Palo Alto. Length of section is 6.2 mi.

Plans were prepared in the office of J. H. Skeggs, district engineer, Division of Highways, San Francisco. C. H. Purcell is state highway engineer.

Portable Electric Crusher For Highway Surfacing Job

Plant consists of two trailers mounting crushers and screens all motor-driven from a diesel-electric generator on third trailer

AN ALL-ELECTRIC, portable crushing and screening plant set up by Guerin Bros., near Buellton, Calif., illustrates the versatility required by contractors working where products of a commercial plant are seldom available and every job represents different problems to be solved. The use of direct-drive, dust-proof electric motors seems to be a step in the solution of several troublesome problems which have always been present in dry plants that must be used wherever aggregate for bituminous mixes is to be produced.

Production of about 28,000 tons of material will be required of the plant including aggregate for crusher-run base, plantmix surfacing, seal coating and imported borrow. The complete job consists of 2.7 mi. of grading and surfacing on highway 101 about 45 mi. north of Santa Barbara, Calif. A contract for the work was awarded to Guerin Bros. of San Francisco, on a bid price of $131,-932, in May, and by late in August grading had been completed to a point where imported borrow could be placed.

The Cedar Rapids portable crushing and screening plant, which was set up in a pit along the Santa Ynez River about 2 mi. east of the job, consists of two units, detachable for transportation, while a third separate unit furnishes the power for operation. One unit of the plant proper contains the 10x36-in. jaw crusher, the bucket conveyor, the feed belt conveyor and most of the controlling equipment. The second unit contains the 4x12-ft. double-deck screen, 30x22-in. roll crusher, reject belt, and two delivery belts.

Each of these two units is a complete two-axle trailer mounted on pneumatic tires with vacuum brakes and four 7x20-in. tires in front and four 9x20-in. tires on rear. In operation the frames of the two units are firmly bolted together. The only other connections that need to be made are the bolting together of feed and reject conveyor frames. When ready for traveling, the jaw crusher unit weighs about 27,000 lb. and the roll crusher and screen unit weighs about 30,000 lb.

The power unit consists of a Caterpillar V8 diesel engine direct-connected to a synchronous generator which produces a 3-phase, 60-cycle alternating current at 220 volts. The output of the generator is 125 kv. at 900 r.p.m. The complete unit is mounted on a special chassis with a 12-ft. wheelbase and dual 7x34-in. tires in the rear and single tires in front. A three-line rubber covered cable permits the power unit to be placed at any reasonable distance from the crusher outside the area where heavy dust is prevalent. For transportation, the power unit weighs about 19,000 lb.

ASSEMBLING the portable plant which travels as two trailer units, separated between the center sets of tires—Complete push-button controls are available for the operator.

The 24-in. feed conveyor is loaded by a pan feeder under the field hopper which is loaded by tractor and scraper. The delivery conveyor carries material over the plant to the far end where it is dropped onto the 1½-in. scalping screen which makes up the top deck of the Symons vibrating screen. Rejects from the scalping screen drop directly into the jaw crusher and from there go to the lower conveyor, the bucket conveyor and finally are returned to the feed conveyor.

At this point, material judged defective by the engineer required the plant superintendent to install a special return circuit. The pit run ⅝-in. material is light-weight and not suitable for use in surfacing. In order to eliminate this material the receiving hopper under the first section of the ⅝-in. screen was opened to the conveyor usually used for sand. Pit run material passing over the lower screen drops through onto this belt and is taken out of the plant to a truck hopper from which it can easily be disposed of. In order to save the ⅝-in. crushed product to replace the pit run eliminated, a special conveyor was installed over the feed belt from the bucket conveyor to the end section of the ⅝-in. screen. Crushed material delivered from the buckets, instead of being returned to the feed conveyor in the natural circuit, is then shunted directly to the second section of the ⅝-in. screen which the required material passes and goes to the stockpile delivery belt.

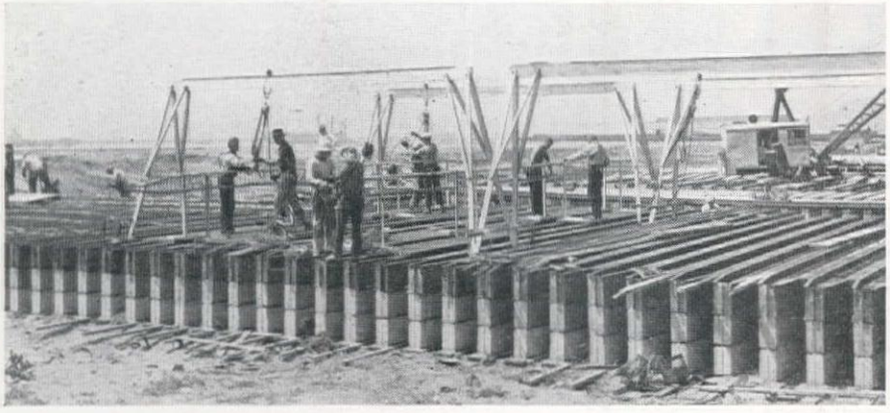
Returning again to the normal flow of materials, passing material from the scalping screen drops onto the second deck which is made up of various sizes in the order named following the flow of materials: ¼-in.; ⅝-in. (two sections over separate hoppers as mentioned in the preceding paragraph); and 1-in. All material passing any of these sizes, with the exception of the first section of ⅝-in., is dropped through the hoppers directly onto the delivery belt and sent to stockpile. Rejects from the lower screen go to the roll crusher which is set at ⅝-in., and from there to the bucket conveyor.

Electric motors, taking power directly from the generator through relays and controls, drive all units of the plant. Both crushers are driven by a 75-hp. Louis Allis motor connected to the jaw by a V-belt. The rolls take power from the jaw axle by means of a chain drive. The vibrating screen is driven by a 7½-hp. motor through V-belt. All other drives are direct connected through speed reducers. Motors on the various conveyors, all of which are individually

driven, vary from 7 to 1 hp. All motors are of the enclosed, dust-proof type, as are all lubrication fittings.

Automatic starting switches on the operator's platform control all motors on the plant and the variable speed motor on the pan feed as well. The capacity of the plant, under some conditions, might be as high as 300 tons per hour, but the plant superintendent believes that the output on this job, where a special problem has been encountered, will average between 125 and 150 tons.

E. R. Guerin, a member of the firm of Guerin Bros., is personally directing the contractor's work on the job. J. E. Worthington, veteran plant superintendent of southern California, is in charge of the set-up and operation of the portable crushing and screening plant. The plant is a new product of the Iowa Manufacturing Co. All of the small drive motors on the plant are General Electric.



Steel Forms Speed Casting Of 4,600 Concrete Piles

Collapsible forms feature special bracing devices to assure true ailgnment and simple clips to connect section lengths and tapered ends

SEVENTY reinforced concrete piles are being cast every day by the N. P. Severin Co. at the Naval fleet supply base in Oakland, Calif., using a recently developed steel form which has simplified operations to what might be termed assembly line production. The speed and efficiency with which these forms can be stripped and prepared for another pour is one of the outstanding features of the pile manufacturing.

The fleet supply base is being constructed by the U. S. Navy Department on the east shore of San Francisco Bay and the north bank of the Oakland Estuary just west of Oakland. Work on the project was started early this year with the awarding of $315,000 contract to the Hydraulic Dredging Co., Oakland, for dredging and filling at the site. In the past several months three construction contracts have been awarded, including one of $613,000 to M. H. Golden of San Diego for a reinforced concrete marginal wharf, and one of $954,690 to Johnson, Drake & Piper of Oakland for a general storehouse. The third award was made to N. P. Severin Co., Chicago, Ill., for the construction of four storehouse buildings at a bid price of $1,050,000.

Placing forms

At the present time progress on the buildings is limited to manufacturing and driving the precast concrete piles which will support the warehouse structures. The Severin contract requires casting and driving of 4,600 piles 16 in. square with 2½-ft. wedge-shaped points. Length of the piles varies somewhat but in general is 40 ft. About 400 piles were poured in wood forms before the steel forms arrived on the job. The piles are cast in groups of 16 to 160, as close to the driving location as practicable, and in tiers of three.

In preparing for the first pour, bulkheads are constructed along each side of the battery location to establish a true longitudinal line, and a wooden floor of 2x12-in. timbers laid down to form one side of each pile in the first tier. The steel forms are essentially 14-ga. one-piece steel plates with provision for fillets on each long edge. Two of these long plates are fastened together, form faces outward, by toggle joints placed about every 3 ft. The toggle joints consist of two horizontal members extending from one plate to the other, hinged at the center as well as at the plates, and a vertical member placed vertically at the center hinge. When the toggles are down they firmly brace the two plates, about 4 in. apart.

On this job three lengths of form are used, 12, 10 and 6 ft. One 12-ft. length is cut and rewelded 2½ ft. from one end, bent to form one side of the tapered end. When two of these forms are brought together to form the complete pile tip, a clip slipped over flanges at the ends of both forms holds the two sides in place. Similar flanges and clips are used to join the various lengths of forms for the complete pile.

Between the bulkheads on the timber form the desired number of forms are placed, interbraced by the toggles and by specially cut 2x4-in. timbers laid on top of the toggles and flush with the top of the forms. True lines are established by the floor and bulkheads, and are carried through the complete battery of forms by the interbracing. One battery may consist of 6 to 54 forms placed side by side. Before placing the reinforcing steel, the forms and bracing timbers are thoroughly oiled.

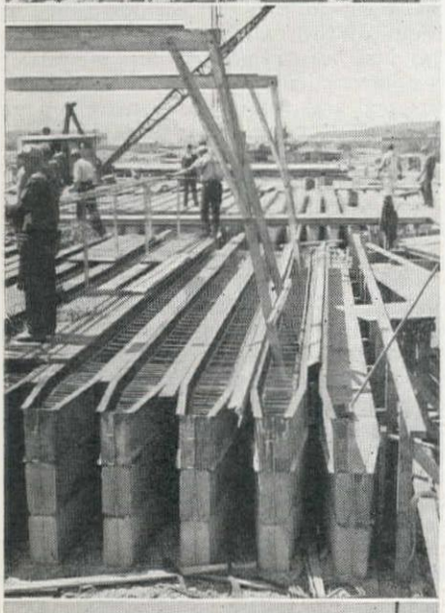
Stripping and replacing forms

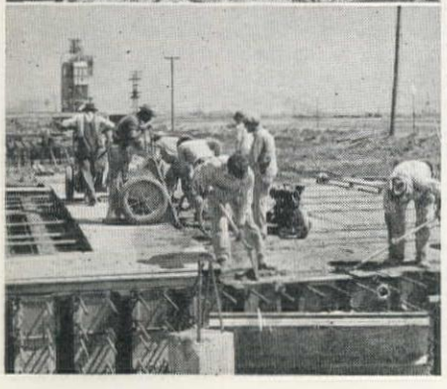
After one tier has been poured, the form stripping and setting for the following tiers is quite a simple operation. About 24 hr. after the concrete has been placed in the forms, a crew of four carpenters walks over the piles giving each toggle joint a short pull with the hook of a crow bar which draws the forms away from adjacent sides of two piles, far enough for the fillets underneath to clear the sides of the piles. Then the four men together raise one complete form length, push the toggles down again which forces the form to its original position, and rest the form on the edges of the two piles from which it has just been removed. This operation is continued until all forms have been stripped and are in position on top of the tier. Roofing paper is laid underneath the forms and on top of the next lower tier, the forms are re-oiled and are then ready for the placing of reinforcing steel and pouring of concrete for the next tier.

Reinforcing steel is assembled directly on the forms from bent shapes delivered from the shop. Assembly stands consist of four wooden decks on each of which are mounted two steel angles about 4 ft. long with several holes drilled near the tops. The platforms are placed on top of the assembly of pile forms with the uprights forming two lines parallel to the long dimension of the piles. Bars are run through the holes in each pair of uprights and the four long reinforcing bars are placed on the horizontals at a height of about 4 ft. The wire rectangles which form the basket around the major bars are then slipped on to their approximate position, the pins of the horizontals withdrawn just enough to let two of the reinforcing bars drop off and be caught by the wire rectangles.

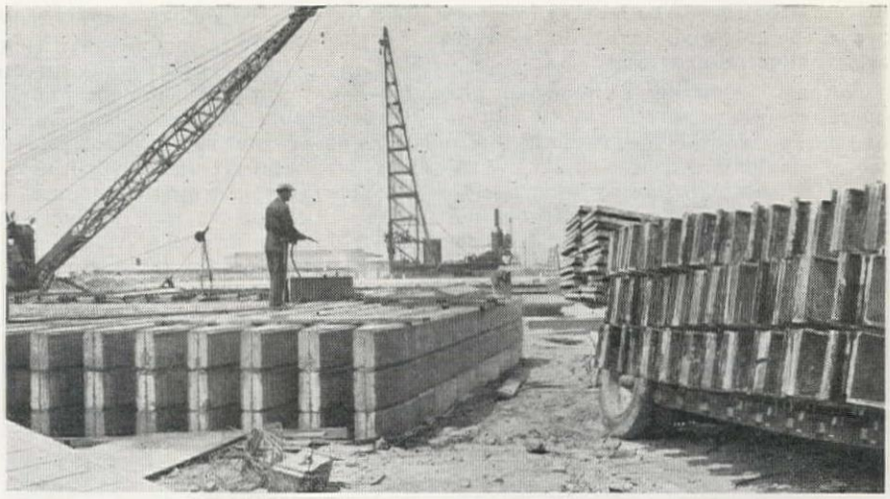
Placing reinforcing steel

With the basket formed roughly, all steel is quickly tied in its proper position and the entire unit is ready for placing. At each end of the reinforcing assembly unit are located two "A" frames about 10 ft. apart, supporting between them a wooden overhead crane





FOUR STEPS in the process of casting concrete piles are shown on the left. At the top, carpenters are preparing to strip forms from piles poured the previous day. Using small pinch bars, the carpenters loosen the forms, then raise them onto the top of the piles from which they were stripped (second from top). Cages of reinforcing steel are assembled on special platforms on the prepared forms and dropped directly into place. Transit-mix concrete is buggied from a truck hopper and well vibrated after being dumped into the forms (below).



AFTER FORMS have been stripped from the highest tier the sections are separated and loaded onto a flat-bed truck for hauling to a new casting location. Piles are kept moist during the curing period by an occasional spraying.

rail. To the small crane wheels are attached light blocks and tackle with round steel rods bent roughly to the shape of a "W" on the lifting end of the tackle.

At each end of the reinforcing cage or basket these bent rods are slipped under the major reinforcing rods and the entire assembly lifted off the uprights by means of the block and tackle. The assembly hanging from the tackle can then be moved on the crane wheels to a position over the pile form into which it is to be placed, and dropped into position. In the form, the steel is held in the proper position by steel bars resting on top of the form and hooks extending down into the form supporting the cage by two of the major longitudinal bars.

End gates forming the top of the piles are the last forms to be placed. After the reinforcing steel is in position, steel plates with four holes for the longitudinal steel are slid into place and fastened by four pins which fit into holes in the 10-ft. end forms. Holes are drilled in this form every 6 in. so that any desired pile length can be cast using a standard form by merely adjusting the position of the end gate.

Pouring concrete

Concrete for the piles is trucked from a commercial batching plant in transit-mix trucks for which runways and elevated hoppers are constructed at one side of the forming site. Runways for concrete buggies are laid directly on the pile forms and the concrete dumped into the forms from pneumatic-tired carts loaded at the hoppers. To keep the concrete moving freely through the hoppers, a vibrator is occasionally thrust down into the hoppers.

The concrete mix is designed for 3,000-lb. strength with ¾-in. maximum aggregate and six sacks of cement per yard. The concrete is thoroughly vibrated in the forms, resulting in piles of excellent quality with very few surface pits. The exposed face of the piles is hand floated. After the initial set has taken place, the 2x4 interbracing timbers between the forms are removed for reuse, but the forms are left in place for about 24 hr. The piles are sprinkled regularly to keep them moist during the curing period, but no cover or special curing process is used. As soon as the forms have been stripped, the process already described is repeated for the next tier, or the forms are dismantled and hauled to a new location. Two men can handle one form section easily, and four men can handle one complete pile form.

Organization

The work of the N. P. Severin Co. is being directed by Roy M. Curtis, superintendent. Placing of the forms has been sublet by the general contractor to the Troiel Co., Inc., of Berkeley, Calif. The steel forms are the invention of A. E. Troiel, president of the organization which holds patents covering the form construction. Placing of reinforcing steel has been sublet to J. Philip Murphy Corp. of San Francisco.

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PLACING of the 18-in. protective blanket of gravel, which is necessary prior to placement of quarry stone for rip-rap to protect the upstream face of the Fort Peck Dam from wave action, was resumed in August with operations proceeding westward from the east abutment. The first shipment of gravel consisting of 3,200 cu. yd. arrived in Fort Peck August 18 from the Becker County Sand & Gravel Co., and J. L. Shiely Co. plant at Cole, Mont.

Construction Design Chart

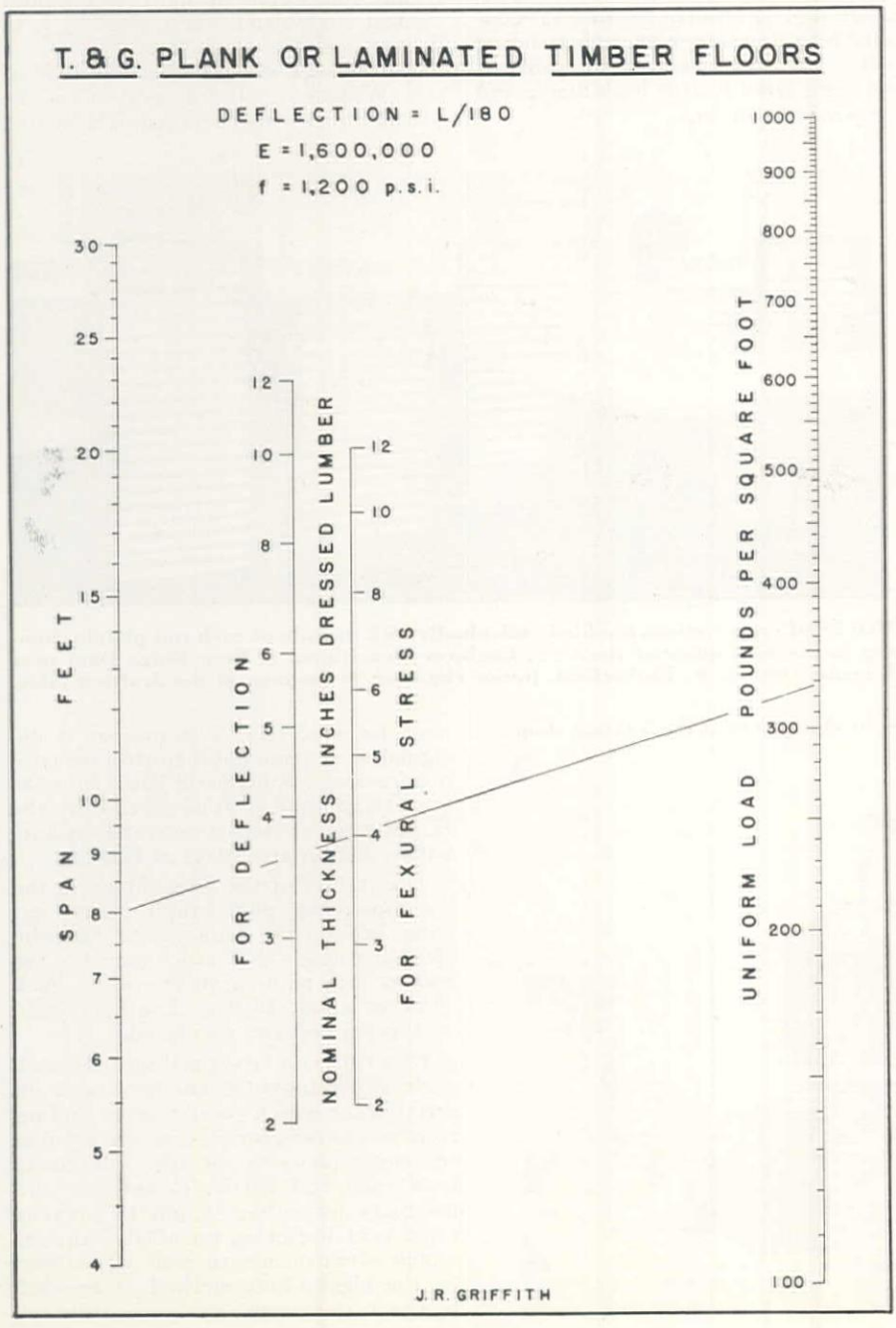
LVII . . . Plank and Laminated Timber Floors

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

PLANK and laminated timber floors have a multitude of uses from decking, bins, and cribbing on construction jobs, to flooring in mill building construction. *Wood Structural Design Data*[1] contains a table of safe loads for such construction which was used as a basis for the construction of the chart.

The accompanying chart is solved by a single straight line intersecting all scales. Two scales for flooring thickness will be noted, one giving the thickness for deflection, and the other one for flexural stress. Thus at a glance it is possible to determine which of the two is the controlling factor. The maximum deflection is limited to 1/180 of the span. The maximum flexural stress has been taken as 1,200 p.s.i., as indicated.

As stated in the reference, "Two types of timber floors, appropriate to heavy loading conditions, are in common use. One type is of planks tongued and grooved or of splined material nailed direct to the supporting members. Material 4 in. or more in thickness should have the edges grooved to take a standard spline. The other type of floor known as laminated, consists of planks 4, 6 in., or more in width and 2 or 3 in. in thickness, set on edge tight together and firmly nailed at the ends and at about 18 in. intervals alternately top and bottom with nails of sufficient size to provide firm contact between the laminations. Where plank floors are laid flat the boards should be two bays in length and laid to break joints at not less than 4-in. intervals. Laminated floors make longer spans possible and it may be difficult to obtain plank two bays in length. Strong and adequately stiff floors will result when the planks are laid with the ends extending between centers of girders with one plank laid across the girder at frequent intervals. Perhaps every sixth or eighth piece, to act as a tie in the floor. But in this method the ends of the planks should join at or near the quarter point of the span between girders. Joints must be so broken however, that no continuous line across the floor will occur."



As an example in the use of the chart let us assume that a 4-in. bin side has been built of 2 x 4 dressed lumber. Intermediate supports are by cross ties spaced 8 ft. on center. From the solution line drawn on the chart it will be seen that for a flexural stress of 1,200 p.s.i., the bin side will support a uniform load of 328 lb. per sq. ft. If another line be drawn from the same span through the 4-in. thickness for deflection, an allowable load of 441 lb. per sq. ft. is indicated. Thus for this span and thickness, flexural stress is indicated as being the controlling factor. The reference gives identical values in both cases.

As another example in the use of this chart, let us assume that an excavation 10 ft. deep is to be made in wet sand using an open box caisson with 4-in. horizontal sheeting. Referring to the May, 1940, chart, wet sand is seen to give an intensity of pressure of 500 lb. per sq. ft. at a depth of 10 ft. On the accompanying chart flexural stress is seen to be the controlling factor and a solution line indicates that intermediate shores should be placed not exceeding 6½ ft. on center.

1. National Lumber Manufacturers Association.

A Handy Tractor Crane

A SMALL mobile hoist built and operated by Yakima district maintenance forces of the Washington Department of Highways has so many uses around the central yard and shop in Yakima that it is seldom idle. It can travel unloaded at a speed of 20 mi. per hr. and is occasionally sent considerable distances to perform special highway work such as pulling and replacing concrete guard rail.

The lifting frame is rigidly attached to the chassis of a 10-20 McCormic-Deering Farm-All tractor mounted on pneumatic tires. Channels forming the frame were salvaged from an old truck frame and are about 7 in. wide and 2½ in. deep. The angles are 6 x 3½ x ½ in. The yoke cross-brace between the angles was taken from an old grader frame, since it happened to be the right size. A straight brace would have done as well.

A 4 x 16-in. drum is chain driven from a power take-off at the right side of the tractor. The ⅜-in. cable passes through a single sheave and block to a hook which can be lifted 10 ft. off the ground. Braking on the drum is provided by a friction brake on the drum drive gear. Direction of rotation of the drum is controlled by a hand lever operating sliding bevel gears. The machine is capable of handling a 2-ton load in both lifting and transporting motion.

Counterbalance is provided by two means. The rear tires of the tractor are loaded with 200 lb. of water each, and an overhanging rear platform carries a load of boiler plate punchings which can be varied in quantity to suit the counterbalance requirements.

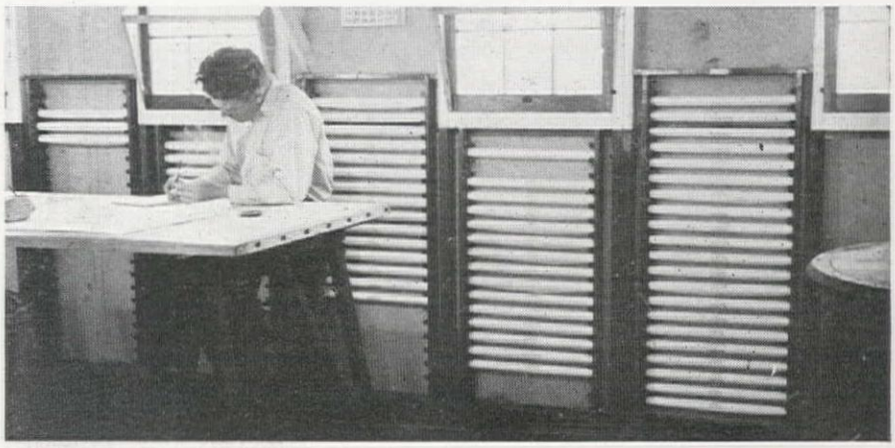
All work of the Washington Department of Highways is under L. V. Murrow, director. Norman Hill is district engineer at Yakima. Arthur Rhodes is shop foreman in the central shop at Yakima.

MOBILE SHOP crane is one of the busiest pieces of equipment at the Yakima shop of the Washington Highway Department.

Rack Frame for Filing Plan Rolls

AN IMPROVED system for filing plans in rolls is in use in the U. S. Engineer field office at Fern Ridge dam. The filing system consists of a frame and cleats of light wood built against a wall, and was devised by J. L. Barger, assistant engineer.

Fern Ridge dam is the first unit of the Willamette Basin project to be placed under construction and is located near Eugene, Ore. The project is designed to provide flood control on tributaries of the Willamette River in western Oregon and is administered by the U. S. Engineer Department at Portland, with a district area office at Eugene.

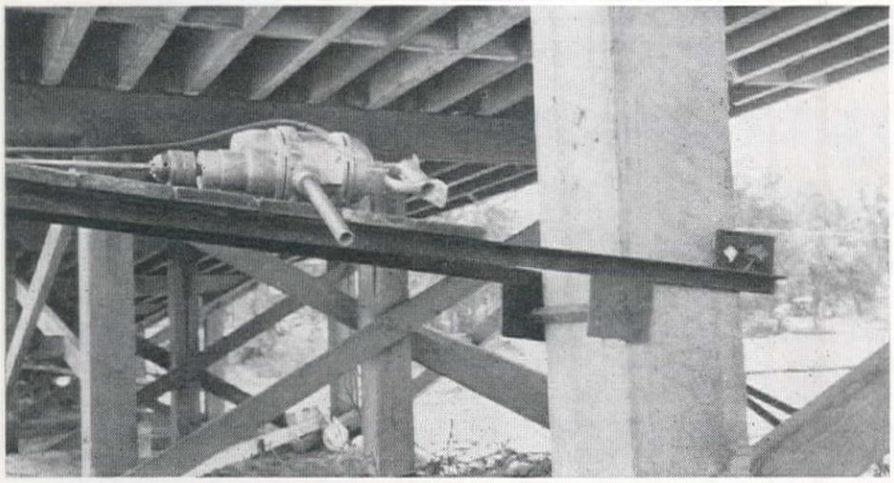


ROLLS of cross-sections are filed individually with the title of each roll plainly showing in the field office of the U. S. Engineer Department at Fern Ridge Dam near Eugene, Ore. H. W. Rutherford, junior engineer, is the man at the drafting table.

The frames of the files, shown in the accompanying photograph, were cut from 1x4-in. S4S Douglas fir and the cleats are of ¾x¾-in. stock nailed to the frames in a manner to provide a back slope of about 10 deg. The completed rack is stained and varnished.

Plan rolls can be slipped into the rack with titles showing and arranged in serial order which saves time in finding rolls and avoids misplacing them when returning plans to the file. The cleats hold each roll firmly, eliminating the necessity for rubber bands to prevent them from becoming unrolled. Damage, which often occurs to rolls when filed by the pigeon-hole method, is avoided by this rack system.

One-Man, Self-Supporting Scaffolding for Bridge Job



THE SCAFFOLDING, shown here in place on a 12-in. timber column, functions on the old lever principle with the lower cross bar acting as the fulcrum. To raise or lower the scaffold it is only necessary to lift the far end (at the left) and slide the scaffold up or down the column.

A LIGHT, simple scaffolding was used by the contractor on the Free Bridge just east of Redding, Calif., when that structure was repaired following the flood of last winter which destroyed 600 ft. of the timber trestle approach. In order to drill holes and place bolts at heights above a man's reach from the ground, A. O. Erickson, superintendent for Heafey-Moore Co. and Fredrickson & Watson Construction Co., Oakland, Calif., designed the scaffold which supports itself on vertical timber columns.

Two pieces of 1½-in. angle iron 5⅓ ft. long are the main frame of the scaffold which is shown in the accompanying photograph. About 14 or 15 in. from one end, small square iron plates are welded to each angle and a 12¾-in. square crossbar 1 in. in cross-section is welded to the plates. At the extreme ends are welded similar but larger plates and in these are cut two square holes large enough to take a 1-in. square bar.

The frame is placed wherever desired with the angles on each side of the column and the end crossbar slipped into place behind the column. The weight of a man on the outer end of the scaffold holds it firmly in place, the two crossbars, which are placed with corners against the column, gripping the timber. A second set of holes are cut in the outer plates so that the crossbars may be set closer together and used on 10-in. timber columns, the outer position being intended for use on 12-in. columns. For safety, cotter pins are placed in the ends of the removable bar to keep it from slipping out of place while in use.

The platform is of light planks fastened to the angles by stove bolts. The unit can be moved easily on the column by lifting the outer end and sliding it up or down as desired. Where a long scaffold spanning one or more bents is necessary, two or more of these units can be placed on adjoining columns and heavy planks placed across them.

HOW

WAS IT DONE

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

Pipe Framework Holds Tower Legs

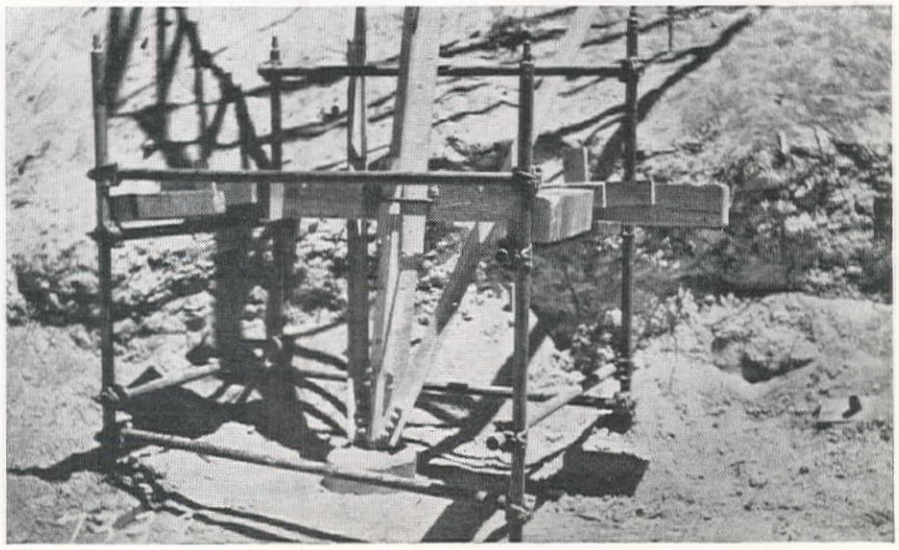
By CLAYTON M. ALLEN
Assistant General Construction Superintendent
Los Angeles Bureau of Power and Light

FOR pouring concrete footings on the third 287,000-volt Boul der Dam transmission line, construction engineers of the Los Angeles Bureau of Power and Light devised a simple, effective and easy method of holding tower stubs in mountainous locations requiring unequal leg extensions.

The unequal leg extensions were assembled by the steel erection crews with the tower stub in as near the final position as was practicable. The final setting crew erected a framework of 6 and 8-ft. Gold Medal patented pipe scaffolding about each footing and by means of 4 x 6-in. timbers, wood wedges, and a ¾-in. round iron U-bolt bent to fit the tower leg member, adjusted each stub for alignment, grade, and batter; special batter gauges were used by the survey party which maintained a constant check throughout the concrete pouring operations.

The customary steel templates were used in level country, being attached by gusset plates to the tower stubs, grade alignment being checked and adjusted by wood diagonal and tie rods, the diagonal being checked with gauges.

LEG EXTENSIONS for the towers of the third Boulder Dam-Los Angeles transmission line were held in place during the pouring and setting of the concrete footings by a 4x6-in. wood cross bar and U-bolt supportd on a pipe scaffolding. This system was used only in mountainous terrain which required unequal leg extensions.



HOW Glued Timber Arches

LIGHT laminated timber arches were fabricated on the job for the construction of a small theatre building at the University of Washington, Seattle. The arches extend vertically from the floor about 20 ft. where the arch itself is located, then continue on a rather sharp angle for the roof, meeting in a hub at the roof peak. The arches were fabricated by cutting, gluing and clamping to shape thin boards, building up the arch in depth.

The procedure was as follows. The first step consisted of laying out a template and building a gluing bench because of the repetition in making eight arches and the necessity for bending boards to the desired curvature. On the template boards were laid out to scale and the end cuts determined. Joints in all boards were marked according to specifications.

No joint was allowed within 2 ft. of the spring line of the arch and no joint in the curve operation of the arch was permitted. In addition the joints were formed to occur at intervals of not less than 2 ft. with a minimum of three boards between each joint in the same plane. This necessitated working out a proper sequence so that after joints had been constructed, further sorting of the boards would not be required.

The arches were constructed of $\frac{3}{4}$x 5$\frac{5}{8}$-in. stock of kiln-dried, clear, old-growth Douglas fir. Lengths of 20 ft. were the longest economically available which required joining to form continuous pieces averaging more than 40 ft. in length. The ends were beveled back 7 in., in the jointing operation, and the two pieces glued together.

After the boards had been scarfed, glued, cut to the required lengths and numbered according to sequence, they were run through a gluing, specially developed for the project, bent to the desired shape on the bench and clamped. On the first arch the boards were clamped together dry first, in order to study the procedure and make any changes or improvements deemed necessary.

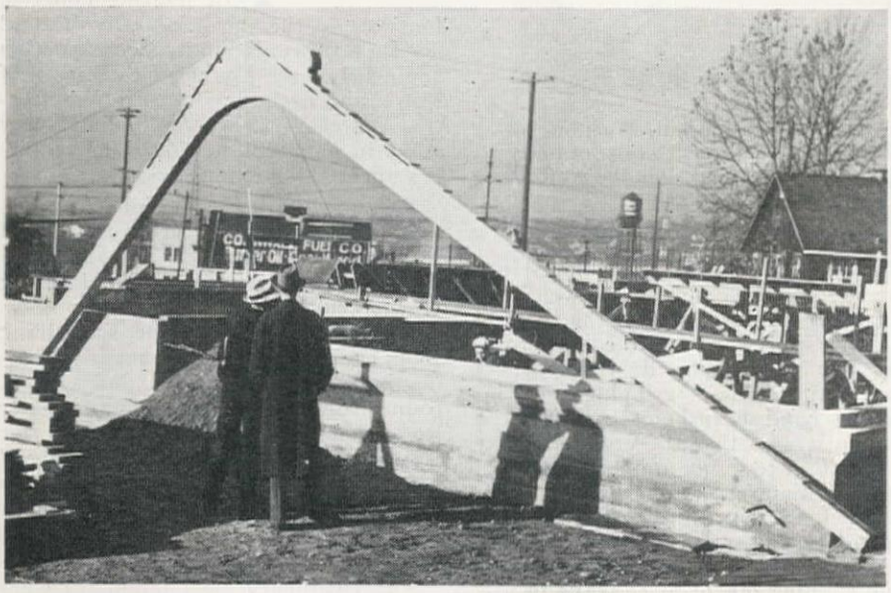
In order to facilitate equal gluing, speed of operation and handling, a practical glue machine was designed on the job. Inasmuch as this was a Government project the machine is not patentable but remains the property of the Government. A casein glue was used, the dry glue powder being mixed with water at a temperature of about 70 deg. F. Extremely cold water was avoided in mixing as this tends to retard the chemical action and make the glue lumpy. A minimum of 30 min. mixing time was found necessary.

Between 28 and 32 men formed the assembly crew for each arch. Two men fed the boards into the gluing machine and three received them on the bending table in the clamps. On the bench there were clamps every 2 ft. and one man was required at each set of clamps.

The glued boards were left in the clamps for a minimum drying period of 24 hr. after which the clamps on the curved section were released sufficiently to allow the placing of a proper number of short boards to form the heel of the arch. The clamps were then retightened and the entire arch allowed to set for a minimum of 24 hr. more. The entire arch was then removed from the clamps and trimmed to exact size, as shown in the accompanying photograph, and two additional boards were glued on the outer edges. The member was finally treated with a waterproofing compound to make it impervious to the weather.

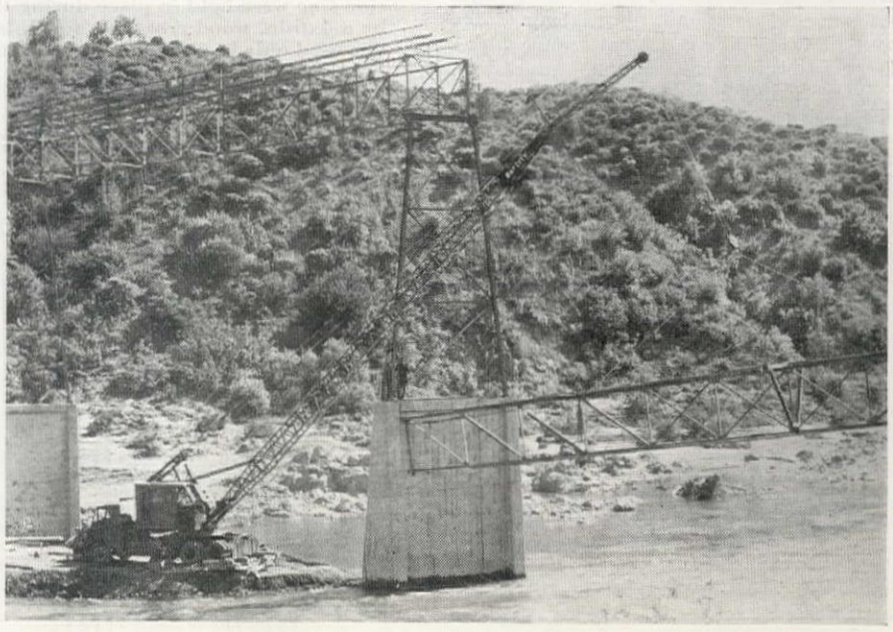
The Penthouse Theatre building was constructed by the Works Projects Administration (WPA) of the Federal Works Agency, F. C. Harrington, commissioner of work projects. The sponsor was the University of Washington. Charles C. May, professor of civil engineering and superintendent of buildings and grounds, C. Kenneth Weidner, assistant superintendent of buildings and grounds, and S. Sergev, associate professor of civil engineering, all of the University of Washington, were responsible for the design. Bebb and Gould were consulting architects for the sponsor. The laminated trusses were designed to meet the specific needs of the building by S. Sergev.

BUILT-UP laminated timber arch, glued and shaped, is ready for the final trimming along the lines indicated by the dotted black line.



SHASTA CONVEYOR BELT BRIDGE PLACED BY TRUCK CRANE

SPAN-LENGTH sections of the bridge which carries the Redding-Shasta Dam conveyor belt across the Sacramento River just below the dam site, were assembled on the ground and erected by a Bay City truck crane equipped with a boom extension. The equipment is a Bay City Moto Crane, Model 18, owned by the Bigge Drayage Co. of Oakland, Calif.



NEWS OF WESTERN CONSTRUCTION

SEPTEMBER, 1940

Highway Salary Survey To Be Made in Nevada

A SALARY SURVEY of the Nevada State Highway Department will be conducted by the American Society of Civil Engineers at the request of the Sacramento Section, which includes within its section area the western part of Nevada. The survey is to be similar to one conducted by the Society covering classification and salary standards of the Arizona State Highway Department. T. E. Stanton, materials and research engineer of the California Division of Highways, and a past director of the Am.Soc.C.E., will represent the Sacramento Section and work with the staff member assigned by the New York office of the Society to conduct the survey. Full co-operation of the Nevada Highway Department has been assured, and all requirements have been met, indicating a prompt start on the survey.

According to information received from Theodore Neuman, secretary of the Sacramento Section, Allen P. Richmond, assistant to the secretary of the Society, who made the survey of the Arizona department, has been assigned to this study, and was scheduled to begin the survey Sept. 9.

Caddoa Dam Contract

CONTRACT for the construction of the Caddoa dam on the Arkansas River in eastern Colorado has been approved by the U. S. Engineer Department. Contract was awarded to W. E. Callahan Construction Co. and Gunther & Shirley and Rohl-Connolly on the low bid of $7,160,000 presented by this group. Construction work on this large earthfill structure is expected to be started immediately. Major James H. Stratton, Corps of Engineers, is in charge of the project.

New Highway District Established in Utah

A NEW highway administrative district has been established by the Utah State Road Commission upon recommendation of E. C. Knowlton, chief engineer. Headquarters of the new No. 6 district will be at Provo, and the commission reports that, although some additional administrative costs will be entailed with the establishment of this new office, the net result will be more

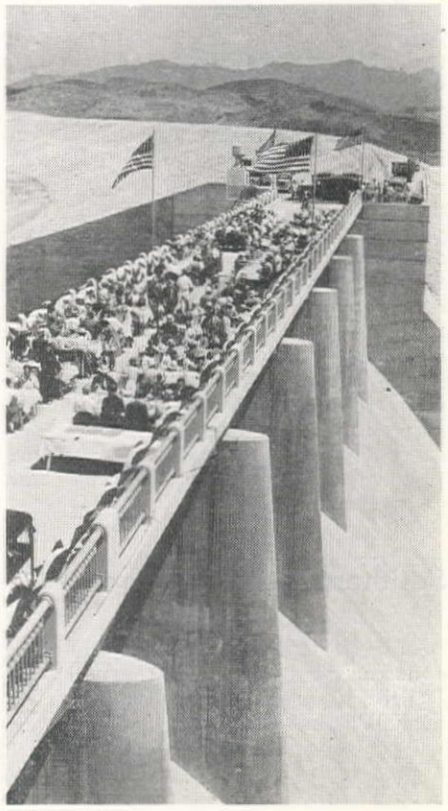
(Continued on page 322)

Hansen Dam Completed and Dedicated

COMPLETION of the Hansen dam, carried out by the Guy F. Atkinson Co., under contract to the U. S. Engineer Department, was celebrated August 19 with appropriate ceremonies. The structure has been built for flood control on Tujunga Wash of the Los Angeles River near the town of San Fernando. A luncheon on the bridge which spans the spillway was served to officials as guests of the Guy F. Atkinson Co. preceding the dedication ceremonies.

Operations of the contractor have been under the personal supervision of George H. Atkinson, vice-president of the company and job manager. Earl Holt was general superintendent. Operations of the U. S. Engineer Department have been under the direction of Lieut. Col. Edwin C. Kelton, district engineer at Los Angeles. A. H. Steiner was resident engineer.

The structure is notable as being the largest dam of the rolled earth type to be constructed, containing almost 14,000,000 cu. yd. of embankment. The work was completed nearly a year ahead of contract schedule. Cost of the project, including rights-of-way, totals nearly $13,000,000.



THE SPILLWAY crossing was the scene of the luncheon served by the Guy F. Atkinson Co., preceding the dedication ceremony. At the microphone is Guy Atkinson reviewing the contractors' operations, and at his right is Lieut. Col. Edwin C. Kelton, District Engineer, U. S. Engineers.

satisfactory administration for the state highway system, including the advantage of smaller districts, permitting engineers to maintain closer contact with the work in these sections.

The new district includes part of Districts 2 and 4, with Utah and Wasatch counties taken from District 2, and Duchesne and Uinta counties removed from District 4 to form the new administrative area. Under the former system of five districts, a total of more than 1,000 mi. was included in each district, and the new set-up will reduce this to an average of 860 mi. Another reason for the reduction in district size was the added responsibility which is placed on district engineers in co-operating with cities and counties in their highway programs.

J. C. Mulville, formerly engineer of District 2, has been appointed engineer for the new District 6, which will include U. S. Highway 40 from the Colorado line to the Summit county line. F. D. Miles remians as district engineer of District 1. J. F. Langford, who has been assistant district engineer of District 2, becomes district engineer in that area. William Osborn continues as engineer of District 3. D. F. Larsen remains as engineer in District 4, and R. A. Gillis of District 5.

Maps of County Roads From Highway Surveys

COUNTY maps, providing information relating to all highway facilities and structures in rural areas, will soon be made available through the individual state highway departments, according to an announcement made by the Public Roads Administration. Work on these maps, which resulted from the highway planning surveys conducted by the state departments in co-operation with the Federal Agency, has been practically completed and they are to be made available for general use. Detail information appearing on the maps include: railroad lines, highways, roads, bridges, farm unit areas, schools, hospitals, camps, power plants, air fields, and other facilities. These maps have value to business organizations and other government agencies in addition to their use for highway planning, which was their original purpose.

The present program calls for the maps to be revised annually, and the states are being urged by the PRA to carry forward this work and issue revised editions as frequently as important changes are necessary.

Southern Pacific Bridge

A $150,000 bridge is being constructed by the Southern Pacific Railroad, spanning the Pajaro River near Watsonville, Calif. The structure will replace a 20-yr. old bridge as a result of heavier equipment now being used over this line by the railroad.

Sacramento River Diversion Aug. 16 At Shasta Dam

DIVERSION of the Sacramento River from its channel at the Shasta dam site was completed by Pacific Constructors, Inc., August 16, after an initial blast opened up the entrance to the diversion channel on August 13.

The contractor had previously prepared an excavated concrete-wall type of diversion channel on one side of the streambed. Concreting operations which started in July have resulted in the construction of several lifts on a row of blocks, forming the inner side of this diversion channel, so that the diversion will not restrict the present concrete placing work.

Present plans call for channel excavation to be carried forward during the present season, with some concrete placing to be started in the lowest section of the foundation. This work will be restricted until the railroad has been shifted to its new location, because any raise in the water level during flood period will affect the operations of the Southern Pacific in its present canyon location.

Following the railroad relocation, concrete placing can be rushed in the channel section, and subsequent procedure will be to run the river over low blocks during the construction program.

Diversion was effected by blasting out a dike which protected the upper end of the diversion channel, and then by end-dumping waste material to close a narrow section of the river channel immediately downstream from this upstream diversion point. This work required about three days to close off the 150-ft. width and divert the 4,000 sec. ft. of water into the prepared channel. The present diversion structure is merely a dump rock and earthfill, and a more impervious structure of clay and selective material will be constructed immediately.

A similar small cofferdam across the lower end of the site will permit unwatering of the stream channel and the start of excavation in this area.

Further Court Action On Tahoe Lake Water

FURTHER Federal court action may be instituted to settle continuing disputes over the water rights of Lake Tahoe and the Truckee River. Under an agreement entered into by the Washoe County Conservation District and the Federal Government, the Bureau of Reclamation was to construct the Boca dam on the Little Truckee River, which would be turned over to the district for operation, relieving the district of its most urgent need for Tahoe Lake water during the irrigating season. A controversy has developed relating to the final cost of the Boca Dam project and, according to reports, the district has refused to accept the final cost figure, with the result that the Government has not turned over the operation of the reservoir. The reservoir is full, but is not being used for irrigation requirements, with only the natural flow of the Little Truckee by-passing the reservoir. Use of this stored water was designed to reduce the withdrawals from Lake Tahoe, which are vigorously opposed by the resort interests around the lake.

Service Started from the Contra Costa Canal

OPERATION of the first completed unit in the Central Valley Project of California was started August 11, when water was turned into the pumping plants at the head of the Contra Costa Canal. This canal (*WCN*, Dec., 1939) has been built to insure a fresh water supply to the municipalities and industries on the upper end of San Francisco Bay. Although the canal has not been completed, serious water problems encountered by the town of Pittsburg resulted in the decision to place the canal in operation for a 20-mi. section which extends beyond the intake to the Pittsburg water supply system. The municipality recently completed a 24-in. pipe line to convey water between the canal and the existing delivery system. In addition to the town of Pittsburg, the Columbia Steel Co. is constructing a pipe line to the canal for augmenting its present water supply.

At the present time, the canal has been completed to a point three miles beyond Pittsburg, and work on the next 9-mi. section is about 35% completed.

Utah Highway Construction Totals About 170 Miles

ABOUT 170 mi. of highway construction is under way in Utah, according to reports from the Utah State Road Commission. Of this mileage, about 117 mi. are being resurfaced, and 51 mi. are being graded and graveled. Cost of the work now under way totals nearly $1,800,000. In addition, the commission has under way about 40 mi. of roadside development work. The Public Roads Administration has given approval to the grade crossing projects totaling about $1,000,000, and there remains nearly another $100,000 of funds to be allocated for this program.

One of the largest individual jobs provides for the widening and realigning of 5.1 mi. of U. S. 91, south of Brigham City, estimated to cost $100,000. This work will be carried out on a right-of-way 120 ft. wide, with a grade width of 56 ft., including shoulders. According to the road commission, Utah will require expenditures totaling $20,000,000 to place the highways of the state in condition adequate for the requirements of modern traffic.

Bids Called to Demolish Buildings at Exposition

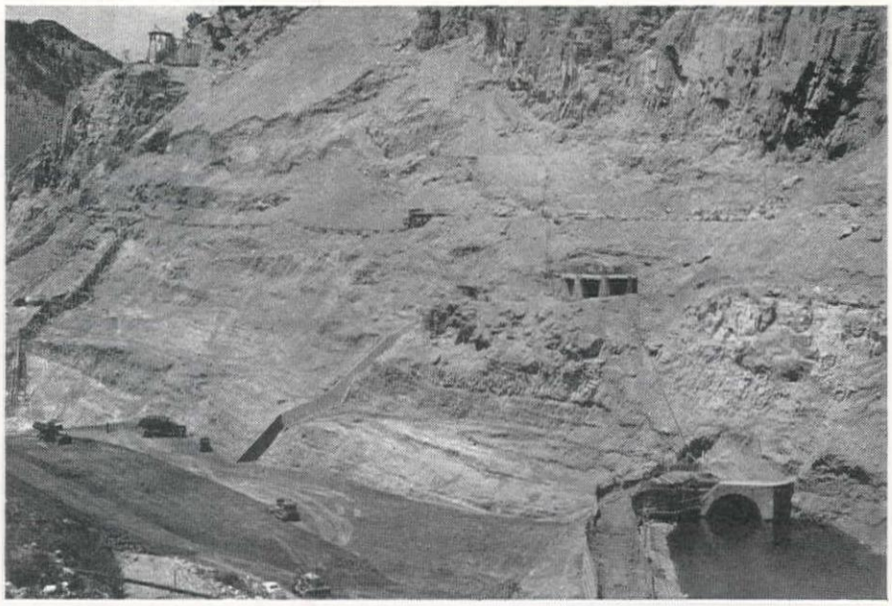
BIDS for the demolition and removal of the temporary buildings at the Golden Gate International Exposition have been called for Sept. 23. The work will involve the complete removal and salvage of all fixed properties and plants belonging to the Exposition Company, together with some of the buildings belonging to the State of California. These properties include horticultural material, electrical and mechanical plant and equipment, buildings and other structures which constitute the plant of the Golden Gate International Exposition. Bids have been asked for the entire job, or for sixteen individual sections of the work.

An Emergency Chlorination Follows Fire at the Fair

UNDER the direction of G. E. Arnold, chief water purification engineer of the San Francisco Water Department, emergency chlorinating of the water distribution system on Treasure Island was carried out, following the fire of August 24 which destroyed the California Building at the Exposition. Although an adequate supply of fresh water was available in the reservoir on Yerba Buena Island for fighting this fire, through a confusion of orders salt water delivered by a fire boat was turned into the water supply mains on the Island, contaminating the entire system. At the conclusion of the fire, the mains were flushed and then the portable chlorinating unit of the San Francisco Water Department was used to sterilize the system. Chlorine was added at various points during a period of about 18 hr. until a 3 p.m. residual was indicated at test points.

Mud Mountain Dam Work Resumed at Full Schedule

AFTER a brief period when construction work was slowed down awaiting decision concerning a change in design plans, activity at the Mud Mountain dam has returned to full schedule, with about 800 men employed on this flood control project located near Tacoma, Wash. The change in design for the structure is announced in connection with an article in this issue which reviews construction operations to date. The most recent work at the site has involved the excavation of a road down into the canyon from the camp site, to cross the canyon on a steel bridge and descend the far side to the river level. Concrete placing on the spillway has been started. In the meantime, the Guy F. Atkinson Co. is dismantling and removing excavation machinery and railroad facilities which were used in handling the several million cu. yd. of material excavated from the spillway site.



BLUE GOES UNDER GREEN AT A COLORADO DAM SITE

DIVERSION of the Blue River at the Green Mountain dam site is followed by the placing of fill in this structure which will be the second highest and largest dam of its type to be constructed. The contract is being carried by the Warner Construction Co. of Chicago on its bid of $4,227,206 to the Bureau of Reclamation. The front cover picture of this issue illustrates an incident during the placing of earth fill.

Funds Available for Preliminaries On $13,000,000 Project in Idaho

APPROVED expenditure of not to exceed $400,000 this fiscal year by the Government will enable the Bureau of Reclamation to bring the Anderson Ranch Project in Idaho up to the construction stage. On July 19, Secretary Ickes approved the report of the Bureau of Reclamation, finding feasible the construction of a reservoir at the Anderson Ranch site on the South Fork of the Boise River for water conservation and irrigation, flood control, power and silt control. An appropriation of $750,000 for commencement of construction of the project, then known as Twin Springs, was made in the 1938 Department of the Interior appropriation bill. The estimated cost of the project is approximately $13,000,000.

In the earlier announcement, however, it was stated that although the project had been found feasible, no move would be made immediately toward its construction, because of the demands on the Treasury in connection with the national defense.

The President's statement

The President recently stated in a letter to the Secretary of the Interior, "You suggest that preliminary work done now would save delay in commencing actual construction at a later date, and indicate there is an urgent need for a supplemental water supply in the Boise Valley. You may proceed with those features of the preliminary work outlined in your letter, the expenditures therefor not to exceed $400,000 in the fiscal year 1941. While releasing this amount for expenditure now, it should be understood that no commitment is being made with respect to the approval of an estimate of appropriation to begin actual construction at an early date."

The features outlined include exploration of clay, sand and gravel deposits to determine the availability of suitable construction materials, the acquisition of rights of way, the clearing of the reservoir area, the preparation of designs for the dam and power plant, the negotiation of repayment contracts and similar preliminary activities.

The Bureau of Reclamation is expected to undertake these preliminary works in the near future.

New Highway Proposed to Cross Sierra Nevada

A $3,000,000 highway construction program is being sponsored in Congress by Representative Gearhart of Fresno, Calif., to connect the naval ammunition depot at Hawthorn, Nev., with existing highways in the California state system. Present highway connections between Hawthorne and the California naval bases do not provide the shortest route or high-speed highways. The proposal of Rep. Gearhart, introduced in the form of a bill, would call for construction of 45 mi. of highway through one of the most rugged parts of the Sierra Nevada. It was pointed out that the route would also provide for opening up this recreational and mining area.

Preliminary Surveys for Dorena Dam in Oregon

PRELIMINARY survey work and foundation exploration for the Dorena dam, which will form the third unit of the program on the Willamette River, have been completed by the U. S. Engineer Department. The dam site is located about 6 mi. east of Cottage Grove, Ore. According to reports, plans for the structure have been submitted to the Washington, D. C., office, and approved, which indicates that preparation of specifications and call for bids may be expected soon.

On the Cottage Grove dam, the second structure in this flood control and water conservation program, T. E. Connolly and Co. have begun preliminary operations with the construction of an access road and spillway excavation.

Carlton Tunnel in 18,500 ft.

DURING the month of July, driving on the Carlton tunnel, near Cripple Creek, Colo., totaled 1,396 ft., or an average of 53.7 ft. per day, including a shut-down on July 4 and the need for enlarging a siding during the month. At the present time, the heading has been advanced about 18,500 ft. from the portal, as compared to its total length of nearly 32,000 ft. Tunnel driving operations which hold the established world record were reviewed in *Western Construction News*, April, 1940.

Two Contracts Awarded For Marshall Ford Dam

CONTRACT for completion of the Marshall Ford Dam on the Colorado River Project in Texas has been awarded by the Bureau of Reclamation to Brown and Root, Inc., and the McKenzie Construction Co. of Austin, Texas, on a low bid of $3,137,495. This contract involves the placing of 464,000 cu. yd. of concrete in addition to other incidental work necessary to complete the dam to its ultimate design height. The project is located 12 mi. northwest of Austin, Texas, and the work to be done under the contract will raise the height of the structure to 270 ft. above foundation, or will add 70 ft. to the present height of the low dam.

In addition to this contract, a second contract was awarded by the Bureau of Reclamation to Cage Brothers and W. W. Vann and Co., Bishop, Texas, on a low bid of $903,000 for the excavation of more than 2,800,000 cu. yd. of material, and the placing of 1,500,000 cu. yd. of earth and gravel in embankments.

This compacted embankment will flank the concrete section on the left abutment, and will be protected by rock facing on both slopes. Present work will increase the length of the concrete section from 2,300 to 2,623 ft., and the embankment section from 1,100 to 2,500 ft.

Washington News

. . . for the Construction West

By ARNOLD KRUCKMAN

Washington, D. C.—The War Department expects the report on the strategic network of national defense highways will be issued before October. The Committee which has been making the survey is headed by Gen. George B. Strong of the War Plans Division of the Army, and by Chief Thomas H. MacDonald of the Public Roads Administration, and by the various state highway officials who have been asked to serve by Administrator John M. Carmody of the Federal Works Agency. The field work has been conducted under the leadership of H. S. Fairbanks of the Public Roads Administration. It will please the state highway officials of the West to learn that without exception they faithfully complied with the Federal Government's request that all information be treated as confidential, while many highway officials of eastern states have been parading their information before the public to the embarrassment and disgust of the military people.

Military highways

Curiously enough this psychological twist has an important effect upon pending plans. Both consciously and unconsciously the military have turned, from other sections, to the Far West as a potential theatre for all kinds of national defense activities. There is a certainty that many cantonments and training centers, whose locations have still been undetermined, will be placed west of the Rockies, and that more industrial units will be allocated to the West if the problems of labor and power can be solved. The military here say that they have found the western people have worked with them to secure an ideal integration of the strategic network, while the people of the East have used the plan to attempt to advantage Chamber of Commerce ambitions, and, in some instances, unscrupulous racketeers have undertaken to promote real estate developments.

The final plan is expected to have very particular application to West Slope needs because the first object is to give priority to highways that carry traffic to and from military establishments. This priority is far more important in the initial stages than the second priority which gives preference to roads that lead to and from industrial plants and communities. It is apparently estimated that the links and gaps of highways and bridges and similar improvements that must be provided will total 75,000 mi. Undoubtedly the whole undertaking will be paid for by Federal funds. The three classes of most urgently needed strategic roads selected by the War Department leading to camps and similar concentration points are not expected to exceed 3,000 mi. in total.

Their effect on Federal Aid

The President, to whom the report will be addressed, is expected to determine the method of financing and the amount to be asked of Congress. No one yet knows what effect this prospective strategic network project will have upon the immediate fate of the Federal Aid Highways Act, finally clarified by Congress late in August, but not yet signed by F. D. R. At this writing it has not been possible to digest the final conclusions of the Congressional Committees. It is clear, however, that $2,500,000 has been added to the secondary roads allocation, making this annual total $17,500,000 and increasing the grand total, annually, to $163,000,000.

Certain changes have been written into the clauses providing for RFC aid that are thought to make it doubtful if the RFC will make the loans. Those interested in details may obtain them by perusing HR 9575 Conference Report which can be secured from the Superintendent of Documents, Washington, D. C. Obviously other Federal road projects, of which there are several pending on the Hill, will be held up until the strategic network report has been issued.

The marked absence of men and women of the western slope from the National Defense Advisory Committee has caused so much irritation that the entire Congressional delegation representing the 11 Western states met in informal conference and probably will have made representations to the National Defense people and to the White House by the time this is published. Most conspicuous in National Defense work here is John M. Watzek, Jr., of Portland, Oregon, who is in charge of the lumber section. He recently announced the Army will immediately use 650,000,000 ft. of lumber for housing, which includes 20,000,000 ft. at Ft. Lewis; 18,500,000 at Camp Ord, Calif.; 2,400,000 at Stockton, Calif.; 1,000,000 on the Puget Sound, and 1,000,000 at Columbia, Ore. The Navy is using 395,000,000 feet at Alaska, San Diego, San Pedro, Guam, Portland, Tongue Point, Hawaii, Puget Sound, Seattle, Samoa, Midway and other Pacific islands.

Bonneville Power

Paul J. Raver, Bonneville Power Administrator, spread before the National Defense Advisory Committee a picture of the power resources of the Pacific Northwest and the industrial potentialities based upon materials used in

preparation for the national defense. After spending considerable time with the National Defense people Mr. Raver returned to the Northwest, leaving here Ivan Bloch, chief of the Bonneville Marketing Development Section at Portland. Mr. Bloch will remain in Washington until November or December. The permanent Bonneville Administration office in Washington, located in the Interior Building, is in charge of Office Engineer J. P. Alvey.

Late in August the President published an Executive Order which made the Bonneville Administration the world's largest power marketing agency. It will henceforth be the merchandiser of all power developed on the Columbia at Bonneville and the Grand Coulee generators in Oregon and Washington. F. D. R. announced the ultimate combined capacity at 2,500,000 kw. The Executive Order makes the Bureau of Reclamation feel rather sad, but it takes the bill of divorcement rather philosophically, especially since its fiscal interests are very carefully protected.

Reclamation program.

The Bureau of Reclamation is still rather uncertain about the Presidential mind in regard to the whole reclamation program. F. D. R. in August personally permitted some expenditure for the Anderson Ranch project in Idaho, part of the Twin Springs work, which has been planned for a number of years. Last month Secretary Ickes announced the Bureau of Reclamation would proceed to spend the $750,000 provided by Congress for the preliminary work. Then the President intervened and ordered Ickes to drop it. Upon further presentation Ickes apparently convinced the President "some preliminary work done now would save delay in commencing actual construction at a later date." F. D. R. wrote, "You may proceed with those features outlined in your letter, not to exceed $400,000. *It should be understood that no commitment is being made with respect to the approval of an estimate of appropriation to begin actual construction at an early date.*"

The President was able legally to intervene in this instance because the Office of the Budget, a part of the White House, had the right to question the "feasibility" of the project. If through Budget he is able to question the feasibility of other projects he may order them to be stopped. They say, however, at the Reclamation Bureau that there are relatively few projects open to such question. They do not themselves question the fact, however, that if the Presidential mind should definitely question the feasibility and timeliness of *any* Reclamation project, it would be difficult in this time of national emergency to proceed.

The Reclamation Bureau is going ahead with all projects for which Congress has provided funds. Naturally it will proceed with caution. There is some significance in the fact that it has already lost 300 of its technical and field personnel, trained men, to the national defense units, and that the Director of Personnel of the Bureau of Reclamation at this writing is in consultation with the National Defense people, going over the rolls of the entire organization. Apparently every person is being appraised. Washington regards the action as antecedent to a wholesale raid upon the Reclamation personnel and staff.

Commissioner John C. Page, of the Bureau of Reclamation, will go West late in September to attend the annual meeting of the National Reclamation Association at Great Falls, Mont. In his immediate party will be George O. Sanford, head of operation and maintenance in the Bureau, and H. L. Mitchell, head of the irrigation section. Maj.-Gen. Julian Schley, chief of the Corps of Engineers; Administrator John W. Carmody, Federal Works Agency; and Dr. Ira N. Gabrielson, chief, Bureau of Wild Life and Fisheries, also will attend. It is possible that Interior Secretary Ickes may be present; and that President Roosevelt may inspect the national defense activities in the adjacent Fort Peck Dam area.

Defense expenditures

Total allocations in the area West of the Rockies listed in the reports issued by the White House fortnightly, since July 1, aggregate $513,310,598. There are inevitable duplications in the various national defense financial statements. It is believed, however, that the tabulations reported here are free of repetitive listing. More recently the Navy has reported an active construction program in the Pacific area totalling $35,650,000. The WPA reports expenditures on behalf of the Army, Navy, Coast Guard, National Guards and defense airports, in the West Slope area, totalling $75,817,000. And it is interesting to note that the RFC in its periodical report just issued states that from 1932 to Aug., 1940, it has loaned in the Pacific Slope area to 3,531 borrowers the gross sum of $989,641,494.18. More recently it reports it has loaned to 33 Western miners a total of $4,192,600. The U. S. Maritime Commission announced late in August that it had ordered 8 cargo ships to be built in Seattle and San Francisco at a gross cost of $23,920,000.

Obituaries . . .

H. C. Neuffer, 49, died at the Veterans Hospital in Albuquerque, N. Mex., on August 23. He was chief engineer during the construction of Coolidge dam in Arizona in 1927-29, being assistant to Major Oberg, designer of the structure, which was noted for the great size of its multiple domes and for its height when it was constructed on the Gila River by the Atkinson-Spicer-Kier Construction Co. At the time of his death, Mr. Neuffer was a partner in the firm of Holway & Neuffer, consulting engineers.

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Clarke C. Cottrell, manager of the public relations department of the California State Automobile Association, and a former state highway engineer of Nevada (1918 to 1921), died in San Francisco, August 21, at the age of 57. Prior to his long association with the automobile association Mr. Cottrell had served with the engineering organizations of the Bureau of Public Roads and the California Division of Highways. It was largely under his administration that the Nevada Highway Department was formed and the state system of highways instituted. Mr. Cottrell played an important part in establishing the present financing method for the California highway system, and he was a recognized authority in fields of highway promotion, traffic safety and motoring legislation. He was active in promoting the original Lincoln and Victory transcontinental highways.

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John C. Fowler, 62, chief field engineer in the office of the Spokane, Wash., city engineer, died in that city on August 19. He had been employed by the city of Spokane since 1909.

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Ernest P. Rands, 72, retired U. S. cadastral engineer of Portland, Ore., died in Oregon City on August 13. He attended Pacific University at Forest Grove, Ore., and from 1898 to 1902 was county surveyor of Clackamas County. For a year he was city engineer of Oregon City and later in association with his brother carried on extensive land surveys in Oregon, Washington and Idaho. In 1910 he was appointed U. S. surveyor and in 1925 cadastral engineer for Oregon. He retired from this position in 1938 but continued in a consulting capacity for another year.

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L. Timothy Lawler, 53, a well-known contractor of Butte, Mont., and Los Angeles, Calif., died in Los Angeles on July 27. Born in Rochester, Minn., he moved to Butte, Mont., where for many years he was identified with the construction of highways, railroads, bridges, power plants, dams and other large projects. There he formed a partnership with J. C. McGuire. He was a member of the firm which constructed San Gabriel Dam No. 1 at Los Angeles, and at the time of his death was a member of the board of directors of Pacific Constructors, Inc., which is building Shasta dam near Redding, Calif.

New Books . . .

SEWAGE TREATMENT—By Karl Imhoff, Consulting Engineer, Essen, Germany, and Gordon Maskey Fair, Porfessor of Engineering, Harvard Graduate School of Engineering, Cambridge. Published by John Wiley & Sons, Inc., New York, N. Y. 370 pages, 5½x8. Price $3.00.

This volume is designed to present a brief and simple review of the factors which influence the design and operation of modern sewage treatment plants. Mathematical considerations have been kept in simple form and complicated drawings have been avoided in illustrat-

ing the types of treatment units. Information intended to cover the design of operation of existing plants is assumed to be available from other sources, and is not included in this small volume of "first principles." The present volume is an expansion of the treatment presented in the book entitled "The Arithmetic of Sewage-Treatment Works," which was a former volume prepared by the senior author who is the internationally known author on sewage treatment. One chapter of the volume is devoted to a discussion of industrial wastes.

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LESSONS IN ARC WELDING—By the Lincoln Electric Company, Cleveland, Ohio. Published by the Lincoln Electric Co., Cleveland, Ohio. 136 pages, 5½x8½. Price 50 cents in the U. S. A., and 75 cents elsewhere.

This volume represents a series of lessons which form the basis of instruction in the Lincoln Arc Welding School.

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CONSTRUCTION PLANNING AND PLANT—By Adolph J. Ackerman and Charles H. Locher. Published by McGraw-Hill Book Company, Incorporated, New York, N. Y. 381 pages, 6x9. Price $4.00.

This volume, designed to provide practical information on the planning and managing of large construction jobs, is based primarily on the experiences of Adolph J. Ackerman in his position as head construction plant engineer on the projects of the Tennessee Valley Authority. Much of the material appeared originally as a series of articles in *Construction Methods*. Charles H. Locher served as consultant on the construction work during the five-year period of 1933-1938, and during that period, his advice and council was available to Mr. Ackerman on the material which was consolidated into the present volume. Although the information contained in the volume deals primarily with the experiences on dam and other construction work of the TVA, the authors have drawn information from many other projects, including their own experiences, to provide a broader base of coverage for this volume on heavy construction work. The book is intended as a useful reference on construction projects, with a further idea of pointing out the analytical methods by which a construction plant may be organized to suit particular job requirements.

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ROAD AND STREET CONSTRUCTION METHODS AND COSTS—By Halpert P. Gillette, Editor, and John C. Black, Associate Editor, Roads and Streets, Chicago, Ill. 607 pages, 6x9. Price $6.00.

To provide an assembly of information relating to costs and methods of highway and street construction, the authors have drawn material from many available sources, such as magazines, Government reports, and trade association literature, and have organized it into a volume designed to cover all phases of the subject. The book consists of abstracts from published material, with emphasis on cost data wherever it could be obtained. Many of the references relate to work done during the past few years, but in many cases, the jobs were carried out 10 to 15 years ago, and in a few instances, the cost data is based on work carried out 20 to 30 years ago. The references are organized into types of work for ready use, and in each classification, the references cover a wide geographical range.

Personally speaking...

C. H. Wilson has joined the engineering staff of W. A. Bechtel Co., San Francisco, Calif., and will be engaged in the work of estimating and cost analysis for the newly organized construction department of that company. He was formerly with such well known contracting organizations as K. E. Parker Co. and Lindgren & Swinerton, Inc.

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Howard F. Topping, who was on the engineering staff of the San Francisco-Oakland Bay bridge throughout the entire design and construction period, and more recently was a member of the Pacific Bridge Co. engineering organization, recently accepted a position with the Panama Canal Commission in connection with the design of the third set of locks for the canal.

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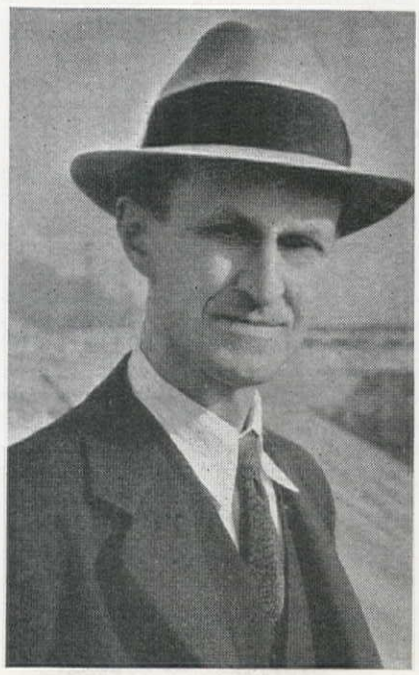
Verne Gongwer, well-known civil engineer of the Pacific Northwest, has resigned his position of project engineer with the TVA to accept the position of chief engineer with the Tacoma, Wash., department of public utilities. Gongwer has served the city of Portland, Ore., the Portland Dock Commission, Baar and Cunningham, consulting engineers of Portland, and the city of Tacoma. In the latter engagement he served as structural engineer on the Narrows Crossing, a 1¼-mi. transmission span over Puget Sound, on construction of Cushman substation and as superintendent of hydraulic design and construction on Cushman dam No. 2. He resigned that position in 1934 to join the staff of the Tennessee Valley Authority in the east where he has been in charge of installation of eight new generating units at Wheeler, Wilson, and Pickwick powerhouses, and dredging below Pickwick, Wheeler, Guntersville and Hales Bar dams.

VERNE GONGWER, chief engineer for the Tacoma Department of Public Utilities, Tacoma, Wash.



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Col. Lincoln B. Chambers, for the past five years district engineer of the U. S. Engineer Department at Sacramento, Calif., and at the same time chairman of the California Debris Commission, has been transferred to Fort Bragg, N. C., as commanding officer of the 41st Engineers.

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Charles E. Carey, chief consulting engineer for the Bonneville Power Administration, has assumed, in addition to his other duties, those of assistant chief of the planning and marketing division of the Administration. The activities of the division, headed by William A. Dittmer, are to be substantially broadened in connection with the marketing of power from both Grand Coulee and Bonneville dams.

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N. A. Sansteby, consulting mechanical engineer who has been connected with the design of a number of large western concreting and crushing plants, is now engaged in designing a rock crushing and hot mix plant for George Herz & Co. for their highway contract near San Bernardino which will include the placing of cement stabilized base. Sansteby was recently a member of the engineering staff of Pacific Constructors, Inc., engaged on the design of the concrete mixing plant and conveying system for Shasta dam.

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A. J. Orselli, who has been superintendent on several recent refinery construction and improvement projects, carried out by the Bechtel-McCone-Parsons Corp., is now directing work on an addition to the refinery of the Union Oil Co. at Oleum, Calif.

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Jasper S. Connell, for the past six years assistant chief engineer and general manager of the Salt River Valley Water Users' Association with headquarters in Phoenix, Ariz., has joined

the engineering organization of the W. A. Bechtel Co., San Francisco, Calif. Prior to his engagement in Arizona he had been working on hydroelectric developments in British Columbia.

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Olaf Laurgaard, city engineer of Portland, Ore., for more than sixteen years, returned to Portland on a vacation and leave of absence after completing Hiwassee dam in North Carolina as construction engineer for the Tennessee Valley Authority. Since leaving Portland early in 1934, he has been construction engineer on Parker dam for the Bureau of Reclamation and general office engineer at Knoxville for the TVA, as well as in charge of Hiwassee dam.

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J. G. Wright, structural engineer who served on the engineering staff of Permanente Corp. during the design and construction period of the mill which will produce cement for Shasta dam, is now in the office of A. W. Earl, consulting engineer of San Francisco, and is engaged on design work for the U. S. Navy. Previous to his work at Permanente, Mr. Wright served on the reconstruction of Berkeley, Calif., school buildings to bring them up to earthquake resistant requirements, and prior to that he was with the engineering staff of Pacific Bridge Co. on the foundation work for the Golden Gate Bridge.

•

J. H. Pomeroy, contractor of San Francisco, Calif., and a member of the firm of Pontoon Bridge Builders, Inc., which built the pontoons for the Lake Washington Bridge at Seattle, returned to that city late in August on business in connection with contracts in the South Pacific islands in which his firm is interested. On his return to San Francisco he was scheduled to fly, via Clipper, to Midway and Wake Islands.

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W. B. Graham, highway contractor of Chehalis, Wash., has filed for the position of country road commissioner in the second district of Lewis County, Washington.

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M. P. Munter, Seattle, Wash., highway contractor who holds a contract for highway paving at Fairbanks, Alaska, has been spending some time on that job in the territory and is due back in the States early in September.

Supervising the Jobs . . .

C. John Haglund, recently field superintendent at the graving docks where the concrete pontoons for the Lake Washington Bridge, Seattle, were constructed, has been appointed general construction superintendent of the naval base facilities at Pearl Harbor, Honolulu, T. H. The contract is held by a group of well-known contractors including Hawaiian Dredging Co., Raymond Concrete Pile Co., Turner Construction Co., Morrison-Knudsen Co., and J. H. Pomeroy & Co.

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B. "Woody" Williams, superintendent for Morrison-Knudsen Co., Inc., Boise, Idaho, is in charge of the driving of a 2,300-ft. tunnel 14 ft. in diameter and construction of the outlet works for Kanopolis dam on the Smoky Hill River southwest of Salinas, Kans. The bid price for the work was $793,124.

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Paul Wilcox, superintendent with A. Teichert & Son, Inc., of Sacramento, Calif., is in charge of levee construction on the Sutter and Tisdale Bypasses in Sutter County, California. Other key men on the contractor's staff include **Henry Teichert, Cyril Ribisi** and **A. L. Kingwell.** The job consists of enlarging, raising, strengthening and setting back levees along the bypasses in the vicinity of Long Bridge and Tisdale Weir under the direction of the U. S. Engineer Department. Bid price was $324,345.

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O. F. Sunde, general superintendent, and **Emil Lundstrom,** job superintendent, are directing the construction of a $250,000 steel frame carbide plant for L. H. Hoffman, Portland contractor. Construction of a main building and a warehouse are included in the job.

•

A. J. Horton, general superintendent for Warren Northwest, Inc., of Portland, Ore., and **R. E. Baltic,** job superintendent, are in charge of the construction of surface landing field runways and warm-up platform at the Naval air station near Seattle, Wash. **R. A. Jenkins** is technical engineer for the contractor, **Carl DeNucci** is grade foreman and **J. Q. Crone** is plant foreman. The contract was awarded on a bid of $600,297 by the U. S. Navy Department.

A. J. HORTON, general superintendent for Warren Northwest, Inc.

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Carl G. Jarboe is superintendent and **D. E. Kelly** is assistant superintendent on the construction of five 2-story barracks and a mess hall at the Eleventh Naval District, San Diego, Calif. The contract for the job was awarded to I. C. Curry, San Diego, by the U. S. Navy Department on a low bid of $309,865.

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O. L. Weidenheimer and **Elmo E. Bacon** are superintendent and assistant superintendent, respectively, on construction of an Air Corps hangar and annexes at Hill Field near Ogden, Utah. Mead & Mount Construction Co., Denver, Colo., was awarded a $494,000 contract for the job by the constructing quartermaster of the U. S. Army.

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J. W. Hess is superintendent for 3.6 mi. of highway grading and surfacing near Petaluma, Calif. His assistants include **John Jacobsen,** office manager; **E. M. Tonn,** structure superintendent; **Victor Berg,** foreman, and **Harry Leighton,** tractor foreman. The $205,836 contract for the work was awarded to Louis Biasotti & Son of Stockton, Calif., and L. D. Tonn of Lodi, Calif., by the California Division of Highways.

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Milton R. Hayes is superintendent on a 3.9-mi. highway grading job on state highway 145 between Placerville and Norwood, Colo. **Ray L. Hartley** and **Welton E. Wear** are assisting Hayes on the $154,580 contract which was awarded to Switzer & Horner of Denver by the Colorado Highway Department.

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L. K. Wilder is superintendent on 5 mi. of highway grading and paving between Kelley Road and Pole Road in Whatcom County, Wash. Foremen on the job under Wilder include **John Jansen,** paving; **Ed Sparks,** grading; and **E. V. Shields,** bridge. C. V. Miller, Bellingham, Wash., was awarded the contract by the Washington Highway Department on a low bid of $127,460.

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Bob Geisler is superintendent for P. W. Womack Construction Co., Phoenix, Ariz., in charge of erecting five apartment houses for the El Encanto Apartments, Inc., in Tucson, Ariz. The contract price was about $200,000.

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Charles W. Smith is superintendent for Gibbons & Reed of Salt Lake City,

Utah, on an 8.4-mi. highway surfacing project in the vicinity of Primeaux and Eureka, Nev. **W. A. "Bill" Gibbons** is assistant superintendent, **W. W. Taylor** is office manager, and **Will Reed** is foreman on the job which was awarded by the Nevada Highway Department on a low bid of $299,470.

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Frank Eggers is supervising construction of a control house and intake tower at Chehalis, Wash., for S. S. Mullen, Seattle contractor who was awarded a $101,013 contract for the work. **Jack Neinen** is foreman assisting Eggers.

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William B. Hughes is superintending the installation of concrete machine foundations in the new machine shop at Mare Island Navy Yard, Vallejo, Calif. **Claude Dyer** and **Jerome Snow** are assistant superintendents on the job which was awarded to James I. Barnes of Santa Monica, Calif., on a low bid of $225,400.

•

L. P. Caffar is superintendent for Henry L. Horn, Caldwell, Idaho, in charge of constructing a $205,704 grade separation at the Nyssa undercrossing of the Union Pacific railroad and the Old Oregon Trail highway. Foremen on the job include **E. C. West, R. O. Horn** and **R. B. Horn.**

•

C. L. Hansen is directing construction for L. H. Hansen and Sons of Fresno, Calif., on the new city hall in Fresno. The building will be a 2-story reinforced concrete structure with basement. The general construction contract price was $198,988.

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Don McGuire is supervising 5.5 mi. of highway construction between Muddy Pass and Kremmling, Colo., for J. H. & N. M. Monaghan of Denver. McGuire's assistants on the $110,902 job include **Jack Cunningham,** superintendent, **Lloyd Imus,** foreman, and **Willard Nelson,** timekeeper.

•

Hank G. Walsh is in charge of building construction on the Frank Luke, Jr., low cost housing development project at Phoenix, Ariz., for E. W. Duhame, contractor of Phoenix who was awarded a $263,242 contract for the job. **Howard E. Boice** is the contractor's engineer and **Homer Henson** is carpenter foreman.

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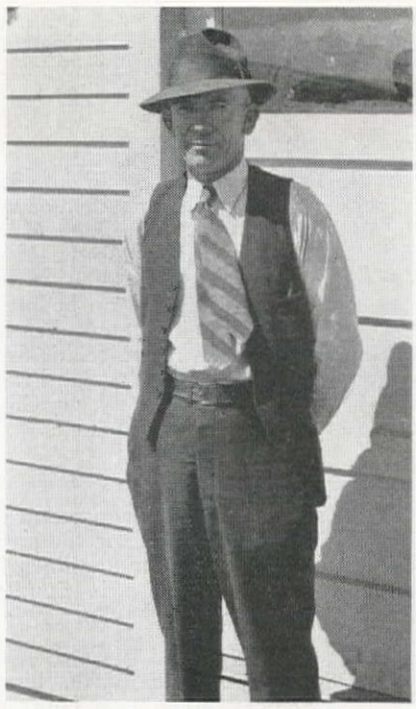
C. A. Isham is superintendent for the installation of a street lighting system at Hill Field near Ogden, Utah, for Moore Electric Co. of Los Angeles, Calif. In addition to the $118,786 street lighting job, he will also supervise the electrical installation for the depot supply building at Hill Field which has been awarded to the same company. The general contract for the supply building is held by Peter Kiewit Sons Co. of Omaha, Neb.



ROY M. CURTIS, superintendent for N. P. Severin Co. of Chicago, Ill., is in charge of that company's contract for the construction of four warehouse buildings at the Fleet Supply Base in Oakland, Calif. The casting of concrete piles for the foundations of the buildings is described in an article appearing in this issue.

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J. E. McClellan, general superintendent, and **Roy C. Knapp,** job superintendent, are in charge of construction of a factory building being erected in Burbank, Calif., by Buttress & McClellan of Los Angeles, Calif., for the Menasco Manufacturing Co. **E. H. Davis** is in charge of the office and purchasing.

•

Robert Ruedy is superintendent in charge of construction of a water supply system for the Young River-Lewis and Clark water district in Clatsop County, Oregon. **O. B. Meyer** is labor foreman on the job and **Joseph Boyakin** is timekeeper. Awarded to Grimstad and Vanderveldt of Astoria, Ore., and Eugene Ruedy Co. of Portland, for about $75,000, the contract includes construction of a dam and distribution pipe line.

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Nelson Rector is supervising the construction of a postoffice building at Hamilton, Mont., for Benjamin H. Sheldon, contractor of Seattle, Wash., who was awarded a $75,936 contract for the job.

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Gordon MacKenzie and **Gilles Wahlquist** are superintendents in charge of erecting structural and reinforcing steel, respectively, for the $500,000 bottling plant being consructed by the Acme Breweries in San Francisco, Calif. Herrick Iron Works, Oakland, Calif., was awarded the contract for both structural and reinforcing steel for the building.

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Dan Bell is superintendent on 42.5 mi. of surfacing on the Dayton-Kane road and the Burgess Junction-Shell road in Big Horn County, Wyoming, under contract to the Big Horn Construction Co. of Sheridan, Wyo. **L. O. Johnson** is office manager for the job. Bid price of the job was $87,994.

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Jack Ware and **Harold Olson** are superintendent and assistant, respectively, for Leonard & Slate, Multnomah, Ore., in charge of 5 mi. of grading and surfacing on the east unit of the Shaniko-Cow Canyon section of Sherman highway in Wasco County, Oregon. **L. Pearl Leonard** is paymistress at the home office. The job was awarded on a low bid of $87,103.

•

Arnold Lee is superintendent on 5 mi. of graded earth road between Hot Springs and Brigham City, Utah, for T. G. Rowland, contractor of Salt Lake City. **J. P. Marshall** is the contractor's engineer in charge of structures. Bid price for the job was $93,871.

•

Joe Rowland, superintendent for T. G. Rowland, Salt Lake City, Utah, is in charge of 4 mi. of grading and gravel surfacing between Richfield and Glenwood, Utah. The contract was awarded by the Utah State Road Commission.

•

Carl A. Durant is now general labor foreman for the Seims-Drake-Puget Sound Co. which holds a contract with the U. S. Navy Department for construction of Naval air bases at Sitka and Kodiak, Alaska. Durant is engaged on all phases of the construction at Kodiak.

•

M. B. Sheik, project director of the jetty construction at Gray's Harbor, Wash., has left Aberdeen for Midway Island in the south Pacific where he will be engaged on the construction of a Naval air base which is under contract to Morrison-Knudsen Co., Hawaiian Dredging Co., Raymond Concrete Pile Co. and Turner Construction Co. **Lafay Pace,** superintendent of the south jetty construction at Aberdeen and the Ilwaco jetty on the Columbia, is already on Midway Island, having sailed some time ago.

•

R. C. Caldwell, formerly purchasing agent for the Utah Construction Co. on the Toston project at Broadwater, Mont., has been transferred to Conchas

J. R. WOMACK is supervising the construction of the Marcos de Niza Housing project in Phoenix, Ariz., for P. W. Womack Construction Co. which holds the $399,468 general contract. *Ben O. Davey* is estimator and purchasing agent for the job.

Dam, New Mexico, where he is office manager for Utah Construction Co. and Griffith Co. on the construction of Conchas canal. Caldwell reports New Mexico rather hot in comparison with Montana.

•

S. R. Bowsfield, superintendent for V. R. Dennis Construction Co. of San Diego, Calif., is directing the grading and paving of a highway project near Brawley, Calif.

•

Frank H. Dunn, superintendent for Dodge Construction Co., on a 19-mi. highway construction job near Lovelock, Nev., has as assistants, in addition to those mentioned in the August issue, **L. C. Mackay,** grade superintendent; **H. E. Baxter,** plant foreman; **Clyde Wright,** plant foreman; **J. F. Stinnett,** water sub-contractor; **Duke Clements,** tractor foreman; **W. L. Poalgoyen,** office manager, and **Dave Otis,** tractor mechanic.

•

W. F. Rennebohm, superintendent for J. F. Shea Co. on the Long Valley dam northwest of Bishop, Calif., is being assisted by **H. Ewart,** general foreman; **J. O. Johnson,** carpenter foreman; **W. G. Robertson,** night foreman; **W. C. Evans** and **James Fessa,** office clerks; and **A. T. Jones,** welder.

•

John C. Gist, general superintendent, and **Jess Hoopes,** superintendent, for A. Teichert & Son, Inc., Sacramento, Calif.,

UNIT BID SUMMARY

Water Supply . . .

California—San Diego County—City—Pipe Line Extension

H. H. Peterson, San Diego, Calif., $45,208, low bidder to the Water Department, Division of Development and Conservation, San Diego, for the construction of the Upas Street pipe line extension consisting of 24-in. cast iron pipe and accessories. Pipe, valves, sleeves, special pipe shapes and miscellaneous castings are to be furnished by the city. Bids were received from the following:

(1) H. H. Peterson.....$45,208
(2) B. G. Carroll & Harry Foster..... 45,896
(3) Williams & Van Valkenburgh, Inc.....$47,917
(4) V. R. Dennis Construction Co..... 50,379

		(1)	(2)	(3)	(4)
970	cu. yd. cl. 1 excav. sta. 0+00 to 14+00 incl. disp. of excav. matl.	3.50	10.00	3.00	6.10
3,550	cu. yd. cl. 1 excav. sta.14+00 to end incl. disp. of excav. matl.....	3.00	2.75	4.50	5.14
2,400	cu. yd. backfill from class 1 excav. incl. cost of water.....	.40	1.00	.75	.60
1,000	cu. yd. sand backfill, incl. cost of water.....	1.60	2.50	2.50	2.00
100	cu. yd. cl. 2 struct. excav., incl. cost of backf. and excess matl.....	3.50	8.00	4.00	8.00
30	cu. yd. cl. 3 excav. for small trenches, incl. cost of backfill.....	2.50	8.00	4.00	5.00
675	cu. yd. cl. 4 bench excav. above P.L. trench.....	.35	2.00	.50	2.00
4,372	lin. ft. loading, hauling and installing complete in place 24-in. cl. 150 cast iron pipe, furnished by City.....	2.75	1.70	1.50	2.00
1,790	lin. ft. loading, hauling and installing complete in place 24-in. cl. 200 cast iron pipe furnished by City.....	2.80	1.70	1.50	2.25
3	each install 24-in. horiz. bev. geared gate valve, hub ends, in place, furnished by City.....	38.00	10.00	$100	30.00
2	each install 24-in. class D C.I. sleeves, in place, furn. by City....	19.00	15.00	25.00	12.00
3	each install, in place, 24x24x6-in. class D C.I. blowoff branches each with two 24-in. bells and one 6-in. flange, furn. by City.....	48.00	10.00	$100	12.00
1	each install 24x24x6-in. cast iron tee, furnished by City.....	40.00	10.00	$100	15.00
1	each install 24x24x16x16-in. C.I. cross, furnished by City.....	41.00	10.00	50.00	15.00
1	each install 24x24x8x8-in. C.I. cross, furnished by City.....	41.00	10.00	50.00	20.00
1	each install 24x24x10x10-in. C.I. cross, furnished by City.....	42.00	10.00	50.00	20.00
1	each install 24x24x10-in. C.I. wye, furnished by City.....	45.00	10.00	50.00	20.00
2	each install 24x24x8-in. C.I. tee, furnished by City.....	41.00	10.00	50.00	18.00
75,000	lb. install 24-in. bends and misc. castings, furn. by City.....	.03	.02	.02	.015
96	lin. ft. 24-in. C.I. pipe, haul and del., furn. by City.....	3.50	.20	1.00	.50
3	each install 6-in. gate valve, furnished by City.....	10.00	3.00	15.00	10.00
30	lin. ft. 6-in. std. wrought iron pipe in place.....	3.00	4.00	2.00	3.00
7	each 2-in. comb. P.A.V. assemblies, furnished by City.....	12.00	5.00	50.00	4.00
10	each 22-in. std. C.I. manhole covers and rings.....	18.00	14.00	20.00	15.00
105	cu. yd. concrete, uncl., in valve chambers, etc.....	25.00	22.00	25.00	15.00
310	bbl. cement in place in the work.....	2.50	2.50	3.00	2.40
10,000	lb. reinforcing steel, in place.....	.05	.06	.07	.06
6,500	sq. ft. asphalt pave. broken and replaced with 7-in. asp. pave.....	.20	.20	.50	.15
100	cu. ft. sidewalk and curb, broken and replaced.....	.60	.50	1.00	.50
2,700	cu. ft. conc. pavement, broken and replaced.....	.40	.40	1.00	.60
30	lin. ft. 26-in. I.D. ¼-in. plate steel pipe, short sec.....	15.00	3.00	7.50	2.40
80	each additional cost of lead joints.....	7.00	6.00	10.00	4.00

Miscellaneous . . .

Montana—McCone County—U. S. Engineers—Power House Substructure

Contract awarded to Woods Bros. Construction Co., Lincoln, Nebr., $412,359, by the U. S. Engineers, Kansas City, Mo., for the construction of a power house substructure at Fort Peck Dam. The site of the work is on the Missouri River at the Port Peck Dam site approximately 20 mi. southeast of Glasgow, Montana, in Township 26 North, Range 41 East, McCone County. The work to be done includes furnishing all labor and materials, tools, plant, supplies and equipment and performing all work required for construction of a power house substructure at Fort Peck, Montana, including foundation for power house and surge tanks, tailrace excavation, concrete slab and walls. The Fort Peck power house will be located within the existing outlet structure for the Fort Peck tunnels. In order to construct the substructure and incidental work covered by the specifications, it will be necessary to remove an existing reinforced concrete floor slab and certain portions of the walls of the existing outlet structure. The Government will furnish to the contractor, free of charge, f.o.b. cars on Government sidings at the site of the work, all cement required for the performance of the work to be done under this contract, and all waterproofing and curing solutions required for protecting excavated surfaces and curing of concrete. The Government will also furnish free of charge to the contractor in stock piles all sand and gravel. Except for materials listed and for equipment, materials, to be furnished by the turbine manufacturer, all materials for completion of the work will be furnished by the contractor. Bids were received from the following:

	Power House Substructure	Savings on Surplus Gov't Equipment	Comparative Bid Price
(1) Fegles Construction Co., Ltd.	$640,314	$7,154	$647,468
(2) Great Lakes Dredge & Dock Co.	694,510	6,283	688,226
(3) S. Patti Construction Co.	592,535	0.00	592,535
(4) Woods Bros. Construction Co.	412,359	1,683	410,675
(5) Government Estimate	733,091	.....	733,091

		(1)	(2)	(3)	(4)	(5)
	L. S. placing, maint. and remov. cofferdams	$8,002	$14,750	$23,068	$9,400	$30,000
	L. S. pumping from foundation excavation	$3,220	$3,000	$16,440	$3,400	$5,000
4,600	cu. yd. breaking and removing existing concrete	25.00	11.25	8.93	7.90	27.00
15,900	cu. yd. excavation of shale foundation	3.90	6.35	5.11	2.15	5.00
25	squares (100 sq. ft.) liquid sealing solution (each coat)	2.00	8.90	1.43	4.50	5.00
10	squares (100 sq. ft.) gunite coating (each coat)	50.00	37.00	7.14	7.00	5.00
210	lb. wire mesh gunite reinforcement	.40	.15	.33	.30	.10
69,500	lb. furn., plac. and remov. steel shoring	.15	.15	.128	.075	.10
82,700	lb. furn. and plac. metal parts for needle beam protec.	.15	.09	.101	.082	.13
1,270	lin. ft. drilling holes for needle beams	10.50	6.00	7.93	5.70	5.00
2,014,000	lb. furn. and plac. reinforcement steel	.0445	.0675	.066	.048	.057
35	lin. ft. furn. and plac. rubber waterstops, type 1	2.15	5.25	.85	2.50	1.50
205	lin. ft. furn. and plac. rubber waterstops, type 2	5.00	6.70	.753	2.25	5.00
300	lin. ft. burning off steel waterstops	.25	1.10	.306	.30	2.00
540	sq. ft. furn. and plac. joint filler—½ in. thick	1.00	.50	.056	.43	.50
275	sq. ft. furn. and plac. joint filler—1-in. thick	2.00	.90	.085	.80	1.00
7,000	sq. ft. furn. and plac. absorptive lining	.20	.30	.142	.12	.07
150	lb. furn. and plac. grout pipes and connections	1.00	.25	.205	.35	.20
200	cu. ft. pressure grouting	10.00	2.25	1.43	2.40	2.00
320	lin. ft. furn. and plac. vitrified pipe drain	1.00	2.25	.633	.55	1.00

(Continued on next page)

J. E. WORTHINGTON, veteran plant superintendent of the Southwest, is in charge of plant erection and operation for Guerin Bros., of San Francisco, Calif., on their 3-mi. highway contract near Buellton, Calif. The plant in this case is an unusual portable, all-electric crushing and screening set-up and is described in an article appearing in this issue.

are in charge of construction work on a conduit from Leevining Creek to Grant Lake reservoir, being built at a contract price of $806,356. Key men on the job for the contractor include **Fred Phillips,** carpenter foreman; **Eric Wieberg** and **Cal Powers,** excavation foremen, **D. M. Best,** concrete foreman, and **R. L. Rose,** plant foreman.

•

O. H. Tucker, superintendent for Macco Construction Co. on the construction of Grant Lake dam in Mono County, California, has as assistants **Jack Beale,** assistant superintendent, and **P. L. Johnson,** master mechanic.

•

John Parmeter is superintendent for Claude C. Wood of Stockton, Calif., on a highway construction job in Yosemite National Park. **Emery Conrad** is office manager on the job, and **H. I. Talcott** is master mechanic.

•

J. M. Rice is operating a shovel and dragline for Griffith Co. and Bent Co. at Friant dam, California.

CORRECTION

Through the inadvertent re-use of an old and incorrect printing plate, an error appeared in our August issue in an advertisement featuring the McDonald Kanister Kit, manufactured by the B. F. McDonald Company of Los Angeles.

The announcement said the McDonald Kanister Kit had been approved by the Research Bureau of the "U. S. Life Saving Bureau" when it should have read, "National Life Saving Bureau," which is not a governmental agency.

1,000 lin. ft. drilling holes for dowel bars	1.50	1.20	.85	.52	2.50
21,400 cu. yd. concrete for power house and found., class A	10.00	10.35	7.97	5.75	9.50
3,000 cu. yd. concrete for power house and found., class C	7.00	10.35	6.30	5.75	9.00
450 cu. yd. concrete for power house and found., class E	15.00	20.50	7.34	8.00	30.00
109,000 lb. furn. and plac. struct. steel and misc. metal work	.15	.18	.175	.115	.20
1,200 lb. furnishing and placing gratings	.20	.20	.124	.123	.15
3,300 lb. furnishing and placing safety treads	.20	.22	.187	.138	.20
1,350 lb. furnishing and placing railings	.20	.37	.185	.237	.15
22,000 lb. furn. and plac. steel piping with screwed fittings	.22	.20	.092	.118	.15
58,000 lb. furn. and plac. steel piping with flanged fittings	.22	.22	.106	.14	.15
140 lb. furn. and plac. wrought iron pipe and fittings	.35	.37	.048	.25	.20
500 lb. furn. and plac. C.I. soil pipe and fittings	.20	.15	.408	.13	.106
L. S. furn. and plac. gate valves and floor stands	$1,000	$865	$1,040	$1,000	$1,500
L. S. furn. and plac. floor drains	$500	$150	$2,964	$350	$500
1,000 lb. furn. and plac. brass pipe and fittings	.75	1.20	.61	.48	.50
103,000 lb. furn. and erecting steel plate pipe	.16	.18	.175	.14	.17
L. S. assembling and placing turbine embedded parts	$17,276	$29,783	$18,523	$20,600	$44,650
L. S. furnishing and placing conduits and fittings	$5,000	$4,400	$5,191	$4,700	$6,000

The following companies' bids were contingent upon their being awarded the items for the surplus Government equipment: Fegles Construction Co., Ltd.; Great Lakes Dredge & Dock Co.; Woods Bros. Construction Co. Column 5 represents the highest price bid under seperate advertisement for cash sale of surplus equipment.

Lot No. 1—Concrete mixing plant.
Lot No. 2—Aggregate reclaiming conveyor, 30-in. x 700 ft., with timber tunnel.
Lot No. 3—Aggregate elevating conveyor, 30-in. x 213-ft., with timber bents and housing.
Lot No. 4—Cement unloader, "Fuller-Kinyon," type B.
Lot No. 5—Cement unloader, "Fuller-Kinyon," type B.
Lot No. 6—"Pennsylvania" Scotch-Marine type stationary boiler, capacity 70 h.p.
Lot No. 7—Heating tank 12 ft. long x 6 ft. diameter.
Lot No. 8—400 ft. (approx.) elephant trunks.
Lot No. 9—220 ft. (approx.) hose, 6-in. cement or grout.
Lot No. 10—14 concrete buckets.
Lot No. 11—73 concrete hoppers.
Lot No. 12—Two-stage stationary compressor, 1,580 c.f.m.
Lot No. 13—Two-stage stationary compressor, 1,240 c.f.m.
Lot No. 14—Guy derrick, 15-ton capacity.
Lot No. 15—Guy derrick, 15-ton capacity.
Lot No. 16—Locomotive, gasoline, "Lima."
Lot No. 17—Locomotive, gasoline, "Vulcan."
Lot No. 18—Crane, dragline, diesel-driven, "Northwest."

	(1)		(2)		(4)		(5)
Lot No. 1	$1,000.00	—$2,500.00	$5,000.00	$1,500.00	$2,600.00	—$900.00	$3,500.00
Lot No. 2	No Bid		3,000.00	1,472.00	3,000.00	1,472.00	1,528.00
Lot No. 3	500.00	—39.00	900.00	361.00	750.00	211.00	539.00
Lot No. 4	300.00	0.00	1,000.00	700.00	1,000.00	700.00	300.00
Lot No. 5	No Bid		1,000.00	700.00	1,000.00	700.00	300.00
Lot No. 6	No Bid		500.00	500.00	300.00	300.00	No Bid
Lot No. 7	100.00	70.00	100.00	70.00	500.00	470.00	30.00
Lot No. 8	No Bid		100.00	100.00	400.00	400.00	No Bid
Lot No. 9	No Bid		100.00	25.00	100.00	25.00	75.00
Lot No. 10	No Bid		1,200.00	950.00	1,200.00	950.00	250.00
Lot No. 11	No Bid		200.00	200.00	150.00	150.00	No Bid
Lot No. 12	500.00	215.00	1,800.00	1,515.00	1,800.00	1,515.00	285.00
Lot No. 13	500.00	—1,500.00	1,500.00	—500.00	1,200.00	—800.00	2,000.00
Lot No. 14	No Bid		1,700.00	—52.60	1,000.00	—752.60	1,752.60
Lot No. 15	No Bid		1,700.00	748.60	1,000.00	48.60	951.40
Lot No. 16	No Bid		1,200.00	—622.00	1,200.00	622.00	578.00
Lot No. 17	No Bid		200.00	—27.67	200.00	—27.67	227.67
Lot No. 18	1,000.00	—3,400.00	1,800.00	—2,600.00	1,000.00	—3,400.00	4,400.00

Tunnel . . .

Oregon—Washington County—State—Excavation and Lining

Contract awarded to Kern & Kibbe, Portland, $135,295 (using Wolman Salts), by the Oregon State Highway Commission, Portland, for 0.2 mi. grade, tunnel excavation, line and pave the Sunset Tunnel Section of the Wolf Creek Highway. Alternate bids were received for the use of Wolman Salts or Zinc Chloride-Sodium Dichromate for timber lining. Bids were received from the following:

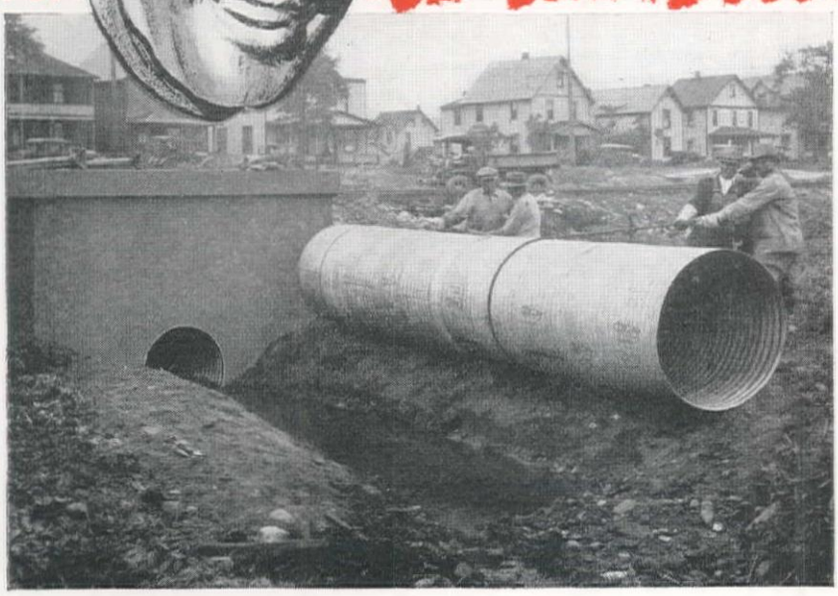
		Using Wolman Salts	Using Zinc Chloride-Sodium Dichromate
(A)	Kern & Kibbe	$135,295	.....
(B)	Birkemeier & Saremal	157,527	.....
(C)	B. H. Sheldon	167,328	.....
(D)	Sam Orino	140,365	$142,265
(E)	J. A. Terteling & Son	157,348	.....
(F)	Diesel Oil Sales Co.	144,463	.....
(G)	C. J. Eldon	138,317	138,317
(H)	Morrison-Knudsen Co.	181,143	194,443
(I)	A. C. Greenwood Co., Inc.	152,336	.....
(J)	T. E. Connolly	174,620	.....

(1) 1,200 cu. yd. excav., single classification
(2) 22,000 cu. yd. tunnel excavation
(3) 12,000 yd. mi. truck haul
(4) 230 cu. yd. class "A" concrete in sills
(5) 20 MFBM cedar blocking in place
(6) 15,000 only Port Orford cedar wedges in pl.
(7) 18 MFBM untreated lumber in tunnel lining
(8) 1,450 cu. yd. gravel packing in place
(9) 170 cords cordwood packing
(10) All specified painting
(11) 180 lin. ft. 4-in. sewer pipe
(12) 1,600 lin. ft. 8-in. concrete pipe
(13) 48 only special section of 8-in. conc. pipe
(14) 10 cu. yd. 1½-in.-0-in. gravel filling materials
(15) 70 cu. yd. ¾-in.-¼-in. rock backfill materials
(16) 14 only catch inlets
(17) 1,580 lin. ft. conc. curb and gutter
(18) 530 sq. yd. concrete sidewalks
(19) 300 cu. yd. 3-in.-0-in. material in leveling course
(20) 70 cu. yd. ½-in.-0-in. material in cushion course
(21) 2,000 sq. yd. Portland cement concrete pavement
(22) 140 lin. ft. ¾-in. expansion joints
(23) 1,800 lin. ft. ½-in. expansion joints
(24) 1,100 lin. ft. contraction joints
(25) 140 only dowels
(26) 2,000 lb. tie bars and reinforcement
(27) 380 MFBM lumber in tunnel lining, Wolman Salts treatment
(28) 380 MFBM lumber in tunnel lining, Zinc Chloride-Sodium Dichromate treat.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
(1)	.50	.75	1.00	1.00	1.00	1.00	.60	.60	1.50	1.00
(2)	2.90	3.90	5.00	2.90	4.50	3.60	3.10	4.90	3.80	5.47
(3)	.25	.15	.15	.25	.20	.12	.20	.25	.10	.07
(4)	24.00	25.00	15.00	30.00	15.00	20.00	15.00	27.00	26.00	15.00
(5)	81.00	$100	70.00	70.00	70.00	80.00	87.50	60.00	50.00	70.00
(6)	.04	.05	.04	.035	.03	.05	.085	.03	.05	.03
(7)	60.00	65.00	50.00	45.00	50.00	60.00	70.00	70.00	50.00	70.00
(8)	4.50	5.00	2.50	6.00	2.50	2.75	4.00	3.70	2.00	2.80
(9)	12.00	12.00	10.00	14.00	10.00	10.00	12.50	10.00	15.00	8.50
(10)	$3600	$4000	$3500	$3500	$1700	$2500	$3000	$500	$3500	$3000
(11)	.50	.50	.50	.50	.50	.50	.40	1.00	.80	.70

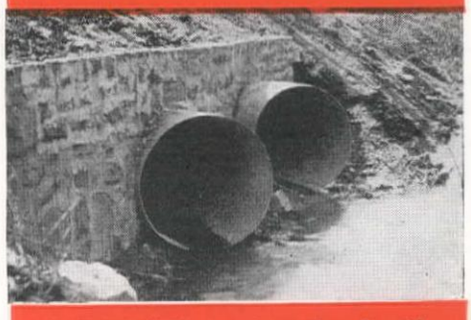
(Continued on next page)

I'm getting { MORE IMPROVEMENTS per dollar of cost WITH TONCAN!



INSTALLING this new drainage opening by ordinary methods would have been slow, expensive. So we jacked Toncan corrugated metal pipe through the existing fill — saved almost 50 per cent in cost and avoided a detour.

BY THREADING Toncan corrugated metal pipe through this failing structure, we saved the trouble and expense of complete replacement, obtained a strong lasting structure with scarcely any reduction in waterway area and no inconvenience to traffic.



JUST 48 HOURS after placing the order with our local Toncan fabricator, these two Toncan Iron culverts were delivered, installed and carrying traffic over a section of road washed out by heavy rains.

QUICK FACTS
About Toncan Pipe

1. Meets State and Federal specifications.
2. Prompt delivery in diameters 6″ to 84″; lengths up to 40′ and limited only by transportation facilities.
3. Quick, easy installation by unskilled labor facilitated by simple, sturdy bolted couplings.
4. Strength and flexibility to support the heaviest loads of fill and traffic.
5. Normally outlasts the roads under which it is laid—low annual cost.
6. Easily extended or salvaged for re-use in other locations.

"It's a fact! Dollar for dollar, I'm pleasing *more* people . . . replacing *more* unsafe bridges . . . installing *more* new culverts since I turned to Toncan Corrugated Metal Pipe. Reason: Toncan pipe goes in faster, *costs less installed* than massive rigid structures. This big saving in time, money, and detours enables me to build more structures per dollar and per season. Moreover, by specifying Toncan Copper Molybdenum Iron—the longest lasting metal in its price range—I am providing strong, durable structures that will outlast the roads. So whether you are figuring cost per structure or cost per year (or both) be thrifty—turn to Toncan."

Beall Pipe & Tank Corp., Portland, Oregon • A. N. Eaton Metal Products Co., Billings, Montana • W. E. Newman & Sons Co., Ogden, Utah • Thompson Mfg. Co., Denver, Colorado • Western Pipe & Steel Co., San Francisco and Los Angeles, California.

SPECIFY TONCAN IRON

The Progressive Metal Three Times Improved for Greater Rust-Resistance

PRODUCT OF REPUBLIC STEEL

(12)	.75	.70	.75	.65	.65	.75	.65	1.35	1.00	.80
(13)	2.00	2.00	1.00	2.50	2.00	3.00	.80	3.00	2.00	2.00
(14)	4.50	4.00	2.75	5.00	3.00	5.00	4.00	5.00	3.00	3.00
(15)	4.50	3.50	3.00	5.00	3.00	4.00	4.00	4.00	3.00	4.00
(16)	20.00	10.00	10.00	20.00	25.00	35.00	15.00	60.00	15.00	10.00
(17)	1.20	2.00	1.50	1.75	1.00	1.35	1.00	2.75	.90	1.00
(18)	2.00	1.80	1.10	3.00	1.70	1.75	1.80	3.00	2.00	1.10
(19)	3.00	3.50	2.50	2.00	2.50	3.00	3.00	3.85	2.00	2.50
(20)	3.00	3.50	2.50	4.00	2.50	3.00	3.00	3.85	3.00	3.00
(21)	4.00	3.00	2.10	4.00	3.00	2.50	2.30	4.40	2.50	2.00
(22)	.20	.20	.40	.20	.20	.25	.16	.18	.30	.30
(23)	.17	.20	.25	.15	.15	.15	.12	.18	.20	.50
(24)	.04	.04	.15	.20	.05	.20	.03	.15	.07	.50
(25)	.25	.25	.20	.30	.20	.40	.15	.50	.25	.20
(26)	.10	.08	.08	.0625	.06	.10	.06	.12	.10	.06
(27)	84.75	85.00	75.00	85.00	75.00	90.00	$100	85.00	97.00	77.00
(28)	.....	.....	.....	90.00	.....	.....	$100	$120	.....	.....

Colorado—Grand County—Bureau of Reclamation—Continental Divide

Contract awarded to Platt Rogers, Inc., Pueblo, $389,370, by the Bureau of Reclam., Denver, for driving 6,600 ft. of the Continental Divide tunnel from the west portal near Grand Lake, Colo. Work items provide for excavation, installation of permanent supports, drilling grout holes, placing grout pipe and pressure grouting. Bids were received from the following:

(1) Platt Rogers, Inc. $389,370
(2) Gordon Construction Co. 463,310
(3) J. F. Shea Co., Inc. 548,620
(4) S. S. Magoffin Co., Inc. $556,390
(5) Stiers Bros. Construction Co. 598,610

	(1)	(2)	(3)	(4)	(5)
31,400 cu. yd. excavation, all classes, in tunnel	10.50	11.90	14.60	14.50	14.90
750,000 lb. furnishing and install. perm. steel tunnel supports	.05	.08	.08	.08	.095
264 MFBM furn. and erect. perm. timbering in tunnel	50.00	60.00	60.00	85.00	$150
85,000 lb. furn. and install. steel tunnel-liner plates	.05	.06	.09	.07	.10
100 cu. yd. washed grav. or spalls outside of plate-steel tunnel-liner plates	3.00	6.00	6.00	10.00	10.00
2,500 lin. ft. drilling grout holes not more than 10 ft. deep	.40	1.00	1.00	1.00	1.00
900 lb. placing grout pipe and connections	.30	.40	.10	.50	1.00
3,500 cu. ft. pressure grouting	.90	1.50	1.00	2.50	2.00

Irrigation . . .

Utah—Weber County—Bur. of Recl.—Pipe Line

Niels Fugal, Pleasant Grove, $14,756, low to the Bureau of Reclamation, Provo, for laying about 67,000 lin. ft. of welded steel pipe of various diameters from 12 to 2 in. for laterals of the South Ogden distribution system, Ogden River Project, Utah. All pipe, valves and appurtenances forming a part of the completed work are furnished by the Government. Bids were received from the following:

(A) Niels Fugal $14,756
(B) Enoch Smith 17,333
(C) Ernest Stettler & Sons Constr. Co. 18,636
(D) Mullins & Wheeler 18,852
(E) Wheelwright Construction Co. 22,719
(F) B. & M. Construction Co. 22,773
(G) Ora Bundy $29,000
(H) Lang & Anderson 29,809
(I) Bert Landon 32,598
(J) The Utah Construction Co. 35,340
(K) J. J. Connor Construction Co. 63,850

(1) 20,100 cu. yd. excavation for pipe trenches
(2) 12,700 cu. yd. backfill
(3) 1,200 cu. yd. compacting backfill
(4) 1,000 lin. ft. laying welded steel pipe 12-in. in diameter
(5) 2,990 lin. ft. laying welded steel pipe, 10-in. in diameter
(6) 15,300 lin. ft. laying welded steel pipe 8-in. in diameter
(7) 16,100 lin. ft. laying welded steel pipe 6-in. in diameter
(8) 31,090 lin. ft. laying welded steel pipe 4-in. in diameter
(9) 1,150 lin. ft. laying standard galv. steel pipe 2-in. in diameter.
(10) 6 valves installing 8-in. gate valves, including valve boxes
(11) 4 valves installing 6-in. gate valves, including valve boxes
(12) 1 valve installing 4-in. gate valve, including valve box
(13) 55 valves installing 2-in. gate valves, incl. valve boxes and rock sumps
(14) 11 valves installing air valves, including valve boxes
(15) 5 valves installing air-relief and vacuum valves, including housings
(16) 1 meter installing meter, including meter box
(17) 360 connections making service connec.
(18) 1 cu. yd. concrete in piers

	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)
(1)	.36	.49	.32	.33	.58	.50	.84	.43	.80	.50	.90
(2)	.06	.04	.17	.13	.16	.20	.30	.30	.40	.25	.50
(3)	.25	.50	1.00	.30	1.00	.30	.40	.80	.75	1.50	1.00
(4)	.15	.14	.21	.21	.18	.16	.19	.30	.15	.40	.70
(5)	.12	.12	.17	.20	.16	.14	.17	.25	.12	.35	.60
(6)	.10	.10	.14	.155	.12	.12	.10	.25	.11	.30	.50
(7)	.08	.08	.11	.135	.10	.11	.10	.20	.10	.25	.45
(8)	.06	.06	.08	.115	.08	.10	.09	.15	.09	.20	.40
(9)	.04	.05	.05	.10	.06	.09	.06	.10	.08	.20	.30
(10)	8.00	5.00	6.00	6.00	3.50	17.00	7.00	20.00	10.00	15.00	40.00
(11)	6.00	4.00	3.00	6.00	3.50	15.00	5.00	20.00	7.50	15.00	40.00
(12)	6.00	5.00	2.00	5.00	3.50	12.00	5.00	20.00	6.00	15.00	40.00
(13)	5.00	4.00	1.00	5.00	8.00	10.00	3.00	10.00	15.00	15.00	30.00
(14)	6.00	5.00	4.00	3.50	5.00	6.00	7.00	10.00	10.00	10.00	30.00
(15)	6.00	10.00	4.00	5.00	8.00	9.00	10.00	10.00	10.00	15.00	30.00
(16)	6.00	10.00	10.00	6.00	25.00	50.00	7.00	25.00	25.00	10.00	40.00
(17)	2.00	2.00	4.00	2.00	1.50	4.00	2.00	7.00	7.50	7.00	15.00
(18)	45.00	30.00	50.00	35.00	30.00	$100	35.00	50.00	40.00	$100	30.00

Bridge and Grade Separation . . .

California—Santa Clara County—State—Underpass

Contract awarded to Earl W. Heple, San Jose, $46,368, by the California Division of Highways, Sacramento, for a reinforced concrete underpass to be constructed on spread footings on the El Camino Real under University Avenue. Bids were received from the following:

(1) Earl W. Heple $46,368
(2) Dan Caputo 50,273
(3) Engineers, Limited 55,929
(4) S. J. Amoroso Construction Co. $56,539
(5) Paul J. Tyler 56,987
(6) Union Paving Co. 62,761

10 M. gals. water	1.50	2.00	3.00	2.00	2.00	3.00
1,500 cu. yd. structure excavation	.80	.75	2.50	1.75	1.00	2.00
1,000 cu. yd. structure backfill	.80	.75	.65	.60	2.00	.75
420 cu. yd. imp. subgrade material	.75	1.50	1.00	1.00	1.00	1.00
1,100 sq. yd. preparing subgrade	.10	.10	.12	.12	.20	.12

(Continued on next page)

230 cu. yd. class "B" P.C.C. (pavement)	9.00	10.00	11.00	13.00	10.00	13.00
54 ea. pavement dowels	.25	.25	.33⅓	.50	.50	.25
239,000 lb. furn. bar reinf. steel	.027	.025	.025	.027	.03	.025
239,000 lb. placing bar reinf. steel	.008	.0125	.009	.01	.01	.005
1,480 cu. yd. class "A" P.C.C. (structs.)	16.00	17.50	20.00	19.50	18.90	22.00
12,000 lb. miscell. iron and steel	.12	.145	.15	.12	.18	.20
60 lin. ft. 18-in. C.M.P.	2.00	1.80	2.40	3.00	2.20	2.50
212 lin. ft. 12-in. C.M.P.	1.50	1.25	1.50	1.75	1.40	1.50
8 lin. ft. 10-in. C.M.P.	1.25	1.10	1.75	3.00	1.20	1.50
300 lin. ft. 8-in. P.M.P. underdrains	1.00	1.00	1.25	1.40	1.00	1.10
45 cu. yd. rock filling material	2.00	2.50	3.00	3.00	2.50	4.00
326 lin. ft. steel tube railing	6.00	6.00	6.50	6.80	6.00	5.50
45 cu. yd. class "B" P.C.C. (curbs and gutters)	15.00	14.00	17.00	20.00	15.00	18.00
28 lin. ft. 16-in. steel exhaust pipe	5.00	4.00	2.50	2.50	2.70	4.00
1 lot drainage pumping equipment	$2500	$2800	$2486	$2400	$3000	$3500
1 lot electrical equipment	$2000	$1880	$1947	$3565	$3750	$3000
1 lot miscell. items of work	$250	$550	$500	$300	$500	$700

California—Shasta County—P. R. A.—Structures

Contract awarded to E. E. Smith, Albany, $50,484, by the Public Roads Administration, San Francisco, for construction of the Fender Ferry bridge across the Pit River in Shasta National Forest. Bids were received from the following:

(1) E. E. Smith $50,484
(2) Scheumann & Johnson 54,233
(3) Fred J. Early, Jr. 64,777
(4) J. & B. Rocca $64,959
(5) A. T. Beckett 65,450

	(1)	(2)	(3)	(4)	(5)
450 cu. yd. unclassified excavation for structures	4.00	6.00	13.22	7.00	20.00
182 cu. yd. class A concrete	21.00	30.00	35.00	40.00	40.00
40 cu. yd. class B concrete	18.00	30.00	35.00	45.00	40.00
210 cu. yd. class D concrete	28.00	28.00	38.00	45.00	42.00
80,000 lb. reinforcing steel	.043	.05	.05	.06	.06
315,000 lb. structural steel	.11	.11	.1225	.122	.10
2,450 M. Ft. B. M. untreated timber including bridge iron	70.00	$140	$200	20.00	$1000

Highway and Street . . .

Colorado—Lake and Summit Counties—P. R. A.—Grade and Surface

C. Ryan & Son, Lakewood, $58,351 (official), awarded contract by the Public Roads Administration, Denver, for 1.1 mi. grade, surface on the Loveland-Fremont Pass Forest Highway Route, Cochetopa and Arapaho National Forest. Bids were received from the following:

(1) C. Ryan & Son $58,351
(2) Lowdermilk Bros. 58,633
(3) Pioneer Construction Co., Luke E. Smith and Engineering Corporation 59,462
(4) M. J. Sears $66,545
(5) DeRemer & Atchison 67,194
(6) Ed H. Honnen 68,234
(7) Hamilton & Gleason 68,877
(8) H. I. Gardner 76,660

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
10,500 cu. yd. strip. & stor. top soil	.25	.45	.16	.25	.25	.25	.20	.40
36,000 cu. yd. unclass. excav.	.27	.20	.22	.27	.25	.30	.33	.25
1,160 cu. yd. unclass. excav. for struct.	1.75	2.00	1.50	1.00	1.50	1.50	2.00	2.00
50,000 cu. yd. unclass. excav. for borrow	.25	.20	.20	.25	.25	.35	.33	.25
170,000 sta. yd. special overhaul	.02	.01	.03	.02	.02	.02	.02	.02
300 C.Y.M. special overhaul	.10	.25	.30	.20	.20	.30	.20	.20
400 hr. tamp. or sheepsf. roll. opr.	2.50	3.50	4.00	8.00	5.00	4.50	3.00	5.00
4,800 ton 2-in. heavy base course	.65	.80	.80	.80	1.00	.85	.95	.65
220 unit watering	1.00	1.50	2.00	2.00	2.00	1.50	2.50	3.00
70 hr. roller operation	5.00	7.00	4.00	4.00	5.00	5.00	4.00	10.00
1 each furnishing roller	$200	$250	$300	$400	$300	$200	$400	$300
L. S. furn. water plt. or plts. for proj.	25.00	25.00	$200	$300	$150	25.00	50.00	$100
2,400 ton crusher run top course	.80	1.00	.90	.80	1.25	1.00	.95	.85
11,000 gal. MC-1 cutb. asph. for prime ct.	.14	.15	.15	.15	.20	.10	.14	.21
170 lb. reinforcing steel	.10	.20	.10	.08	.10	.10	.08	.10
1,260 lb. structural steel	.12	.15	.20	.10	.10	.12	.15	.15
31 M.F.B.M. treat. timb, creo. pres.	$115	$112	$130	$125	$130	$110	$135	$125
24 cu. yd. class A cem. stone masonry	20.00	27.50	24.00	25.00	32.00	25.00	25.00	50.00
20 cu. yd. cement rubble masonry	16.00	25.00	18.00	20.00	30.00	18.00	23.00	50.00
806 lin. ft. 24-in. C. G. S. M. pipe	2.60	2.60	2.50	3.50	2.60	2.55	2.30	2.75
146 lin. ft. 36-in. C. G. S. M pipe	5.00	4.90	4.60	5.25	4.50	4.70	4.65	5.00
100 lin. ft. 42-in. C. G. S. M. pipe	6.00	5.75	5.50	6.00	5.25	5.75	5.35	7.00
22 lin. ft. 48-in. C. G. S. M. pipe	8.00	7.75	6.25	7.00	6.50	7.25	7.60	8.50
1,150 lin. ft. treated timber piling	1.15	1.20	1.50	1.25	1.75	1.30	1.25	1.75
1 each test pile	$300	$300	$100	$400	$250	$100	$125	$100
50 cu. yd. hand laid rock embk.	1.50	5.00	5.00	5.00	4.00	2.00	5.00	15.00
2,230 lin. ft. 6-in. perf. C.S.M.P. undr.	1.20	2.00	1.80	2.25	2.00	2.00	1.75	5.00
22.5 M.F.B.M lam. or strip floors, tr.	$105	$112	$130	$125	$130	$100	$135	$125
340 sq. yd. min. surf. asph. plank, 1 in.	4.00	2.50	3.25	4.00	4.00	3.00	3.50	6.00
7 ea. conc. maintenance posts	10.00	10.00	8.00	7.50	10.00	5.00	7.00	10.00
200 lin. ft. hub-high tr. wood guard rail	1.00	1.50	.90	1.50	1.00	1.00	1.15	1.50
4,400 cu. yd. replacing top soil	.40	.40	.40	.50	.50	.50	.30	.50
25,000 sta. yd. overh. top soil pile to place.	.02	.02	.03	.02	.02	.03	.02	.02
500 c.y.m. overh. top soil pile to place.	.10	.25	.30	.20	.20	.30	.20	.20
100 ea. treated reflector guard posts	2.00	2.25	2.00	2.50	3.00	2.00	3.00	3.50
12 ea. embankment protectors	15.00	20.00	15.00	12.00	20.00	20.00	12.50	20.00
280 lin. ft. 8-in. corr. galv. S.M.P. dr.	1.00	1.20	1.10	1.50	1.25	1.00	1.10	2.00
L. S. moving and rebuilding fence	$200	$500	$150	$450	$500	$300	$175	$650

Nevada—Pershing County—State—Grade and Surface

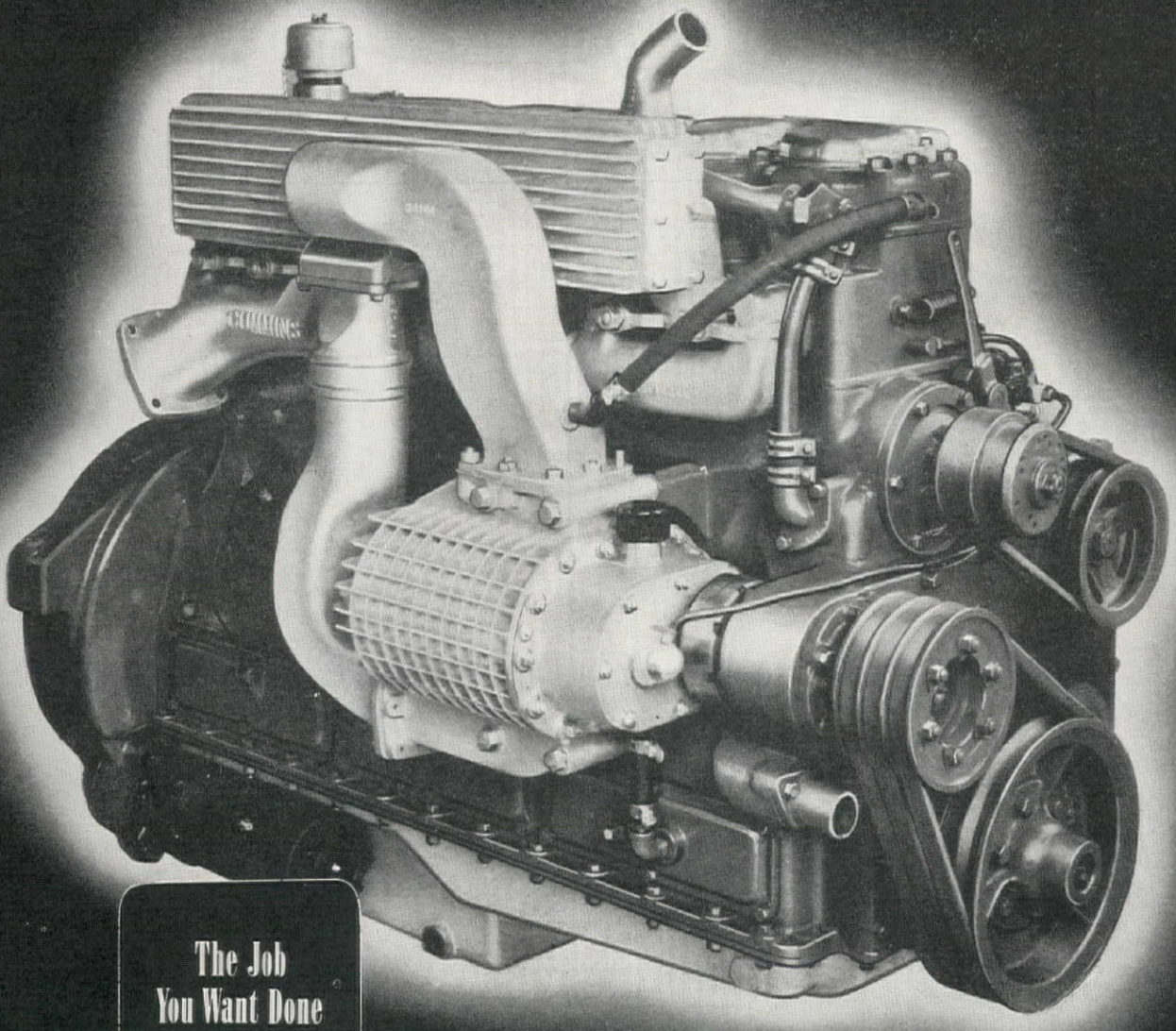
Contract awarded to Dodge Construction Co., Inc., Fallon, $274,460, by the Nevada Department of Highways, Carson City, for 19.1 mi. grade and surface in the vicinity of Lee Center and Humboldt House, Route 1. Bids were received from the following:

(1) Dodge Construction Co., Inc. $274,460
(2) Olof Nelson Construction Co. 286,001
(3) Gibbons & Reed 317,272
(4) Carl E. Nelson $276,507
(5) Isbell Construction Co. 287,440

	(1)	(2)	(3)	(4)	(5)
100 hr. 95 h.p. tractor and carryall	7.00	6.00	6.50	6.00	7.00
200 hr. 95 h.p. tractor with bulldozer or angledozer	7.00	6.00	6.00	5.00	7.00
200 hr. 60 h.p. tractor with 10-ft. blade grader	6.00	6.00	3.50	3.50	6.00
300 hr. motor grader with scarifier	4.00	4.00	3.75	4.00	4.00
100 hr. 1½ ton dump truck	2.25	2.00	2.00	2.00	2.00
100 hr. ½ ton pickup	1.50	1.25	1.50	1.50	2.00
Force Account special detours (set by engineer)	$1000	$1000	$1000	$1000	$1000
37,883 ton selected detour surfacing	.12	.16	.15	.15	.12
127,218 ton mi. haul on selected detour surfacing	.06	.05	.05	.05	.06

(Continued on next page)

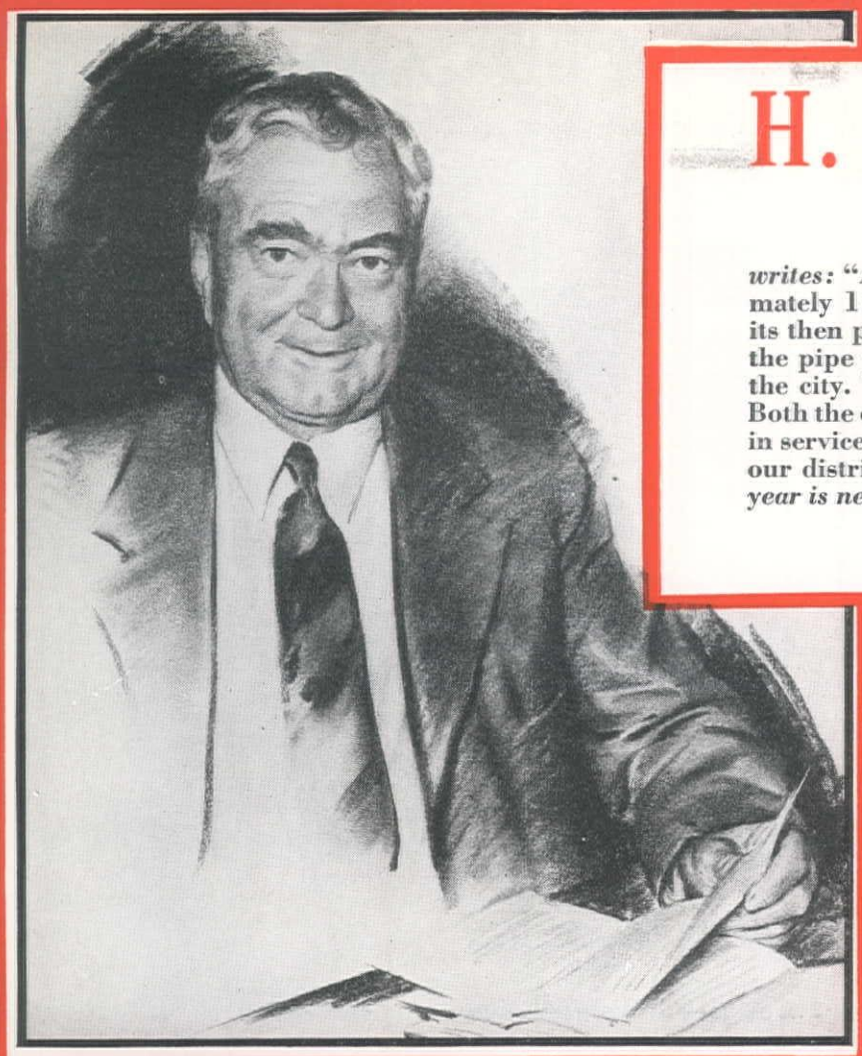
THE *Standout* IN AUTOMOTIVE, INDUSTRIAL & MARINE DIESEL POWER



The Job You Want Done Is *Now* Being Done with

CUMMINS *Dependable* **DIESELS**

SUPERCHARGED—one-third more power—less weight and lower fuel and lube oil consumption per horsepower—the same smooth running, quick acceleration, low maintenance and proved dependability that distinguish all Cummins Diesels . . . Write for the folder, "The Logic of Supercharging." Cummins Engine Company, 1916 Wilson Street, Columbus, Indiana.



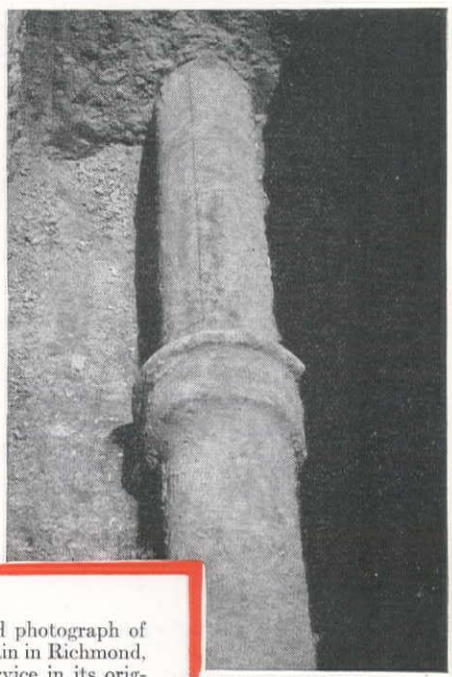
H. K. BURTON

Superintendent of Waterworks

Salt Lake City, Utah

writes: **"About 65 years ago Salt Lake City laid approximately 1½ miles of 20- and 24-inch cast iron pipe for its then principal supply main. In 1920 about a mile of the pipe was removed and relaid in the eastern part of the city. This salvaged pipe was in excellent condition. Both the original main and the relocated portion are now in service. There are about 380 miles of cast iron pipe in our distribution system. *Maintenance cost per mile per year is negligible.*"**

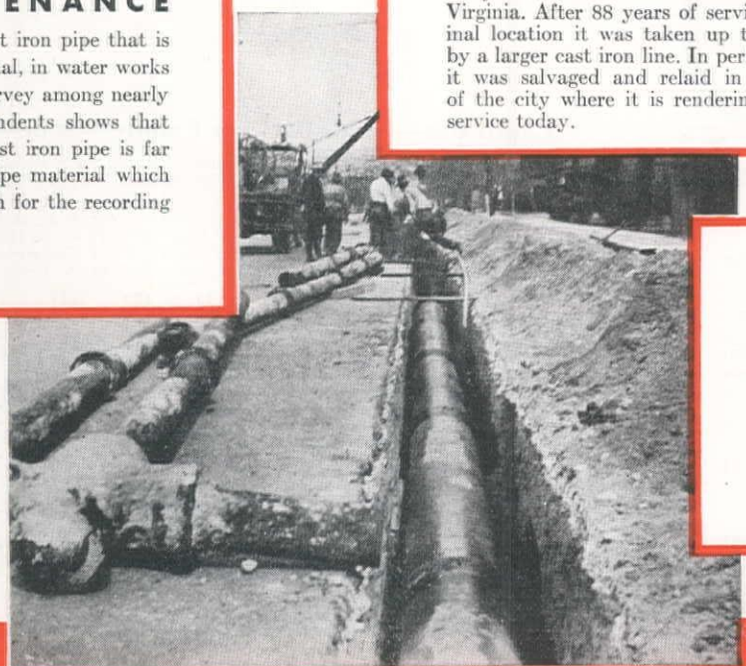
H. K. Burton



LONG LIFE. Unretouched photograph of 110 year-old cast iron water main in Richmond, Virginia. After 88 years of service in its original location it was taken up to be replaced by a larger cast iron line. In perfect condition, it was salvaged and relaid in another part of the city where it is rendering satisfactory service today.

LOW MAINTENANCE

is an economy factor in cast iron pipe that is usual, rather than exceptional, in water works experience. An impartial survey among nearly 200 water works superintendents shows that the maintenance cost of cast iron pipe is far below that of any other pipe material which has been in use long enough for the recording of conclusive data.



SALVAGE VALUE

Photograph shows 6-inch cast iron pipe (on side of trench) removed for larger installation, after 25 years service, and relaid elsewhere by the City of El Paso, Texas.

Look for the "Q-Check" registered trade mark. Cast iron pipe is made in sizes from 1¼ to 84 inches.

THE CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER, 1013 PEOPLES GAS BUILDING, CHICAGO, ILLINOIS

CAST IRON PIPE

PUBLIC TAX SAVER NO. 1

1,366	ton liquid asphalt, type SC3 (roadmix)	13.00	14.50	16.40	14.00	13.35
20.37	mi. roadmix detours	$250	$200	$300	$200	$200
Lump Sum	signs	$300	$500	$700	$300	$1000
Lump Sum	move buildings	$2000	$1500	$2500	$1000	$2500
Force Account	prepare foundations (set by engineer)	$200	$200	$200	$200	$200
1,905	lin. ft. remove culvert pipe	.50	.40	.50	.40	.25
96	each remove headwalls	5.00	3.00	10.00	3.00	2.00
214,467	sq. yd. remove and stockpile roadmix surfacing	.02	.03	.015	.015	.015
153,800	cu. yd. roadway excavation	.15	.13	.20	.14	.15
1,307	cu. yd. drainage excavation	.20	.16	.20	.20	.50
352	station "V" type ditches	2.50	3.00	2.00	2.00	2.00
23,602	cu. yd. borrow	.15	.12	.18	.15	.17
1,097	station slope rounding	2.50	3.00	3.00	2.00	5.00
480,010	yd. station overhaul	.01	.005	.01	.008	.01
12,168	yd. mi. overhaul	.10	.10	.12	.10	.10
3,815	cu. yd. structure excavation	1.00	.70	.85	.75	1.00
3,196	cu. yd. backfill	.50	.40	.75	.35	.50
19.06	mi. subgrade, type "B"	$150	$100	$100	$100	$100
12,044	cu. yd. salvaged aggregate	.25	.20	.25	.30	.30
Force Account	roadside cleanup (set by engineer)	$700	$700	$700	$700	$700
7,940	M. gal. water	.90	1.00	1.25	1.00	1.25
93,237	ton type 1, gravel base	.24	.25	.28	.25	.25
65,033	ton type 2 gravel base (1-in. size)	.36	.36	.40	.34	.40
865	ton liquid asphalt, type MC1A (prime)	13.50	18.00	19.40	14.00	14.00
162	ton liquid asphalt, type SC3 (seal) (shoulder)	14.00	14.50	17.40	14.00	13.00
1,741	ton screenings	1.75	2.00	2.00	1.50	2.00
228	ton liquid asphalt, type MC4 or MC5 (seal)	14.00	16.50	17.90	15.00	14.00
838	cu. yd. class "A" concrete	20.00	22.00	20.00	25.00	25.00
57	cu. yd. class "B" concrete	22.00	22.00	25.00	25.00	25.00
84,110	lb. reinforcing steel	.045	.05	.055	.0425	.05
11.0	MFBM untreated Douglas fir	$100	$100	85.00	80.00	$110
460	lin. ft. 18-in. corr. metal pipe (dipped)	2.00	2.00	2.10	2.00	1.90
178	lin. ft. 24-in. corr. metal pipe (dipped)	2.75	2.75	2.95	3.00	2.80
58	lin. ft. 30-in. corr. metal pipe (dipped)	3.50	4.00	3.75	4.00	3.65
28	lin. ft. 36-in. corr. metal pipe (dipped)	5.00	5.00	5.90	6.00	5.80
104	lin. ft. 21½ x 13½-in. corr. metal arch pipe (dipped)	2.25	2.00	1.85	2.00	1.95
810	lin. ft. 18-in. vitrified pipe	2.50	2.00	2.35	2.00	2.50
730	lin. ft. 24-in. vitrified pipe	3.50	3.50	3.75	3.25	4.00
60	lin. ft. 30-in. vitrified pipe	5.50	6.00	6.00	5.50	6.00
779	lin. ft. relay culvert pipe	.50	.50	.60	.50	.50
101	cu. yd. hand-laid riprap	4.00	4.00	6.00	2.00	10.00
68	ea. move pipe culvert headwalls	10.00	10.00	12.00	10.00	10.00
182	ea. culvert markers	2.50	3.00	3.00	2.00	2.00
42	each guide posts	2.50	3.00	2.75	2.50	3.00
102,664	lin. ft. construct fence	.08	.10	.10	.09	.08
78	ea. monuments	3.00	3.00	3.00	4.00	3.00
1,765	ton liquid asphalt, type SC4 or SC5 (plantmix)	12.00	14.00	14.40	13.00	13.00
35,164	ton class "B2" plantmix bituminous surface	1.20	1.30	1.36	1.30	1.10
226	lin. ft. paved ditches (plantmix)	.30	.50	.30	1.00	.30

Oregon—Clackamas County—State—Surface

Contract awarded to Babler Bros., Portland, $65,365 (using tar), by the Oregon State Highway Commission, Portland, for 4.9 mi. macadam surface on Rock Creek-Molalla Section of the Woodburn-Sandy Section Highway. Bids were received from the following:

	Using Asphalt	Using Tar
(1) Babler Bros.	.....	$65,365
(2) R. O. Dail & Warren Bros.	.....	71,909
(3) A. Milne	$71,096	.....
(4) Homer G. Johnson	.....	77,688
(5) E. C. Hall Co.	70,660	70,935

		(1)	(2)	(3)	(4)	(5)
1,500	cu. yd. excavation, single classification	1.00	.40	.40	.50	.35
1,500	cu. yd. 8"-0" quarry-run rock backfill	1.00	1.15	1.10	1.15	1.20
32,000	cu. yd. 6"-0" quarry-run rock in base	.98	1.15	1.10	1.30	1.15
5,800	cu. yd. 1"-0" crushed material in base and shoulders	1.90	2.25	2.00	1.80	1.90
200	M. gal. sprinkling	2.00	1.50	2.00	2.50	1.50
4.90	mi. preparation of base	$100	$100	$100	$200	$100
4,500	cu. yd. mineral aggregate in place	2.50	2.50	3.00	2.80	2.65
48	ton emulsified or RC-3 asphalt in seal coat	20.00	15.40	17.00	20.00	20.00
46	ton RC-2 asphalt in prime coat	.....	.....	20.00	.....	20.00
296	ton asphalt in place	.....	.....	20.00	.....	20.00
55	ton light tar in prime coat	17.00	17.00	.....	20.60	18.00
350	ton heavy tar in place	17.00	17.20	.....	20.00	17.50

California—Santa Barbara County—State—Grade and Surface

Contract awarded to Basich Bros., Torrance, $216,772, by the California Division of Highways, Sacramento, for 3.4 mi. grade and plantmix surfacing between Tecolote Creek and Las Varas Creek. Bids were received from the following:

(1)	Basich Bros.	$216,772	(5) J. E. Haddock, Ltd.	$235,612
(2)	Macco Construction Co.	219,496	(6) R. E. Hazard & Sons	238,854
(3)	Gibbons & Reed Co.	221,385	(7) Fredericksen & Westbrook	240,627
(4)	Oswald Bros.	229,674	(8) A. Teichert & Son, Inc.	248,091

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
181	stas. clearing and grubbing	12.00	30.00	16.00	14.00	40.00	20.00	50.00	15.00
8,200	M. gals. water	.85	1.00	1.00	1.00	.90	.45	.90	.80
1,200	cu. yd. removing conc.	.95	1.50	1.00	2.00	1.90	1.50	1.25	1.40
372,000	cu. yd. roadway excav., w/o class.	.175	.188	.17	.17	.18	.195	.23	.18
3,100	cu. yd. struct. excav.	1.00	1.25	1.25	1.12	1.25	1.00	1.00	1.00
1,125	cu. yd. ditch and channel excav.	.30	.75	.50	.50	.90	.50	.75	1.00
1,555,000	sta. yd. overhaul	.003	.003	.002	.0033	.0035	.0025	.004	.003
181	stas. finishing roadway	5.75	5.00	4.00	6.00	6.00	5.00	3.50	7.00
27,000	cu. yd. imported borrow, type A	.54	.55	.58	.65	.50	.75	.45	1.10
13,700	tons imported borrow, type B	.96	.65	1.25	1.15	1.35	1.25	1.20	1.25
13,400	tons base material (stabilization)	1.50	1.40	1.90	1.50	1.70	1.75	1.40	2.00
5,000	bbls. portland cem. (stabilization)	2.30	1.90	2.10	2.00	1.80	2.00	2.00	1.80
35	tons liq. asph. RC-1, 2 or 3 (curing sl. & pt. bdr.)	40.00	25.00	10.80	60.00	17.00	11.00	28.00	30.00
11,250	tons mineral aggr. (P.M.S.)	1.60	2.00	1.90	2.07	2.00	2.00	1.70	2.20
725	tons liq. asph. ROMC-4 or 5 (P.M.S.)	6.25	8.00	7.60	6.00	7.50	7.50	8.50	7.00
23	tons liq. asph. SC-4 (stockpiling)	6.40	7.00	6.50	7.00	7.30	8.50	7.50	7.00
85	tons liq. asph. SC-2 (pr. ct.)	6.40	7.00	6.50	35.00	6.80	8.50	7.50	7.00
45	tons asp. emul. (sl. ct.)	18.70	18.00	20.00	22.00	22.00	20.00	18.00	20.00
365	tons screenings (sl. ct.)	2.80	4.00	2.75	2.80	3.40	1.50	3.50	2.50
10,300	sq. yd. prep. mix. & shap. (det.)	.06	.10	.07	.10	.10	.08	.06	.07
145	tons liq. asp. SC-2 (detours)	6.40	7.00	6.50	7.00	6.80	6.00	7.50	7.00
1,500	cu. yd. salvaging detour surf.	.60	.50	.60	1.10	.35	.75	.75	.60

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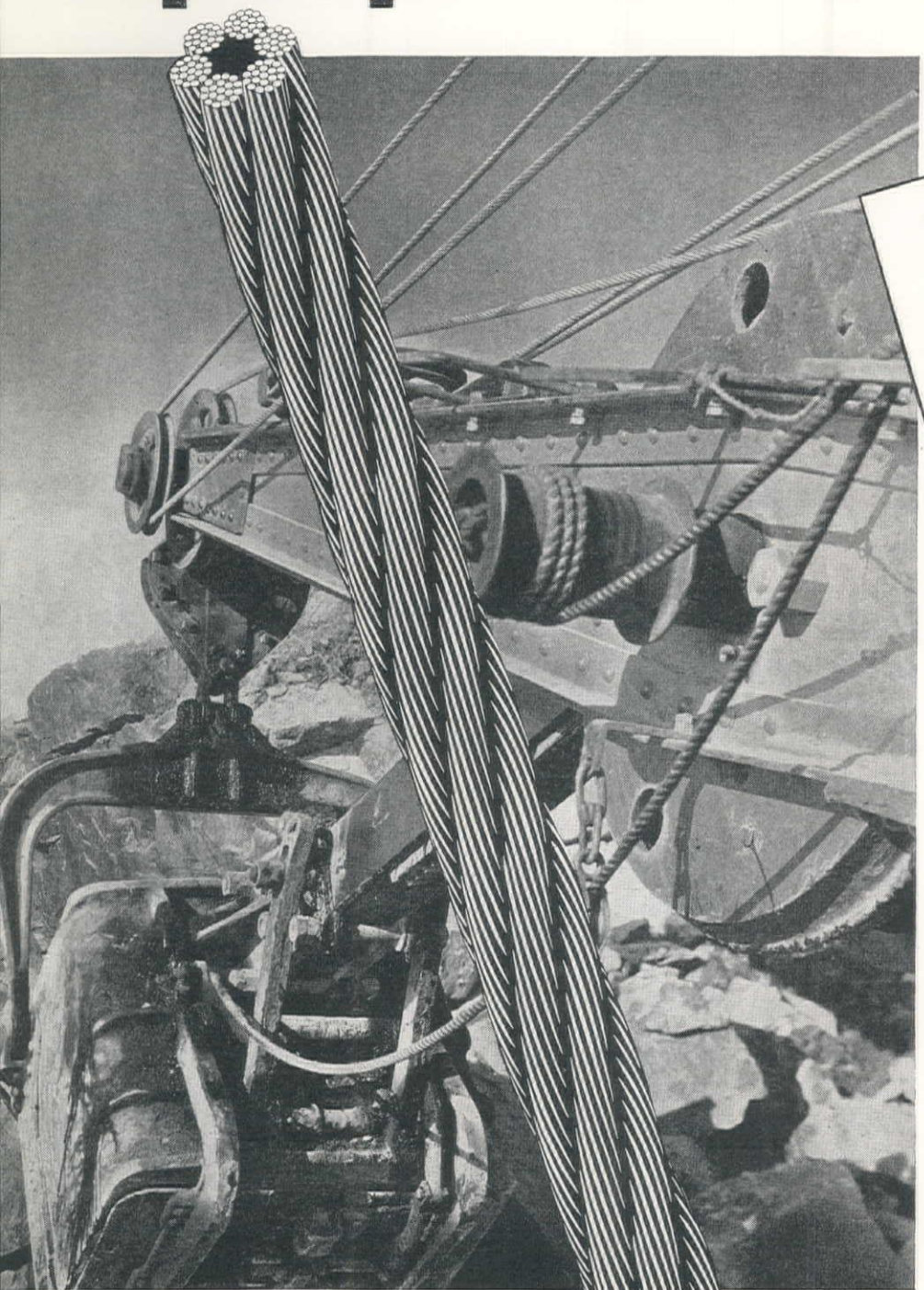
Strip Rope Costs to the Bone...



ROEBLING

"BLUE CENTER"

WIRE ROPE

STANDARD OR PREFORMED

Every dollar saved counts on most earth moving and construction jobs. That is why an ever-increasing number of contractors are taking advantage of the cost-cutting ability of Roebling "Blue Center" Wire Rope.

First of all, "Blue Center" is the finest of all Roebling Wire Ropes. It represents the highest achievement of all Roebling's research and manufacturing efforts. It has been developed with the one idea of producing a super-quality rope—one which will assure the maximum of durability, safety and economy in rope service. Made of famous Roebling acid open-hearth steel—it provides the highest degree of resistance against abrasion, fatigue and sudden shocks.

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A "TOWER OF TORTURE" FOR WIRE ROPE!

This machine is typical of the costly and exceptional testing equipment employed by Roebling to make certain that Roebling "Blue Center" Wire Rope measures up to the exacting standards set for it. This equipment has a capacity of 2½ million pounds—is capable of pulling apart a steel bar 6 inches square.

JOHN A. ROEBLING'S SONS COMPANY
OF CALIFORNIA

San Francisco, Seattle, Los Angeles, Portland

ROEBLING "BLUE CENTER"... The Finest of all Roebling Wire Ropes

148,500 lb. bar reinf. steel	.05	.045	.04	.045	.04	.045	.04	.045
1,040 cu. yd. class A P.C.C. (structs.)	23.00	18.00	19.00	20.00	23.00	25.00	18.00	22.00
732 lin. ft. 8-in. C.M.P.	1.05	1.00	.95	1.25	1.00	.75	1.00	1.00
250 lin. ft. 18-in. C.M.P.	1.75	1.80	1.55	2.00	1.75	1.50	2.00	2.00
514 lin. ft. 24-in. C.M.P.	2.50	2.50	2.40	2.70	2.70	3.00	3.00	2.80
156 lin. ft. 30-in. C.M.P.	3.25	4.00	3.00	3.25	3.20	3.50	3.75	3.70
140 lin. ft. 36-in. C.M.P.	5.00	5.00	4.75	5.20	5.00	5.00	5.50	5.50
445 cu. yd. rock filling material	4.00	3.00	3.60	3.50	4.00	3.00	3.00	4.00
472 lin. ft. salvaging pipe culvs.	.40	.50	.60	.60	1.00	.50	.75	.75
252 lin. ft. rel. salv. pipe culvs.	.30	.50	.60	.40	.50	.60	.75	.50
19 each spillway assemblies	17.50	15.00	14.75	15.00	15.00	12.50	15.00	15.00
173 each guide posts	2.35	3.00	2.00	2.50	2.25	2.50	2.00	2.50
36 each culvert markers	2.35	3.00	2.00	2.65	2.50	2.50	2.50	2.50
400 lin. ft. laminated guard railing	1.20	1.50	1.00	1.25	1.00	1.00	1.00	1.00
100 cu. yd. broken conc. riprap	3.50	5.00	2.50	2.50	4.00	3.00	2.50	3.00
1 ea. cast steel frame & cov. for D.I.	42.00	60.00	50.00	15.00	40.00	50.00	60.00	50.00
0.9 mi. new property fence, type A	$470	$500	$450	$550	$550	$500	$600	$500
1.55 mi. new property fence, type B	$1285	$650	$700	$1000	$1100	$1000	$1000	$800
0.5 mi. mov. & reset. chain link fence	$2300	$1000	$1500	$3000	$2000	$3000	$2000	$1000
2.8 mi. moving and resetting fences	$410	$500	$400	$650	$425	$300	$450	$400
6 each drive gates, 14-ft.	21.00	25.00	15.00	25.00	21.00	15.00	25.00	25.00
12 each drive gates, 8-ft.	16.00	15.00	12.50	20.00	15.00	12.00	18.00	20.00
72 each monuments	2.35	2.50	3.00	3.00	3.00	3.00	2.50	3.00

Idaho—Bonner County—P. R. A.—Grade

Contract awarded to Clifton & Applegate, Spokane, Wash., $73,885 (official), by the Public Roads Administration, Ogden, Utah, for construction and improvements of 1.8 mi. of the Clark Fork Forest Highway. Bids were received from the following:

(1) Clifton & Applegate $73,885
(2) Max J. Kuney 74,453
(3) McNutt Bros. 80,270
(4) Roy L. Bair $81,327
(5) F. H. DeAtley and Co. 84,906

	(1)	(2)	(3)	(4)	(5)
All Req'd. Lump Sum maintenance of existing road and sections accepted for traffic	$150	$150	$150	$150	$150
78,300 cu. yd. unclassified excavation	.53	.47	.58	.62	.59
950 cu. yd. unclassified excavation for structures	1.50	1.50	1.50	1.00	1.50
165,000 sta. yd. special overhaul	.01	.005	.01	.015	.02
2,400 cu. yd. mi. special overhaul	.20	.264	.20	.20	.20
500 lin. ft. furrow ditches	.10	.10	.05	.10	.15
35 M. sq. ft. obliteration of old roads	5.00	6.00	10.00	5.00	5.00
5,830 cu. yd. 2 in. heavy gravel base course	.70	1.00	.50	.85	.80
5,860 ton crusher run top course	.85	1.00	.80	.85	.90
200 ton supplemental crushed gravel	1.00	1.00	1.00	.85	1.00
400 M. gal. watering	1.00	1.20	1.00	1.50	1.50
9 day roller operation	16.00	32.00	20.00	20.00	16.00
1 each furnishing roller	$200	$300	$500	$150	$200
All Req'd. Lump Sum furnishing water plant or plants	50.00	$100	$100	$100	50.00
13 cu. yd. class B concrete	30.00	30.00	25.00	30.00	40.00
106 lb. reinforcing steel	.20	.15	.10	.10	.10
800 cu. yd. cement rubble masonry	12.00	15.00	16.00	12.00	15.00
51 lin. ft. 24-in. std. reinf. conc. culvert pipe	4.00	4.50	4.00	3.60	4.50
52 lin. ft. 15-in. corr. gal. sheet metal pipe	2.00	2.00	1.75	1.40	1.90
228 lin. ft. 18-in. corr. gal. sheet metal pipe	2.50	2.50	2.00	1.75	2.50
170 lin. ft. 24-in. corr. gal. sheet metal pipe	4.00	3.50	3.00	2.60	3.50
51 lin. ft. remove and relay 18-in. concrete pipe	1.00	1.00	1.00	1.00	.75
5,650 lin. ft. guardrail, plate type	1.20	1.30	1.30	1.10	1.40

California—Sierra and Plumas Counties—P. R. A.—Grade

Contract awarded to Harms Bros., Alturas, $53,675 (official), by the Public Roads Administration, San Francisco, for 7.2 mi. grade and bituminous treatment of subgrade on Route 28, Calpine-Clio National Highway, Tahoe and Plumas National Forest. Bids were received from the following:

(1) Harms Bros. $53,675
(2) Isbell Construction Co. 56,322
(3) Piombo Bros. & Co. $56,402
(4) Johnston Rock Co. 61,802

	(1)	(2)	(3)	(4)
As Required F. A. cleanup clearing	$300	$300	$300	$300
6 acres clearing	$200	$225	$400	$300
6 acres grubbing	$150	50.00	$100	$200
20,000 cu. yd. unclassified excavation	.32	.35	.37	.35
704 cu. yd. unclassified excavation for structures	3.50	1.50	1.50	2.00
24,600 cu. yd. unclassified excavation for borrow	.30	.55	.40	.30
33,000 sta. yd. overhaul	.01	.01	.01	.02
37,000 cu. yd. mi. borrow haul	.10	.10	.125	.20
1.027 mi. finishing earth graded road	$500	$100	$400	$350
1,100 1000 gal. unit watering	1.50	1.50	1.25	2.00
7.204 mi. shaping, compacting and mixing	$950	$600	$750	$800
908 ton MC-2 cutback asphalt	16.50	16.00	18.00	20.00
200 cu. yd. blotter material	2.00	3.00	2.50	5.00
5,300 lin. ft. dike shaping and compacting	.10	.30	.05	.10
13 cu. yd. class A concrete	40.00	35.00	40.00	35.00
160 lb. reinforcing steel	.08	.10	.10	.10
224 lin. ft. 8-in. corrugated galvanized sheet metal pipe	1.00	1.00	1.00	1.75
54 lin. ft. 18-in. corrugated galvanized sheet metal pipe	2.00	1.65	2.00	2.75
348 lin. ft. 24-in. corrugated galvanized sheet metal pipe	3.00	2.50	2.80	3.75
44 lin. ft. 30-in. corrugated galvanized sheet metal pipe	4.00	3.00	3.50	5.00
4 each 8-in. corrugated galvanized sheet metal pipe elbows	6.00	12.00	8.00	10.00
30 lin. ft. remove, clean and re-lay or stockpile exist. C.M.P.	1.00	1.00	1.50	1.25
1,366 lin. ft. 8-in. perf. corr. sheet metal pipe underdrain	2.50	2.75	2.20	2.50
410 sq. yd. mortar backfill seal	1.10	.60	1.00	1.25
7 each right of way monuments—type A	3.00	4.00	3.00	4.00
4 each concrete maintenance posts	8.00	10.00	5.00	10.00
8 each culvert markers	3.00	3.50	3.00	4.00

California—Trinity County—State—Grade and Surface

Contract awarded to Hemstreet & Bell, Marysville, $106,308, by the California Division of Highways, Sacramento, for grading and surfacing with screened gravel base and surfacing material and an embankment protection to be constructed between Douglas City and Vitzthums, about 0.8 mi. in length. Bids were received from the following:

(1) Hemstreet & Bell $106,308
(2) Claude C. Wood 109,917
(3) Harms Bros. & N. M. Ball Sons 127,853
(4) C. W. Caletti & Co. $139,554
(5) Johnston Rock Co., Inc. 156,316

	(1)	(2)	(3)	(4)	(5)
Lump Sum clearing and grubbing	$400	$1000	$2200	$5000	$1500
900 M. gals. water	1.00	1.00	1.00	1.00	1.25
59,500 cu. yd. roadway excav. w/o class	.30	.35	.43	.57	.55

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3,275 cu. yd. struct. excav.	1.00	1.00	2.00	2.00	1.25
333,000 sta. yd. overhaul	.005	.005	.005	.005	.007
18,500 cu. yd. channel excav.	.29	.30	.40	.40	.60
42 sta's finishing roadway	5.00	5.00	4.00	10.00	10.00
2,000 cu. yd. screened gravel base	.75	1.00	.70	1.50	2.50
32 tons liq. asp. SC-2 (pen. O. trt.)	20.00	20.00	21.00	20.00	18.00
1,300 cu. yd. surfacing material	1.25	1.00	1.00	2.00	3.00
15 cu. yd. class A P.C.C. (structs.)	30.00	30.00	28.00	30.00	30.00
750 lb. bar reinf. steel	.10	.10	.06	.10	.10
120 lin. ft. 8-in. C. M. P.	1.20	1.00	1.15	1.00	1.25
64 lin. ft. 12-in. C. M. P.	1.50	1.50	1.35	1.50	1.50
338 lin. ft. 18-in. C. M. P.	1.80	2.00	2.00	2.00	2.00
200 lin. ft. 24-in. C. M. P.	2.75	2.75	2.70	3.00	2.75
1,750 lin. ft. 8-in. P. M. P.	1.00	1.00	1.08	1.00	1.25
900 cu. yd. rock filling material	1.50	2.00	2.00	1.50	2.00
115 lin. ft. salvaging pipe culverts	.50	.50	.90	1.00	1.00
80 lin. ft. relaying salv. pipe	.50	.50	.50	1.00	1.00
6,300 cu. yd. sacked conc. riprap	8.25	8.00	9.00	9.00	9.50
4,300 sq. yd. wire and rock mattress	2.20	2.25	2.30	2.00	4.00
265 ea. cable anchors	13.00	12.00	15.00	15.00	7.00
2,775 lin. ft. metal guard railing	1.00	1.30	1.30	1.00	3.00
27 ea. culvert markers	3.00	2.00	3.00	3.00	4.00
7 ea. monuments	3.00	3.00	3.00	3.00	4.00

Highway and Street...

Nevada—Eureka County—State—Surface

Contract awarded to Gibbons & Reed, Salt Lake City, Utah, $299,470, by the Nevada Department of Highways, Carson City, for 8.4 mi. surfacing, etc., in the vicinities of Primeaux and the Eureka-Elko county line. Bids were received from the following:

(1) Gibbons & Reed Co. $299,470
(2) McNutt Bros. 301,717
(3) Utah Construction Co. 317,493
(4) Floyd S. Whiting $506,932
(5) Dodge Construction Co., Inc. 394,829
(6) Isbell Construction Co. 368,970

	(1)	(2)	(3)	(4)	(5)	(6)
50 hr. 95 h.p. tractor with Bulldozer or Angledozer	6.00	7.00	7.00	8.00	7.50	7.50
50 hr. motor grader with scarifier	4.00	4.00	4.50	5.00	4.50	5.00
50 hr. 1½ ton dump truck	2.25	2.00	2.50	2.00	2.50	2.25
50 hr. ½ ton pick-up	1.50	1.00	2.00	2.00	1.50	2.00
Force Acct. special detours (set by engineer)	$500	$500	$500	$500	$500	$500
2,343 ton selected detour surfacing	.51	.50	.37	.40	.75	.50
94 ton liquid asphalt, type SC2 (roadmix)	14.00	18.00	14.00	15.00	15.50	15.25
1.12 mi. roadmix detours	$300	$300	$200	$400	$400	$300
Lump Sum signs	$400	$500	$1800	$200	$500	$1000
5,380 lin. ft. remove fence	.02	.02	.02	.02	.03	.05
440 lin. ft. remove culvert pipe	.50	.50	.60	1.00	.75	.50
5 each remove headwalls	5.00	4.00	5.00	10.00	5.00	5.00
8 each remove trees	5.00	5.00	10.00	5.00	5.00	5.00
Force Acct. adjust water lines (set by engineer)	$150	$150	$150	$150	$150	$150
8,578 sq. yd. remove and relay existing surface	.05	.10	.05	.10	.07	.06
82,670 sq. yd. remove and stockpile roadmix surfacing	.02	.03	.02	.05	.03	.02
614,507 cu. yd. roadway excavation	.245	.19	.24	.50	.29	.27
1,391 cu. yd. drainage excavation	.25	.30	.24	.30	.50	1.00
159 sta. "V" type ditches	3.00	3.00	2.50	5.00	5.00	1.50
392 sta. slope rounding	3.00	6.00	4.00	7.00	5.00	5.00
1,697,028 yd. sta. overhaul	.005	.005	.01	.01	.005	.005
45,020 yd. mi. overhaul	.12	.15	.10	.15	.10	.10
1,775 cu. yd. structure excavation	1.00	1.00	1.25	1.00	1.50	1.50
3,121 cu. yd. backfill	.70	.50	.60	.30	.50	.50
8.37 mi. subgrade, type B	$100	$200	$150	$400	$150	$100
723 cu. yd. salvaged aggregate (parapets)	.20	1.00	.70	.50	.50	1.50
Force Acct. roadside cleanup (set by engineer)	$400	$400	$400	$400	$400	$400
8,473 M. gal. water	1.00	1.75	1.25	2.50	1.50	2.00
74,339 ton type 1, gravel base	.285	.40	.32	.40	.65	.40
30,689 ton type 2, gravel base (1-in. size)	.43	.75	.39	.45	.85	.75
5,188 ton gravel surface	.45	.75	.39	.50	.85	.95
287 ton liquid asphalt, type MC1A (prime)	17.70	20.00	17.50	15.00	18.50	16.00
38 ton liquid asphalt, type SC2 (seal)	15.00	20.00	14.00	20.00	15.50	16.00
764 ton screenings	2.00	2.00	2.00	2.50	2.50	3.50
102 ton liquid asphalt, type MC4 or MC5 (seal)	16.10	19.00	16.25	20.00	17.50	16.00
630 cu. yd. class A concrete	20.00	23.00	25.00	25.00	25.00	28.00
46 cu. yd. class B concrete	24.00	23.00	30.00	25.00	27.00	30.00
67,050 lb. reinforcing steel	.05	.05	.05	.06	.06	.05
4,300 lb structural steel	.10	.10	.15	.10	.15	.15
1.5 M.F.B.M. untreated Douglas fir	80.00	$100	$120	$100	$150	$150
818 lin. ft. 8-in. corr. metal pipe (dipped)	.90	1.00	1.00	1.00	1.50	1.05
1,238 lin. ft. 18-in. corr. metal pipe (dipped)	1.60	2.10	1.90	2.00	2.25	1.80
986 lin. ft. 24-in. corr. metal pipe (dipped)	2.45	2.95	2.85	3.00	3.25	2.80
184 lin. ft. 36-in. corr. metal pipe (dipped)	4.85	5.70	5.25	7.00	5.50	5.60
66 lin. ft. 48-in. corr. metal pipe (dipped)	6.80	9.00	7.25	9.00	7.50	7.50
90 lin. ft. 21½x13½-in. C. M. arch pipe (dipped)	2.25	2.45	2.50	2.00	2.75	2.40
378 lin. ft. relay culvert pipe	.50	.50	.60	1.00	.75	.50
1,164 lin. ft. 8-in. perforated underdrain	.90	1.05	1.00	1.00	1.50	1.25
144 cu. yd. drain backfill	.70	1.50	1.75	1.00	2.00	3.00
1,164 lin. ft. grouting drain backfill	.25	.25	.40	.50	.20	.25
24 cu. yd. hand-laid riprap	4.00	5.00	10.00	3.00	5.00	6.00
5 each move pipe culvert headwalls	10.00	10.00	12.00	10.00	10.00	10.00
2 each move drop inlets	20.00	10.00	25.00	20.00	12.50	25.00
96 each culvert markers	1.70	2.00	3.00	3.00	3.00	3.00
20 each guide posts	1.70	2.00	3.00	4.00	3.00	3.00
84,551 lin. ft. construct fence	.10	.07	.11	.12	.10	.12
5,152 lin. ft. reconstruct fence	.05	.04	.09	.05	.07	.05
8 each 16-ft. steel gates	35.00	20.00	25.00	20.00	25.00	35.00
84 each monuments	3.00	3.00	3.00	5.00	3.00	3.00
771 ton liquid asph. type SC4 or SC5 (plantm.)	14.00	15.00	14.00	15.00	16.00	14.00
15,345 ton class B-2 plantmix bituminous surface	1.30	1.40	1.40	1.50	1.80	2.05
1,340 lin. ft. paved inlet and outlet ditches	.25	.40	.30	.40	.30	.50

+ PURCHASING POWER +

CONTRACTS AWARDED to western contractors indicate the tremendous purchasing power of the heavy construction market in the West. Sell this market by advertising in Western Construction News.

CONSTRUCTION SUMMMARY

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

Large Western Projects...

CONTRACTS AWARDED

Guy F. Atkinson Co., San Francisco, Calif., $18,012,500 (cost plus and fixed fee basis) bv the U. S. Navy Dept., Washington, D. C., for construction of fleet operating base at San Pedro, Los Angeles County, Calif.

Columbia Construction Co., Oakland, Calif., $1,720,354 by the U. S. Engineer Office, Seattle, Wash., for reconstruction of north jetty at entrance to Grays Harbor, Wash.

Siems-Spokane Co., Spokane, Wash.; **Johnson, Drake and Piper,** Minneapolis, Minn.; **Puget Sound Bridge and Dredging Co.,** Seattle, Wash., $2,900,000 (Unalaska) and $1,193,000 (Kodiak) (cost plus fixed fee basis) by the U. S. Navy Dept., Washington, D. C., for air bases at Unalaska and Kodiak, Alaska.

Brown & Root, Inc. and **McKenzie Construction Co.,** Austin, Texas, $3,137,495 (Sched. 1) by U. S. Bureau of Reclamation, Denver, Colo., for completion of the Marshall Ford Dam on the Colorado River Project near Austin, Travis County, Texas.

Ford J. Twaits Co., Los Angeles, Calif., and **Morrison-Knudsen Co., Inc.,** Los Angeles, Calif., $2,731,000 by the Constructing Quartermaster, Presidio of Monterey, for construction of temporary housing at Camp Ord, Monterey County, Calif.

Cahill Brothers, San Francisco, Calif., $2,000,000 by the Bank of America, San Francisco, Calif., for construction of 12-story office building at Pine, Montgomery and California Streets, San Francisco, Calif.

F. J. Kerchhof, Denver Colo., $867,000 by U. S. War Dept., Washington, D. C., for construction of photographic, clerical and armament schools for Lowry Field, Denver County, Colo.

Engineers, Ltd., Sacramento, Calif., $469,397, by the Marin Municipal Water District, San Rafael, Calif., for enlargement of Alpine Dam, about 8 mi. from Fairfax, Marin County, Calif.

Woods Brothers Construction Co., Lincoln, Nebr., $410,675 by U. S. Army Dept., Washington, D. C., for construction of power house substructure at Fort Peck, Valley County, Mont.

MacDonald Constructoin Co., St. Louis, Mo., $504,316 by the U. S. Army Dept., Washington, D. C., for construction of laundry and bakery buildings at various military posts in the Panama Canal Zone.

Warren Northwest, Inc., Portland, Ore., $600,297 by Public Works Officer, Puget Sound Navy Yard, Bremerton, Wash., for surfacing of landing field runways and warming up platform, also final grade and drain system at the Naval Air Station, King County, Seattle, Wash.

Highway and Street...

CONTRACTS AWARDED

Arizona

COCONINO CO.—**W. E. Orr,** 302 W. Monte Vista Road, Phoenix—$29,284 for improvement of Flagstaff-Lake Mary Hwy.—by Arizona State Highway Commission, Phoenix.

COCONINO CO.—**Lee Moor Contracting Co.,** Bassett Tower, El Paso, Texas—$133,637 for const. 2.5 mi. grade, drain, aggr. base course and conc. pave on Ash Fork-Flagstaff Hwy. west of Flagstaff—by Arizona State Highway Commission, Phoenix.

NAVAJO CO.—**Tiffany Construction Co.,** Box 846, Phoenix—$83,205 for const. 10 mi. aggreg. base course and plantmix surf. on the Showlow-Springerville Hwy., east of Showlow—by Arizona State Highway Department, Phoenix.

PIMA CO.—**White and Miller,** P. O. Box 235, Tucson—$75,803 for const. 6¼ mi. grade, drain., base course and roadmix bitu. surf. on Tucson-Tanque Verde Hwy.—by Arizona State Highway Department, Phoenix.

PINAL CO.—**Wallace and Wallace,** 1440 E. Speedway, Tucson—$64,351 for completing the Lewis Brothers contract to Arizona State Highway Dept. for 5.8 mi. grade, drain, aggr. base course and plantmix surf. on the Mesa-Superior Hwy. SE of Apache Junction—by Maryland Casualty Co., Baltimore, Md.

California

HUMBOLDT CO.—**Joseph Shaw,** P. O. Box 396, Crescent City—$69,411 for 0.3 mi. grade and plantmix surf. and slope protection work at Shibely and Greenlaw Bluffs—by California Division of Highways, Sacramento.

LOS ANGELES CO.—**Sully Miller Contracting Co.,** 1500 W. 7th St., Long Beach—$12,394 for improvement of Redondo Ave. betw. Anaheim St. and State St., Long Beach—by City Manager, Long Beach.

LOS ANGELES CO.—**Griffith Co.,** 1060 S. Broadway, Los Angeles—$76,392 for improving El Embarcadero, Long Beach—by Port Manager, Long Beach.

LOS ANGELES CO.—**J. E. Haddock, Ltd.,** 3578 E. Foothill Blvd., Pasadena—$42,794 for improvement of 1.5 mi. of LaBrea Ave. from Stocker St. N., Los Angeles—by County Board of Supervisors, Los Angeles.

LOS ANGELES CO.—**P. J. Akmadzich,** Box 454, Sunland—$14,190 for improvement of Glen Oaks Blvd., betw. Brand Blvd., and Pacific Ave., Glendale—by City Council, Glendale.

MONTEREY CO.—**J. A. Casson,** 22105 Meekland Ave., Hayward—$17,928 for 16 mi. place import. borrow on shoulders and roadmix surf. treat. betw. Gonzales and Salinas—by California Division of Highways, Sacramento.

PLUMAS CO.—**Isbell Construction Co.,** P. O. Box 2351, Reno, Nev.—$169,559 (official) for 5.7 mi. grade, surf., bitu. treat. of subgrade on Rt. 22, North Fork Feather River National Forest Hwy., Plumas National Forest—by Public Roads Administration, San Francisco.

RIVERSIDE CO.—**Matich Brothers,** Elsinore—$106,486 for 3 mi. grade and plantmix surf. on cement stabilized base in vicinity of Riverside—by California Division of Highways, Los Angeles.

SACRAMENTO CO.—**McGillivray Construction Co.,** P. O. Box 873, Sacramento—$47,732 for improving Swanston and Land Terrace Vista, Sacramento—by City Council, Sacramento.

SACRAMENTO CO.—**A. Teichert & Son, Inc.,** 1846 - 37th St., Sacramento—$12,962 for 15 mi. seal coat on roads in the 5th District, Sacramento—by County Supervisors, Sacramento.

SACRAMENTO CO.—**J. R. Reeves,** P. O. Box 1072, Sacramento—$11,644 for grade, rocking and surfacing Madison Ave. betw. Auburn Blvd. and Manzanita—by County Commissioners, Sacramento.

SAN DIEGO CO.—**Walter H. Barber,** P. O. Box 1523, San Diego—$15,589 for improvement of Strandway betw. Ventura and San Jose, San Diego—by City Council, San Diego.

SAN DIEGO CO.—**Roland T. Reynolds,** Rt. 4, Box 5, Anaheim—$29,919 for 0.8 mi. grade, roadmix surf. treat. and const. reinf. conc. bridge across Chihuahua Creek in the vicinity of Oak Grove—by California Division of Highways, Los Angeles.

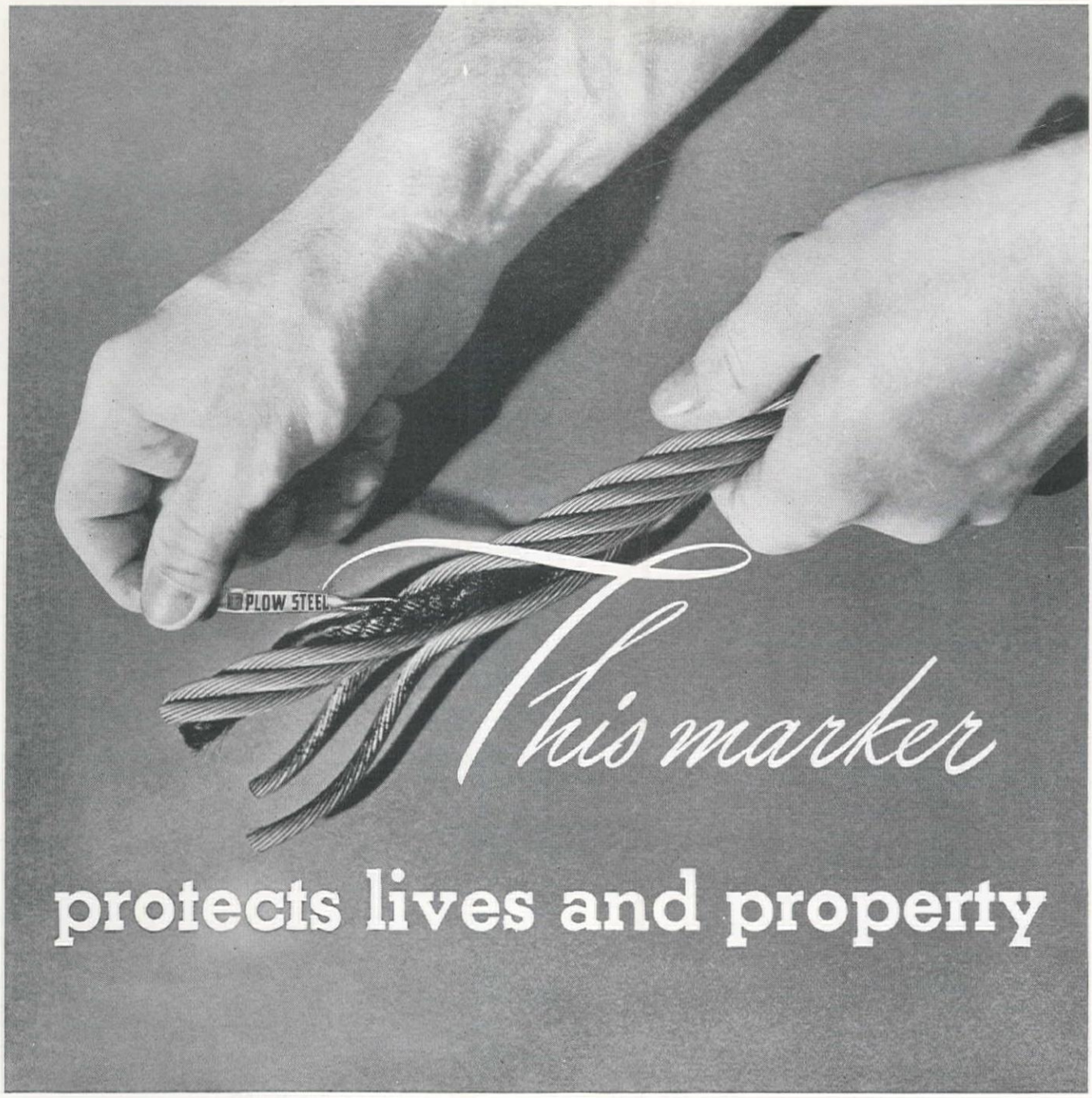
SAN DIEGO CO.—**R. E. Hazard & Sons,** P. O. Box 1510, San Diego—$49,466 for 2.6 mi. grade and surf. at Barnett Ave. and Rosecrans St., and betw. Miramar Road and Torrey Pines Reservoir, San Diego—by California Division of Highways, Los Angeles.

SAN FRANCISCO CO.—**Charles L. Harney,** Call Bldg., San Francisco—$35,000 for asph. conc. pave., etc., on 25th St., betw. Wisconsin and Texas Sts., San Francisco—by Department of Public Works, San Francisco.

SAN FRANCISCO CO.—**Charles L. Harney,** Call Bldg., San Francisco—$11,868 for asph. conc. pave., etc., on streets adjacent to Potrero Housing Project, San Francisco—by Department of Public Works, San Francisco.

SAN LUIS OBISPO CO.—**F. H. Gates, Inc.,** 105 No. Broadway, Santa Maria—$14,888 for 2½-in. plantmix surf. and subbase pave. on various streets in San Luis Obispo—by City Council, San Luis Obispo.

SAN MATEO CO.—**Piombo Brothers,** 1571 Turk St., San Francisco—$17,411 for 1.6 mi. grade on Ralston Ave., Belmont Canyon Road west of El Camino Real—by County Purchasing Agent, Redwood City.



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SANTA BARBARA CO.—**Basich Brothers,** 20550 Normandie Ave., Torrance—$216,772 for 3.4 mi. grade and plantmix surf. betw. Tecolote Creek and Las Varas Creek—by California Division of Highways, Sacramento.

SANTA CLARA CO.—**A. J. Raisch,** 358 Lincoln Ave., San Jose—$23,375 for asph. conc. surf. on Alma St. from San Antonio Ave. to Matadero Creek, San Jose—by Board of Supervisors, San Jose.

SANTA CLARA CO.—**Union Paving Co.,** 310 California St., San Francisco—$16,490 for improve. Fremont Ave. from Sunnyvale-Saratoga Hwy. to San Francisco Hwy., San Jose—by County Board of Supervisors, San Jose.

SISKIYOU CO.—**Parish Brothers,** 1222 No. Gower St., Hollywood—$65,442 for 1.4 mi. grade and surf. with roadmix surf. on cr. run base in vicinity of Weed—by California Division of Highways, Sacramento.

SONOMA CO.—**Louis Biasotti & Son,** P. O. Box 587, Stockton, and L. D. Tonn, P. O. Box 465, Lodi—$205,836 for const. 3.6 mi. grade, asph. conc. surf. and reinf. conc. bridge in the vicinity of Petaluma—by California Division of Highways, Sacramento.

TRINITY CO.—**Hemstreet & Bell,** P. O. Box 906, Marysville—$106,308 for 0.8 mi. grade, screen grav. base and surf. matl.; const. embankment protection, betw. Douglas City and Vitzthums—California Division of Highways, Sacramento.

YOLO CO.—**Fredericksen & Westbrook,** 212 - 13th St., Sacramento—$172,955 for 3.5 mi. grade, conc. pave., plantmix surf. on exist. pave. in vicinity of Davis Subway and Swingle—by California Division of Highways, Sacramento.

TUOLUMNE AND MARIPOSA COS.—**J. E. Haddock, Ltd.,** 3578 E. Foothill Blvd., Pasadena—$89,620 (official) for 23.8 mi. bitu. treat. surf. and sealcoat on various sections of Route 3, Big Oak Flat Road, and Route 4, Tioga Road, Yosemite National Park—by Public Roads Administration, San Francisco.

Colorado

EL PASO CO.—**Honnen Construction Co.,** Box 92, Colorado Springs—$60,169 for 2.5 mi. grav. surf. betw. Colorado Springs and Breed on State Hwy. 1—by State Highway Engineer, Denver.

GRAND AND JACKSON COS.—**J. H. and N. M. Monaghan,** 332 So. Race St., Denver—$110,902 for 5.5 mi. grav. surf. betw. Kremmling and Muddy Pass on State Hwy. 2—by State Highway Engineer, Denver.

LAKE AND SUMMIT COS.—**C. Ryan & Son,** Box 201, Lakewood—$58,351 (official) for 1.1 mi. grade, surf., etc., on Loveland-Fremont Pass Forest Hwy. Rt., Cochetopa and Arapahoe National Forest—by Public Roads Administration, Denver.

MONTROSE CO.—**Land & Anderson,** 1020 Collier St., Longmont—$18,832 (official) for const. and improve. of 3.2 mi. of the Black Mesa Forest Hwy. Route, in Gunnison National Forest—by Public Roads Administration, Denver.

Idaho

BONNER CO.—**Clifton & Applegate,** Hutton Bldg., Spokane, Wash.—$73,885 (official) for const. and improvement 1.8 mi. of Clark Fork Forest Hwy. in Bonner County—by Public Roads Administration, Ogden, Utah.

BINGHAM AND BONNEVILLE COS.—**Olof Nelson Construction Co.,** P. O. Box 413, Logan, Utah, and W. C. Burns, Idaho Falls—$118,707 (joint bid) for 8.2 mi. widen roadbed, const. drain. structs., etc., on Yellowstone Park Hwy., betw. Shelly and Idaho Falls—by Commissioner of Public Works, Boise.

CANYON CO.—**Morrison-Knudsen Co., Inc.,** P. O. Box 1518, Boise—$24,606 for const. 3.8 mi. bitu. surf. on Nampa-Murphy Hwy. and 6.5 mi. on Arena Valley Road—by Commissioner of Public Works, Boise.

CASSIA CO.—**Wheeler & England,** Moreland—$27,922 for 5.2 mi. grade, drain and const. cr. grav. surf. on the Albion South Road—by Commissioner of Public Works, Boise.

LINCOLN AND BLAINE COS.—**Olof Nelson Construction Co.,** Logan, Utah—$37,512 for const. roadmix bitu. surf. and seal coat on 4.3 mi. Idaho Central Hwy. in vicinity of Carey; 4.1 mi. of Sawtooth Park Hwy. betw. Marley and Richfield—by Commissioner of Public Works, Boise.

TETON CO.—**Carl E. Nelson,** Logan Utah—$29,385 (recommended) for 5.4 mi. grade, surf. on the Teton Forest Hwy. in

the Targheen National Forest—by Public Roads Administration, Ogden, Utah.

TWIN FALLS CO.—**Hoops Construction Co.,** Twin Falls—$14,785 for 1.2 mi. misc. const. on road west of Castleford and 3.5 mi. on road N. E. of Buhl—by Commissioner of Public Works, Boise.

Montana

BIG HORN CO.—**Stanley H. Arkwright,** Great Falls—$63,086 for 5.3 mi. grade, cr. grav. surf., roadmix oil treat., small drain. structs. and 3 treated timber pile trestle bridges on Sec. A of the Hardin-Custer Road—by Montana State Highway Commissioner, Helena.

BIG HORN CO.—**Wachter-O'Neil Construction Co.,** Havre—$59,091 for 8.8 mi. grade and const. drain. structs. on Sec. F of Crow Agency-Broaddus Road—by Montana State Highway Commission, Helena.

DEER LODGE CO.—**Union Construction Co.,** Great Falls—$122,833 for 8.6 mi. grade and const. small drain. structs.; const. 2 treated timber pile trestle bridges on the Wisdom-Divide Road —by Montana State Highway Commission, Helena.

MADISON CO.—**Dan. J. Cavanagh,** Box 1083, Twin Falls, Ida. —$116,396 for 5.3 mi. grade, cr. grav. surf., roadmix oil treat.; const. small drain. structs. on Sec. G of the Vigilante Trail road —by Montana State Highway Commission, Helena.

McCONE CO.—**Lobnitz Brothers,** Ashton, Ida.—$88,650 for 11.3 mi. grade, cr. grav. surf. and const. small drain structs. on Sec. G of the Jordan-Circle Road—by Montana State Highway Commission, Helena.

Nevada

EUREKA CO.—**Gibbons & Reed,** 259 W. 3rd St., Salt Lake City, Utah—$299,470 for 8.4 mi. surf., etc., in the vicinities of Primeaux and the Eureka-Elko county line—by Nevada Department of Highways, Carson City.

LYON CO.—**Silver State Construction Co.,** Fallon—$26,889 for const. of approx. 5.2 mi. of state highway system in the vicinity of Fernley—by Department of Highways, Carson City.

NYE CO.—**Silver State Construction Co.,** Fallon—$68,536 for const. 20.7 mi. grade, surf., etc., in the vicinities of Warm Springs and Sandy Summit—by Nevada Department of Highways, Carson City.

STOREY CO.—**Nevada Rock and Sand Co., Inc.,** Box 1626, Reno—$24,142 for 5.4 mi. roadmix bitu. surf. in vicinity of Virginia City—by Nevada Department of Highways, Carson City.

New Mexico

RIO ARRIBA CO.—**Brown Brothers,** Albuquerque—$54,282 for 5.3 mi. grade, minor drain. structs., one multiple span conc. bo xculvert, and misc. const., on U. S. Hwy 285, betw. Abiquiu and Tierra Amarilla—by New Mexico State Highway Department, Santa Fe.

SANTA FE CO.—**A. O. Peabody,** Santa Fe—$102,017 for 14.4 mi. base course surf., placing double pene. wearing top and misc. const. on U. S. Hwy. 285, betw. Santa Fe and Encino—by New Mexico State Highway Department, Santa Fe.

SOCORRO CO.—**Brown Brothers,** Albuquerque—$103,952 for 8.4 mi. grade, minor drain. structs.; 1 multiple span conc. box culvert, and misc. const. on U. S. Hwy. 380, betw. San Antonio and Carrizozo—by New Mexico State Highway Department, Santa Fe.

TAOS AND RIO ARRIBA COS.—**Henry Thygesen & Co., Inc.,** Albuquerque—$42,189 for 8.1 mi. base course surf., double pene. wearing top and misc. const., on U. S. Hwy. 64, betw. Santa Fe and Taos—by New Mexico State Highway Department, Santa Fe.

TORRANCE CO.—**A. O. Peabody,** Santa Fe—$75,501 for 11.8 mi. base course surf., placing double pene. wearing top, and misc. const. on U. S. Hwy. 285, betw. Santa Fe and Encino—by New Mexico State Highway Department, Santa Fe.

TORRANCE AND SAN MIGUEL COS.—**Davies & Sons,** Fort Sumner—$69,028 for 10.3 mi. base course surf., placing double penetration wearing top and misc. const. on U. S. Hwy. 285, betw. Santa Fe and Encino—by New Mexico State Highway Department, Santa Fe.

UNION CO.—**A. O. Peabody,** Santa Fe—$48,957 for 8.3 mi. grade, drain. structs., base course surf., one 7-span bridge, and misc. const. on State Hwy. betw. Clayton and New Mexico-Oklahoma State Line—by State Highway Engineer, Santa Fe.

Oregon

BAKER CO.—**Leonard & Slate,** Multnomah—$51,818 for 4.8 mi. grade and const. bridge, Keating Road-Ruckles Creek Sec. of Baker-Homestead Hwy.—by Oregon State Highway Commission, Portland.

CURRY CO.—**A. Milne,** 7253 N. E. Broadway, Portland—$57,-089 for 0.7 mi. grade and bitu. macad. surf., Brookings Sec. of Oregon Coast Hwy.; furn. 8,500 cu. yd. cr. grav. in stockpile—by Oregon State Highway Commission, Portland.

HARNEY CO.—**Chester T. Lackey,** Ontario—$18,835 for furn. approx. 9,700 cu. yd. cr. rock in stockpiles on Sage Hen Hill-Harney Sec. of the Central Oregon Hwy.—by Oregon State Highway Commission, Portland.

JACKSON CO.—**R. I. Stuart & Sons,** Medford—$18,425 for furn. approx. 16,300 cu. yd. cr. grav. in stockpiles, Little Butte Creek-Cascade Gorge Sec. of Crater Lake Hwy.—by Oregon State Highway Commission, Portland.

LINCOLN CO.—**A. Milne,** 7253 N. E. Broadway, Portland—$23,968 (using road oil) for 0.6 mi. grade, surf. and oil on So. Newport Sec. of Oregon Coast Highway—by Oregon State Highway Commission, Portland.

MORROW CO.—**Babler Brothers,** 2407 N. W. 28th Ave., Portland—$43,089 for 4.9 mi. grade and surf. and 11.8 mi. oiling; furn. 1,500 cu. yd. cr. rock in stockpiles, Eightmile-Dry Creek Sec. of Wasco-Heppner Sec. Hwy.—by Oregon State Highway Commission, Portland.

WASCO CO.—**Colonial Construction Co.,** W. 326 First Ave., Spokane—$76,027 for 6.1 mi. grade Forest Boundary-Warm Springs River Sec. of Warm Springs Hwy.—by Oregon State Highway Commission, Portland.

Utah

BOX ELDER CO.—**T. G. Rowland,** 1558 Yale Ave., Salt Lake City—$93,872 for 1.1 mi. graded earth road betw. Hot Springs and Brigham City—by Utah State Road Commission, Salt Lake City.

GARFIELD CO.—**Miner Brothers Construction Co.,** Provo—$18,718 (recommended) for 0.4 mi. grade and surf., and bridge on Panguitch-Tropic Forest Hwy.—by Public Roads Administration, Ogden.

IRON CO.—**J. M. Sumsion,** Springville—$19,468 for const. 11.2 mi. 1½-in. roadmix bitu. surf. betw. New Castle and Modena—by Utah State Road Commission, Salt Lake City.

SEVIER CO.—**Strong and Grant,** Springville—$87,778 for 4.9 mi. grav. surf. road betw. Emery and the Forest Boundary—by Utah State Road Commission, Salt Lake City.

Washington

KING CO.—**Valley Construction Co.,** Seattle—$54,825 for widening, paving and repaving of various streets in Seattle—by Board of Public Works, Seattle.

LINCOLN CO.—**F. R. Hewett** 420 W. 22nd Ave., Spokane—$80,220 for 5.6 mi. clear, grade, drain and surf. on Primary State Hwy. 22, Bockemohle Canyon to Fort Spokane—by Director of Highways, Olympia.

OKANOGAN CO.—**M. E. Nelson,** Tonasket—$62,712 for 13.3 mi. ballast, surf., and const. light bitu. surf. on Secondary State Hwy. 10-A, betw. Summit Lake and Nespelem—by Director of Highways, Olympia.

SPOKANE CO.—**F. H. DeAtley,** 208 Salsberg Bldg., Lewiston, Ida.—$52,139 for 3.2 mi. clear, grade, drain. and surf. on Sec. State Hwy. south of Fairfield—by Director of Highways, Olympia.

SPOKANE CO.—**Chas. A. Power,** E. 27 - 8th Ave., Spokane—$77,042 for 2.4 mi. clear, drain, pave. on Primary St. Hwy., Liberty Lake Junction—by Director of Highways, Olympia.

WHATCOM CO.—**C. V. Wilder,** 2006 State St., Bellingham—$127,461 for 5 mi. clear, grade, drain and pave. on Sec. St. Hwy., Kelley Road to Pole Road—by Director of Highways, Olympia.

Wyoming

CAMPBELL CO.—**C. C. Warrington,** Cheyenne—$114,624 for base course surf., base tr. stone chip sealcoat and misc. work on 10.6 mi. of Gillette-Douglas Road, and 19.8 mi. of Gillette-Midwest Road—by Wyoming State Highway Commission, Cheyenne.

HOT SPRINGS CO.—**J. J. Dooling,** Denver, Colo.—$109,618 for 10.4 mi. grade, drain, misc. work, an I-beam span bridge and

7 culverts on Meeteetse-Thermopolis Road—by Wyoming State Highway Commission, Cheyenne.

LINCOLN CO.—**Northwest Engineering Co.,** Rapid City, S. D. —$117,903 for 21.7 mi. misc. highway const. on Cokeville-Star Valley Road, and 1.7 mi. const. on Freedom Spur—by Wyoming State Highway Commission, Cheyenne.

PARK CO.—**Taggart Construction Co.,** Cody—$61,292 for 4 mi. grade, drain, base course surf., oil treat, one timber bridge, and misc. work on Powell-Willwood Road—by Wyoming State Highway Department, Cheyenne.

SHERIDAN AND WESTON COS.—**Teton Construction Co.,** Cheyenne—$23,203 for 19.5 mi. stone chip sealcoat on Sheridan-Gillette Road and 8.1 mi. on Newcastle-Custer Road—by Wyoming State Highway Commission, Cheyenne.

SWEETWATER CO.—**Wyoming Construction Co.,** Laramie —$56,965 for 16 mi. grav. base course, base treat., stone chip seal coat, misc. work on Rock Springs-Hiawatha Road; and 1.8 mi. oil treat. on Thayer Junction-Superior Road—by Wyoming State Highway Commission, Cheyenne.

TETON CO.—**Big Horn Const. Co.,** Sheridan—$19,272 for 17.3 mi. stone chip sealcoat and misc. work on Jackson-Moran Road —by Wyoming State Highway Commission, Cheyenne.

UINTA CO.—**Gibbons & Reed,** Salt Lake City, Utah—$36,677 for const. curbs, gutters, grade and pave of 17 blocks in Evanston —by City Council, Evanston.

UINTA CO.—**John M. Keahy,** Buffalo—$38,555 for 3.9 mi. grade, drain, culverts, base course surf., stone chip sealcoat and misc. work on the Urie-Carter road—by Wyoming State Highway Commission, Cheyenne.

UINTA, LINCOLN AND SWEETWATER COS.—**Blanchard Brothers,** Majestic Bldg., Cheyenne—$63,472 for 18.7 mi. misc. highway const. on Thayer Junction-Red Desert Road; 37.2 mi. const. on Kemmerer-Evanston Road—by Wyoming State Highway Commission, Cheyenne.

WESTON CO.—**Inland Construction Co.,** Omaha, Nebr.—$44,-506 for const. 7 mi. base course surf., oil treat., stone chip seal coat and misc. work on Four Corners-Newcastle Road—by Wyoming State Highway Commission, Cheyenne.

PROPOSED PROJECTS

California

SAN MATEO CO.—Plans and specifications have been completed and bids will probably be called for the middle of September for street improvements in Baywood Knolls, San Mateo.

Nevada

NYE CO.—All bids for const. of 20.7 mi. grade and surf. in the vicinities of Warm Springs and Sandy Summit have been rejected by the Nevada State Department of Highways, Carson City, and the project will be readvertised.

Bridge & Grade Separation...

CONTRACTS AWARDED

California

FRESNO CO.—**James E. Anderson,** P. O. Box 101, Visalia—$9,751 for removing exist. timber bridge and const. new 152-ft. conc. slab timber bridge across Big Creek south of the town of Big Creek—by California Division of Highways, Sacramento.

FRESNO CO.—**F. Fredenburg,** P. O. Box 373, South San Francisco—$18,428 for const. two timber bridges with reinf. conc. decks across Kings River Sloughs NW of Reedley—by California Division of Highways, Sacramento.

FRESNO CO.—**Trewhitt, Shields & Fisher,** 1501 Pacific S. W. Bldg., Fresno—$17,175 for repairs to the lower Reedley bridge —by County Board of Supervisors, Fresno.

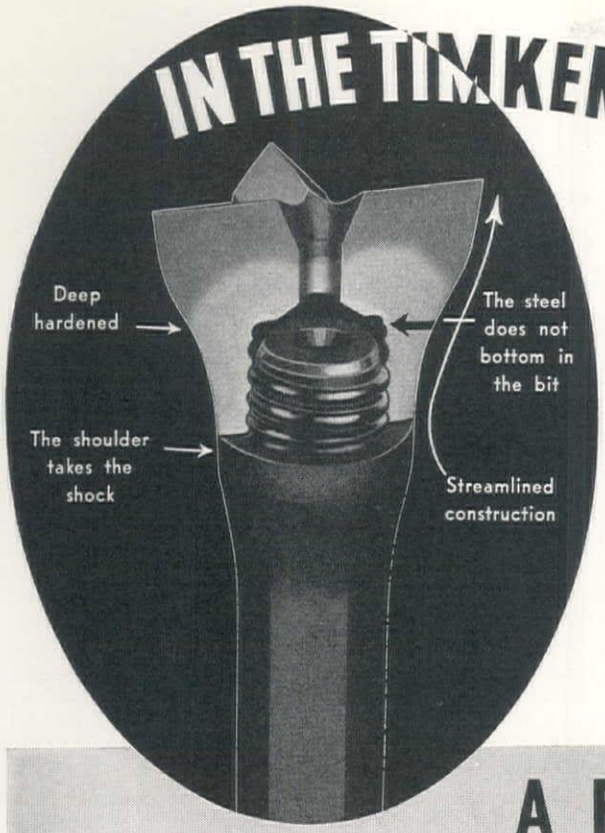
MADERA CO.—**Louis McClain,** Los Angeles—$13,127 for const. reinf. conc. slab bridge across Chowchilla River north of Chowchilla—by California Division of Highways, Fresno.

MENDOCINO CO.—**Thomas Construction Co.,** 1515 Keystone St., Burbank—$9,994 for repairing bridge over Noyo River near Fort Bragg—by California Division of Highways, Eureka.

MONO CO.—**A. A. Tieslau,** 2819 Telegraph Ave., Berkeley—$9,712 for const. a bridge at Soda Creek 28 mi. N.E. of Bridgeport—by California Division of Highways, Bishop.

ORANGE CO.—**Werner & Webb,** 6830 Lexington, Los Angeles

IN THE TIMKEN REMOVABLE ROCK BIT



THE shoulder takes the shock. There is definite clearance between the end of the steel and the bottom of the bit. The function of the threads is only to hold the bit on the steel. The contour is streamlined. The bit is uniformly deep hardened. It is made of world-famous TIMKEN Electric Furnace Alloy Steel. To the user these features mean: (1) absence of "bottoming", (2) easy removability, (3) less "stuck" steel, (4) more footage per bit, (5) faster cutting—in short, drilling costs reduced to the lowest levels ever recorded.

A FULL COMPLEMENT OF TIMKEN BITS FOR EVERY DRILLING JOB

The TIMKEN "H" Series Bit. A general purpose bit for contracting, mining, and quarrying to be used with light and medium weight drills. Comes in either side or center hole in sizes from 1⅜" to 2⅝" gauge inclusive.

The TIMKEN "M" Series Bit. The "M" Bit is an intermediate type recommended when the "H" series proves too light and the heavy duty "D" series is not required. The "M" Bit is manufactured only with a center hole and is available in a limited range of sizes including 2", 2⅛", 2¼" and 2⅜".

The TIMKEN "D" Series Bit. A heavy section bit for heavy mining and general quarrying to be used on wagon drills and tripod drills or other applications where large sections of drill steel and heavy machines are required. This bit comes in either side or center hole in sizes from 1¾" to 3" gauge inclusive.

The TIMKEN "R" Series Bit. Often referred to as the "rose" bit, the "R" series is used in soft formations like limestone and sandstone. It comes in either side or center hole in gauges 1⅜" to 2⅜" inclusive.

The TIMKEN "J" Series Bit. This type if often called the "chisel" bit. It is designed for hard formations and ravelled rock. It is furnished with side hole only in sizes from 1⅜" to 2⅝" inclusive.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
ROCK BITS

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

—$46,388 for const. reinf. conc. bridge and 0.3 mi. grade and plantmix surf. across Santiago Creek, Orange—by California Division of Highways, Los Angeles.

RIVERSIDE CO.—**Thorsten & Dahl,** 2912 W. 75th St., Los Angeles—$12,824 for const. four 19-ft. timber appr. spans in the Colorado River bridge; four 19-ft. spans to extend Teed Ditch bridge; two 19-ft. spans to extend Acari Ditch bridge, near Blythe—by California Division of Highways, San Diego.

SAN BERNARDINO CO.—**Oberg Brothers,** 612 E. 80th St., Los Angeles—$12,422 for const. of a reinf. conc. slab bridge and 0.2 mi. grade and plantmix surf. at Cable Creek N. W. of San Bernardino—by California Division of Highways, San Bernardino.

SANTA CLARA CO.—**Earl W. Heple,** 494 Delmas Ave., San Jose—$33,600 for const. of reinf. conc. box culvert on McKee Road, from King to Capital Ave., San Jose—by Board of Supervisors, San Jose.

SHASTA CO.—**E. E. Smith,** 852 Carmel St., Albany—$50,484 (official) for const. Fender Ferry bridge across the Pit River in Shasta National Forest—by Public Roads Administration, San Francisco.

Montana

BIG HORN CO.—**D. M. Manning,** Hysham—$20,042 for const. five treated timber pile trestle bridges on Sec. F of the Crow Agency-Broaddus Road—by Montana State Highway Commission, Helena.

GALLATIN CO.—**McLaughlin Construction Co.,** Livingston —$69,000 for const. of a 6-span steel and conc. viaduct and approach road over NP RR tracks east of Manhattan—by Montana State Highway Commission, Helena.

McCONE CO.—**D. M. Manning, Hysham**—$23,044 for const. six treated timber pile trestle bridges on Sec. G of the Jordan-Circle Road—by Montana State Highway Commission, Helena.

RAVALLI CO.—**J. C. Boespflug Construction Co.,** Miles City—$58,020 for const. 13 treated timber pile trestle bridges, with necessary grading and surf. of appr., on Sec. A and B of the Florence-Hamilton Road—by Montana State Highway Commission, Helena.

New Mexico

CATRON CO.—**F. O. McDaniel,** Santa Fe—$19,753 for const. 8 conc. box culverts and misc. const. on U. S. Hwy. 260, betw. Alma and Reserve—by State Highway Engineer, Santa Fe.

QUAY CO.—**Walter L. Denison,** Las Vegas—$46,384 for const. 17 conc. box culverts and minor drain. structs. on State Hwy. 18, betw. Tucumcari and Ragland—by State Highway Engineer, Santa Fe.

SIERRA CO.—**W. E. Bondurant,** Roswell—$28,881 for const. two pile trestle bridges, one over the Rio Grande and the other over Cuchillo Creek—by New Mexico State Highway Department, Santa Fe.

Oregon

LINCOLN CO.—**Tom Lillebo,** Reedsport—$15,865 for redrive pier fenders for Yaquina Bay Bridge, Oregon Coast Highway, Newport—by Oregon State Highway Commission, Portland.

LINN CO.—**Barham Brothers,** 1010 N. 18th St., Salem—$12,238 for const. 76-ft. reinf. conc. bridge over Cox Creek on Pacific Highway, Albany—by Oregon State Highway Commission, Portland.

TILLAMOOK CO.—**Birkemeier & Saremal** ,Sherlock Bldg., Portland—$11,375 for widening exist. bridge over Beaver Creek at Beaver on Oregon Coast Highway—by Oregon State Highway Commission, Portland.

Washington

PIERCE CO.—**Industrail Engineers and Contractors, Inc.,** Tacoma—$12,290 for repairs and replacements on the west side approach of the Day Island bridge overhead, Tacoma—by County Commissioners, Tacoma.

STEVENS CO.—**Norris Brothers,** Burlington—$258,317 (various schedules) for const. superstructures for county bridge over Kettle River Gorge, and railroad bridge over Kettle River near Boyds, on GN RR relocation, Columbia Basin Project—by Bureau of Reclamation, Coulee Dam.

STEVENS CO.—**J. A. Terteling,** 2223 Fairview Ave., Boise, Idaho—$37,360 for const. reinf. conc. and steel undercrossing; reinf. conc. overcrossing on Prim. St. Hwy. 3, Kettle Falls to Kettle Falls bridge, Great Northern Ry.—by Director of Highways, Olympia.

STEVENS AND LINCOLN COS.—**Angeles Gravel and Supply Co.,** Port Angeles—$89,590 for const. two reinf. conc. appr. spans and four reinf. conc. bridge piers on Prim. St. Hwy. 22, Spokane River Bridge Piers and approaches—by Director of Highways, Olympia.

Wyoming

HOT SPRINGS—**Blanchard Brothers,** Cheyenne—$41,063 for const. bridges on Meeteetse-Thermopolis road—by Wyoming State Highway Department, Cheyenne.

Water Supply . . .

CONTRACTS AWARDED

California

ALAMEDA CO.—**Loveland & Co., Ltd.,** 485 California St., San Francisco—$13,566 for installation of 12, 16 and 20-in. C.I. water mains in Webster St., Pacific Ave., etc., Alameda—by East Bay Municipal Utility District, Oakland.

LOS ANGELES CO.—**H. R. Setterlund,** 305 No. 4th St., Alhambra—$13,323 for const. of a 1,700,000-gal. water reservoir—by City Council, Alhambra.

LOS ANGELES CO.—(1) **Werner & Webb,** 6830 Lexington, Los Angeles—$25,311 and $20,648; (2) **Warren Southwest, Inc.,** 2145 E. 25th St., Los Angeles—$60,016; for const. of feeder mains for distribution system of Colorado River Aqueduct in the cities of Burbank, Compton, Long Beach and Torrance—by Metropolitan Water District, Los Angeles.

LOS ANGELES CO.—**Elliott, Stroud-Seabrook,** 112 W. 9th St., Los Angeles—$94,920 for const. 630 ft. of 80-in. and 120-in. enamel lined steel pipeline for the Morris reservoir connection for the Colorado River Aqueduct—by Metropolitan Water District, Los Angeles.

LOS ANGELES CO.—**Saunders Brothers,** 112 So. Pickering, Whittier—$2,862 for drilling and testing a well for Whittier State School, Whittier—by State Architect, Sacramento.

SAN BERNARDINO CO.—**Saunders Brothers,** 112 So. Pickering, Whittier—$2,016 for drilling and testing a well for Southern California State Prison, Chino—by State Architect, Sacramento.

SAN DIEGO CO.—**H. H. Peterson,** 3788 W. Atlantic, San Diego—$44,803 for inst. of 6,250 ft. 24-in. C.I. pipe for Upas St. pipeline extension, San Diego—by City Council, San Diego.

SHASTA CO.—**Chicago Bridge and Iron Co.,** San Francisco—$7,925 for const. of a 30,000-gal. steel water tank and tower, 87 ft. high, at Fall River Joint Union High School, McArthur—by Fall River Joint Union High School District, McArthur.

VENTURA CO.—**Saunders Brothers,** 112 So. Pickering, Whittier—$2,304 for drilling and testing a well for State Hospital at Camarillo—by State Architect, Sacramento.

Oregon

CLATSOP CO.—(1) **Grimstad & Vanderveldt,** Astoria—$3,710; (2) **Eugene Ruedy Co.,** 7909 N. E. Halsey, Portland—$73,910 for const. of conc. dam, controls, chlorinator and bldg., reinf. conc. reservoir, and supply and distrib. pipeline for the Young River-Lewis & Clark Water Dist., Astoria—by City Engineer, Astoria.

Utah

WEBER CO.—**E. Stettler & Sons Co.,** Logan—$63,792 for const. of water distribution system at Hill Field—by Constructing Quartermaster, Hill Field.

Washington

KING CO.—**Argentieri and Colarossi,** Seattle—$6,750 for const. of water mains in 35th and 36th Aves. West, betw. West Howe St. and West Viewmont Way, Seattle—by Board of Public Works, Seattle.

Sewerage . . .

CONTRACTS AWARDED

California

LOS ANGELES CO.—**A. R. Milosevich,** 303 N. Alma, Los Angeles—$21,690 for const. sewers in the Paseo del Mar and

Walker Ave. sewer district, Los Angeles—by Board of Public Works, Los Angeles.

LOS ANGELES CO.—**Bebek & Brkich and VCK Construction Co.,** 238 W. Florence, Los Angeles—$5,328 for const. of sewer in Barrington Ave., betw. Barrington Place and Montana Ave., Los Angeles—by Board of Public Works, Los Angeles.

LOS ANGELES CO.—**Culjak and Zelko,** 1354 So. Bonnie Beach Place, Los Angeles—$1,478 for const. of a sewer in 25th St., betw. Gaffey St. and Cabrillo Ave., Los Angeles—by Board of Public Works, Los Angeles.

SAN DIEGO CO.—**G. E. Kerns,** 3712 Gaviota Ave., Long Beach—$4,497 for const. of a reinf. conc. sludge digester and appurt. work at the city sewage disposal works, Escondido—by City Council, Escondido.

SAN FRANCISCO CO.—**Charles L. Harney,** Call Bldg., San Francisco—$6,000 for const. sewers and paving on Princeton St. betw. Silver Ave. and Sweeney St., San Francisco—by Department of Public Works, San Francisco.

SAN MATEO CO.—**E. J. Tobin,** 1132 Longridge Road, Oakland—$6,473 for const. sanitary sewers in Harbor Addition, San Carlos—by City Council, San Carlos.

Colorado

EL PASO CO.—**Schwartz Construction Co.,** Colorado Springs—construction of 3,350 ft. of 6-in. water mains for the Brookside Water Co., in the Franzhurst addition in Ivywild—by Trustees of the Myron Stratton Home Corp., Colorado Springs.

Waterway Improvement . . .

CONTRACTS AWARDED

California

COLUSA AND GLENN COS.—**Poulos & McEwen,** P. O. Box 1017, Sacramento—$134,000 for enlarg., raise, strengthen and setting back approx. 47,100 ft. of exist. levee along E. levee of Sacramento River rfom Princeton-Butte City Road to the Parrot Grant Line—by U. S. Engineer Office, Sacramento.

GLENN CO.—**Fredrickson Brothers,** 1259 - 65th St., Emeryville—$189,638 for enlarge, raising, strengthen and setting back exist. levees in various locations in the county—by U. S. Engineer Office, Sacramento.

LOS ANGELES CO.—**Shannahan Brothers,** 6193 Maywood Ave., Huntington Park—$46,818 for const. Unit 9 of the San Gabriel River Outlet at Alamitos Bay, involving 16,200 tons of rock in the extension of the west jetty—by County Board of Supervisors, Los Angeles.

LOS ANGELES CO.—**Guy F. Atkinson Co.,** Russ Bldg., San Francisco—$18,012,500 (cost plus fixed fee basis) for const. fleet operating base at San Pedro—by Navy Department, Washington, D. C.

SACRAMENTO CO.—**Basalt Rock Co., Inc.,** P. O. Box 538, Napa—$37,800 for furn. riprap stone along Sacramento River and Steamboat Slough—by U. S. Engineer Office, Sacramento.

SACRAMENTO CO.—**L. G. Lentz,** 2548 - 41st St., Sacramento—$32,890 for furn. and delivering 15,000 T. riprap stone at various points on Sacramento River—by U. S. Engineer Office, Sacramento.

SONOMA CO.—**Basalt Rock Co., Inc.,** 900 - 8th St., Napa—$48,700 for const. a 600-ft. extension to jetty in mouth of Russian River at Jenner—by State Division of Water Resources, Sacramento.

SUTTER CO.—**Morrison-Knudsen Co.,** 411 W. 5th St., Los Angeles—$356,714 (official) for enlarge, raise, strengthen and set back levees along Feather and Bear Rivers in vicinities of Starr Bend and Plumas Landing—by U. S. Engineer, Sacramento.

SUTTER CO.—**A. Teichert & Son, Inc.,** 1846 - 37th Ave., Sacramento—$324,345 (official) for enlarge, raise, strengthen and set back levees along Sutter and Tisdale By-Passes in vicinities of Long Bridge and Tisdale Weir—by U. S. Engineer Office, Sacramento.

Idaho

KOOTENAI CO.—**Sather & Son,** Coeur d'Alene—$113,540 for const. conc. and steel sheet pile flood wall, levee, etc., on Coeur d'Alene Lake and Spokane River—by U. S. Engineer Office, Seattle.

Oregon

CLATSOP CO.—**Tittle & Tittle,** Rainier—$51,475 (official) for reconditioning 3.6 mi. exist. levees; const. 200 ft. new levee; const. drain structs. and appurt. work in Diking Dist. 13, Walluski Area—by U. S. Engineer Office, Portland.

COLUMBIA CO.—**Parker-Schram Co.,** Couch Bldg., Portland—$385,254 (official) for const. 6.7 mi. main levee and 2.3 mi. of diversion canal and levee and appurt. works in Deer Island Drain. Dist.—by U. S. Engineer Office, Portland.

MARION CO.—**E. L. Gates,** Trail—$11,900 for excavation of 119,000 cu. yd. of material from Whiteman Bar in Willamette River—by U. S. Engineer Office, Portland.

MULTNOMAH CO.—**Jacobsen-Jensen,** 8444 N. W. St. Helens, Portland—$69,181 for reconst. and enlarge. of exist. levee, etc., in Peninsula Drainage Dist. No. 1—by Army Engineer Corps, Washington, D. C.

Washington

GRAYS HARBOR CO.—**Columbia Construction Co.,** Latham Square Bldg., Oakland, Calif.—$1,720,354 for reconst. north jetty at entrance to Grays Harbor—by U. S. Engineer Office, Seattle.

Territories

ALASKA—**Siems-Spokane Co.,** 412 Realty Bldg., Spokane, Wash.; Johnson, Drake and Piper, 1138 Baker Bldg., Minneapolis, Minn.; Puget Sound Bridge and Dredging Co., 2929 16th Ave., S. W., Seattle—$2,900,000 (Unalaska) and $1,193,000 (Kodiak) (cost plus fixed fee basis) for construction air bases at Unalaska and Kodiak—by U. S. Navy Department, Washington, D. C.

PROPOSED PROJECTS

California

LOS ANGELES CO.—The Board of Harbor Commissioners, Long Beach, has applied to the U. S. Engineer Office, Los Angeles, for a War Department permit to construct two fills of quarry waste, protected with riprap facing on the west bank of turning basin near intersection with Cerritos Channel, Long Beach Inner Harbor.

SAN DIEGO CO.—The Harbor Department, San Diego, has made application to the U. S. Engineer Office, Los Angeles, for a War Department permit to construct a 277x930-ft. mole type pier at the foot of G Street in San Diego Bay.

SANTA BARBARA CO.—The Submarine Oil Co., Los Angeles, has applied to the U. S. Engineer Office, Los Angeles, for a War Department permit to construct additions to its existing wharf at Summerland.

SANTA BARBARA CO.—The Tide Water Associated Oil Co., San Francisco, has made application to the War Department for approval of plans for a 1,196-ft. wharf in Santa Barbara Channel east of the S. P. RR. station at Gaviota.

Dam . . .

CONTRACTS AWARDED

California

MARIN CO.—**Engineers, Ltd.,** 619 "H" St., Sacramento—$469,397 for enlarge. of Alpine Dam, about 8 mi. from Fairfax—by Marin Municipal Water District, San Rafael.

PLACER CO.—**R. R. Bishop,** 5017 E. Broadway, Long Beach—$53,661 for const. 7,500 sq. ft. conc. abut. protect. slab, and 100-ft. conc. grav. retain. wall at North Fork Dam on North Fork of American River—by U. S. Engineer Office, Sacramento.

SHASTA CO.—**Wixson & Crow,** Redding—$65,000 for clearing approx. 1,040 ac. of the Shasta Reservoir site, Central Valley project—by Bureau of Reclamation, Sacramento.

Montana

GARFIELD CO.—**J. L. McLaughlin,** Great Falls—$81,725 (alt. B) for const. of the Big Dry Dam and auxiliary spillway—by State Water Conservation Board, Helena.

Texas

TRAVIS CO.—**Brown & Root, Inc.** and **McKenzie Construction Co.,** Austin—$3,137,495 (Sched. 1) for completion of the Marshall Ford Dam on the Colorado River Project near Austin—by U. S. Bureau of Reclamation, Denver, Colorado.

Irrigation . . .

CONTRACTS AWARDED

Idaho

PAYETTE CO.—**Vernon Brothers,** Box 1787, Boise—$84,573 for const. earthwork and structures, Graveyard Gulch and Langley Gulch wasteways, Payette Division, Boise Project—by U. S. Bureau of Reclamation, Boise.

Utah

WEBER CO.—**Niels Fugal,** Pleasant Grove—$14,756 for const. pipelines on laterals 10, 13, 15, 17, and 19, South Ogden distribution system, Ogden River Project, near Ogden—by U. S. Bureau of Reclamation, Provo.

Tunnel . . .

CONTRACTS AWARDED

Colorado

CLEAR CREEK CO.—**Ed H. Honnen Construction Co.,** Box 92, Colorado Springs—$272,246 for const. highway tunnels betw. Forks Creek and Golden—by State Highway Engineer, Denver.

Buildings . . .

CONTRACTS AWARDED

Arizona

MARICOPA CO.—**E. W. Duhame,** 1812 E. Harvard St., Phoenix—$263,242 for const. of buildings for Frank Luke, Jr., housing development project, Phoenix—by Housing Authority, Phoenix.

PIMA CO.—**P. W. Womack Construction Co.,** P. O. Box 2414, Phoenix—$200,000 for const. of five apt. houses in Tucson—by El Encanto Apartments, Inc., Tucson.

California

AMADOR CO.—**Azevedo Construction Co.,** 5th and V Sts., Sacramento—$72,426 for general construction of assembly hall and chapel at the Preston School of Industry, Ione—by State Architect, Sacramento.

FRESNO CO.—**Midstate Construction Co.,** Pacific S. W. Bldg., Fresno—$157,748 for general construction of classroom building of the Theodore Roosevelt High School, Fresno—by Fresno City High School District, Fresno.

FRESNO CO.—**Trewhitt, Shields & Fisher,** Pacific S. W. Bldg., Fresno—$89,981 for general construction of the gymnasium bldg. of the Theodore Roosevelt High School, Fresno — by Fresno City High School District, Fresno.

LOS ANGELES CO.—**Wm. P. Neil Co.,** 4814 Loma Vista St., Vernon—$56,000 for const. 174x280-ft. warehouse, Vernon—by Central Manufacturing District, Vernon.

LOS ANGELES CO.—**Atlas Construction Co.,** 1470 Paloma St., Pasadena—$65,300 for const. of an addition to the manufacturing plant of Douglas Aircraft Corp., on Imperial Hwy., El Segundo—by Douglas Aircraft Corp., Santa Monica.

LOS ANGELES CO.—**P. J. Walker Co.,** 3900 Whiteside St., Los Angeles—$155,237 for const. of a 4-story and basement Class A office bldg. addition at 820 S. Flower St., Los Angeles —by Southern California Gas Co., Los Angeles.

MONTEREY CO.—**Ford J. Twaits Co.,** 816 W. 5th St., Los Angeles, and **Morrison-Knudsen Co., Inc.,** Title Guarantee Bldg., Los Angeles—$2,731,000 for const. temporary housing at Camp Ord—by Constructing Quartermaster, Presidion of Monterey.

SAN DIEGO CO.—**R. J. Daum,** 6803 West Blvd., Inglewood—$53,211 for general const. of addition to library bldg. at San Diego State College, San Diego (Stanton-Reed Co., low bidder, withdrew its proposal)—by State Architect, Sacramento.

SAN DIEGO CO.—**John Replogle,** 943 E. St., San Diego—$143,400 (official) for const. of three single story, timber frame, hospital ward bldgs. at 11th Naval District Hospital, San Diego —by 11th Naval District, San Diego.

SAN FRANCISCO CO.—**Cahill Brothers,** 206 Sansome St., San Francisco—$2,000,000 for const. of 12-story office bldg. at Pine, Montgomery and California Sts., San Francisco—by Bank of America, San Francisco.

SAN FRANCISCO CO.—**S. Bertone,** 3030 Larkin St., San Francisco—$75,000 for const. of 10-story, Class A apartment house at Larkin and North Point Sts., San Francisco—by S. Bertone, San Francisco.

SAN JOAQUIN CO.—**Meyer Construction Co.,** 735 Portola Drive, San Francisco—$346,050 for const. temporary housing at Stockton Airport, Stockton—by Constructing Quartermaster, Fort Mason.

SANTA CLARA CO.—**Carl N. Swenson,** 355 Stockton Ave., San Jose—$75,900 for const. of a utilities building at Moffett Field—by Administration Officer, National Advisory Committee of Aeronautics, Moffett Field.

SANTA CLARA CO.—**Leo Epp,** 4745 Geary Blvd., San Francisco—$118,877 for const. of an office and laboratory bldg. for the 16-ft. wind tunnel at Moffett Field—by Administration Officer, National Advisory Committee of Aeronautics, Moffett Field.

Colorado

DENVER CO.—**F. J. Kerchhof,** Denver—$867,000 for const. of photographic, clerical and armament schools for Lowry Field —by U. S. War Department, Washington, D. C.

Montana

RAVALLI CO.—**Benjamin Shelton,** 1210 - 25th St. N., Seattle —$75,936 for const. of a postoffice building at Hamilton—by Public Buildings Administration, Washington, D. C.

Nevada

HUMBOLDT CO. — **Busboom & Rauh,** 109 E. Iron Ave., Salina, Kansas—$58,000 for repairs and extension to U. S. Post Office, Winnemucca — by Public Buildings Administration, Washington, D. C.

Oregon

MARION CO.—**L. H. Hoffman,** 715 S. W. Columbia, Portland—$59,975 for const. reinf. conc. bldg. at substation near Salem—by Bonneville Power Administration, Portland.

MULTNOMAH CO.—**L. B. James,** Portland—$100,000 terminal for Northwest Airlines, Inc., station, radio dept. and rooms for pilots and stewardesses at Portland-Columbia airport—by Northwest Airlines, Portland.

MULTNOMAH CO.—**West Coast Construction Co.,** Lloyd Bldg., Seattle, Wash.—$105,696 for const. of Midway Control House and appurtenances, Bonneville—by Bonneville Project, Portland.

TILLAMOOK CO.—**Potucek and Matson,** 1636 E. 31st St., Tacoma, Wash.—$58,724 for const. of a post office at Tillamook —by Public Buildings Administration, Washington, D. C.

Washington

KITSAP CO.—**Pacific Car and Foundry Co.,** 220 W. Hudson Sa., Seattle—$136,700 for const. of a 360x140-ft. steel frame shop bldg. at Puget Sound Navy Yard, Bremerton—by Bureau of Yards and Docks, Washington, D. C.

PIERCE CO.—**Bailey Construction Co.,** Seattle—$340,125 for const .of temporary housing at Fort Lewis—by Constructing Quartermaster, McChord Field, Tacoma.

PIERCE CO.—**Sam Bergesen,** Tacoma—$104,500 for const. of recruiting reception center at McChord Field—by Constructing Quartermaster, McChord Field.

Territories

CANAL ZONE—**McCarthy Brothers Construction Co.,** Roosevelt Bldg., St. Louis, Mo.—$272,050 for const. of laundry and bakery bldgs. at Fort Gulick—by U. S. War Department, Washington, D. C.

CANAL ZONE—**MacDonald Construction Co.,** 3829 W. Pine Blvd., St. Louis, Mo.—$504,316 for const, of laundry and bakery bldgs. at various military posts in the Panama Canal Zone—by U. S. War Department, Washington, D. C.

CANAL ZONE—**Novey & Luttrell, Inc.,** P. O. Box 2007, Ancon, C. Z.—$274,721 for construction of a laundry and a bakery building at Corozal, Canal Zone—by U. S. War Department, Washington, D. C.

ALASKA—**Atwell Construction Co.,** 1314 Sixth Ave., Seattle —$50,000 for const. of 50 prefabricated plywood houses to be shipped to airbase in Alaska—by U. S. Navy Department, Washington, D. C.

PROPOSED PROJECTS

California

ALAMEDA CO.—The Bureau of Yards and Docks, Navy Department, Washington, D. C., has completed plans and specifications and bids will be called shortly for const. of two storehouses at the Fleet Supply Base, Oakland.

Miscellaneous . . .

CONTRACTS AWARDED

Arizona

MARICOPA CO. — (1) **Tiffany Construction Co.,** Box 846, Phoenix—$11,805 for gas, water and sewer const.; (2) **Arizona Sand & Rock Co.,** Box 1522, Phoenix—$34,900 for site improvement; (3) **Vancotte Co.,** 5024 W. Washington Blvd., Los Angeles, Calif.—$3,723 for electric distribution—all in connection with const. of Frank Luke, Jr. Low Cost Housing Development Project, Phoenix—by Housing Authority, Phoenix.

California

ALAMEDA CO.—For miscellaneous work at the Administration Buliding, University of California, Berkeley—(1) **Scott Buttner Electrical Co.,** 23rd and Webster, Oakland—$32,123 for electrical work; (2) **James A. Nelson, Inc.,** 10th and Howard Sts., San Francisco—$101,795 for plumbing, heating and ventilation; (3) **Atlas Elevator Co.,** 34 Harriet St., San Francisco —$12,200 for passenger elevators—by The Board of Regents, University of California, Berkeley.

KERN CO.—**Clark C. Dresser,** 6242 Drexel Ave., Los Angeles —$12,110 for const. of curbs and gutters in District 12, Bakersfield—by Kern County Supervisors, Bakersfield.

LOS ANGELES CO.—**Raymond Concrete Pile Co.,** Washingington Bldg., Los Angeles—$22,360 for furn. and driving reinf. steel and conc. in pile shells for cast-in-place reinf. conc. piles at Aliso S. viaduct, Los Angeles—by City Purchasing Agent, Los Angeles.

LOS ANGELES CO.—**Oil Field Construction Co.,** 2650 Cherry Ave., Long Beach—$218,760 for furn., erect. and testing a liquid field petroleum gas air mix stand-by plant at the Gas Department's compressor plant, Long Beach—by City Manager, Long Beach.

LOS ANGELES CO.—**Newbery Electric Corp.,** 1038 Venice Blvd., Los Angeles—$34,332 for electrical work at the water softening and treatman plant of the Colorado River Aqueduct—by Metropolitan Water District, Los Angeles.

MARIN CO.—**Charles L. Harney, Call Bldg.,** San Francisco—$21,300 for const. of paved aprons and drainage system at Hangar 7, Hamilton Field—by Constructing Quartermaster, Ft. Mason.

MONTEREY CO.—**Barrett & Hilp,** 918 Harrison St., San Francisco—$35,600 for const. two RR spurs from S. P. right-of-way to Camp Clayton, and one 50-car spur track, and one 25-car spur track, on camp grounds—by Constructing Quartermaster, Presidio of Monterey, Monterey.

SAN BERNARDINO CO.—(1) **Johnston & Washer,** 1319 S. Los Angeles St., Los Angeles—$130,861 for mechanical work (2) **Collins Electrical Co.,** 708 E. Market St., Stockton—$29,631 for electrical work—for the Administration Bldg., Southern California Prison, Chino—by State Architect, Sacramento.

SAN FRANCISCO CO.—**S. J. Amoroso Construction Co.,** 2136 Alemany Blvd., San Francisco—$13,712 for misc. const. for Miraloma School, San Francisco—by Department of Public Works, San Francisco.

SAN MATEO CO.—**Lindgren & Swinerton,** Standard Oil Bldg., San Francisco—for const. concrete and pile foundations for enlargement of substation—by Pacific Gas and Electric Co., San Francisco.

SAN MATEO CO.—**Charles L. Harney,** Call Bldg., San Francisco—$15,300 for const. and completion of roads and sidewalks, first phase, at Golden Gate National Cemetery, San Bruno—by Constructing Quartermaster, Fort Mason.

SANTA CLARA CO.—**Moore Drydock Co.,** Foot of Adeline St., Oakland—$180,900 for const. of a 7x10 ft. wind tunnel at Moffett Field—by Administrative Officer, National Advisory Commission of Aeronautics, Moffett Field.

SANTA CLARA CO.—**N. M. Ball Sons,** P. O. Box 404, Berkeley—$46,900 for const. paved aprons, taxiways and drain system at Moffett Field—by Constructing Quartermaster, Fort Mason.

SOLANO CO.—**Montgomery Elevator Co.,** Moline, Ill.—$16,463 for furn. and install. a 12,000-lb. cap. electric freight elevator in new paint shop at U. S. Navy Yard, Mare Island—by Public Works Officer, Navy Yard, Mare Island.

Colorado

LA PLATA CO.—**Sandberg & Johnston Construction Co.,** Hampton, Iowa—$113,678 for const. of 180 mi. of distribution line in the vicinity of Durango—by La Plata Electric Assn., Inc.

DENVER CO.—**J. B. Bertrand, Inc.,** 301 Union Station, Denver—$322,966 for const. reinf. conc. pave. and drain of Runway No. 1, Lowry Field—by Constructing Quartermaster, Lowry Field.

Idaho

CASSIA CO.—**H. A. Risk Pipe and Construction Co.,** Nebraska City, Nebr.—$59,452 for const. 101.7 mi. of transmission lines in the vicinity of Malta—by The aRft River Rural Electric Cooperative, Inc., Malta.

Montana

VALLEY CO.—**Woods Brothers Construction Co.,** 132 S. 13th St., Lincoln, Nebr.—$412,358 for const. of substructure for power house at Fort Peck Dam—by U. S. Engineer Office, Fort Peck.

Oregon

CLATSOP CO.—**Western Construction Co.,** Textile Tower, Seattle—$72,950 for magazines and underground gasoline system, Naval Air Station, Tongue Point—by Bureau of Yards and Docks, Navy Department, Washington, D. C.

COLUMBIA CO.—**Curtis Gardnes,** 3830 N. E. 32nd Place, Portland—$16,992 (recommended) for const. pumping plant and appurt. in the Deer Island Drain District—by U. S. Engineer Office, Portland.

MULTNOMAH CO.—**Fritz Ziebarth,** Security Bank Bldg., Long Beach, Calif., and Vancouver, Wash.—$64,166 for const. of third transmission line cable crossing over Columbia River at Bradford Island, near Bonneville—by Bonneville Power Administration, Portland.

Utah

WEBER CO.—**Moore Electric Co.,** 321 W. 3rd St., Los Angeles—$118,786 for const. street lighting system at Hill Field—by Constructing Quartermaster, Hill Field.

Washington

ASOTIN CO.—**Homer G. Johnson,** Imperial Hotel, Portland, Ore.—$53,722 (subject to REA approval) for const. 80 mi. of transmission lines—by Clearwater Valley Light and Power Assn., Lewiston, Idaho.

CHELAN CO.—**W. T. Butler** and **Olof Boen,** Seattle—$84,334 for const. rearing ponds, diversion dam, dike, roads and drain. and water systems at Entiat station for migratory fish control, Columbia Basin Project—by Bureau of Reclamation, Coulee Dam.

KING CO.—**Warren Northwest, Inc.,** P. O. Box 5072, Portland, Ore.—$600,297 for surf. of landing field runways and warming up platform, also final grade and drain system at the Naval Air Station, Seattle—by Public Works Officer, Puget Sound Navy Yard, Bremerton.

KITSAP CO.—**J. J. Agutter & Co.,** 600 Harrison St., Seattle—$85,818 for improving exist. and securing additional facilities for fire protection at Naval Ammunition Depot, Puget Sound Navy Yard, Bremerton—by Public Works Officer, Puget Sound Navy Yard, Bremerton.

LEWIS CO.—**Washington Asphalt Co.,** 309 W. 39th St., Seattle—$163,283 for const. 203.5 mi. transmission lines in the vicinity of Chehalis—by Public Utility District No. 1, Chehalis.

Territories

HAWAII—**Viking Construction Corp.,** New York, N. Y.—$209,340 for power plant piping, install. turbine and motor driven pumps, etc., at Navy Yard, Pearl Harbor—by U. S. Navy Department, Washington, D. C.

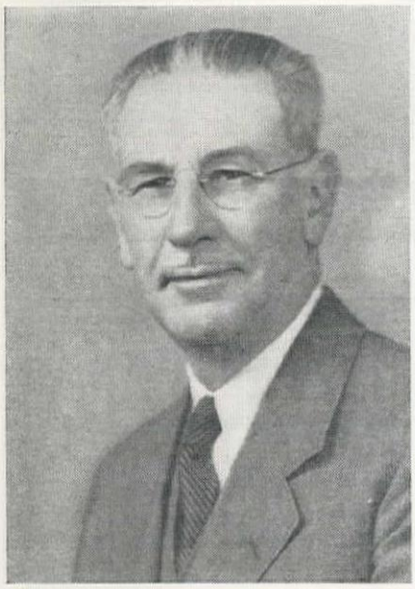
PROPOSED PROJECTS

California

MODOC CO.—The REA has allocated $45,000 to the Surprise Valley Electrification Corp., Alturas, for const. of an additional unit in the generating plant.

News of Men Who Sell to the Construction West

A. E. Anderson, who was recently appointed manager of the Seattle office of *E. I. duPont de Nemours & Co., Inc.,* as was very briefly noted in our August issue, has been a member of the duPont organization for thirty-three years, first entering the employ of that company in 1907. He is a native of Denver, Colo., and a graduate of the Colorado School of Mines, receiving his degree in mining engineering from that school in 1904.



A. E. Anderson

Until 1930 most of his duties were as mining engineer and technical representative serving the company's customers throughout the United States. His experience includes a trip to South America and another to the Philippine and Hawaiian Islands. Since 1930 he has been assistant manager of the Seattle district under **E. F. King** who resigned on July 1 to retire from active business.

Anderson is succeeded by **R. F. Cramer** who has been assistant manager of the Denver, Colo., office and is now assistant manager of the Seattle office.

* * * *

J. T. Sullivan has been appointed as an additional assistant manager of the Los Angeles, Calif., branch of the *International Harvester Co.,* marking the first time that a company branch outside of New York City has had more than one assistant manager. **George M. Palmer,** who has been assistant manager for some time under **L. S. Koenig,** branch manager, will devote all of his time to the wholesale business while Sullivan will be assigned to the job of supervising all retail sales.

W. Paul Elder, formerly national user salesman, succeeds Sullivan as manager of Los Angeles city retail sales.

* * * *

Claude C. Cook, for twelve years branch manager and later plant manager for a western pump manufacturer, has become associated with the Peerless Pump division of *Food Machinery Corp.* in an executive capacity and will make his headquarters at the Los Angeles plant. Prior to his recent affiliation, Cook was for many years employed by the United Iron Works of Joplin and Springfield, Mo., as engineer in the drilling and pumping division.

W. H. Hunter, general sales manager of the *American Hoist & Derrick Co.,* St. Paul, Minn., was a Seattle visitor late in August, calling on the *Pacific Hoist & Derrick Co.* which represents the American Hoist & Derrick Co. in western Washington. **J. B. Woodbury,** vice-president of the *Maine Co.* and in charge of the Sargent overhead shovel division of that organization also called on the Pacific Hoist & Derrick Co. during a western trip which included visits to San Francisco and Sacramento, Calif.

* * * *

A. H. Cox & Co., Seattle, Wash., received a large number of official visitors during the month of August, including **Roy Mosel,** Pacific Coast sales manager of the *Jaeger Machine Co.,* from San Francisco; **"Buck" Buchanan,** Pacific Coast sales manager of the *Thew Shovel Co.* from San Francisco; **A. C. Burch,** engineer in charge of the Moto-Crane division of the *Thew Shovel Co.;* **Charley O'Halleran,** Northwest sales manager, and **A. E. Mills,** Northwest manager of the *Allis-Chalmers Manufacturing Co.* from Portland; and **Lou Boren,** Pacific Coast sales manager of *Gar Wood Industries* from San Francisco.

* * * *

Jay Doyle, veteran Caterpillar distributor in the Visalia-Porterville-Tulare, Calif., district, announced his retirement from active duty as of August 1, after twelve years association with *Caterpillar Tractor Co.* and several years with Caterpillar's predecessor, Holt Manufacturing Co. The new distributors are **Edward H. Halton** and **John S. Treanor,** carrying on in the name of *Halton-Treanor.* Halton was formerly a partner in Hill & Halton, a cherry proceesing concern in Napa, Calif., and at the same time was a fruit buyer for California Packing Corp. Treanor was formerly with the sales department of the Riverside Cement Co., Los Angeles.

Halton and Treanor have announced that they will handle the same complete line of equipment at the same locations and with the same personnel, with the addition of **Joseph Parker** as service manager.

* * * *

J. W. Travis, formerly assistant branch manager for the *International Harvester Co.* at Denver, Colo., has been transferred to Salt Lake City in the same capacity. He is succeeded by **W. E. Benton,** formerly assistant branch manager at Wichita, Kans. **P. H. Cushman,** assistant branch manager at Salt Lake City, Utah, has suceeded Benton at Wichita.

* * * *

Osmose Wood Preserving Co. of Buffalo, N. Y., has announced the opening of a new branch office at 821 Ernst & Crammer Building in Denver, Colo., to handle the company's business in the Rocky Mountain states. **Dan Kamphausen** has been appointed manager of the new office.

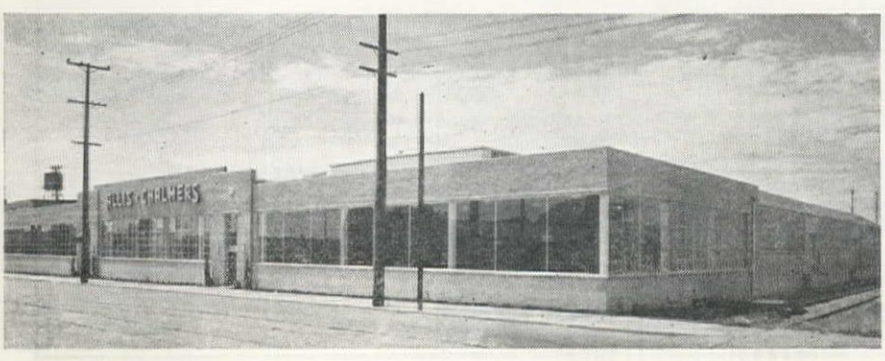
* * * *

W. J. Koehring, for thirty-three years president of the *Koehring Co.,* has resigned as president and will become chairman of the board. During his long service the company has developed from a small beginning in the manufacture of concrete mixers to its present activities of manufacturing an extensive line of heavy duty construction equipment.

G. E. Long, who has been elected president, has been with the company since 1928, becoming treasurer in 1932 and in recent years act-

NEW HOME OF ALLIS-CHALMERS AT OAKLAND, CALIF.

OPENED with appropriate ceremonies on June 22, as reported in the August issue of *WCN,* this new plant of the Allis-Chalmers Manufacturing Co., at Oakland, Calif., has 60,000 sq. ft. of floor area providing for show rooms, offices and parts department.



LARGEST IN THE WEST

THE NEW PLANT of the Fruehauf Trailer Co. opened July 11, in Los Angeles, is the largest in the West, and has a production capacity of 10 trailers per day. Including the front office section of the building, the structure is 800 ft. long by 120 ft. wide.

ing as secretary, sales manager and general manager. **C. A. Koehring** remains as vice-president of the company, and **P. Graser** has been elected secretary-treasurer.

* * * *

Homer Elder, vice-president and general manager of the *International Equipment Co.* of Boise, Idaho, died suddenly at his home after a heart attack. Mr. Elder, 47 years old, had had a wide acquaintance with various sections of Idaho, having worked in Bonners Ferry, Sandpoint, as district clerk in Jerome and in Coeur d'Alene. His brother is a clerk of the district court, while another brother was at one time democratic national committeeman from Idaho.

Harry W. Howard, Pacific Coast regional manager of *General Motors* with headquarters in San Francisco, flew to Seattle during the month, paying an official visit to **Ross A. Sweet,** Seattle manager.

* * * *

Bill Sweet, sales manager for the truck and coach division of General Motors at Seattle, returned to Seattle from a vacation spent on an Oregon beach.

* * * *

B. W. Harberg, Northwest representative of the *Koehring Co.,* who moved from Seattle to Portland several months ago to improve the health of his young daughter, has returned to Seattle.

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W. E. Shird, sales engineer at Seattle for the *Northwest Engineering Co.,* has returned from a two months trip to Alaska where he covered all towns in the territory, including Hellzapoppin and Good News.

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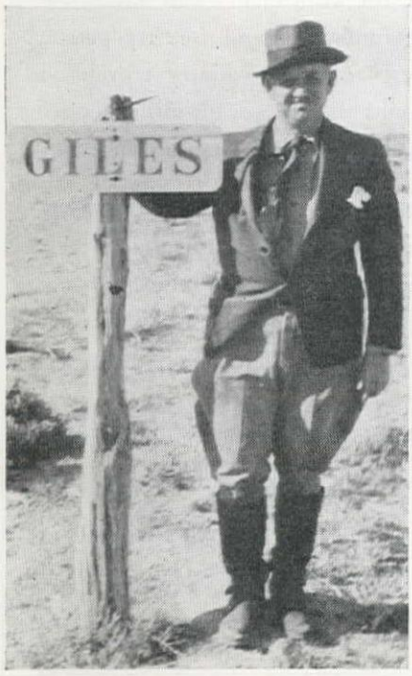
Ted Henry, sales engineer for *Schramm, Inc.,* called on W. A. Wylie, Seattle manager of Howard-Cooper Corp., which represents Schramm in Washington, Oregon and Idaho.

GILES E. "MAC" MACQUEEN stops for a picture beside the sign marking the site of the old town of Giles, Nev. because of the similarity of names. He reports the sagebrush background is typical of "rush hour" activity. MacQueen is the sales engineer for the Macwhyte Company who is well known to users of wire rope throughout his territory of Colorado, Wyoming, Utah and other western states.



New Materials and *Equipment* ...

Mobiloader

Manufacturer: Athey Truss Wheel Co., Chicago, Ill.

Equipment: Tractor-mounted bucket loader.

Features claimed: Mounted on a D4 Caterpillar diesel tractor, this utility tool designed to dump to the rear of the tractor without maneuvering. The 1½-yd. bucket is cable operated and can be dumped at the front at any height from the ground to 7½ ft. Clearance under the rear dump chute is 7½ ft. Power is transmitted from the front power takeoff to a reversing transmission and work gear unit mounted on the left hand fender. Control is from the tractor seat by one lever. There is no structure in front of the operator to obstruct his view. No special mountings are needed and the attachment can be made without drilling holes.

Single Bucket Carryall

Manufacturer: R. G. LeTourneau, Inc., Peoria, Ill.

Equipment: 8-cu. yd. single bucket scraper.

Features claimed: The Model LS is rated at 8.2 cu. yd. struck capacity and 11 cu. yd. heaped. Loading is made easier by a longer and steeper blade base. Greater capacity is available because of higher sides and a built-up apron. A newly designed A-frame gives more room for bigger loads, speeds up loading, facilitates dumping of sticky materials and adds structural strength. With the apron cable dead ended on the apron, all hoist and unloading cables are now placed up and out of the dirt. Power demands of larger loads are reduced by centering fixed sheaves at the tailgate so that a direct pull is attained on the gate. The Model LS can be fitted with either four or six large tires. Tire clearance is improved by a goose-neck type yoke.

Welding Temperature Control

Manufacturer: Tempil Corp.

Distributor: Victor Equipment Co., San Francisco, Calif.

Equipment: Tempil pellets for controlling welding temperatures.

Features claimed: These pellets make possible accurate determination of a wide range of temperature without recourse to elaborate technical equipment. They are available to melt with an accuracy tolerance of 3% at temperatures of 200, 300 and up to 1,500 deg. F. For special requirements they can also be furnished in 50-deg. intervals and for temperatures above 1,500 deg. They are made in easily distinguishable colors and are individually marked with their respective melting temperatures. They permit the making of safer and stronger welds, indicate the approach of safe temperature limits in casting work and are used for other purposes where accurate heat control is essential.

Largest Carryall

Manufacturer: R. G. LeTourneau, Inc., Peoria, Ill.

Equipment: 26-yd. single bucket scraper.

Features claimed: The latest and largest single bucket Carryall Scraper—the Model N—rated at 25.8 cu. yd. struck capacity and 33 heaped, is designed for pusher loading. It is constructed with higher sides and a larger apron to hold all of the dirt that the power of two tractors can dig. A longer and steeper cutting blade base, facilitating easy and fast loading, causes material to boil in—to flow back into the bowl and forward into the apron. Cable controlled fractional inch cutting, positive ejection and measured spreading are attained through the response of the power control unit. Several important new features are introduced by the Model N. Additional yards were added to its capacity by extending and building a higher apron. Instead of placing a lifting sheave on the apron where it would often be covered by and worked through dirt, the cable was dead ended on the apron, and the apron sheaves placed on top of the spring pipe, where they travel back and forth in a slide—entirely eliminating abrasive cable wear caused by dirt getting into them. Easier passage of sticky materials is permitted by an arched "A" frame which also adds strength. Ample flotation and needed compaction is obtained and resistance minimized by the use of four large 24 x 32 tires, 80 in. high. A gooseneck yoke gives greater tire clearance.

Car-Life Oil Filter

Manufacturer: Oil Purifier, Inc., Oakland, Calif.

Equipment: Oil filter effective for 25,000 miles.

Features claimed: Each time the motor is stopped the filter cartridge expands and sheds dirt and carbon into a dirt trap which is easily flushed by opening a pet-cock while the motor is running. The cartridge is impregnated with Power-Tone which neutralizes and absorbs acids and varnish. Six sizes for trucks, tractors, industrial engines and passenger cars are offered which will operate efficiently for 15,000 mi. under adverse conditions and up to 25,000 mi. under normal conditions.

Wheel-Type Trencher

Manufacturer: Buckeye Traction Ditcher Co., Findlay, Ohio.

Equipment: Rotary wheel ditcher Model 12A.

Features claimed: Incorporating a number of new features in a single rugged compact unit, the new excavator wheel frame is of a trussed bridge construction providing greater strength and resistance to distortion than former designs of equal weight. A fluid coupling, which is optional equipment, protects transmissions from sudden shocks and reduces engine stalling. The conveyor belt has a new type of guide clips which insures even tracking and minimizes belt and pulley wear. The excavator drive is the Buckeye Constant Center type which eliminates the need for idlers to take up chain slack and provides a smooth flow of power at any digging depth. The new model cuts a trench up to 26 in. wide and 5½ ft. deep. Overall digging height is 8 ft.

Two-Engine Dragline

Manufacturer: Page Engineering Co., Chicago, Ill.

Equipment: Two-engine diesel-electric powered walking dragline.

Features claimed: A large diesel on the main deck is designed for hoisting or walking, while a second smaller diesel on an upper deck furnishes power for swinging. This new development in large machines gives a fast hoist and swing at the same time so that swinging need not be delayed while waiting for the hoisting of the bucket. The two engines furnish a balaced power and increase the number of loaded buckets that can be handled per minute. The two-engine walker is not cumbersome, but more compact and less expensive than a single-engine dragline carrying the same total horsepower.

Roll Crusher

Manufacturer: Iowa Manufacturing Co., Cedar Rapids, Iowa.

Equipment: Entire line of roll crushers redesigned.

Features claimed: The roll shells are mounted on tapered cores by means of sectional wedges. Pinion and gear drives from countershaft to stationary shaft and finger timing gears for transmission of power from stationary to the floating roll assure a smoother operation and longer wear. Both gear and pinion and finger gears are completely enclosed in oil. Adjustment of the opening between the rolls can be made by removing or inserting shims in the slot on top of the frame while the roll is operating. Heavy helical chrome canadium steel wire springs keep the proper tension on the floating roll so that the opening remains constant under proper operating conditions. The springs relieve undue stress and prevent breakage if uncrushable material is accidently introduced. Shear plates at the ends of the springs relieve the tension entirely if necessary. All crushers are equipped with anti-friction bearings. Seals confine the lubricant and prevent the entrance of foreign matter to the bearings. The entire countershaft and bearing assembly is completely enclosed in a tubular steel housing. Bearings are placed far out on the shaft, one bearing near the hub of the flywheel and the other near the pinion. The frame is welded, riveted and cross-braced I-beam construction. Roll shells are manganese steel. The flywheel is extra heavy semi-steel. Countershaft bearings are Timken tapered roller, and roll shaft bearings are SKF cylindrical roller. Six sizes of crushers are built: 16x16-in., 24x16-in., 30x18-in., 30x22-in., 40x20-in., and 40x24-in.

High-Mileage Truck Tires

Manufacturer: Goodyear Tire & Rubber Co., Akron, Ohio.

Equipment: Hi-Miler rib and Hi-Miler All-Weather tread road service tires.

Features claimed: Treads of both tires are tougher and flatter, putting more rubber in contact with the ground, and tread depths are greater than have been provided for general purpose work. Undertreads have been increased 25 to 30%. Heat-resisting, low-stretch Supertwist cords retain up to 71% of their tensile strength under extreme temperatures, and multiple compounds protect against separation and heat fatigue and help distribute the shearing stresses more evenly between tread and tire body.

Well Point Pumps

Manufacturer: Construction Machinery Co., Waterloo, Iowa.

Equipment: Combination pumps for well point pre-drainage systems.

Features claimed: The combination wet vacuum and dual prime units are especially adapted for well point pre-drainage systems. They are available in 4, 6, 8 and 10-in. sizes. No filters are needed. Vacuum pump is easily disengaged when only the dual prime pump is required.

Small Trucking Unit

Manufacturer: Standard Steel Corp., Los Angeles, Calif.

Distributor: Smith-Booth-Usher Co., Los Angeles, Calif.

Equipment: Shop tractor truck.

Features claimed: The MidgeTruk is a small compact motorized trucking unit for short range hauling. Powered with a 4.2-h.p. Wisconsin air-cooled engine, it has three forward speeds from 3½ to 10 m.p.h. and one reverse, and is mounted on four pneumatic tired wheels. It can be equipped with interchangeable bodies, either flat, dump or special. It has a width of 47 in. and turning radius of 42 in., will handle loads of 1,500 lb. with a drawbar pull of 800 lb.

Electric Chain Saw

Manufacturer: Mall Tool Co., Chicago, Ill.

Equipment: Universal electric 24-in. chain saw.

Features claimed: The new chain saw can be furnished in 24 and 36-in. capacities powered by a 1½-h.p. electric motor for operation on 110-v. A.C. or D.C., or 220-v. A.C. or D.C. current. The cutting teeth used in the construction of the chain saws are tempered for long life of cutting edges. The teeth are so constructed that the operator files only one surface when sharpening. Each tooth has a

permanent set which is not destroyed by sharpening. In removing a chain all that is necessary is to release the tension on the chain and push out one self-locking rivet. No special tools are necessary. The new style chain saw can be furnished for replacement of other makes of saws.

Portable Electric Generator

Manufacturer: Master Vibrator Co., Dayton, Ohio.

Equipment: Gas-electric generating plants.

Features claimed: Four models of light weight gas-electric generating plants are being offered for operating small electric tools or floodlights. They will furnish 500, 650, 1,000 or 1,250 watts at 110 volts, D.C. The unit consists of a Briggs and Stratton gasoline motor and a generator mounted on a metal non-creep base and is provided with a carrying handle. It is intended for operating concrete vibrators, power saws and drills, grinders, buffers, floodlights and blowers.

Finegrader Improved

Manufacturer: Buckeye Traction Ditcher Co., Findlay, Ohio.

Equipment: R. B. Power Finegrader.

Features claimed: A recent engineering improvement in the R. B. Power Finegrader consists of a relocation of the form wheels (in effect, a lengthening of the wheel base so that it is longer than a standard road form section) in order that the weight of the Finegrader will, at all times, be supported by *two* form sections on each side of the grade, four

in all. This design change prevents the total weight of the machine from bearing, at any time, on only one form section on each side of the grade, thus eliminating any possibility of the load forcing the forms out of vertical alignment at the joints.

Powered Centrifugal Pump

Manufacturer: Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

Equipment: Independently powered pumps.

Features claimed: These units are designed to furnish powered pumps for drainage, irrigation, gravel plants and construction jobs independent of any outside source of power. The power units in five sizes from 18 to 110 h.p. are available for gasoline, kerosene, distillate, natural gas or butane fuel. All are valve-in-head, medium speed engines with removeable cylinder liners and forced feed lubrication. The centrifugal pumps are horizontal shaft, single stage, single or double suction designed for handling liquids at normal temperatures. Capacities range up to 5,000 g.p.m. and 100-ft. head.

Convertible 1-Yd. Shovel

Manufacturer: Link-Belt Speeder Corp., Chicago, Ill.

Equipment: Model LS-100 excavator.

Features claimed: The machine is controlled by easy-throw levers and equipped with a new type of clutch which includes a booster system that gives the feel of the load at all times. Other features include fully enclosed travel brakes controlled from the cab; fully enclosed traction gears running in oil; a 72-in. diameter machine-finished roller-path turn-table with patented self-aligning rollers; anti-friction bearings; free floating center pin bearings; and welded steel design for strength and resistance to shock loads. The engine is a heavy-duty industrial gasoline or diesel.

Osgood Small Excavator

Manufacturer: The Osgood Co., Marion, Ohio.

Equipment: Small convertible shovel.

Features claimed: Type 10 is designed to fill the need of users of ⅜ and ½-yd. excavating and material handling equipment. The machinery deck is a one-piece steel casting, and all machinery is mounted on pads. Engine and countershaft are mounted on a cast iron safety fuel tank. Power is transmitted to the countershaft through silent chain drive, to the dipper through gears running in oil. Swing and travel, crowd and retract gears are fully enclosed and run in oil. They are equipped with multiple disc type clutches.

Small Eectric Saw

Manufacturer: Skilsaw, Inc., Chicago, Ill.

Equipment: Electric powered 6-in. portable saw.

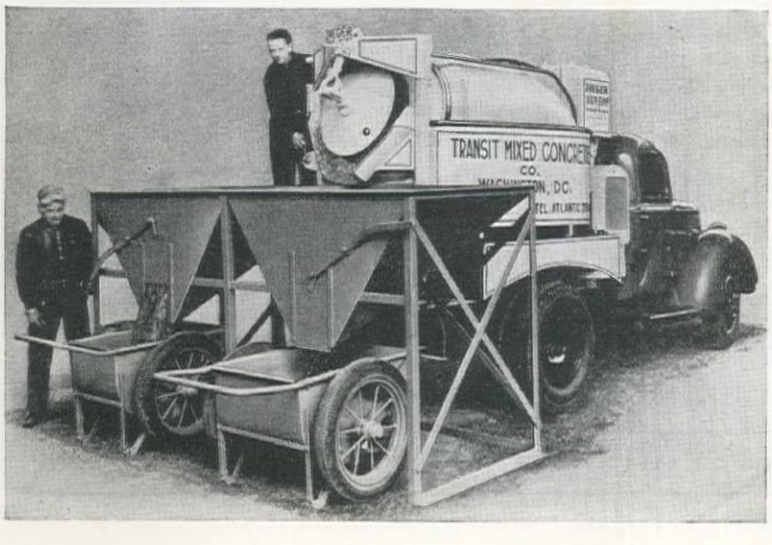
Features claimed: Model 67 is compact and built for heavy-duty service. The blade has a free speed of 3,400 r.p.m. and is protected by an automatic telescopic guard that rotates on ball bearings. The base can be adjusted for depth and bevel cutting. Every moving shaft is mounted on ball bearings for quiet operation and long life. It is 15½ in. long and weighs 11½ lb., will rip and cross-cut hardwood up to 1 in. and cross-cut dressed pine up to 2 in.

High Dump Truck Mixers

Manufacturer: The Jaeger Machine Co., Columbus, Ohio.

Equipment: Truck mixers and agitators with high discharge point.

Features claimed: Designed with a high discharge point to meet unusual placing conditions, this new line of truck mixers and agitators will deliver concrete, low slump or high, over a wide radius, into higher forms, over material piles or into large floor hoppers. The drums are extra large and load in one drop from the top. They are equipped with the exclusive Jaeger Throw-Back Blades for thorough mixing and fast discharge. The outlet door is vacuum operated. The water booster is winter protected and measures accurately within ½ of 1%. The drive is cab-controlled, truck engine with separate engines available if desired. The mixer can be cut out for traffic stops and heavy grades, or reversed by operation of a valve in the driver's compartment. Two-speed shock proof transmission provides high mixing speed for short hauls and slow speed for long hauls or agitation.



Literature...Catalogs

The following booklets may be obtained by sending your request directly to the manufacturer or to WESTERN CONSTRUCTION NEWS, 333 Kearny Street, San Francisco.

Kay-Brunner Steel Products, Inc., Los Angeles, Calif., a booklet covering cable and hydraulically controlled dirt moving equipment containing photographs of the equipment in action as well as photographs of the cable and hydraulic power control units.

Electroline Co., Chicago, Ill., a bulletin describing the improved wire rope connectors with built-in vibration-damping design. Installation methods are described.

The Byers Machine Co., Ravenna, Ohio, illustrated catalogs containing the latest specifications of Byers shovels, draglines, clamshells and backhoes.

Black & Decker Mfg. Co., Towson, Md., the third in a series of handbooks, this one devoted to portable electric saws.

Link-Belt Co., Chicago, Ill., a catalog containing complete price and dimensional data of flexible couplings.

Straub Manufacturing Co., Oakland, Calif., a folder describing the Kue-Ken crushing principle.

Broderick & Bascom Rope Co., St. Louis, Mo., the third edition of the Riggers' Handbook covering wire rope slings, fittings, socketing, splicing and engineering data on wire rope uses.

Timber Engineering Co. of California, San Francisco, Calif., a booklet on modern timber highway bridges, illustrating the uses of Teco joint connectors and devoted chiefly to engineering drawings.

B. F. Goodrich Co., Akron, Ohio, a catalog of mechanical rubber goods featuring rubber transmission belting together with instructions, recommendations and data. Also included are hose and fittings and other types of rubber products. A second booklet includes reproductions of a recent series of advertisements devoted to typical examples of Goodrich development in rubber.

R. G. LeTourneau, Inc., Peoria, Ill., two folders illustrating earth moving equipment and its uses, the first folder devoted to governmental projects and the second to general construction.

Bucyrus-Erie Co., South Milwaukee, Wis., a comprehensive bulletin describing the crawler crane method of handling material on all types of work including construction and manufacturing industries.

The Heil Co., Milwaukee, Wis., a specification folder covering the new twin-cable scoop available in capacities from 6 to 24 cu. yd.

Littleford Bros., Cincinnati, Ohio, a folder briefly describing and illustrating the 84-HD kettle with the Double Heat Circulation feature.

Gar Wood Industries, Inc., Detroit, Mich., three bulletins as follows: No. 7 on hydraulic hoists and dump bodies for 1½ and 2-ton trucks; No. 16 on hydraulic hoists and dump bodies made specially for Ford

trucks; and No. 17 on hydraulic hoists and dump bodies made specially for Chevrolet trucks.

Elastic Stop Nut Corp., Union, N. J., a folder explaining the construction and action of Elastic Stop Nuts and a graphic listing of the advantages obtained through their use.

Air Reduction, New York City, an illustrated booklet describing the complete line of Airco electrodes and Wilson electric welding machines. Suggestions as to the use of each type are made, and specification tables are included.

Precision Bearings, Inc., Los Angeles, Calif., the 1940 supplement to Bearing Application Manual No. 5. It brings to date the replacement data covering bearings for passenger cars and trucks, and contains a complete list of bearings used in 1940 passenger cars.

The Kenmar Manufacturing Co., Philadelphia, Pa., a new price list which includes descriptions of each size of caulking gun and illustrates the various types of nozzles available.

Wheelco Instruments Co., Chicago, Ill., a bulletin illustrating and describing the complete line of thermocouples, thermocouple wire, lead wire, insulators and protecting tubes.

Caterpillar Tractor Co., Peoria, Ill., a booklet illustrating a wide variety of applications for 25 and 35-h.p. diesel tractors on construction jobs.

OFFICIAL BIDS

Construction of the Tule Lake Tunnel

UNITED STATES DEPARTMENT OF THE INTERIOR
(Bureau of Reclamation)
Washington, D. C., August 28, 1940

Sealed bids (Specifications No. 933) will be received at the office of the U. S. Bureau of Reclamation, Klamath Falls, Oregon, until 10 a. m., September 27, 1940, and will at that hour be publicly opened for furnishing labor and materials and performing all work for the construction of the Tule Lake tunnel, Modoc division, Klamath Project, Oregon-California. The work is located about 23 miles southeast of Klamath Falls, Oregon. The principal items of work and the estimated quantities involved are as follows: 14,300 cubic yards of excavation in open cut; 10,050 cubic yards of excavation in tunnel; 35 cubic yards of backfill; 25 cubic yards of concrete in portal structures and transitions; 3,100 cubic yards of concrete in tunnel lining; 700 cubic feet of pressure grouting; 65 cubic yards of gravel or spalls outside of plate-steel tunnel-liner plates; furnishing and installing 115,000 pounds of permanent steel tunnel supports; furnishing and erecting 60 M. ft. b. m. of permanent timber in tunnel; furnishing and installing 43,000 pounds of steel tunnel-liner plates; constructing 2,000 linear feet of 6-inch diameter tunnel drain; laying 100 linear feet of 6-inch diameter sewer pipe with cemented joints; placing 3,000 pounds of reinforcement bars; drilling 500 linear feet of grout holes not more than 10 feet deep; and placing 200 pounds of grout pipe and connections. 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. Guarantee will be required with each bid in an amount not less than 10 percent of the amount of the bid. Performance bond will be required in an amount not less than 50 percent of the estimated aggregate payments to be made under the contract. Payment bond will be required in the sum of one-half of the total amount payable by the terms of the contract. Partial payments will be made monthly. The work shall be commenced within thirty (30) calendar days after date of receipt by the contractor of notice to proceed and shall be completed within five hundred (500) calendar days from the date of receipt of such notice. Liquidated damages for delay will be twenty-five dollars ($25) per day. No charge to prospective bidders for copies of the specifications and drawings; to others $1.00 not returnable. For particulars, address the Bureau of Reclamation, Klamath Falls, Oregon; Denver, Colorado, or Washington, D. C.

JOHN C. PAGE, Commissioner.

Slope Protection

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
SANTEE-COOPER PROJECT
Docket No. 4329-P-R

1. TIME AND PLACE OF OPENING BIDS: Sealed proposals for furnishing, processing and placing concrete or rock slope protection on the Pinopolis Dams and Dikes, Santee Dam and other structures will be received by the South Carolina Public Service Authority at the Office of the Engineer, Harza Engineering Company, 27 Cumberland Street, Charleston, South Carolina, until 10:00 a. m., October 8, 1940, at which time all proposals will be taken to the Ballroom of the Francis Marion Hotel where they will be publicly opened and read.

2. PROCUREMENT OF PLANS AND SPECIFICATIONS: Proposals must be submitted on forms furnished by the Authority. These forms along with other contract documents including plans and specifications may be obtained from the office of the Secretary of the Authority, Room 508, Peoples Office Building, Charleston, S. C., upon payment of $10.00 for the first set and $3.00 per set thereafter. **No refund will be made.** These documents may be examined at the offices of the Authority, Columbia, and Charleston, S. C.; at the offices of the Engineer, 27 Cumberland Street, Charleston, S. C., and 205 W. Wacker Drive, Chicago, Illinois; at the offices of the Associated General Contractors, Columbia, S. C., Charlotte, N. C., Raleigh, N. C., Atlanta, Ga., and at the plan room of the F. W. Dodge Company, Atlanta, Ga.

3. DESCRIPTION OF THE WORK: The work will consist of furnishing, processing and placing porous concrete, hand laid paving or dumped riprap upon the dams, dikes and structures of the project, situated in an area from 30 to 60 miles northerly of Charleston, S. C. Access may be had by rail, water or highway to various points in this area.

Rock riprap may be taken from below grade in the Diversion Canal cut joining the Pinopolis and Santee Reservoirs, borrow pits located by the Contractor on property owned by the Authority, outside quarries or any combination of these sources. Bids will be received on alternate schedules including the use of porous concrete in lieu of rock on certain portions of the work.

Bid alternates and approximate quantities are listed below and separate bidding schedules are set up for work in the Santee and Pinopolis Basins.

APPROXIMATE QUANTITIES

Description	Santee (cu. yd.)	Pinopolis (cu. yd.)	Total (cu. yd.)
Alternate 1—			
All dumped rock	390,000	740,000	1,130,000
Alternate 2—			
Hand placed rock	160,000	210,000	370,000
Dumped rock	100,000	290,000	390,000
Alternate 3—			
Porous concrete slab	90,000	120,000	210,000
Dumped rock	60,000	260,000	320,000

4. BIDDER'S BOND: Each bid must be accompanied by a certified check or bidder's bond executed by the bidder and a surety company licensed to do business in South Carolina and countersigned for the Surety by an agent or attorney-in-fact who is a bona fide resident of the State of South Carolina, in the sum of not less than five (5) percent of the amount of the bid. This is required as a guarantee that if the bid is accepted, a contract will be immediately entered into and the performance of it properly secured. The certified check or bond will be returned upon non-acceptance of bid or execution of contract.

5. WITHDRAWAL OF BID: No bid may be withdrawn for a period of thirty (30) days after the date set for the opening of said bid. The Authority reserves the right to reject any or all bids and to waive informalities therein or to accept any bid or combination of bids considered to be most advantageous to the Authority.

6. LICENSES: An Act of the General Assembly of South Carolina approved June 2, 1936, entitled "An Act to Regulate the Practice of General Contracting in South Carolina" provides that general contractors (defined as anyone who, for a fixed price, commission, fee or wage, undertakes to construct or superintend the construction of any building, highway, sewer, grading, or any improvement or structure, where the cost of the undertaking is seven thousand five hundred dollars ($7,500.00) or more) shall file a written application for general contractor's license with the South Carolina Licensing Board for Contractors (Columbia, S. C.), said application to be filed thirty days prior to any regular or special meeting of said Board and to be accompanied by $20.00.

Bidders must satisfy the requirements of the South Carolina State Statutes regarding annual license tax and license tax on each individual contract, as set forth in Section 2543 of the Civil Code of 1932. Bidder's licenses may be obtained from the South Carolina Tax Commission, Columbia, S. C., price $100.00.

Any bidder contemplating construction in the State of South Carolina will be required to show evidence of the issuance of such general contractor's and bidder's licenses before his bid is opened or considered.

7. VIEWING SITE: Prospective bidders will be given assistance in viewing the site of the work upon application to the offices of the Harza Engineering Company, 27 Cumberland Street, Charleston, S. C., and Pinopolis Dam site near Moncks Corner, S. C. Borehole samples and records of the Diversion Canal rock will be available for examination.

By order of the Board of Directors.

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
By TOM B. PEARCE, Chairman.

Attest:
CHARLES H. GERALD, Secretary.

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